Selected Annotated Bibliography on Newborn Health

Evidence-based information for programs in developing countries including public health aspects
BASICS II
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1. Note: Although abstracts are grouped in different sections, there is obviously some overlap between categories. Readers are requested to check other relevant sections as well.
2. Only maternal documents with direct application to newborn health have been included.
3. For TBA training materials, see also section on Capacity Building, including Training Materials.
4. Included articles are primarily relevant to breastfeeding in the newborn and promotion of breastfeeding at the community level - other articles relevant to older children are not included, but may be found in the PAHO Infant Feeding Bibliography. See also the section on Mother to Child Transmission.
Infant mortality in developing countries has decreased significantly during the last two decades. Much of the decrease is due to reductions in mortality in the post-neonatal period, that is, between 4 weeks to 1 year of age. Neonatal mortality has not decreased to the same extent and in some countries has remained relatively static. Currently, about 60% of infant deaths take place within the first month, and of these, about 60% take place within the first week. If the Millennium Development Goals for infant mortality are to be achieved, this brief but critical period of life needs to be addressed.

The leading causes of deaths in older infants and in the newborn period differ. In older infants, over 70% of deaths are due to pneumonia and diarrhea, with malnutrition serving as a major underlying factor. The major causes of death in newborn infants include infections (32%), birth asphyxia (29%), and complications of prematurity (24%) with low birth weight being an underlying factor. Simple, low-cost interventions can prevent many of the problems and deaths in the newborn period.

Neonatal health is closely linked to reproductive health and child survival and development. A significant number of babies in developing countries are born at home. Care-seeking is often limited and inappropriate in the home, resulting in a number of deaths. Therefore, in addition to advocacy for suitable policies, resources, and other systems-strengthening initiatives, community- and family-based interventions including promotion of optimal behaviors should be key components of programs to improve newborn health.

Furthermore, in many developing countries, pre-service education for medical and paramedical staff includes very little if any training related to newborn health. Training in the practical aspects of newborn care is particularly absent. As a result, health workers are ill-equipped to handle even the most basic health issues of the newborn infant. Basic newborn care is a requisite for all babies and requires simple interventions that include a number of behavior change approaches. At the same time, the components of this care should as far as possible be evidence-based.

This document is concerned with aspects of neonatal and maternal health that are likely to have a direct impact on the baby. Although it was prepared for the LAC region, these aspects are relevant to many health facilities and communities in developing countries. This bibliography includes summaries of relevant program experiences and available evidence for some components of newborn care. It includes abstracts of articles from journals, as well as references to some resource materials, tools, and documents published by various organizations.

The abstracts are divided into sections according to the table of contents. Some abstracts are related to more than one topic. For example, some references on cord care are listed not only under the main section on cord care but also under prevention of maternal and neonatal tetanus, and some references on breastfeeding are included under mother-to-child transmission of HIV/AIDS besides the chapter on breastfeeding.

This bibliography is not meant to be an exhaustive review but rather is meant to highlight information of relevance to technical personnel, organizations and stakeholders interested or involved in implementing newborn health interventions at facility and community levels.
Section 1: Background and General Aspects
Background and General Aspects

Dow, U. 1998. Birth Registration: The “first” right. see URL.
Ref Type: Internet Communication

Abstract: A birth certificate is a ticket to citizenship. Without one, an individual does not officially exist and therefore lacks legal access to the privileges and protections of a nation. Civil registration is also the basic tool by which an efficient government counts its citizens and plans the schools, health centres and other services they need. Yet many nations lack effective systems for recording births. Every year, about 40 million babies—one third of all births—go unregistered around the world.

Hidden behind the well-known images of children who have missed out on life’s opportunities for want of adequate care is a huge but silent group of children denied another fundamental right: the right to a name and nationality. These children are denied their birthright by their very invisibility. Lacking birth certificates, they spend their lives on the edges of the ‘official’ world, skirting or falling over obstacles that never arise in the paths of those who had the good fortune to be registered when they were born.

Available at: http://www.unicef.org/pon98/civil1.html


Abstract: OBJECTIVES: To evaluate birthweight-specific neonatal mortality and perinatal interventions in major medical centers in developed and developing countries. METHODS: A survey was developed and electronically mailed to 13 medical centers participating in the Global Network for Perinatal and Reproductive Health (GNPRH). The ability of a center to provide requested data was assessed. The mortality rates and use of specific perinatal interventions in centers in developing countries were compared with developed countries. RESULTS: Nine centers in developing countries responded to the survey, and three centers in developed countries were used for comparison. Data collection was highly variable. Most developing country centers were able to provide data by birthweight but not by gestational age. The differences in mortality rates between developing and developed countries were more pronounced at lower gestational ages and birthweights. A difference was found in perinatal interventions between developing and developed countries. In the former, viability was generally considered 28 weeks, and the gestational age at which cesarean sections were usually performed for the sake of the fetus at preterm gestations varied from 26 to 37 weeks. Most centers did not routinely induce for pPROM; only five out of nine centers used antibiotics to prolong latency. Most centers used tocolysis beginning at 26–28 weeks through 32–37 weeks, and a variety of tocolytic agents were used. Most centers routinely used corticosteroids for preterm infants, and all centers employed repeat weekly steroid dosing if undelivered.

CONCLUSIONS: Despite the fact that the GNPRH centers included in this study represent some
of the best health care available in these countries, they lag far behind centers in developed
countries in neonatal mortality rates and their use of various obstetric practices. Furthermore,
incomplete and inconsistent data collection complicates the evaluation of the factors contributing
to high neonatal mortality rates.

morbidities and the unmet need for health care in rural neonates—a prospective
observational study in Gadchiroli, India,” Indian Pediatr., vol. 38, no. 9, pp. 952–965.

Abstract: BACKGROUND: Majority of the neonates in developing countries are born and cared
for in rural homes but the available information is mostly hospital based. OBJECTIVES: To
estimate: (i) the incidence of various neonatal morbidities and associated case fatality in home-
cared rural neonates, (ii) proportion of neonates with indications for health care, and (iii) the
proportion who actually receive it. DESIGN: Prospective observational study. SETTING: Rural
homes. METHODS: Neonates in 39 study villages in the Gadchiroli district (Maharashtra, India)
were observed during one year (1995–96) by 39 trained female village health workers at birth
and during neonatal period (0–28 days) by making eight home visits. A physician checked the
data and the morbidities were diagnosed by a computer program. Vital statistics in these villages
was independently collected. RESULTS: Out of 1016 live births, 95% occurred at home and 763
(75and%) neonates were observed. The agreement between observations by health workers
and physician was 92%. Total 48.2and neonates suffered high risk morbidities (associated case
fatality >10%), 72.2% suffered low risk morbidities, and 17.9% gained inadequate weight (less
than 300 g). Seventeen percent neonates developed clinical picture suggestive of sepsis.
Though 54.4% neonates had indications for health care and 38 out of total 40 neonatal deaths
occurred in these, only 2.6% received medical attention. The neonatal mortality rate was
52.4/1000 live births. CONCLUSION: Nearly half of the neonates in rural homes developed high
risk morbidities ten times the neonatal morbidity rate and needed health care but practically
none received it. The magnitude of care gap suggests an urgent need for developing home-
based neonatal care to reduce neonatal morbidities and mortality.

438–443.

Abstract: AIMS: To provide a comprehensive description of young infant admissions to a first
referral level health facility in Kenya. These data, currently lacking, are important given present
efforts to standardise their care through the integrated management of childhood illness (IMCI)
and for prioritising both health care provision and disease prevention strategies. METHODS:
Prospective, 18 month observational study in a Kenyan district hospital of all admissions less
than 3 months of age to the paediatric ward. RESULTS: A total of 1080 infants were studied.
Mortality was 18% overall, though in those aged 0–7 days it was 34%. Within two months of
discharge a further 5% of infants aged <60 days on admission had died. Severe infection and
prematurity together accounted for 57% of inpatient deaths in those aged <60 days, while
jaundice and tetanus accounted for another 27%. S pneumoniae, group B streptococcus, E coli,
and Klebsiella spp. were the most common causes of invasive bacterial disease. Hypoxaemia, hypoglycaemia, and an inability to feed were each present in more than 20% of infants aged 0–7 days. Both hypoxaemia and the inability to feed were associated with inpatient death (OR 3.8 (95% CI 2.5 to 5.8) and 7.4 (95% CI 4.8 to 11.2) respectively). CONCLUSIONS: Young infants contribute substantially to paediatric inpatient mortality at the first referral level, highlighting the need both for basic supportive care facilities and improved disease prevention strategies.


Abstract: In 1983, Project HOPE was invited by Zhejiang Medical University to collaborate in developing a neonatal intensive care unit (NICU) at the Children's Hospital in Hangzhou, China. The initial approach involved renovating facilities, purchasing equipment and supplies, placing short-term consultants in the unit as teachers, and bringing selected leaders to the United States for brief fellowships. An evaluation at 18 months disclosed poor organization and leadership, inconsistent clinical care, and unsatisfactory utilization and maintenance of facilities and equipment. Therefore the strategy was revised to include long-term physician and nursing consultants, establishment of ties with HOPE Biomedical Engineering projects, and development of formal education programs. The unit was transferred to the Chinese after 4 years and an evaluation 1 year after transfer revealed an actively functioning independent NICU with evolving effective leadership, established purchasing and preventive maintenance programs, and continuing formal education activities. Unsatisfactory progress was found with the development of a transport system, some laboratory capabilities, adherence to admission and discharge policies, and various other administrative issues. Although the goal of establishing an independent NICU was realized, perhaps the most lasting accomplishment was the establishment of a facility and a format for development of a transportable education program aimed at improving neonatal care practices throughout a larger region of China.

Project HOPE, Millwood, VA


Abstract: One hundred and seventy tribal mothers of Dangaria Kandh Community were interrogated to know their age-old customs and beliefs on neonatal care. The practices were again classified as beneficial, innocuous and harmful. Beneficial practices like robbing in (100%), early breastfeeding (83.44%), acceptance of colostrum (100%) and some manoeuvre on neonatal resuscitative measures (43.53%) were observed in this community. The apparently innocuous practice observed commonly was massaging the neonate with oil. Among the harmful practices diet restriction to nursing mothers (43.53%), delayed and unsterile umbilical cord cutting and tying (100%) were commonest. Their concept on neonatal diseases and its management is discussed. They preferred old lady of family or indigenous dai to conduct delivery unless there is some complication.

Abstract: The perinatal mortality rate is widely used as a summary statistic for evaluating the effectiveness of perinatal care. Since October, 1992, it has been a legal requirement in England and Wales to register fetal deaths at 24–27 completed weeks of gestation as stillbirths (in addition to those after 28 weeks), thereby altering the definition of perinatal death. In a cohort analysis of all babies born to women resident in Wales during 1993, we assessed whether the revised definition of perinatal mortality rate more appropriately measures effectiveness of care. There were 36,793 births and 313 perinatal deaths (221 stillbirths, 92 early neonatal deaths). At 24–27 weeks’ gestation there were 59 (39%) survivors and 93 deaths (52 stillbirths, 36 neonatal deaths [28 early, eight late], and 5 postneonatal deaths). 119 babies had a birthweight below 500 g; one survived and 24 were perinatal deaths. Of the 36 late neonatal deaths all were attributed to perinatally related events. Increased survival of infants at 24–27 weeks’ gestation emphasises the importance of including all these infants in the perinatal mortality rate, but it would be a more useful measure of the effectiveness of perinatal care if it excluded babies below 500 g, and included late neonatal deaths.

Department of Child Health, University of Wales College of Medicine, Cardiff, UK.


Abstract: Of 8.1 million infant deaths in 1993, almost half (3.9 million, 48%) were neonatal deaths. While infant mortality has been decreasing steadily all over the world, changes in neonatal mortality have been much slower. Almost-two thirds (2.8 million) of newborn deaths were within one week of birth, and deaths of many babies after the first week were also due to perinatal causes.

Available at: www.who.int/reproductivehealth/publications/MSM_96_13/MSM_96_13_table_of_contents.en.html


Abstract: Limited resources, widespread poverty, and the absence of health insurance pose daily ethical problems for Third World physicians, who must balance their roles as individual patient advocates against a desire to provide health care to the greatest number of children. Pakistan has a per capita income of Rs. 7,220 (US$380) per year, or Rs. 800 (US$32) per month. The annual population growth of the country is 3.1%, and approximately 360,000 infants are born each year in Karachi, the largest city in the country. The Aga Khan University Hospital, a private teaching institution, is the only hospital in Karachi with a Level III Neonatal Intensive Care Unit (NICU). The financial and medical data of 200 infants admitted to the NICU in 1988 were reviewed retrospectively, and compared with those of two specific subgroups. (1) Among 15 infants who underwent surgical intervention, the average total cost of hospitalization was Rs. 36,040 (US$1,900) per patient, with an average daily cost of Rs. 923 (US$49). The longest hospital stay was 6 months, for a child who had total colonic aganglionosis associated with a short gut syndrome. There were two deaths in this group. (2) Of the 21 premature neonates
admitted having Idiopathic Respiratory Distress Syndrome (IRDS) during this period, the total hospitalization cost per patient was Rs. 23,260 (US$788), with a daily cost of Rs. 1,050 (US$55). Eleven patients required ventilatory support. There were 16 survivors. Among both groups, 6% of all revenues generated in the NICU were used to help families pay for the bills under a welfare scheme.

Department of Surgery, Aga Khan University Hospital, Karachi, Pakistan


Abstract: (Abstract taken from Acknowledgements and Conclusion) This brief is the first in the “Policy Perspectives on Newborn Health” series, produced through collaboration between the Population Reference Bureau and Save the Children’s Saving Newborn Lives initiative. Aimed at government decisionmakers and health care professionals, “Policy Perspectives on Newborn Health” will show how incorporating newborn care into existing safe motherhood and child survival programs can ensure newborn survival, as well as contribute to improving women’s health and the well-being of future generations. Saving Newborn Lives, launched with a generous contribution from the Bill and Melinda Gates Foundation, is a 15-year initiative to improve the health and survival of newborns in the developing world.

Newborns are the most vulnerable members of society. Preventing newborn deaths and improving newborn health and survival go hand in hand with promoting safer motherhood. Decisionmakers can work to ensure healthier futures for mothers and their newborns by supporting programs that provide essential maternal and newborn care, as well as broader policies that enhance women’s health and socioeconomic opportunities during the life cycle. Intervening to make motherhood safer and to protect newborns in their most fragile period is an essential investment in the future.


Abstract: Until recently policy makers and health professionals in developing countries have neglected newborn care, even though 70% of infant deaths occur during the first month of life. The principles of essential newborn care are simple: resuscitation, warmth to avoid hypothermia, early breast-feeding, hygiene, support for the mother-infant relationship, and early treatment for low birth weight or sick infants. Putting these principles into practice does not require expensive high technology equipment.

This important book has been written by experts in newborn care, mostly from developing countries in south Asia. It contains a review of the current health status of mothers and newborn infants in the developing world, the evidence base for cost-effective essential and preventive neonatal interventions in poor communities, ideas for improving service delivery, and the priorities for future action and research.

Contents:
– Current Status of Newborn Infants and Perinatal Health in South Asia
– Social, Economic and Cultural Aspects of Motherhood in South Asia
– Cost-Effective Essential Newborn Care in Poor Communities: The Evidence-Base Improving Health Service Delivery

**Abstract:** An institution-based surveillance and nested case-control study was conducted in Natal, Northeastern Brazil to estimate the level and determinants of early neonatal mortality. The early neonatal mortality rate was 25.5 per 1000 live-birth, 75% of early neonatal deaths were premature low birthweight infants, and the mortality rates were 591 and 318 per 1000 respectively, for preterm small for gestational age (PT-SGA) and preterm appropriate for gestational age (PT-AGA) infants. Mortality was 50 per 1000 for term low birthweight, and 8.6 for term normal birthweight AGA infants. In addition to prematurity and low birthweight, the main risk factors associated with early neonatal death were maternal smoking, complications during pregnancy or intrapartum, and inadequate antenatal care. The associations were weaker for prepregnancy factors such as single marital status or low maternal body weight, and no significant associations were observed with socioeconomic status. These findings suggest that in this population, efforts to reduce early neonatal death should focus on improved maternal care and the prevention of prematurity.

Dept of Population Dynamics, Johns Hopkins School of Hygiene and Public Health, Baltimore, Maryland 21205.


**Abstract:** Some 7 million perinatal deaths occur throughout the world each year, 98% in developing countries. Most of these are preventible. The underlying socio-economic, ethical and medical problems are reviewed in terms of their prevention and the optimal use of scarce resources. In particular, there is an urgent need to control population growth by raising the status of women and providing better and more accessible family planning services. Greater emphasis needs to be given to the development of primary health care in developing countries. In the foreseeable future, community maternal and newborn care is likely to rely on trained traditional birth attendants, with referral medical facilities when required. Breast feeding remains the most important priority in newborn care. Education of parents and young children holds the key to progress.

Department of Perinatal Medicine and Child Health, University of Bristol, UK.

Abstract: Full text available at:
http://www.globalhealth.org/assets/publications/MakingChildbirthSafer.pdf


Abstract: Worldwide, about eight newborn babies die every minute, yet interventions to reduce early neonatal mortality and morbidity are still not given high priority in most developing countries. It is often assumed that neonatal care is too costly for high coverage in poor populations, but in fact many deaths could be prevented or treated with low technology and improved care. There are four principles of basic newborn care: an atraumatic and clean delivery, maintenance of body temperature, initiation of spontaneous respiration and breast feeding shortly after birth. For the majority these could be facilitated at the health centre by nurse midwives or at home by TBAs or family members. Low cost special care for many of the 10%–15% who are sick or pre-term or low birth weight could be provided at district hospitals using appropriate simple technologies.

International Maternal Health, Institute of Child Health, University College London Medical School


Abstract: Singleton survivors born to multigravidae in the whole island of Jamaica in 2 months (September–October 1986) were compared with singleton perinatal deaths occurring to multigravidae throughout the island in the 12-month period September 1986 to August 1987. Past obstetric history was obtained from the mothers using a structured questionnaire. Deaths were categorised using the Wigglesworth classification. Logistic regression was used to compare current outcomes in women who had had at least one previous pregnancy. Antepartum fetal deaths with (1) outcome of last pregnancy; (2) previous Caesarean section; (3) previous stillbirth; and (4) increasing gravidity. In the presence of these factors maternal age ceased to be statistically significant. Deaths from immaturity were strongly associated with the past obstetric history, with increased risks for pregnancies to mothers with a history of previous miscarriage, perinatal death and premature live births. In general, however, the higher the gravidity the lower the risk. In the presence of these factors, maternal age showed no significant association. Intrapartum asphyxia was also associated with the outcome of the last pregnancy, history of prior stillbirth or neonatal death. First pregnancies were at significantly higher risk than second pregnancies (P < 0.05). For perinatal deaths as a whole, and in the presence of maternal age, the following were statistically significant independent factors: (1) the outcome of the immediately preceding pregnancy (high risks associated with prior miscarriage, stillbirth and premature live births); (2) previous Caesarean section (increased risk); (3) previous perinatal deaths; and (4) more than one prior early fetal loss. The results indicated that prior poor
obstetric history bears similar risks of subsequent adverse outcome in the developing as in the
developed world. There was no variation in risk, however, with interpregnancy interval or
previous termination. Much of the variation in risk of perinatal death with maternal age among
multigravidae appears largely to be secondary to past obstetric history.

Institute of Child Health, University of Bristol, UK.


Abstract: Perinatal mortality rates in Iraq have been extremely high during the last 10 years,
although detailed data are not available due to inadequate collection of health information during
the Gulf conflict and the period of sanction which has continued since August 1990 until the
present. The average perinatal mortality rate for Iraq was estimated to be 28 per 1000 live births
during the period 1980–90 (the period before sanctions). This rate is similar to the rate in other
countries in the region in the same period. The average perinatal mortality rate during the period
1990–1999 is estimated to be 107 per 1000 live births, which is quite high. The important
causes of neonatal death are low birth weight, perinatal infections and birth asphyxia due to fetal
hypoxia. Many of these deaths can be avoided with simple, practical and affordable
interventions, such as a reduction in deaths due to infections by early and exclusive breast
feeding, screening and management of communicable diseases, by use of tetanus toxoid and
good cord care, and improvement of antenatal care by rebuilding new primary health centers, by
the introduction of new equipment for diagnosis and management of birth problems, especially
infectious diseases, by the improvement of survival rates of low-birth-weight infants, by a
reduction of birth asphyxia with trained birth attendants to monitor labor and to resuscitate
infants.

Hyg., vol. 87, no. 1, pp. 1–2.

Abstract: In developing countries, child mortality declined during the 1980s, but neonatal
mortality did not improve. Ministries of Health do not consider reduction of early neonatal
mortality to be a priority. Underreporting of perinatal deaths is common (e.g., at least 40% of
perinatal deaths). Researchers sometimes categorize perinatal deaths as other causes of infant
mortality. Many people believe too technological or costly interventions are needed to reduce
perinatal mortality, but simple, low-cost principles of newborn care do exist: keep the newborn
warm, feed often, avoid infection, and keep the newborn close to the mother. A study in
Zimbabwe shows that asphyxia, a preventable condition, occurred in 76% of cases. Prenatal
care; education; improved treatment of syphilis, hypertension, diabetes, and amniotic fluid
infection; closer monitoring of the fetal condition during labor; and proper management of
abnormal labor would reduce perinatal deaths. Premature infants are at greater risk of death
than are intrauterine growth retarded infants. Research is needed to learn more about the
epidemiology, causes, and sequelae of asphyxia as well as the most cost-effective
interventions. 38% of newborns at a hospital in Kathmandu had mild or moderate hypoglycemia,
44% of whom experienced at least 3 hypoglycemic episodes in the first 2 days. Known
hypoglycemic risk factors are low birth weight and hypothermia. Possible hypoglycemic risk
Factors are prelactal feeds and a delay in beginning breast feeding. Effective perinatal health care in developing countries requires a tired system of referral and a motivated community health worker trained to manage safe delivery and newborn care. Unfriendly staff and user charges are obstacles to primary perinatal health care, however. UNICEF’s Baby Friendly Hospital initiative aims to stop distribution of free infant formula in maternity wards and to improve perinatal care.


**Abstract:** According to the World Health Organization (1996a), an estimated eight million perinatal deaths occur globally each year. Like other health indicators, perinatal mortality disproportionately affects developing societies, where approximately 98% of all perinatal deaths occur. Despite its pervasiveness, reductions in perinatal mortality have been mediocre in comparison to the gains made in post-neonatal and early childhood mortality. In addition, many questions regarding appropriate methods of collecting perinatal mortality data remain unanswered.

This document provides a comprehensive review of the current state of knowledge on perinatal mortality in the developing world. It presents information and data on causes, correlates and interventions, and it identifies research gaps in the current perinatal mortality literature. Case studies from countries such as Mexico, Zambia, India, Mozambique and Thailand illustrate relationships between selected factors and perinatal mortality, and they highlight methodological issues relevant to community-based assessment of perinatal mortality.


**Abstract:** 1996—WHO/FRH/MSM/96.7

Brings together, in a standard format, data on perinatal and neonatal mortality worldwide. The listings consist of data collected form a variety of sources, including health service reporting and surveys. Regional and global estimates have been derived from the data listings. A full description of materials and methods are included.

Available at: http://www.who.int/reproductive-health/publications/Abstracts/perinatal_mortality_listing_available_information.html


**Abstract:** Lower perinatal and neonatal mortality have been achieved in the developed countries following advancement of neonatal care, introduction of high technologies, and better knowledge of pathophysiology of the newborn infants. Other contributing factors are organised delivery room care with skillful resuscitative techniques as well as risk identification and efficient transport of the sick infants including in utero transfer of the fetus, etc. It cannot be assumed that similar results can be attained in developing countries where financial and human resources are
the problems. With limited resources, it is necessary to prioritize neonatal care in the developing countries. It is essential to collect minimum meaningful perinatal data to define the problems of each individual country. This is crucial for monitoring, auditing, evaluation, and planning of perinatal health care of the country. The definition and terminology in perinatology should also be uniform and standardised for comparative studies. Paediatricians should be well trained in resuscitation and stabilisation of the newborn infants. Resuscitation should begin in the delivery room and a resuscitation team should be formed. This is the best way to curtail complication and morbidity of asphyxiated births. Nosocomial infections have been the leading cause of neonatal deaths. It is of paramount importance to prevent infections in the nursery. Staff working in the nursery should pay attention to usage of sterilised equipment, isolation of infected babies and aseptic procedures. Paediatricians should avoid indiscriminate use of antibiotics. Most important of all, hand-washing before examination of the baby is mandatory and should be strictly adhered to. Other simpler measures include warming devices for maintenance of body temperature of the newborn babies, blood glucose monitoring, and antenatal steroid for mothers in premature labour. In countries where neonatal jaundice is prevalent, effective management to prevent kernicterus is essential. Simple assisted ventilatory device such as nasal continuous positive airway pressure (nCPAP) is also useful.

Department of Neonatology 1 Kandang Kerbau Hospital, Singapore.


Abstract: OBJECTIVE: To assess maternal and neonatal health services in 49 developing countries. METHODS: The services were rated on a scale of 0 to 100 by 10–25 experts in each country. The ratings covered emergency and routine services, including family planning, at health centres and district hospitals, access to these services for both rural and urban women, the likelihood that women would receive particular forms of antenatal and delivery care, and supporting elements of programmes such as policy, resources, monitoring, health promotion and training. FINDINGS: The average rating was only 56, but countries varied widely, especially in access to services in rural areas. Comparatively good ratings were reported for immunization services, aspects of antenatal care and counselling on breast feeding. Ratings were particularly weak for emergency obstetric care in rural areas, safe abortion and HIV counselling. CONCLUSION: Maternal health programme effort in developing countries is seriously deficient, particularly in rural areas. Rural women are disadvantaged in many respects, but especially regarding the treatment of emergency obstetric conditions. Both rural and urban women receive inadequate HIV counselling and testing and have quite limited access to safe abortion. Improving services requires moving beyond policy reform to strengthening implementation of services and to better staff training and health promotion. Increased financing is only part of the solution.

**Ref Type:** Internet Communication.

**Abstract:** The World Health Organization estimates that more than nine million infants die before birth or in the first few weeks of life each year, and that nearly all of these deaths occur in developing countries. Most of these deaths are caused by infectious diseases; pregnancy-related complications such as placent previa and abruptio placentae; delivery-related complications, including intrapartum asphyxia, birth trauma, and premature birth. Sadly, very few programs currently exist to specifically target perinatal and neonatal mortality. However, a cost-effective, and efficient way to introduce interventions would be to make additions to already existing programs.


**Abstract:** Effective reduction of perinatal and maternal mortality remains a major global challenge. The main causes of neonatal deaths are asphyxia, birth trauma, infection, prematurity, and malformation. However, there are several simple and noncostly measures that can avoid these problems. These are: 1) syphilis screening programs; 2) tetanus toxoid vaccination; 3) immunizing women twice during their pregnancy; 4) nutritional supplementation; and 5) prevention and treatment of severe anemia. Yet, the most important intervention that is both relatively simple and cost-effective can be implemented during pregnancy. On the other hand, reducing maternal mortality poses as a much bigger challenge. The primary concern in preventing mortality lies in avoiding pregnancy, evading the complications during pregnancy, or by controlling the complications if ever they arise. Furthermore, the WHO stated that the presence of a skilled attendant at birth is one of the most effective interventions in reducing maternal mortality. In general, perinatal and maternal mortality reduction requires long-term efforts and strengthening of the health care systems.

*Department of Reproductive Health and Research, World Health Organisation, Geneva, Switzerland*


**Abstract:** The perinatal mortality rate (PNMR) is a key health status indicator. It is multifactorial in etiology and is significantly influenced by the quality of health care. While there is an ethical imperative to act to improve quality of care when deficiencies are apparent, the lack of controls—when an interventions is applied to an entire service—makes it difficult to infer a causal relationship between the intervention and any subsequent change in PNMR. However, by specifically measuring avoidable perinatal deaths (those due to error or omission on the part of the health service), this limitation is partially overcome, and the impact of the intervention can be more rigorously evaluated. This paper reports the impact of perinatal audit in a rural African health district between 1991 and 1995. A total of 21,112 consecutive births were studied: the
average number of deliveries increased by 31% from 325 to 424 per month. The PNMR (birth weight \( \geq 1000g \)) in 1991 was 27/1000, increased to 42/1000 in 1992, and fell steadily to 26/1000 in 1995 (40% reduction; \( p=0.002 \)). The proportion of avoidable deaths fell from 19% in 1991 to zero in the second half of 1995 (\( p=0.0008 \)). While factors associated with perinatal mortality are many, complex, and interrelated, this report suggests that mortality can be reduced significantly in resource-poor settings by improving quality of health care. Including the measurement of avoidable deaths in perinatal audit allows the impact of interventions to be more rigorously assessed than by simple measuring the PNMR.

Centre for Epidemiological Research in South Africa, Medical Research Council.


Abstract: OBJECTIVES: To study reproductive pattern and perinatal mortality in rural Tamil Nadu, South India. DESIGN: Community based, cross sectional questionnaire study of 30 randomly selected areas served by health subcentres. SETTING: Rural parts of Salem District, Tamil Nadu, South India. SUBJECTS: 1321 women and their offspring delivered in the 6 months before the interview. MAIN OUTCOME MEASURES: Number of pregnancies, pregnancy outcome, spacing of pregnancies, sex of offspring, perinatal and neonatal mortality rates. RESULTS: 41% of the women (535) were primiparous; 7 women (0.5%) were grand multiparous (> 6 births). The women had a mean age of 22 years and a mean of 2.3 pregnancies and 1.8 live children. The sex ratio at birth of the index children was 107 boys per 100 girls. The stillbirth rate was 13.5/1000 births, the neonatal mortality rate was 35.3/1000, and the perinatal mortality rate was 42.0/1000. Girls had an excess neonatal mortality (rate ratio 3.42%; 95% confidence interval 1.68 to 6.98; this was most pronounced among girls born to multiparous women with no living sons (rate ratio 15.48 (2.04 to 177.73) v 1.87 (0.63 to 5.58) in multiparous women with at least one son alive). CONCLUSIONS: In this rural part of Tamil Nadu, women had a controlled reproductive pattern. The excess neonatal mortality among girls constitutes about one third of the perinatal mortality rate. It seems to be linked to a preference for sons and should therefore be addressed through a holistic societal approach rather than through specific healthcare measures.

Department of Obstetrics and Gynaecology, Aarhus University Hospital, Denmark.


Abstract: available from: info@ngonetworks.org / www.ngonetworks.org

**Abstract:** Peri-neonatal mortality is a serious health problem in Guatemala, especially in rural areas where most deliveries occur at home and are overseen by traditional birth attendants (TBAs) who function in the role of midwives. The three aims of the work reported here were to identify important predictors of peri-neonatal mortality within a rural area of Guatemala; to assess the effects of traditional and modern health care providers on such mortality; and to find ways of identifying high-risk women who might benefit from transfer to a hospital or clinic. For these purposes a case-control study was conducted of 120 women in the rural department of Quetzaltenango who had lost their babies from the 20th week of pregnancy through the 28th day of life. These women and 120 controls were interviewed in their homes by trained physicians, using questionnaires in Spanish or the appropriate Indian dialect, and the results were analyzed through a series of statistical tests. It was found that the complications of pregnancy and delivery with the greatest statistical significance were prematurity, malpresentation, and prolonged labor. Population-based attributable risks of these complications demonstrated that they accounted for significant proportions of the observed peri-neonatal mortality. While these conditions cannot be eliminated, within the rural Guatemalan context it appears that early referral of women with these complications to more specialized care settings could result in improved delivery outcomes.

*Institute of Nutrition of Central America and Panama, Guatemala City, Guatemala.*


**Abstract:** This editorial introduces an issue of the International Journal of Gynecology and Obstetrics that publishes the proceedings of the International Association for Maternal and Neonatal Health’s (IAMANEH) 1997 conference. The editorial opens by describing IAMANEH as a non-profit nongovernmental organization (NGO) created in 1977 to improve maternal and neonatal health worldwide. IAMANEH is a federation of approximately 36 national societies and is different from other international associations in this area because it clearly prioritizes developing countries and is based in NGOs. IAMANEH conferences are distinguished by the fact that they are organized to draw attention to a specific theme; for 1997, this was the social, cultural, and technological determinants of maternal and neonatal health. The proceedings of this conference deal with the maternal/neonatal health determinants of violence, the appropriate use of technology, abortion, adolescence, sexually transmitted diseases, HIV/AIDS, the role of midwives, and the role of traditional birth attendants.

**Abstract:** A new index is presented that measures the effort levels of national programmes to reduce maternal and neonatal mortality. These indices come from a questionnaire instrument composed of 14 major headings and 81 items. Forty-nine countries including most of the population in each geographical region are covered. Data were collected from 10 to 25 raters in each country, who rated the 81 items for both the current year and 3 years ago, using a 0–5 scale running from no adequacy to full adequacy. The raters were drawn from a variety of positions and backgrounds, and were identified by a consultant retained in each country for that purpose. On average, country programmes score at about half of the maximum score, but this varies considerably across the 14 components of effort, from very low scores for access to treatment by rural women, to high scores for neonatal care. Regional averages are not far apart for the overall score, although South Asia scores are especially low and East Asia's are especially high. To a considerable extent regions agree in the relative stress they give to each of the 14 components. Over the 3-year period, average scores rose by about 10%. When countries are divided into three groups by their maternal mortality levels, most of the 14 components distinguish the high from the medium mortality countries; and about half of the components distinguish the medium from the low mortality countries. This new Maternal and Neonatal Programme Effort Index (MNPI) appears to yield useful measures for various dimensions of programme effort, and it relates sensibly to the output measure of maternal mortality, at least as it is currently measured.

*The Futures Group International, Glastonbury, CT 06033, USA. J.Ross@tfgi.com*


**Abstract:** In the State of the World’s Newborns, we review the most recent data on the newborn, revealing the alarmingly poor health and quality of health care for mothers and newborns in virtually all impoverished countries. While there has been a dramatic reduction in under-five mortality in the past two decades, there has been relatively little change in newborn mortality, even though proven, cost-effective solutions exist to save many of these young lives. Indeed, newborn deaths now constitute over 40 percent of all deaths to children under age five. Until recently, policymakers and program planners focused relatively little attention on this age group, concentrating instead on interventions that primarily benefit infants over one month of age. We now recognize, however, that additional gains in child survival will depend in large measure on saving newborn lives.


Abstract: Population-based surveys were conducted in selected clusters of Pakistan’s least developed provinces, Balochistan and North-West Frontier Province (NWFP), including the Federally Administered Tribal Areas (FATA), to assess levels and causes of neonatal and postneonatal mortality. Interviews were conducted in a total of 54,834 households: Balochistan, 20,486; NWFP, 26,175; and FATA, 8,173. Trained interviewers administered questionnaires after obtaining verbal informed consent from the respondents. Verbal autopsy interviews were conducted for infant deaths reported for the previous year. The infant mortality rate based on combined data from the different sites was 99.7 per 1000 live births (range 129.0-70.1). The contribution of neonatal deaths to all infant deaths was much higher for NWFP (67.2%), where the overall rate was the lowest, than for Balochistan (50.8%) and FATA (56.8%). Around 70% of all neonatal deaths occurred in the early neonatal period. The three main clinical causes of infant deaths were diarrhoea syndrome (21.6%), tetanus (11.7%) and acute respiratory infections (11.6%). In the neonatal period, however, tetanus (18.3%), small size for gestational age or low birth weight (15.3%), and birth injury (12.0%) accounted for nearly half (45.6%) of all deaths, while the contributions of diarrhoea syndrome (5.1%) and acute respiratory infections (6.0%) were less significant (11.1%). Tetanus was the cause of death for 21.7% and 17.1% of all infant deaths in FATA and NWFP respectively. The results suggest that there should be a shift in child survival programmes to give greater emphasis to maternal and neonatal health, in particular to maternal tetanus immunization, safe delivery and cord care.


Abstract: While changes in perinatal care are occurring in all countries of the region, the need to reinforce perinatal care in CCEE/NIS is particularly evident. For this, specific strategies and tools must be developed. Consequently, WHO/EURO, in close collaboration with the Veneto Region of Italy, organized a workshop to examine the available material, to identify the gaps, and to establish terms of reference for a Task Force.
Section 2:
Selected Maternal Health Aspects with Direct Impact on Newborn Health including Antenatal Care and Prevention of Low Birth Weight
General Aspects


Abstract: Worldwide, about 500,000 women and girls die of complications related to pregnancy and childbirth each year; and over 99 percent of these deaths occur in developing countries. The tragedy—and opportunity—is that most maternal deaths could be prevented with cost-effective health care services. Facing a range of competing priorities and limited resources, policymakers and program planners are in need of concise information on programs that are both effective and feasible.

The POLICY Project is pleased to have the opportunity to make a significant contribution to the maternal health field with the launch of a new resource that documents safe motherhood interventions that work. This publication—the first in a series entitled “What Works: A Policy and Program Guide to the Evidence on Family Planning, Safe Motherhood, and STI/HIV/AIDS Interventions”—presents a comprehensive review of the interventions (with supporting evidence) that have been shown to enhance maternal health in developing countries.

Importantly, this document helps public health officials and decision makers answer the question “What should we do?” when trying to figure out how to improve maternal health. It is also a tool to help maternal health advocates demonstrate that safe motherhood programs save lives, benefit societies and communities, and are effective and feasible, even in resource-constrained settings.

The Safe Motherhood Module brings together the best available evidence on a range of interventions and packages it in one convenient source, covering topics such as Labor and Delivery, Postnatal Care, Care During Pregnancy, Pre-pregnancy Care, and Policy and Program Issues. It also provides guidance on programs that have not been shown to work, programs that should be avoided, and programs for which more evidence is needed. Additional sections provide a summary of safe motherhood interventions and present resources for program designers.

The Safe Motherhood Module has been reviewed by some of the world’s leading maternal health experts, including those from the United Nations Population Fund (UNFPA), World Health Organization (WHO), International Center for Research on Women (ICRW), JHPIEGO, Pan American Health Organization (PAHO), U.S. Agency for International Development (USAID), and others. Forthcoming modules in the series will focus on addressing STIs/HIV/AIDS and reducing unintended pregnancies.


Abstract: These clinical trial results are the first, to our knowledge, from a prospective, randomized, and controlled experiment demonstrating that a reduction of smoking during pregnancy improves the birth weight of the infant. Nine hundred thirty-five pregnant smokers were randomly assigned to treatment and control groups; the former received smoking intervention. At the eighth month of pregnancy, differences between the two groups in salivary thiocyanate level and reported smoking were statistically significant. For single, live births, the treatment group infants had a mean birth weight that was 92 g heavier and were 0.6 cm greater in length than the control group infants. The decrement in weight related to smoking cannot be fully explained by gestational age. The findings suggest that some fetal growth retardation can be overcome by the provision of antismoking assistance to pregnant women.


Abstract: A framework for a new approach to antenatal care (ANC) is presented to improve maternal health. Based on evaluations of ANC, safe motherhood programs, gender and social theory, it suggests that managers should draw upon existing family and community support systems, and develop partnerships beyond the health service. Policy and program changes are required in: professional mandates for ANC providers, organization of ANC services, service protocols, training programs, policy towards TBAs, referral care, and service support systems.


Abstract: Development of antenatal care from the beginning of the 20th century and its relation to perinatal mortality in developed countries is presented. The role of socioeconomic factors, new diagnostic and therapeutic procedures, extended indications for cesarean section and of neonatal intensive care is also stressed. In the West- and Middle-European countries by the introduction of antenatal care the perinatal mortality (PNM) rate decreased from about 60.0@1000 in the years 1920–1930 to about 40.0@1000 in 1950s. Further decrease to about 25.0@1000 in the 1970s was conditioned by an increase of number of antenatal visits and by extended indications for cesarean section. New technologies (amnioscopy, pH.metry, cardiotocography and ultrasound examinations) decreased the PNM rate to about 13.0@1000 in the year 1980. Regional organization with neonatal intensive care units decreased PNM rate to low values of 5.0–9.0@1000. The echo of the number of antenatal visits to PNM rate is illustrated on 36,855 deliveries at the University Clinic in Zagreb. In developing countries maternal and perinatal mortality is very high. The reason for that is a bad socioeconomic background and a lack of organized antenatal and perinatal health care system. The policy to decrease maternal and perinatal mortality is presented: the improvement of antenatal booking and of the number of prenatal visits of pregnant women; their childbearing under professional assistance. The organizing of maternity health care should be different from country to country, from region to region, respectively.

Abstract: 1994—WHO/FRH/MSM/96.8

This report focuses attention on drawing up recommendations on antenatal care and outlining the tasks and procedures health workers are expected to perform at different levels of the health care system. It also examines how to optimize antenatal care in terms of clinical tasks and procedures in relationship to the timing of the visits, distance to referral centres, and frequency of attendance.

Available at:


Abstract: OBJECTIVES: This article explores whether the impact of social and demographic risk factors for preterm birth differs for small for gestational age preterm births versus other preterm births. STUDY DESIGN: This was a European case control study of the determinants of preterm birth (4700 cases and 6460 controls). Small for gestational age and non-small for gestational age preterm births were compared with a control group of term births; relationships were explored further by stratifying preterm births into subgroups by mode of onset, the presence of hypertension, and gestational age. RESULTS: Of the social and demographic risk factors for preterm birth identified in this sample, high maternal age, smoking, and low and high maternal body mass index have a stronger effect on small for gestational age preterm births. In contrast, obstetric history, maternal education, and marital status have similar effects regardless of birth weight. Hypertension during pregnancy is strongly associated with small for gestational age preterm birth and contributes to an explanation of observed differences. CONCLUSIONS: These results underline the importance of considering fetal growth restriction in the analysis of risk factors for preterm birth.


Abstract: BACKGROUND: This study assessed women and providers’ satisfaction with a new evidence-based antenatal care (ANC) model within the WHO randomized trial conducted in four developing countries. The WHO study was a randomized controlled trial that compared a new ANC model with the standard type offered in each country. The new model of ANC emphasized actions known to be effective in improving maternal or neonatal health, excluded other interventions that have not proved to be beneficial, and improved the information component, especially alerting pregnant women to potential health problems and instructing them on appropriate responses. These activities were distributed within four antenatal care visits for women that did not need any further assessment. Methods Satisfaction was measured through
a standardized questionnaire administered to a random sample of 1,600 pregnant women and another to all antenatal care providers. RESULTS: Most women in both arms expressed satisfaction with ANC. More women in the intervention arm were satisfied with information on labor, delivery, family planning, pregnancy complications and emergency procedures. More providers in the experimental clinics were worried about visit spacing, but more satisfied with the time spent and information provided. CONCLUSION: Women and providers accepted the new ANC model generally. The safety of fewer visits for women without complications with longer spacing would have to be reinforced, if such model is to be introduced into routine practice.

MotherCare/John Snow, Inc. 1994. Assessing Maternal and Peri/Neonatal Health: Tools and Methods, the MotherCare Experience.


This paper contains a set of rapid assessment tools to analyse existing maternal and peri/neonatal health status at both the national and community levels. Each tool covers both qualitative and quantitative indicators, and all have been used in the first phase of the MotherCare Project. The first country-level tool is designed to assess safe motherhood in general by gathering data on health policies and coverage of services, key population and fertility factors, rates of maternal mortality and morbidity, and women's social and economic status. The second country-level tool, which can also be used at the community level, contains a set of specific questions to determine the status of maternal and perinatal health. Community-level assessment tools focus on measuring maternal and peri/neonatal health status through methods that include case reviews, surveys, and participatory group assessment. Each tool includes suggestions for its use, along with advice on gathering or estimating data that may be hard to find (e.g., national rates of maternal mortality.)

ORDERING INFORMATION: Document can be ordered free of charge, with a limit of 15 copies, via mail or email to:

John Snow, Inc./MotherCare
1616 North Fort Myer Drive 11th Floor
Arlington, VA 22209, USA
E-mail: mothercare_project@jsi.com
Include name, organization, and mailing address (including country) in your correspondence.


This guide contains a set of tools to help researchers conduct community assessments that identify the key barriers to maternal and infant health and survival. It also aims to help programme managers use the research findings to develop safe motherhood interventions. Written for those with experience with qualitative research methods and an understanding of behaviour change programmes, the guide does not prescribe a research plan. Instead, it outlines the essential components for research design and data collection. Information is
presented under clear sub-headings with key points boxed, including examples from MotherCare in-country research experiences. The guide reviews the major causes of maternal and infant mortality, defines a pathway of needed actions for maternal survival, and details the steps required when planning a community assessment. It then provides a set of short, user-friendly modules that guide researchers in determining and operationalising their questions and selecting research methodologies; module topics include prevention issues and normal care of mothers and infants, community responses to complications, and communication. Two final chapters describe how to analyse data collected, and how to turn the findings into policy action. An appendix lists publications and Internet resources for quantitative and qualitative research.

ORDERING INFORMATION: Document can be found online at:
http://www.jsi.com/intl/mothercare/home.htm

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Arlington, VA 22209, USA
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Single copies of documents are provided free of charge. Multiple copies may require a charge.


Abstract: A cross-sectional study was conducted from September to March 1993 at maternity ward of Jimma Hospital to assess the pattern and determinants of birth interval and the role of contraceptive in influencing the length of birth interval. The information was collected by use of pre-tested questionnaire from 415 mothers by three midwives trained for this purpose. The variables examined were: information on parity, use of contraceptive methods during the preceding birth intervals, breast feeding and some demographic variables such as age, marital status, education. Pregnancy outcome variables such as, live births, stillbirths, abortion and infant deaths. Slightly over seventy five per cent of the study subjects were aged 20–29 years, 59% and 27% were para 2–3 and 4–5 respectively. In more than 81% of the subjects, the birth interval was less than three years with a mean birth interval of 22.1 months. Approximately two per cent used contraceptive when the birth interval was 12 months and less. Stillbirth and early neonatal deaths accounted for 3.2% and 6.9% respectively. Based on the findings, we underscore the importance of birth spacing using the available family planning methods to promote safe motherhood and achieve better child survival.

Department of Obstetrics and Gynaecology, Jimma Institute of Health Sciences, Ethiopia.

**Abstract:** The birth weights of newborns routinely subjected to diagnostic ultrasound antenatally are compared with the birth weights of infants delivered by the same physician over a similar span of time seven years earlier, when diagnostic ultrasound was not available. They are also compared with the birth weights of infants delivered by a physician in the same rural community who requested diagnostic ultrasound for less than 10 per cent of his pregnant patients. There is no apparent difference between the average weights of the infants subjected to diagnostic ultrasound and those who were not.


**Abstract:** The MotherCare Project has as its goal the reduction of maternal and neonatal mortality and related morbidities, and the promotion of the health of women and newborns. To achieve these goals, maternal and family planning programs were strengthened in both rural and urban settings through three intervention strategies—policy reform, affecting behaviors and improving services. The fundamental premise in each project was to strengthen the weakest part of the maternity care pyramid, ensuring linkages among all levels of service—from community through to the referral hospital level. In rural Andean populations of Bolivia, knowledge of danger signs and women’s response to them improved, increasing in use of prenatal and family planning services through a participatory problem-solving and community-based strategy. In West Java, Indonesia, bringing professional midwifery services and facilities closer to women together has resulted in a positive response to their use. Augmenting this intervention with a transport and intercommunication system together with improved hospital practice through perinatal mortality meetings and in-service training for doctors and midwives has reduced the maternal and perinatal mortality over a four year period. Hospital practice has improved in Uganda and in two states of Nigeria, maternal mortality and morbidity have been reduced in the training facility where seminars for physicians, training of midwives in life saving midwifery and interpersonal communication skills have taken place, and equipment and supplies have been improved. Furthermore, in rural Guatemala, implementation of norms and protocols, expert supervision and sensitization of hospital staff to the needs of the community has increased referral by traditional birth attendants (TBAs) to the hospital and reduced perinatal mortality.


**Abstract:** All women are entitled to receive basic maternity care during pregnancy and delivery. This includes quality antenatal care, a clean and safe delivery regardless of site, and postpartum care for mother and infant. This document presents global data on maternity care coverage (antenatal care coverage, deliveries attended by skilled personnel, deliveries in health facilities, and postpartum care coverage). The statistics used in the preparation of this report were derived from the World Health Organization/Safe Motherhood Initiative database. The data indicate that,
in developing countries, only two-thirds of pregnant women receive any antenatal care, under 55% of deliveries are attended by skilled personnel, and only 40% of deliveries take place in health facilities. 90-100 million women do not receive any postpartum care. The lowest coverage rates are reported from South Central Asia and Western and Eastern Africa.


Abstract: 43 determinants of low birth weight were analyzed from 895 published papers in the English and French literature from 1970-1984. The assessment was limited to singleton births of women living at sea level with no chronic illness; rare factors and complications of pregnancy were excluded. The 43 factors were categorized as genetic and constitutional, demographic and psychosocial, obstetric, nutritional, maternal morbidity during pregnancy, toxic exposure and antenatal care. The existence and magnitude of a causal effect on birth weight, gestational age, prematurity and intrauterine growth retardation were determined by a set of methodological standards. In developed countries, the most important factor was cigarette smoking, followed by nutrition and pre-pregnancy weight. In developing countries the major determinants were racial origin, nutrition, low pre-pregnancy weight, short maternal stature, and malaria. Pre-pregnancy weight, prior premature birth or miscarriage, diethylstilbestrol exposure and smoking were major determinants of gestational duration, but the majority of prematurity was unexplained in both developed and developing countries. There is a need for future research on the effect of maternal work, prenatal care, and certain vitamin and mineral deficiencies on intrauterine growth, and the effect of genital tract infection, prenatal care, maternal employment, stress and anxiety on prematurity.


Abstract: This paper investigates whether children later reported as having been unwanted or mistimed at conception will, when compared with children reported as wanted, show adverse effects when the following criteria are applied: receipt of antenatal care before the sixth month of gestation, supervised delivery, full vaccination of the child, and child growth (stunting). The study uses data from five recent Demographic and Health Survey enquiries in Bolivia, Egypt, Kenya, Peru, and the Philippines. In Peru, children unwanted at conception were found to have significantly worse outcomes than other children, but in the other countries, a systematic effect was found only for receipt of antenatal care. Weak measurement of the complex concept of wantedness may have contributed to these results. Birth order of the child, with which wantedness is inextricably linked, has more powerful and pervasive effects, with first-born and second-born children being much less likely to show adverse effects.

Abstract: Evidence to support that antenatal screenings and interventions are effective in reducing maternal mortality has been scanty and studies have presented contradictory findings. In addition, antenatal care utilization is poorly characterized in studies. As an exposure under investigation, antenatal care should be well defined. However, measures typically only account for the frequency and timing of visits and not for care content. We introduce a new measure for antenatal care utilization, comprised of 20 input components covering care content and visit frequency. Weights for each component reflect its relative importance to better maternal and child health, and were derived from a survey of international researchers. This composite measure for antenatal care utilization was studied in a probability sample of 300 low to middle income women who had given birth within the last three years in Varanasi, Uttar Pradesh, India. Results showed that demarcating women’s antenatal care status based on a simple indicator—two or more visits versus less—masked a large amount of variation in care received. Logistic regression analyses were conducted to examine the effect of antenatal care utilization on the likelihood of using safe delivery care, a factor known to decrease maternal mortality. After controlling for relevant socio-demographic and maternity history factors, women with a relatively high level of care (at the 75th percentile of the score) had an estimated odds of using trained assistance at delivery that was almost four times higher than women with a low level of care (at the 25th percentile of the score) (OR = 3.97, 95% CI = 1.96, 8.10). Similar results were obtained for women delivering in a health facility versus at home. This strong positive association between level of care obtained during pregnancy and the use of safe delivery care may help explain why antenatal care could also be associated with reduced maternal mortality.


Abstract: The effects of anti-smoking health education during pregnancy on smoking behaviour and the subsequent infant’s size at birth were investigated in a controlled trial. It was found that the planned educational intervention was incompletely carried out and was given more effectively to primigravidae in whom subsequent reduction of smoking was more evident. The effects of educative intervention on size at birth were therefore analysed for first and later pregnancies separately. The differences in birthweight and length between the intervention and control groups were concentrated almost entirely among the first born infants who were 68 g heavier and 0.75 cm longer in the intervention group than the first born infants in the control group.

**Abstract:** BACKGROUND: A short interval between pregnancies has been associated with adverse perinatal outcomes. Whether that association is due to confounding by other risk factors, such as maternal age, socioeconomic status, and reproductive history, is unknown. METHODS: We evaluated the interpregnancy interval in relation to low birth weight, preterm birth, and small size for gestational age by analyzing data from the birth certificates of 173,205 singleton infants born alive to multiparous mothers in Utah from 1989 to 1996. RESULTS: Infants conceived 18 to 23 months after a previous live birth had the lowest risks of adverse perinatal outcomes; shorter and longer interpregnancy intervals were associated with higher risks. These associations persisted when the data were stratified according to and controlled for 16 biologic, sociodemographic, and behavioral risk factors. As compared with infants conceived 18 to 23 months after a live birth, infants conceived less than 6 months after a live birth had odds ratios of 1.4 (95 percent confidence interval, 1.3 to 1.6) for low birth weight, 1.4 (95 percent confidence interval, 1.3 to 1.5) for preterm birth, and 1.3 (95 percent confidence interval, 1.2 to 1.4) for small size for gestational age; infants conceived 120 months or more after a live birth had odds ratios of 2.0 (95 percent confidence interval, 1.7 to 2.4);1.5 (95 percent confidence interval, 1.3 to 1.7), and 1.8 (95 percent confidence interval, 1.6 to 2.0) for these three adverse outcomes, respectively, when we controlled for all 16 risk factors with logistic regression. CONCLUSIONS: The optimal interpregnancy interval for preventing adverse perinatal outcomes is 18 to 23 months.


**Abstract:** While the adverse effect of tobacco smoking by mothers on fetal outcome has been extensively documented in literature, effect of consumption of tobacco in other forms, such as eating, chewing, etc., as a traditional practice in some communities in India and its neighboring countries has received scant attention. In the present study, 70 mother-newborn pairs, where mothers consumed tobacco, were compared with an equal number of pairs serving as controls, precisely matched for socioeconomic status, maternal literacy, parity of the mother, birth interval, age, height and weight of mother, gestational age and sex of the baby. The birth weight, length, and circumference of skull were studied. A statistically significant lower birth weight by an average of 395.3 g and lower birth length by 0.518 cm was observed in the tobacco consumer group. Tobacco consumption exceeding 200 mg/day during pregnancy distinctly influenced birth weight, particularly in the forms that were more likely to be ingested than merely chewed. In qualitative terms, tobacco consumption during pregnancy significantly diminished birth weight and length. What remains to be studied is the quantitative correlation between toxic metabolites of tobacco and fetal outcome.

**Abstract:** BACKGROUND: This study was a randomized controlled trial of primigravida in Botswana to determine the effectiveness of the presence of a female relative as a labor companion on labor outcomes. METHODS: One hundred and nine primigravida in uncomplicated spontaneous labor were randomly distributed into a control group who labored without family members present, and an experimental group who had a female relative with them during labor. RESULTS: Significantly more mothers in the experimental group had a spontaneous vaginal delivery (91% vs 71%), less intrapartum analgesia (53% vs 73%), less oxytocin (13% vs 30%), fewer amniotomies to augment labor (30% vs 54%), fewer vacuum extractions (4% vs 16%), and fewer cesarean sections (6% vs 13%) than in the control group. These differences were all significant at p < 0.05. Epidural analgesia was not used in the hospital at the time of the study. The only analgesics used were intramuscular pethidine or hyoscine N-butylbromide (Buscopan). CONCLUSIONS: The presence in labor of a female relative was shown to be associated with fewer interventions and a higher frequency of normal delivery compared with the outcomes of those without family member support. The presence of a female relative as a labor companion is a low-cost, preventative intervention that is consistent with the traditional cultural practices in Botswana. In the light of this and previous studies, all women giving birth in a hospital should be offered the choice of a female relative as a companion to give support during labor.


**Abstract:** We examined the effects of short interpregnancy intervals on small-for-gestational age and preterm births in a biracial population using North Carolina birth certificate data from 1988 to 1994. We defined small-for-gestational age birth as being below the 10th percentile on a race-, sex-, and parity-specific growth curve after a gestation of 37–42 weeks. We defined preterm birth as a gestation of less than 37 weeks. We analyzed birth records from all eligible singleton births to black or white women ages 15–45 years after an interpregnancy interval of 0–3 months (N=11,451) and a random sample of singleton births after an interval of 4–24 months (N=23,118). We defined interpregnancy interval exposure categories as 0–3, 4–12, and 13–24 months. The multivariate adjusted odds ratio for small-for-gestational age births after interpregnancy intervals of 0–3 months compared with 13–24-month intervals was 1.6 (95% confidence interval = 1.4–1.8). The odds ratio for preterm birth after interpregnancy intervals of 0–3 months was 1.2 (95% confidence interval = 1.1–1.3). Odds ratios did not vary substantially by race for either outcome.

Abstract: OBJECTIVE: To compare the estimated effect on birth weight of reductions in maternal cigarette consumption and urinary cotinine during pregnancy. STUDY DESIGN: An observational study of 641 women with complete data on cigarette consumption, urinary cotinine and infant birth weight. Correlation and regression analyses were used to examine relationships between birth weight, cigarette consumption and urinary cotinine at first and last prenatal visits. RESULTS: Correlations of cigarette consumption and urinary cotinine with infant birth weight were −.23 and −.30 (first visit) and −.26 and −.31 (last visit); all P values were <.001. The regression equation relating urinary cotinine concentrations at first and last visits to infant birth weight explained a significantly larger proportion of the variability in birth weight than the equation relating cigarette consumption at these visits to infant birth weight, 11% vs. 7%, P=.04. Among continuing smokers, both equations predicted gains in birth weight in association with reductions in cigarette consumption, but quitting smoking before the first visit was associated with the most weight gain. As compared to the average infant birth weight of a woman who smoked 20 cigarettes per day throughout pregnancy, the estimated gain in birth weight would be 105 g if she cut down by 10 cigarettes per day after the first visit, 210 g if she quit after this visit and 310 g if she quit before the first visit. CONCLUSION: For women still smoking at their first prenatal visit, infant birth weight is already compromised, but subsequent reductions in cigarette consumption are associated with gains in birth weight. For women who cannot quit smoking, these reductions need to be substantial if increases in birth weight of >100 g are to be achieved.


Abstract: In 1987 an international conference brought global attention to an issue that previously had been ignored: the world’s alarmingly high number of maternal deaths in childbirth. The conference ended with a declaration calling for a reduction in maternal mortality by at least half by the year 2000. As the deadline approached, safe motherhood activists lamented the fact that the world was nowhere near to achieving this objective. They attributed this failure to a variety of causes, but were in agreement that the medical technology was available to prevent maternal deaths in childbirth, and the key was generating the political will to make such technology widely available to women in developing countries. What ‘political will’ means, however, has been left as an unopened black box. What causes governments to give priority to the issue of safe motherhood, given that national political systems are burdened with thousands of issues to sort through each year? In marked contrast to our extensive knowledge about the medical interventions necessary to prevent maternal death, we know little about the political interventions necessary to increase the likelihood that national leaders pay meaningful attention to the issue. Drawing from a scholarly literature on agenda setting, this paper identifies four factors that heighten the likelihood that an issue will rise to national-level attention: the existence of clear indicators showing that a problem exists; the presence of effective political entrepreneurs to push the cause; the organization of attention-generating focusing events that promote widespread concern for the issue; and the availability of politically palatable policy
alternatives that enable national leaders to understand that the problem is surmountable. The paper presents a case study of the emergence, waning and re-generation of political priority for safe motherhood in Indonesia over the decade 1987–1997, to highlight how these four factors interacted to raise safe motherhood from near obscurity in the country to national-level prominence. While there are contextual factors that make this case unique, some elements are applicable to all developing countries. The paper draws out these dimensions in the hope that greater knowledge surrounding how political will actually has been generated can help shape strategic action to address this much neglected global problem.


Abstract: The objectives was to assess the determinants of and rates of abortion, stillbirth, and infant mortality for a cohort of pregnant women from slums in New Delhi, Calcutta, and Madras, India and rural slums in Hyderabad, Varanasi, and Chandigarh, India in 1981. The relationship of low birthweight (LBW) and high risk pregnancies to social, environmental, nutritional, cultural, and biological factors was of interest. The results showed variation both between and within urban and rural areas. Rural pregnancy outcome showed fewer LBWs and perinatal and neonatal mortality. Perinatal, neonatal, and infant mortality rates were consistent with prior findings. There was a demonstrated need for prenatal care and referral due to the 10–12% with a poor obstetric history and the significant number with anemia, bleeding, hypertension, toxemia, and urinary tract infections during this pregnancy. Many women were malnourished (body weight <40 kg, height <145 cm, and midarm circumference of <22.5 cm). These women can be identified as high risk. Other risk factors identified were women with disadvantageous personal habits: smoking, alcohol use, tobacco chewing, and working. 10–25% of pregnancies were not registered even though the prenatal clinic was accessible and outreach was provided. <20% completed the recommended number of prenatal visits. 75–85% visited at least once and sometimes more often. Screening for high risk must be done at the 1st visit. Women had strong feelings about the preference for a Dai during delivery and for place of delivery. Poor training of health workers was reflected in the lack of adequate sanitation during the birthing process. Neonatal units were lacking and primary care absent. 10–14% of births were preterm of which 50% occurred at 36 weeks. Multiple regression identified risk factors for fetal and neonatal mortality and LBW as maternal age, preterm birth, maternal anemia, previous preterm or LBW, birth interval, and previous fetal and neonatal mortality. Recommendations are for improving sanitation, hygiene, and water supplies, promoting community awareness of the adverse effects of early marriage and close birth spacing, improving the delivery of health care, allocating health resources based on morality rates, using an intersectoral approach for dealing with the complex social and personal habits adversely affecting childbearing and 7 other suggestions. Existing services and their use are inadequate.

Abstract: In a case-control study in Natal, northeast Brazil, conducted between September 1984 and February 1986, 303 cases of intrauterine growth retardation and 282 cases of preterm delivery were compared with 1,710 normal controls to ascertain the effects of the preceding birth-to-conception interval on pregnancy outcome. The risk of intrauterine growth retardation associated with interpregnancy intervals of six months or less was 1.38 (95% confidence interval (CI): 1.02–1.86) after adjustment for maternal age, education, smoking, and prior fetal loss or low birth weight. When maternal postpartum body weight was introduced into the logistic model, the risk of intrauterine growth retardation decreased slightly to 1.25 and was no longer significant (95% CI: 0.91–1.72). Short interpregnancy intervals (six months or less) were more frequently observed in women with postpartum body weight of less than 45 kg (31.1%) than in women weighing 50 kg or more (18.9%), which might suggest that the effect of short intervals on the risk of intrauterine growth retardation is mediated through maternal nutritional status. No association was found between birth-to-conception intervals and preterm delivery.


Abstract: OBJECTIVE: Interpregnancy intervals are associated with the risk of low birth weight (LBW) infants, but the association between interpregnancy interval and prematurity is unknown. Our objective was to determine whether interpregnancy intervals were associated with the risk of premature infants and to define the degree of risk according to interpregnancy interval.

METHODS: We analyzed 289,842 singleton infants born to parous Mexican-origin Hispanic and non-Hispanic white women in the United States who resided in the same county and delivered between January 1, 1991 and September 30, 1991. Interpregnancy interval was defined as the number of months between the previous live birth and conception of the index pregnancy. Multivariate logistic regression analysis was used to estimate odds ratios and 95% confidence intervals for the risk of interpregnancy interval on very premature (23–32 weeks), moderately premature (33–37 weeks), and term gestation (38–42 weeks). RESULTS: Nearly 37% of women had interpregnancy intervals less than 18 months, 45.5% of women had intervals of 18-59 months, and 17.6% of women had intervals over 59 months. After adjusting for confounding variables, women with intervals less than 18 months were 14–47% more likely to have very premature and moderately premature infants than women with intervals of 18–59 months. Women with intervals over 59 months were 12–45% more likely to have very premature and moderately premature infants than women with intervals of 18–59 months. CONCLUSION: Women with interpregnancy intervals from 18–59 months had the lowest risk of very premature and moderately premature infants. Further study is needed to define the mechanisms through which interpregnancy interval influences pregnancy outcome.

**Abstract:** Concerns about confounding by lifestyle factors and for the mechanism underlying the fetal growth restriction, statistical adjustments for adult body size, and conflicting evidence from natural experiments raise questions about whether such an association is truly causal. Moreover, even if the association is causal, the evidence of period versus birth cohort effects and of geographic and temporal trends suggests that the public health importance of such an association is likely to be small, consistent with the small effect on blood pressure reported by Leon et al. Future epidemiologic studies should devise critical tests of the fetal programming hypothesis rather than merely replicate its predicted associations. More basic scientific investigation should also be encouraged in order to understand the mechanisms underlying the reported associations, since such an understanding may provide valuable clues to the prevention of hypertension, type 2 diabetes, and CHD irrespective of the effects of fetal programming.


**Ref Type:** Generic

**Abstract:** Towards an evidence-based approach to decision making; reducing maternal mortality through evidence-based treatment of eclampsia; reducing postpartum hemorrhage: routine use of active management of the third stage of labor; the WHO reproductive health library; better births initiative: a programme for action in middle- and low-income countries; using evidence to save the lives of mothers.

Full text available at: http://www.globalhealth.org/assets/publications/MakingChildbirthSafer.pdf


**Abstract:** Most women in the developing world lack access to modern methods of contraception and to adequate prenatal care. Even in countries with relatively well-developed health systems, preventable maternal illness and death persist because of inappropriate management of the complications of pregnancy.

This paper draws on experience and research in both developing and industrial countries. That evidence shows that community-based approaches such as local family planning and the training and deployment of midwives help to reduce maternal mortality in high-mortality settings. Prenatal care and more childbirth services are identified as among the most cost-effective of government interventions for improving child health.

Abstract: OBJECTIVES: The aims of this study were to record the different types of hypertension associated with pregnancy and to assess the incidence of hypertension and its gravity in Senegal. METHODS: Over a two-year period, a cohort of pregnant women with hypertension according to the American working group classification of hypertension and pregnancy, was studied. A group of 47 non hypertensive women were matched for age and parity. Modalities of delivery were studied: maternal death, type of delivery, birth weight.

RESULTS: Among 2,400 deliveries, hypertension was observed in 94 women with mean age 33 years. The incidence of hypertension was 3.9% and the incidence of preeclampsia was 2.5%. The different types of hypertension were: Type I: 44 (47%), Type II: 16 (17%), Type III: 18 (19%), Type IV: 16 (17%). Echocardiography showed 30 cases of left ventricle hypertrophy with 3 cases of systolic dysfunction. Thirty-five patients had undergone a caesarean. Forty-seven infants had a birth weight below 2,000 g. Maternal mortality was 12.7%, fetal and neonatal mortality was 50%. There was a 21-fold higher chance of caesarean section in hypertensive women (p<4 x 10^-4). Neonatal mortality was 36 times higher (p (4 x 10^-6) than in the control group with a birth weight lower birth weight 975 g (p<10^-6). Women suffering from toxemia gave birth to children having a lower birth weight (−543 g) (p<5.10^-3), but, there was no significant difference concerning caesarean (p<7*10^-1) maternal, fetal and neonatal mortality (p<9. 10^-1) compared with other sub-groups. CONCLUSION: In developing countries, hypertension in pregnant women is a severe condition responsible for disease and handicaps which could be avoidable at little cost through a better policy of detection and good quality multidisciplinary management.


Abstract: The WHO convened two interagency meetings on Reproductive Health Indicators for Global Monitoring in 1996 and 1997 in order to achieve consensus on a minimal list of reproductive health indicators for global monitoring. Also, the convention aimed to agree on criteria for the identification and selection of indicators at district and national levels, to define research needs in areas for which indicators have not yet been identified or tested, and to share country experiences on identifying and selecting indicators and generating necessary data. After going through the process of discussion, the convention was able to provide the final list of 15 reproductive health indicators. These indicators include: 1) total fertility rate; 2) contraceptive prevalence rate; 3) maternal mortality ratio; 4) antenatal care coverage; 5) births attended by skilled health personnel; 6) availability of essential obstetric care; 7) availability of comprehensive obstetric care; 8) perinatal mortality rate; 9) low birth weight prevalence; 10) positive syphilis serology prevalence in pregnant women; 12) percentage of obstetric and gynecological admissions due to abortion; 13) reported prevalence of female genital mutilation; 14) prevalence of infertility; 15) reported incidence of urethritis in men.


**Abstract:** Atlanta, 1999.

A comprehensive, technical manual, this publication summarises recent literature and lessons learned from programme implementation to reduce maternal and newborn mortality. It reviews the health and non-health causes of mother and infant deaths and morbidity, and provides guidance for designing, monitoring, and evaluating a maternal health program. The manual features information on key interventions and best practises, compiled from 10 years of the global Safe Motherhood Initiative, along with a series of case examples of existing programmes working to promote maternal and newborn survival; these include initiatives to improve obstetric services and establish community-based maternal health programmes. Written primarily for regional or district health professionals, and NGO and other program managers, the manual may also be useful to Ministry of Health officials, technical staff of international agencies, and as a training or reference manual for medical and public health professionals. The manual's text is accessible, and accompanied by illustrations, charts, and tables. It also has a glossary of key terms, an extensive list of references, and a series of appendices with charts and tables summarising successful interventions and approaches.


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**Abstract:** The nutritional status of a woman before and during pregnancy is critical to both her infant's and her own health and survival. It determines her well-being and that of the fetus and child, and in turn the health and reproductive capacity of the next generation’s mothers. Anthropometric assessment of nutritional status during the reproductive cycle, particularly during pregnancy, is a widely used, low-technology procedure that has seldom been rigorously evaluated. The need to provide sound technical advice on the utility and feasibility of selected anthropometric indicators for routine application in primary health care, especially in circumstances where resources are limited, led to a meta-analysis of 25 data sets on maternal anthropometry and pregnancy outcomes from 20 different countries, providing information on more than 111,000 births and quantifying to what degree anthropometric measurements are useful and efficient in predicting maternal and child outcomes of pregnancy in the community and at home in different country settings. The next stage will be the demonstration of the operational value of the findings of this study through their successful application in service settings on a large scale.

**Abstract:** A longitudinal study was conducted on 212 pregnant women from May 1987 to April 1988. Maternal Care Receptivity (MCR) “an innovative approach” was adopted for the assessment of maternal care services provided to pregnant mothers at their door steps. During follow-up, scores were allotted to each of the services rendered and antenatal status of pregnant women. Depending on the score—MCR was classified as high (11 to 8), moderate (7 to 4) or poor (3 to 0). Perinatal and neonatal deaths were recorded and an inverse relationship between MCR and perinatal and mortalities was observed (z=5.46, p<0.0001). Significantly, no perinatal or neonatal deaths occurred in women with high MCR. One of the most important cause of high PNMR and neonatal mortality rate in developing countries is poor MCR, i.e., under utilization of even the existing maternal health services. The main reasons for this under utilization appear to be poverty, illiteracy, ignorance and lack of faith in modern medicine.


**Abstract:** OBJECTIVE: To determine the association of socio-demographic, maternal, medical and obstetric risk factors with low birth weight. DESIGN: A case-control study. PLACE AND DURATION OF STUDY: This study was carried out in the department of Neonatology, Children Hospital and Mother and Child Health Care Centre, Pakistan Institute of Medical Sciences, Islamabad during August-September 2001. SUBJECTS AND METHODS: One hundred and ninety consecutive low birth weight (<2.5 kg) live born babies were enrolled cases against 760 consecutive normal birth weight (>2.5 kg) babies as controls. Informations regarding maternal, biosocial, medical and obstetric complications during pregnancy were recorded on a pre-tested proforma. Data analysis was done through logistic regression model in SPSS10 and results were interpreted in terms of odds ratio and p-values. RESULTS: The mean weight of cases was 2.08 kg as compared to 3.1 in controls. Forty-six percent of cases were preterm. The factors like maternal malnutrition, young age of the mothers, poverty, close birth spacing, hypertension and antenatal per vaginum (p/v) bleeding during pregnancy have independent effect in causing low birth weight (LBW). CONCLUSION: Maternal biosocial, medical and obstetric factors have strong association with LBW. To overcome this problem, special attention is required to strengthen the mother and child health care services in the community.


**Abstract:** This study investigated the association between maternal cigarette smoking and fetal growth, evaluated by longitudinal ultrasound examinations and by neonatal anthropometric measurements. The investigation was carried out in a healthy population of affluent Scandinavian women, parity 1 and 2, who were selected consecutively and prospectively, and with term, normal pregnancies. Three hundred and six non-smoking, 242 light-smoking and 308 heavy-smoking mothers and their newborns were examined. Ultrasound measurements were performed in pregnancy weeks 17, 25, 33 and 37. Biparietal diameter (BPD), mean abdominal
diameter (MAD) and femur length were recorded. The negative effect on fetal growth from maternal smoking was found to affect the male fetus proportionally more than the female. Boys born to heavy-smoking mothers had a weight reduction of 8.2% and a lower fat accretion (as measured by subscapular skinfold) of 12%, whereas girls had a weight and fat reduction of 4.8% and 2% respectively. In boys (but not girls) born to smokers, head circumference was significantly smaller, also reflected by significantly smaller mean BPD measurements recorded from pregnancy week 18 onwards. The MAD measurements became successively more negatively affected in the second half of pregnancy in both males and females. A greater intrauterine growth velocity and a different hormonal milieu are suggested as possible explanations of the greater male susceptibility.


Abstract: Explains how the new WHO Mother-Baby Package can be used as a powerful tool for improving the health of mothers and infants—immediately and dramatically. Designed for use in national programmes in the developing world, the package consists of 18 simple interventions that have proven their capacity to reduce maternal and infant mortality in resource-poor settings. Recommended interventions were selected on the basis of considerable scientific knowledge about the causes of complications during pregnancy and childbirth and the best ways to prevent them. Pragmatic as well as scientifically valid, the package can be implemented within the existing health care system and without the need for sophisticated equipment, expensive drugs, or additional resources and facilities.

The document, which is addressed to national decision-makers and health planners, provides both an explanation of general strategies crucial to the success of the Package and a detailed guide to the actions required to implement each of the 18 core interventions. Concerning strategic issues, the book advocates an integrated approach to service delivery aimed at reducing the number of high-risk and unwanted pregnancies, reducing the number of complications, and reducing case fatality rates when complications occur. Essential service-related components of the package are identified as family planning, quality antenatal care, clean and safe delivery, and access to essential obstetric care for high-risk pregnancies and complications.

Available at: http://www.who.int/dsa/cat98/mat8.htm#Mother-Baby Package: Implementing Safe Motherhood in Countries


Abstract: One of the health problems in Indonesia is the high prevalence of stunting in infants. Determinants and specifically the relative contribution of prenatal and postnatal factors to growth and nutritional status of Indonesian infants were investigated. Newborn infants, from women recruited at approximately 18 wk of pregnancy from 9 rural villages in West Java, Indonesia,
were followed until 12–15 mo of age. Weight, length, morbidity, breast-feeding and food intake were assessed monthly. Determinants of length and weight increase and nutritional status reflected by Z-scores were evaluated using multiple linear regression. Neonatal weight (3.2 +/- 0.5 kg) and length (49.7 +/- 2.2 cm) were reasonable. However, growth started to falter at 6–7 mo of age, resulting in prevalences of 24% stunting and 32% underweight at 12 mo of age. The multiple regression models explained 19–41% of the variation in growth and nutritional status of infants. Neonatal weight (beta=0.285) and length (beta=0.492) were the strongest positive predictors of weight-for-age and height-for-age Z-scores, respectively. Fever was negatively associated with weight increase (beta=–0.144) and weight-for-age (beta=–0.142) and weight-for-height Z-scores (beta=–0.255) but not with length increase or height-for-age Z-scores. Intake of complementary foods was positively associated with increases in weight (beta=0.190) and length (beta=0.179) and nutritional status of infants (beta=0.136–0.194). In conclusion, in this rural population in West Java, neonatal weight and especially length, reflecting the prenatal environment, are the most important predictors of infant nutritional status.


Abstract: This supplement to the Journal of Perinatology details a meeting held in Kathmandu, Nepal in April/May of 2001. This workshop presented a global perspective to the state of newborn medicine and offered a forum to identify problems and to prioritize changes in care offered to mothers and their newborns. The goal was to implement survival interventions that would decrease perinatal and neonatal mortality and morbidity. Regional issues in Asia, Africa and Latin America are discussed freely. Research plans are detailed and the results from recent research are presented, with a global review of these interventions. The organizers of this meeting have emphasized the importance of understanding the local beliefs and practices that can directly and indirectly affect provision of maternal and neonatal care. Perinatologists and neonatologists in the United States have very little knowledge of the state of their specialties in other countries of the world. It would be a wonderful experience for many of us to visit other countries to broaden our perspectives and allow for a greater understanding of the state of perinatal and neonatal care in the world.


Abstract: OBJECTIVE: We sought to examine the current perinatal correlates and neonatal morbidity associated with intrauterine growth failure among neonates born at term gestation. STUDY DESIGN: We compared 372 small for gestational age (SGA, birth weight <10th percentile) infants born at term gestation to 372 appropriate for gestational age controls (AGA, birth weight 10th to 90th percentile) matched by sex, race, and gestational age within 2 weeks. RESULTS: Compared with AGA controls, significant (P <.05) maternal risk factors for SGA status included single marital status (59% versus 53%), lower prepregnancy weight (144 +/- 41 lbs versus 153 +/- 40 lbs), lower weight gain during pregnancy (29 +/- 15 lbs versus 33 +/- 15 lbs), smoking (25% versus 17%), hypertension (14% versus 7%), and multiple gestation (9%
versus 2%). Mothers of SGA infants were more likely to undergo multiple (>or=3) antenatal ultrasound evaluations (19% versus 7%), biophysical profile monitoring (11% versus 4%), and oxytocin delivery induction (28% versus 16%) (P <.05). Pediatrician attendance was more common among SGA deliveries (50% versus 37%, P <.05). SGA infants had significantly higher rates of hypothermia (18% versus 6%) and symptomatic hypoglycemia (5% versus 1%). These neonatal problems remained significant even when medical or pathologic causes of intrauterine growth failure, including pregnancy hypertension, multiple gestation, and congenital malformations, were excluded. CONCLUSION: Despite higher rates of pregnancy complications among mothers of SGA infants, the rates of neonatal adverse outcomes are low. However, SGA infants remain at risk for hypothermia and hypoglycemia and require careful neonatal surveillance.


Abstract: Prenatal care has been implemented in developing countries according to the same mode as applied in industrialized countries without considering its real effectiveness in reducing maternal and neonatal mortality. Several recent studies suggest that the goals should be revisited in order to implement a program of prenatal care based on real scientific evidence. Based on the current literature, we propose a potentially effective content for prenatal care adapted to the context of developing countries. Four antenatal consultations would be enough if appropriately timed at 12, 26, 32 and 36 weeks pregnancy. The purpose of these consultations would be: 1) to screen for three major risk factors, which, when recognized, lead to specific action: uterine, scar, malpresentation, premature rupture of the membranes; 2) to prevent and/or detect (and treat) specific complications of pregnancy: hypertension, infection (malaria, venereal disease, HIV, tetanus, urinary tract infection); anemia and trace element deficiencies, gestational diabetes mellitus; 3) to provide counseling, support and information for pregnant women and their families (including the partner) concerning: severe signs and symptoms of pregnancy and delivery, community organization of emergency transfer, delivery planning. These potentially effective actions can only have a real public health impact if implemented within an organized maternal health system with a functional network of delivery units, if truly quality care is given, and if the relationships between health care providers and the population are based on mutual respect. Sub-Saharan African women use prenatal care extensively when it is accessible; this opportunity must be used to implement evidence-based actions with appropriate and realistic goals.


Abstract: The importance of the length of preceding birth intervals for the survival chances of young children has been established, but the debate concerning the causal biomedical or behavioral mechanisms continues. This article uses data from 17 Demographic and Health Surveys to investigate the effect of birth intervals on child mortality: Anthropometry of children, recent morbidity of children, and use of health services are examined in addition to child survival
data for children born in the five years before the survey. Various methodological approaches are used to investigate the relative importance of the postulated mechanisms linking birth intervals and child survival. Short preceding birth intervals are associated with increased mortality risks in the neonatal period and at 1–6 months of age, and, to a much lesser extent, at 7–23 months of age. The effects of short birth intervals on nutritional status are rather moderate, and there is a weak relationship with lower attendance at prenatal care services. No consistent relationship exists between the length of birth intervals and other health status or health-service utilization variables. The results indicate that prenatal mechanisms are more important than postnatal factors, such as sibling competition, in explaining the causal nature of the birth interval effect.


Abstract: This guideline compiles a set of multi-sectoral interventions designed to promote safe motherhood and builds programmatic linkages among health, nutrition, education, sanitation, communication and gender. Although prepared for UNICEF field staff, the actions and methodologies discussed can be useful to policy makers, planners and programme managers working to reduce maternal and neonatal mortality more generally. The guideline reviews the causes—direct and indirect—of maternal illness and death; lessons learned from field experience about the best ways to promote maternal survival (including improving nutritional status, expanding girls’ access to education, ensuring skilled attendance at delivery and building effective referral systems); and key operational strategies. It then provides a set of chapters focused on specific, cost-effective interventions and actions. Among these are: promoting safe motherhood as a human right; improving the nutritional status of girls and women; expanding access to health care during pregnancy and delivery; providing maternal and neonatal care in emergency situations; and developing or strengthening programmes to promote reproductive health, reduce teenage pregnancy, provide services to women and infants with HIV/AIDS, and reduce the incidence of gender violence and discrimination. Each chapter follows a similar format, stating objectives, defining a needs assessment, detailing interventions at various levels (e.g., national policy making, health system and community), and describing indicators for monitoring and evaluation. Throughout the guideline, examples of actual programmes are provided to illustrate recommended interventions. Also included is a list of publications on safe motherhood.


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**Abstract:** OBJECTIVE: To compare the quality of public and private first-tier antenatal care services in Dar es Salaam, United Republic of Tanzania, using defined criteria. METHODS: Structural attributes of quality were assessed through a checklist, and process attributes, including interpersonal and technical aspects, through observation and exit interviews. A total of 16 health care providers, and 166 women in the public and 188 in the private sector, were selected by systematic random sampling for inclusion in the study. Quality was measured against national standards, and an overall score calculated for the different aspects to permit comparison. FINDINGS: The results showed that both public and private providers were reasonably good with regard to the structural and interpersonal aspects of quality of care. However, both were poor when it came to technical aspects of quality. For example, guidelines for dispensing prophylactic drugs against anaemia or malaria were not respected, and diagnostic examinations for the assessment of gestation, anaemia, malaria or urine infection were frequently not performed. In all aspects, private providers were significantly better than public ones. CONCLUSION: Approaches to improving quality of care should emerge progressively as a result of regular quality assessments. Changes should be introduced using an incremental approach addressing few improvements at a time, while ensuring participation in, and ownership of, every aspect of the strategy by health personnel, health planners and managers and also the community.


**Abstract:** A randomised community intervention trial was undertaken in 12 subcentres in Karur health unit district, Tamil Nadu, to compare the efficacy of two antenatal care packages. A newly recommended ‘high-risk’ strategy package and a uniform package recommended by the Tamil Nadu Government were each implemented in 4 randomly selected subcentres by the study team, and the latter was also delivered by routine health services in the 4 remaining subcentres. Analyses were based on 294 pregnant women on the high-risk package (HR), 242 on the Tamil Nadu Government (TNG) package and 335 women in the control series. The HR package reduced the differences between the high-risk women and the others in mean haemoglobin and the percentages with preventable neonatal morbidity and low birth weight, and consequently the overall outcome was better in the HR series than in the TNG series. Finally, the results with the TNG package were better when it was implemented by the study team than by the routine health services, in terms of preventable maternal morbidity and preventable perinatal morbidity, but there was no impact on birth weight.


**Ref Type:** Generic

**Abstract:** Information available at: info@rhcatalyst.org

**Abstract:** Epidemiological evidence suggests that maternal psychosocial stress, strenuous physical activity and fasting are independent risk factors for preterm birth and low birth weight. Data from clinical studies consistently demonstrate that women in preterm labor have significantly elevated levels of corticotropin-releasing hormone compared with age-matched control subjects. Because production of corticotropin-releasing hormone appears to be stress sensitive, this neuropeptide may play a critical role in the physiological mediation among stressful experiences, work stress and fasting and risk of preterm birth. In addition to the direct effect of elevated corticotropin-releasing hormone on the initiation of labor, it may have an immunomodulatory effect such that women with high levels of corticotropin-releasing hormone may be more susceptible to infection or the pathological consequences of infection. We review the epidemiological data linking maternal stress, physical stain and fasting to preterm birth and low birth weight and review the plausible biological pathways through which these exposures may increase risk of preterm birth. The timing of these exposures is considered important. Future research and clinical programs addressing these exposures must consider assessments and interventions before pregnancy.


**Abstract:** Geneva, 1998.

This manual provides a guide to conducting an assessment of the major challenges to national and sub-national health systems seeking to reduce maternal and neonatal mortality. Included are detailed guidelines for conducting a field-based assessment of health system capacities to provide maternal health services, comprising protocols, checklists, and model forms for: interviewing health personnel, clients, and TBAs; assessing supplies and equipment; and reviewing records. The manual also contains materials to conduct a five day workshop to train needs assessment surveyors; instructions for surveyors on field work; and suggestions for analysis and interpretation of the data collected. The manual comes with a diskette with the survey forms in both word processing and EPI-Info formats and the surveyor’s manual and model forms in word processing formats.

211 pp. English.

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Abstract: BACKGROUND: There is uncertainty concerning antenatal care as a tool to eliminate or alleviate adverse outcomes in the newborn. We identified congenital conditions, intrauterine infections, intrauterine growth retardation, preterm birth and some specific infectious diseases in the mother with a view to prophylactic and other interventions. The value of some special diagnostic tools is also under discussion. METHODS: Review of recent literature, especially randomized controlled trials and systematic reviews. RESULTS AND CONCLUSIONS: Genetic abnormalities cannot be prevented after conception, but many of them, and a number of acquired conditions, can be discovered by ultrasonographic and biochemical diagnostics. The advisability of screening must be determined locally for each condition, based on prevalence, treatment options and the legal requirements for abortion. Smoking, excessive alcohol intake, and severe undernutrition cause fetal growth retardation. Interventions to reduce maternal smoking have had limited success. Protein-energy supplementation only modestly affects birthweight. Routine measurement of uterine height is a good predictor of severe growth retardation and in rural settings of perinatal death. Preterm birth has been linked to ascending infection and subsequent rupture of the membranes. Attempts to eradicate local infections have shown some benefit but results are not convincing yet. Cervical cerclage and betamimetic drugs have little, if any, effect. Claims for reduction of physical strain (standing >5 hours) at work should be supported. Tuberculosis in the mother should be discovered and treated. Malaria prophylaxis during pregnancy will protect the mother and possibly benefit the fetus. Adequate tetanus immunization of all mothers is a high priority intervention in developing countries. In HIV-positive mothers, Zidovudine ante- and perinatally will lower perinatal HIV-transmission significantly. Risk scoring may help identify some women for referral to higher level of care. Routine ultrasonography does not improve the outcome of pregnancy in terms of live births and morbidity, but may influence mortality through discovery and abortion of fetuses with major malformations. One vaginal examination during pregnancy is recommended but no repeat procedure unless medically indicated.


Abstract: The authors studied the effects and population-level impact of short (< or = 12 months) interpregnancy intervals on the risks for low (<2.5 kg) birth weight and preterm (<37 weeks) delivery of liveborn singleton infants to US African American, Mexican, Native American, non-Hispanic white, and Puerto Rican mothers (n=4,841,418) from 1989 to 1991. Statistical analyses were done by using the Mantel-Haenszel correlation statistic chi-square test and logistic regression. The proportion of livebirths associated with < or =12-month interpregnancy intervals was the lowest among non-Hispanic whites (18.5%, 95% confidence interval 18.5–18.5) and the highest among Native Americans (29.7%, 95% confidence interval 29.2–30.2). As compared with mothers with >12-month intervals, mothers with <6-month
intervals had an approximately 50% to 80% increased risk of very low (<1.5 kg) birth weight delivery and a 30% to 90% increased risk of very preterm (<32 weeks) delivery. Logistic regression analyses showed that the adverse effects of short intervals were reduced by about 10% but remained for the most part significant after controlling for potential confounding by maternal age, education, parity, marital status, prenatal care, smoking, and previous preterm delivery.


**Abstract:** In spite of the well-known effect of tobacco on embryo growth retardation, of the higher perinatal mortality of the offspring of smoking mothers, and of the dependence of perinatal mortality risk on small birth weight, it has consistently been found that small infants of smoking mothers have lower mortality rates than small infants of non-smoking mothers. This problem was studied on the perinatal database of a hospital, using adverse outcomes (death or Apgar score <7 at the 10th minute of life) as endpoints rather than perinatal or foetal mortality. A stochastic model constructed to account for cause-effect relations demonstrated that tobacco influences weight and mortality by independent pathways. Furthermore, this model shed some light on the non-tobacco determinants of small birth weight and neonatal morbidity. The method undertaken, based on the use of latent variables, had the advantage of analysing the prevalence, consequences and interactions of some risk factors without identifying them.


**Abstract:** OBJECTIVE: To examine the relation of cigarette consumption and exhaled carbon monoxide levels during pregnancy and to assess the effect of these smoking measures on birth weight. METHODS: Cigarette consumption and exhaled carbon monoxide levels were recorded at the first prenatal visit and the 36-week visit from women who smoked early in pregnancy. Analysis of variance was used to compare birth weights for differing levels of cigarette consumption and exhaled carbon monoxide. Correlation and regression analyses were used to estimate the effects of the smoking measures at both prenatal visits on birth weight. RESULTS: Cigarette consumption and exhaled carbon monoxide levels at both visits were associated significantly with birth weight. After the first prenatal visit, a reduction in cigarette consumption of at least nine cigarettes per day or in exhaled carbon monoxide of 8 parts per million (ppm) was associated with gains in birth weight of 100 g or more. The proportion of low birth weight (LBW) infants increased significantly with increasing levels of cigarette consumption and with increasing concentrations of exhaled carbon monoxide. CONCLUSION: Substantial reductions in cigarette consumption or in exhaled carbon monoxide levels after the first prenatal visit are needed to achieve gains in birth weight. Not smoking, or having an exhaled carbon monoxide level less than 5 ppm minimizes the likelihood of having an LBW infant.

**Abstract:** This paper reviews the evidence bearing on socioeconomic determinants of intrauterine growth retardation (IUGR). The primary focus is on those factors with a quantitatively important impact from a public health perspective, as indicated by their large etiologic fraction (population attributable risk). In developed countries in which a sizeable proportion of women smoke during pregnancy, cigarette smoking is associated with the largest etiologic fraction (by far), followed by low gestational weight gain (primarily due to low energy intake) and low prepregnancy body mass index (BMI). In developing countries where undernutrition is prevalent and pregnant women do not smoke, low maternal weight gain and BMI assume even greater importance, as does short maternal stature. A major section of the paper concerns the large within-country socioeconomic disparities in IUGR and the possible mechanisms underlying these disparities. In developed countries, differences in cigarette smoking explain a large part of the disparity; low weight gain and short stature may also be important mediators in some settings. Future etiologic studies should assess a wide scope of potential determinants and will require large sample sizes to control for their mutually confounding effects.


**Abstract:** A hospital-based cohort study was carried out in a district hospital in Zimbabwe to evaluate the effect of a maternity waiting home on perinatal mortality. Information on antenatal risk factors, use of antenatal care, access to the hospital and stage of labour on arrival was collected for each woman delivering at the hospital during the period 1989-1991 (n=6438). Women who stayed in the maternity waiting home had a lower risk of perinatal death compared to women who came directly from home to the hospital during labour. The crude relative risk of perinatal death for the women coming from home was 1.7 (95% confidence interval (CI) 1.1–2.6; P<0.05). After adjusting for the effect of potential confounding variables, the relative risk decreased to 1.5 (95% CI 0.95–2.5, P=0.07). However, when the analysis was restricted to women with antenatal risk factors there was a significant 50% reduction in the risk of perinatal death for the women who stayed at the maternity waiting home compared to women who came from home during labour (adjusted relative risk 1.9; 95% CI 1.1–3.4; P<0.05). The use of maternity waiting homes has the potential to reduce perinatal mortality in rural areas with low geographic access to hospitals and merits further evaluation.


**Abstract:** A case-control study was conducted to assess the effectiveness of antenatal care in preventing intrauterine growth retardation (IUGR) and low birth weight due to preterm delivery (PD), using data from 1837 births which took place in 25 hospitals in Mexico City during 1984. Women with an inadequate number of visits for gestational age had 63% greater odds of IUGR (95% CI: 1.01, 2.65) and 51% greater odds of PD (95% CI: 1.02, 2.23) than women with an
adequate number. The content of antenatal visits showed no independent effect on the prevention of IUGR. Women having had poor content showed a PD OR of 1.76 (95% IC: 1.33, 2.34). An important reduction in the incidence of births with IUGR and PD could be expected if women could attend an adequate number of antenatal visits (11 and 9% reductions, respectively). Eighteen per cent of the PD births would probably be prevented if antenatal care could include at least six procedures: blood pressure, height and weight, urine and blood samples, and pelvic examination.


Abstract: This paper provides an overview of the occurrence, etiology and temporal trends of adverse pregnancy outcomes. Disparities between developed and developing countries are highlighted for maternal mortality, infant mortality, stillbirth and low birth weight. The higher rate of low birth weight in developing countries is primarily due to intrauterine growth restriction rather than preterm birth. Much of the excess intrauterine growth restriction is caused by short maternal stature, low prepregnancy body mass index and low gestational weight gain (due to low energy intake). No important contribution has been established for micronutrient intake, nor have different fetal growth trajectories been demonstrated to reflect the timing of exposure to nutritional or other etiologic factors. Infant mortality has declined substantially over time both in developed and developing countries despite no decline (and even an increase) in low birth weight. Several developed countries have reported a temporal increase in fetal growth in infants born at term, a reduction in stillbirth rates and prevention of neural tube defects. More progress is required, however, in understanding the etiology and prevention of preterm birth.


Abstract: Each year, an estimated half million women die from complications related to childbirth either during pregnancy, delivery or within 42 days afterwards. When pregnant women have complications, their infants are at greater risk of becoming ill, permanently disabled or dying. For every maternal death, there are at least 20 infant deaths: stillbirths, neonatal or postneonatal deaths. Altogether, an estimated 7 million infants each year die perinatally (stillborn or deaths within the first week of life). Low cost, feasible, and effective intervention strategies include: a) improved family planning and abortion services; b) obstetric care at delivery; and, c) prenatal services. Two hypothetical populations of one million (a low mortality and a high mortality country) are used to illustrate maternal and perinatal program strategies and priorities. In countries with high fertility, major reductions in maternal and infant deaths result both from reductions in the number of pregnancies through family planning and from improved obstetric care. Where fertility is already low, reductions result almost entirely from improved obstetric and prenatal care. The investments required are relatively low, while the potential gains are great. The cost to avert each death in a high mortality population is estimated between $800 and $1,500 or as low as $0.50 per capita per year. The priorities for programs targeting maternal and perinatal health depend on demographic, ecologic and economic factors, and should include the
promotion of good health, not merely the avoidance of death. More operational research is required on various aspects of maternal and perinatal health; in particular, on the cost-effectiveness of different service components.


Abstract: OBJECTIVES: The objective of this study was to determine whether the length of the interval between pregnancies was associated with either preterm birth or intrauterine growth retardation in a low-income, largely Black population. METHODS: The study population consisted of 4,400 women who had received prenatal care in county clinics and had two consecutive singleton births between 1980 and 1990. RESULTS: Interpregnancy intervals were positively associated with age and negatively associated with the trimester in which care was initiated in the second pregnancy. Whites had shorter intervals than non-whites. The percentage of preterm births increased as the length of the interpregnancy interval decreased, but only for women who had not had a previous preterm birth. The association between interval and preterm birth was maintained when other factors associated with preterm birth were controlled. There was no significant relationship between intrauterine growth retardation and interpregnancy interval. CONCLUSIONS: Women, particularly those who are poor and young, should be advised of the potential harm to their infants of short interpregnancy intervals.


Abstract: In the preparation of a randomised controlled trial to evaluate a new programme of antenatal care (ANC) in different parts of the world, we conducted a baseline survey of the ANC procedures in all 53 clinics participating in the trial. There were two components of this survey: (1) description of clinic characteristics and services offered: the staff of each clinic was interviewed and direct observation was made by field supervisors, and (2) the actual use of services by pregnant women attending these clinics: we reviewed a random sample of 2,913 clinical histories. The clinical units surveyed were offering most of the activities, screening, laboratory tests and interventions recommended as effective according to the Cochrane Pregnancy and Childbirth Database (PCD), although some of these were not available in some sites. On the other hand, some tests and interventions that are considered not effective according to these criteria are reportedly offered. There was a difference across sites in the availability and offer to low-risk women of vaginal examination, evaluation of pelvic size, dental examination, external version for breech presentation and formal risk score classification, and a notable difference in the type of principal provider of ANC. There was a large variation in the actual use of screening and laboratory tests and interventions that should be offered to all women according to Cochrane PCD criteria: some of these are simply not available in a site; others are available, but only a fraction of women attending the clinics are receiving them. The participating sites all purport to follow the traditional ‘Western’ schedule for ANC, but in three
sites we found that a high percentage of women initiate their ANC after the first trimester, and therefore do not have either the recommended minimum number of visits during pregnancy or the minimum first trimester evaluation. It is concluded that the variability and heterogeneity of ANC services provided in the four study sites are disturbing to the profession and cast doubts on the rationale of routine ANC.


Abstract: The routine program for antenatal care consists of a number of scheduled visits aiming at detection of symptomless complications such as hypertension and deviation in fetal growth, as well as giving psychosocial support and health education. In a Swedish state-of-the-art conference in May 1990, the scientific basis of this routine program was critically evaluated. It was clearly demonstrated that the scientific evidence to support present timing and contents of routine visits is unsatisfactory, and that there is a great need for evaluation both of single diagnostic procedures and intervention and of programs of antenatal care. Evaluations of antenatal care should consider not only pregnancy outcome but also patient satisfaction and cost-benefit analysis. Long-term follow-up studies are urgently needed, not only of the effects of complications but also of antenatal diagnosis and interventions.


Abstract: This booklet presents the findings of the “State of the World’s Mothers 2000, Save the Children,” which examines the overall status of mothers in 106 countries—20 industrialized nations and 86 in the developing world. Data were based on published statistics from governments, international agencies, and research institutions. It is noted that for mothers, indicators of well-being include health status, modern contraceptive use, literacy and participation as national government office holders while for children, they include infant mortality rates, access to safe water, primary school enrollment and nutritional status. Overall, findings affirm the strong link between the well-being of women and of children. It reveals two factors that make a vital difference in their well-being: female education and access to, and use of, family planning services. The findings also show that national wealth alone does not guarantee the welfare of mothers and children. Recommendations from these findings include the following: 1) ensure access to quality education for both women and girls; 2) ensure that all women have access to high quality, voluntary family planning services; 3) improve current research and conduct new studies that focus specifically on mothers; and 4) close the gap in mothers’ and children’s well-being among marginalized populations in industrialized countries.


Abstract: The incidence and some determinants of low birth weight (LBW) were studied in two population-based cohorts of singletons born live to families in Ribeirao Preto, Sao Paulo State,
Brazil. The first cohort comprised infants born between June 1978 and May 1979 (6,750 births—population survey) and the second, infants born between May and August 1994 (2,990 births—sample survey). The incidence of LBW was 7.2% in 1978–79 and 10.6% in 1994. After adjustment for confounding factors, the following determinants remained significant in 1978–79: female sex, maternal age ≥ 35 years, preterm delivery, < four antenatal health visits, maternal smoking, lower level of maternal education, and manual work/unemployment. In 1994, the significant determinants were preterm delivery, maternal smoking and caesarean section.

The adjusted percentage population attributable risk (PAR%) fell for the majority of risk factors but increased for caesarean section, preterm birth, multiparity (≥ 5), primiparity and non-cohabitation. The increase in the rate of LBW from 1978-79 to 1994 was higher for families with more qualified occupations, and occurred only for infants delivered at 36–40 weeks’ gestational age and weighing 1,500–2,499 g, i.e. those most likely to be born by elective caesarean section. The caesarean section rate rose from 30.3% in 1978–79 to 51.1% in 1994. The increase in LBW was probably due to iatrogenic practices associated with elective caesarean section.


Abstract: BACKGROUND: There is a lack of strong evidence on the effectiveness of the content, frequency, and timing of visits in standard antenatal-care programmes. We undertook a systematic review of randomised trials assessing the effectiveness of different models of antenatal care. The main hypothesis was that a model with a lower number of antenatal visits, with or without goal-oriented components, would be as effective as the standard antenatal-care model in terms of clinical outcomes, perceived satisfaction, and costs. METHODS: The interventions compared were the provision of a lower number of antenatal visits (new model) and a standard antenatal-visits programme. The selected outcomes were pre-eclampsia, urinary-tract infection, postpartum anaemia, maternal mortality, low birthweight, and perinatal mortality. We also selected measures of women’s satisfaction with care and cost-effectiveness. This review drew on the search strategy developed for the Cochrane Pregnancy and Childbirth Group of the Cochrane Collaboration. FINDINGS: Seven eligible randomised controlled trials were identified. 57,418 women participated in these studies: 30,799 in the new-model groups (29,870 with outcome data) and 26,619 in the standard-model groups (25,821 with outcome data). There was no clinically differential effect of the reduced number of antenatal visits when the results were pooled for pre-eclampsia (typical odds ratio 0.91 [95% CI 0.66–1.26]), urinary-tract infection (0.93 [0.79–1.10]), postpartum anaemia (1.01), maternal mortality (0.91 [0.55–1.51]), or low birthweight (1.04 [0.93–1.17]). The rates of perinatal mortality were similar, although the rarity of the outcome did not allow formal statistical equivalence to be attained. Some dissatisfaction with care, particularly among women in more developed countries, was observed with the new model. The cost of the new model was equal to or less than that of the standard model. INTERPRETATION: A model with a reduced number of antenatal visits, with or without goal-oriented components, could be introduced into clinical practice without risk to mother or baby, but some degree of dissatisfaction by the mother could be expected. Lower costs can be achieved.
Maternal Nutrition


Abstract: A total of 418 pregnant women at 16–24 wk of gestation, from six subcentres of a rural block of Varanasi district were selected. Pregnant women (137 of 215) from 3 subcentres received the supplementation of 60 mg elemental iron as ferrous sulphate combined with 500 micrograms folic acid, daily for 100 days (study group) and 123 (of 203) pregnant women from the other 3 subcentres without supplementation (control group) could be evaluated for their pregnancy outcome. The haemoglobin and serum ferritin levels increased significantly in the study group. In the latter, the mean birth weight was 2.88 +/– 0.41 kg with low birth weight incidence of 20.4 per cent as compared to the control figures of 2.59 +/– 0.34 kg and 37.9 per cent respectively. The incidence of low birth weight was further reduced to 12.1 per cent if the supplementation could be started by 16–19 wk of gestation.


Abstract: OBJECTIVE: This study examined the relationship between enrollment in the Special Supplemental Nutrition Program for women, Infants, and Children (WIC) and delivery of small-for-gestational-age infants. METHODS: WIC records were linked with birth certificates for 1992 full-term births; 41,234 WIC records and 18,34 non-WIC records were identified. Length of participation was defined by gestational age at enrollment. Logistic regression was used to examine the association between WIC participation and small-for-gestational-age births. RESULTS: Odds ratios for small-for-gestational-age birth decreased with increasing length of enrollment in WIC. CONCLUSIONS: Enrollment in WIC is associated with a lower prevalence of small-for-gestational-age deliveries.


Abstract: This article reviews current knowledge of the effects of maternal anemia and iron deficiency on pregnancy outcome. A considerable amount of information remains to be learned about the benefits of maternal iron supplementation on the health and iron status of the mother and her child during pregnancy and postpartum. Current knowledge indicates that iron deficiency anemia in pregnancy is a risk factor for preterm delivery and subsequent low birth weight, and possibly for inferior neonatal health. Data are inadequate to determine the extent to which maternal anemia might contribute to maternal mortality. Even for women who enter pregnancy with reasonable iron stores, iron supplements improve iron status during pregnancy and for a considerable length of time postpartum, thus providing some protection against iron deficiency in the subsequent pregnancy. Mounting evidence indicates that maternal iron
deficiency in pregnancy reduces fetal iron stores, perhaps well into the first year of life. This deserves further exploration because of the tendency of infants to develop iron deficiency anemia and because of the documented adverse consequences of this condition on infant development. The weight of evidence supports the advisability of routine iron supplementation during pregnancy.


Abstract: BACKGROUND AND METHODS: Periconceptional administration of folic acid can reduce a woman’s risk of having a fetus or infant with a neural-tube defect. As part of a public health campaign conducted from 1993 to 1995 in an area of China with high rates of neural-tube defects (the northern region) and one with low rates (the southern region), we evaluated the outcomes of pregnancy in women who were asked to take a pill containing 400 microg of folic acid alone daily from the time of their premarital examination until the end of their first trimester of pregnancy. RESULTS: Among the fetuses or infants of 130,142 women who took folic acid at any time before or during pregnancy and 117,689 women who had not taken folic acid, we identified 102 and 173, respectively, with neural-tube defects. Among the fetuses or infants of women who registered before their last menstrual period and who did not take any folic acid, the rates of neural-tube defects were 4.8 per 1000 pregnancies of at least 20 weeks’ gestation in the northern region and 1.0 per 1000 in the southern region. Among the fetuses or infants of the women with periconceptional use of folic acid, the rates were 1.0 per 1000 in the northern region and 0.6 per 1000 in the southern region. The greatest reduction in risk occurred among the fetuses or infants of a subgroup of women in the northern region with periconceptional use who took folic acid pills more than 80 percent of the time (reduction in risk, 85 percent as compared with the fetuses or infants of women who registered before their last menstrual period and who took no folic acid; 95 percent confidence interval, 62 to 94 percent) [corrected]. In the southern region the reduction in risk among the fetuses or infants of women with periconceptional use of folic acid was also significant (reduction in risk, 41 percent; 95 percent confidence interval, 3 to 64 percent). CONCLUSIONS: Periconceptional intake of 400 microg of folic acid daily can reduce the risk of neural-tube defects in areas with high rates of these defects and in areas with low rates.


Abstract: Haematological and folic acid status were assessed in 200 women in the 6th month of pregnancy. Folic acid deficiencies with no or little haematological impairment were found in one third of the cases, and their occurrence increased when the socioeconomic level was low. During the last trimester of pregnancy, the women were given either iron alone or iron and folic acid supplementation. In the mothers, the rise of folate values in serum and red blood cells, in the
folic acid-supplemented group, had no obvious haematological consequences, showing that iron therapy alone can, in developed countries, prevent the anaemia in pregnancy. In the infants, there was no difference in the haematological indices, whatever the mothers’ treatment had been. However, a significant difference appeared for the gestational age and, therefore, the height and weight. Folic acid supplementation during pregnancy increased its duration by virtually 1 week.


Abstract: In order to identify differences in growth and nutritional status between early (up to 17 years old) and late (17 to 19 years old) adolescent mothers during pregnancy and to measure the risk to have an intrauterine growth retardation (IGR: birthweight <10 degrees percentile), a retrospective longitudinal anthropometric study was carried out in 300 adolescent pregnancies. Nutritional status was estimated according to the body mass index (height/weight2)—measured during the first (<20 weeks) and last (>33 weeks) prenatal control—and by the weight gain during pregnancy. When a mother had a weight gain <25 degrees percentile she was considered at risk to have an IGR. Neonatal anthropometry included birthweight, recumbent length, cephalic perimeter and body mass index. Comparison between both groups of mothers was performed by one way ANOVA and Mantel-Haenszel stratified procedure. Odds-ratio was also calculated. Results showed no statistically significant differences in growth between both early and late adolescent pregnancies and between both groups of newborns. When a mother had a weight gain <25 degrees percentile the relative risk to have an IGR increase up to three times (O.R=2.71 I.C. 95%: 1.31/6.45). There were highly significant differences in growth between newborns from mothers at risk and from mothers not at risk (p<0.01). The study showed that the risk to have an IGR is significantly related to nutritional status and not to age itself in adolescent pregnancies.


Abstract: To estimate the effect of maternal zinc deficiency on pregnancy outcomes, we conducted a zinc supplementation trial in an urban shantytown in Lima, Peru, a population with habitual low zinc intakes. Beginning at 10–24 wk gestation, 1,295 mothers were randomly assigned to receive prenatal supplements containing 60 mg iron and 250 (g folate, with or without 15 mg zinc. Women were followed up monthly during pregnancy. At birth, newborn weight was recorded, and crownheel length, head circumference and other circumferences and skinfold thicknesses were assessed on d 1. At delivery, 1016 remained in the study; duration of pregnancy was known for all women, and birth weight information was available for 957 newborns. No differences were noted in duration of pregnancy (39.4 +/- 2.2 vs. 39.5 +/- 2.0 wk) or birth weight (3267 +/- 461 vs. 3,300 +/- 498 g) by prenatal supplement type (iron + folate + zinc vs. iron + folate; P > 0.05), and there were no differences in the rates of preterm (<37 wk) or post-term (>42 wk) delivery, low birth weight (<2,500 g) or high birth weight (>4000 g). Finally,
there were no differences by prenatal supplement type in newborn head circumference, crownheel length, chest circumference, mid-upper arm circumference, calf circumference or skinfold thickness at any of three sites. Adjustment for covariates and confounding factors did not alter these results. Adding zinc to prenatal iron and folate tablets did not affect duration of pregnancy or size at birth in this population.


**Abstract:** BACKGROUND: Maternal zinc deficiency during pregnancy may be widespread among women in developing countries, but few data are available on whether prenatal zinc supplementation improves maternal and neonatal zinc status. OBJECTIVE: We studied whether maternal zinc supplementation improved the zinc status of mothers and neonates participating in a supplementation trial in a shantytown in Lima, Peru. DESIGN: Beginning at gestation week 10–24, 1,295 mothers were randomly assigned to receive prenatal supplements containing 60 mg Fe and 250 microg folate, with or without 15 mg Zn. Venous blood and urine samples were collected at enrollment, at gestation week 28–30, and at gestation week 37–38. At birth, a sample of cord vein blood was collected. We measured serum zinc concentrations in 538 women, urinary zinc concentrations in 521 women, and cord zinc concentrations in 252 neonates. RESULTS: At 28–30 and 37–38 wk, mothers receiving zinc supplements had higher serum zinc concentrations than mothers who did not receive zinc (8.8 +/- 1.9 compared with 8.4 +/- 1.5 micromol/L and 8.6 +/- 1.5 compared with 8.3 +/- 1.4 micromol/L, respectively). Urinary zinc concentrations were also higher in mothers who received supplemental zinc (P < 0.05). After adjustment for covariates and confounding factors, neonates of mothers receiving zinc supplements had higher cord zinc concentrations than neonates of mothers who did not receive zinc (12.7 +/- 2.3 compared with 12.1 +/- 2.1 micromol/L). Despite supplementation, maternal and neonatal zinc concentrations remained lower than values reported for well-nourished populations. CONCLUSION: Adding zinc to prenatal iron and folate tablets improved maternal and neonatal zinc status, but higher doses of zinc are likely needed to further improve maternal and neonatal zinc status in this population.


**Abstract:** OBJECTIVE: To test the efficacy in terms of birth weight and infant survival of a diet supplement programme in pregnant African women through a primary healthcare system. DESIGN: 5 year controlled trial of all pregnant women in 28 villages randomised to daily supplementation with high energy groundnut biscuits (4.3 MJ/day) for about 20 weeks before delivery (intervention) or after delivery (control). SETTING: Rural Gambia. SUBJECTS: Chronically undernourished women (twin bearers excluded), yielding 2,047 singleton live births and 35 stillbirths. MAIN OUTCOME MEASURES: Birth weight; prevalence of low birth weight (<2,500 g); head circumference; birth length; gestational age; prevalence of stillbirths; neonatal
RESULTS: Supplementation increased weight gain in pregnancy and significantly increased birth weight, particularly during the nutritionally debilitating hungry season (June to October). Weight gain increased by 201 g (P<0.001) in the hungry season, by 94 g (P<0.01) in the harvest season (November to May), and by 136 g (P<0.001) over the whole year. The odds ratio for low birthweight babies in supplemented women was 0.61 (95% confidence interval 0.47 to 0.79, P<0.001). Head circumference was significantly increased (P<0.01), but by only 3.1 mm. Birth length and duration of gestation were not affected. Supplementation significantly reduced perinatal mortality: the odds ratio was 0.47 (0.23 to 0.99, P<0.05) for stillbirths and 0.54 (0.35 to 0.85, P<0.01) for all deaths in first week of life. Mortality after 7 days was unaffected. CONCLUSION: Prenatal dietary supplementation reduced retardation in intrauterine growth when effectively targeted at genuinely at-risk mothers. This was associated with a substantial reduction in the prevalence of stillbirths and in early neonatal mortality. The intervention can be successfully delivered through a primary healthcare system.


Abstract: The burden of maternal morbidity and mortality in developing countries is high. Each year, 600,000 women die from pregnancy-related causes and 62 million women suffer from morbidity and complications of pregnancy. The extent to which maternal nutrition can improve maternal health and survival is not well understood. Excluding deaths due to induced abortions, the other four main causes of maternal mortality (preeclampsia, hemorrhage, obstructed labor, and infection) may be amenable to nutrition interventions. The role of calcium in reducing the incidence of preeclampsia and hypertension is promising, but more research in deficient populations is urgently needed. Antenatal iron supplementation, although frequently recommended to prevent anemia during pregnancy, has had little program success. Severe anemia may be an important cause of maternal mortality, but convincing evidence is lacking on the health consequences of mild-to-moderate maternal anemia. Knowledge of the etiology of anemia is important in identifying effective strategies for combating it. Other vitamins such as folate, B12, and vitamin A may enhance the effect of iron supplementation in populations where multiple nutrition deficiencies exist. Maternal night blindness is widespread in South Asian women. In Nepal, this condition is associated with markedly increased risks of vitamin A deficiency, anemia, morbidity, and maternal and infant mortality. These findings need to be replicated elsewhere in South Asia. One study has shown vitamin A and beta carotene supplementation to reduce maternal mortality and morbidity. These findings need testing in different settings with emphasis on investigating the mechanisms of the effect. The area of prepregnancy nutrition and its influence on prolonged and obstructed labor is wide open for investigation. The scope for research in the area of maternal nutrition and health is large and the onus is on nutritionists to bring to the forefront the role of nutrition in maternal health and survival.

**Abstract:** Micronutrients may have a role in enhancing reproductive health of women living in the developing world. Two illustrative micronutrients, zinc and vitamin A, have received some attention in this regard. Numerous animal experiments and observational studies suggest the potential role of zinc deficiency in labor and delivery-related complications such as premature rupture of membrane, placental abruption, preterm labor and inefficient uterine contraction. These associations have not been confirmed in supplementation studies. Zinc does not appear to be a limiting factor in intrauterine growth in the developing world, contrary to some evidence of its suggested benefit among women residing in industrialized countries. One study in Nepal found that maternal vitamin A or beta-carotene supplementation reduces pregnancy-related mortality but not infant mortality. These findings are corroborated by observations of the significantly higher risk of mortality among night-blind women compared to non-night-blind women long after the termination of pregnancy and the resolution of night blindness. Maternal multiple micronutrient supplementation needs more careful evaluation before its use in large-scale programs. Two recent trials indicated that a prenatal multiple micronutrient supplement provides no added advantage over iron and folate in reducing outcomes such as low birth weight and probably no survival benefit. Data are also suggestive that adding zinc may negate the beneficial effect of iron and folic acid on birth weight. Research is needed to further our understanding of nutrient-nutrient interactions.


**Abstract:** OBJECTIVE: To assess the impact on birth size and risk of low birth weight of alternative combinations of micronutrients given to pregnant women. DESIGN: Double blind cluster randomised controlled trial. SETTING: Rural community in south eastern Nepal. PARTICIPANTS: 4,926 pregnant women and 4,130 live born infants. INTERVENTIONS: 426 communities were randomised to five regimens in which pregnant women received daily supplements of folic acid, folic acid-iron, folic acid-iron-zinc, or multiple micronutrients all given with vitamin A, or vitamin A alone (control). MAIN OUTCOME MEASURES: Birth weight, length, and head and chest circumference assessed within 72 hours of birth. Low birth weight was defined <2,500 g. RESULTS: Supplementation with maternal folic acid alone had no effect on birth size. Folic acid-iron increased mean birth weight by 37 g (95% confidence interval –16 g to 90 g) and reduced the percentage of low birthweight babies (<2,500 g) from 43% to 34% (16%; relative risk=0.84, 0.72 to 0.99). Folic acid-iron-zinc had no effect on birth size compared with controls. Multiple micronutrient supplementation increased birth weight by 64 g (12 g to 115 g) and reduced the percentage of low birthweight babies by 14% (0.86, 0.74 to 0.99). None of the supplement combinations reduced the incidence of preterm births. Folic acid-iron and multiple micronutrients increased head and chest circumference of babies, but not length. CONCLUSIONS: Antenatal folic acid-iron supplements modestly reduce the risk of low birth weight. Multiple micronutrients confer no additional benefit over folic acid-iron in reducing this risk.

**Abstract:** More than 9 million neonatal deaths occur each year, 98% of them in developing countries. Neonatal deaths account for two-thirds of deaths in infancy and 40% of deaths before age 5 yrs. The major direct causes of neonatal death are infections, preterm delivery and asphyxia. Important indirect causes include low birth weight and hypothermia. The present body of work on multiple micronutrient interventions is not sufficient for us to draw conclusions on their effects on neonatal well-being. Because studies have generally concentrated on single micronutrients and a range of outcomes, this paper reviews the findings for individual nutrients and then summarizes the situation. The evidence for the contribution of micronutrient deficiencies to perinatal mortality and duration of gestation is limited, and the evidence base for individual micronutrient effects on neonatal mortality and morbidity is patchy. To translate knowledge into policy, community evaluations of effect and an expanded evidence base that includes affordability, acceptability and scalability are also required. A balance between supply-side and demand-side interventions must be struck, with an emphasis on effect and sustainability. Among the key requirements are randomized, controlled community effectiveness trials of the effect of micronutrient supplementation in pregnancy on perinatal mortality and neurodevelopment, studies on improving adherence and studies on the relation between micronutrient deficiencies and sepsis and neonatal encephalopathy. It would also be helpful to look at mechanisms for bringing the periconceptional period within the ambit of trials.


**Abstract:** OBJECTIVE: To study the effect of periconceptional multivitamin supplementation on neural tube defects and other congenital abnormality entities. DESIGN: Randomised controlled trial of supplementation with multivitamins and trace elements. SETTING: Hungarian family planning programme. SUBJECTS: 4,156 pregnancies with known outcome and 3713 infants evaluated in the eighth month of life. INTERVENTIONS: A single tablet of a multivitamin including 0.8 mg of folic acid or trace elements supplement daily for at least one month before conception and at least two months after conception. MAIN OUTCOME MEASURES: Number of major and mild congenital abnormalities. RESULTS: The rate of all major congenital abnormalities was significantly lower in the group given vitamins than in the group given trace elements and this difference cannot be explained totally by the significant reduction of neural tube defects. The rate of major congenital abnormalities other than neural tube defects and genetic syndromes was 9.0/1,000 in pregnancies with known outcome in the vitamin group and 16.6/1,000 in the trace element group; relative risk 1.85 (95% confidence interval 1.02 to 3.38); difference, 7.6/1,000. The rate of all major congenital abnormalities other than neural tube defects and genetic syndromes diagnosed up to the eighth month of life was 14.7/1,000 informative pregnancies in the vitamin group and 28.3/1,000 in the trace element group; relative risk 1.95 (1.23 to 3.09); difference, 13.6/1,000. The rate of some congenital abnormalities was lower in the vitamin group than in the trace element group but the differences for each group of abnormalities were not significant. CONCLUSIONS: Periconceptional multivitamin
supplementation can reduce not only the rate of neural tube defects but also the rate of other major non-genetic syndromatic congenital abnormalities. Further studies are needed to differentiate the chance effect and vitamin dependent effect.


**Abstract:** This report summarizes the evidence from systematic reviews of randomized controlled trials on the effectiveness of nutritional interventions aimed at reducing intrauterine growth retardation (IUGR). There were 12 interventions including protein-energy, vitamin, mineral, and fish oil supplementation, as well as the prevention and treatment of anemia and hypertensive disorders. A primary concern is the limited data supporting the effectiveness of recommended nutritional interventions during pregnancy, some of which are widely used even in women without nutritional deficiencies. Overall, with the exception of perhaps balanced protein/energy supplementation (typical odds ratio: 0.77; 95 per cent confidence interval: 0.58 to 1.01), no effective nutritional interventions for reducing the risk of IUGR have been demonstrated. Other interventions, such as zinc, folate and magnesium supplementation during gestation, merit further research which should be conducted among populations at risk of IUGR, using larger sample sizes, and addressing coexisting factors limiting fetal growth. Appropriate combinations of interventions should be a priority for evaluation as it is unlikely that a single factor will reduce a multicausal outcome like IUGR that is so dependent on socioeconomic disparities.


**Abstract:** BACKGROUND: In areas endemic for hookworm, routine antenatal mebendazole therapy could greatly reduce the prevalence of anaemia in pregnancy. At present, however, this is not a widely accepted control strategy because of a lack of data on the safety of the drug. We assessed the effect of mebendazole therapy during pregnancy on birth outcome. METHODS: A cross-sectional study was done in Sri Lanka, where prescription of mebendazole to women in the second trimester of pregnancy is recommended. Two hospitals were chosen for the study, and women who gave birth there between May, 1996, and March, 1997, were recruited. We compared the rates of major congenital defects, stillbirth, perinatal death, and low birthweight (< or = 1500g) among babies of mothers who had taken mebendazole during pregnancy with those whose mothers had not taken an anthelmintic (controls). FINDINGS: The rate of major congenital defects was not significantly higher in the mebendazole group than in the control group (97 [1.8%] of 5275 vs 26 [1.5%] of 1737; odds ratio 1.24 [95% CI 0.8–1.91], p=0.39). Among 407 women who had taken mebendazole in the first trimester (contrary to medical advice), 10 (2.5%) had major congenital defects (odds ratio vs controls 1.66 [0.81–3.56], p=0.23). The proportions of stillbirths and perinatal deaths were significantly lower in the mebendazole group (1.9 vs 3.3%, 0.55 [95% CI 0.4–0.77]), as was the proportion of low-birthweight babies (1.1 vs 2.3%, 0.47 [95% CI 0.32–0.71]). INTERPRETATION: Mebendazole
therapy during pregnancy is not associated with a significant increase in major congenital defects, but our results indicate that it should be avoided during the first trimester. This therapy could offer beneficial effects to pregnant women in developing countries, where intestinal helminthiases are endemic.


Abstract: This brief review of the available studies confirms that the administration of iodized oil before or during pregnancy prevents endemic cretinism and brain damage by correcting iodine deficiency and thyroid function in pregnant women, fetuses, neonates, infants and children. The potential benefits derived from using iodized oil immediately before or during pregnancy greatly outweigh the potential risks in areas of moderate and severe prevalence of iodine-deficiency disorders, where iodized salt is not yet available.


Abstract: BACKGROUND: Hotien county in Xinjiang province, China, is an area of severe iodine deficiency and has a high infant mortality rate. We investigated whether iodine replacement through iodination of the irrigation water would decrease infant mortality.

METHODS: We added potassium iodate to irrigation water over a 2 to 4 week period beginning in 1992 in certain areas of three townships (Tusala, Long Ru, and Bakechi). Logistic regression analysis was used to compare the odds ratios for infant and neonatal mortality in treated and untreated areas.

FINDINGS: The median urinary iodine concentration significantly increased in women of child-bearing age from < 10 micrograms/L to 55 micrograms/L. Infant-mortality rates decreased in the treated areas of Long Ru (mean [SD] 58.2 [4.4] per 1,000 births to 28.7 [7.1] per 1000 births), Tusala (47.4 [12.4] per 1000 births to 19.1 [1.5] per 1000 births), and Bakechi (106.2 [9.5] per 1000 births to 57.3 [7.3] per 1,000 births). Similar results were also seen for neonatal mortality. On regression analysis iodine treatment and time were significant independent predictors of infant mortality.

INTERPRETATION: Iodine supplementation of irrigation water in areas of severe iodine deficiency decreases neonatal and infant mortality. Iodine replacement has probably been an important factor in the national decrease in infant mortality in China.


Abstract: Fetal undernutrition affects large numbers of infants in developing countries, with adverse consequences for their immediate survival and lifelong health. It manifests as intrauterine growth retardation (IUGR), defined as birth weight <10th percentile, which probably underestimates the number failing to achieve full growth potential. Birth weight is a crude measure of the dynamic process of fetal growth and does not capture effects of fetal undernutrition on body composition and the development of specific tissues. The link between
maternal nutrition and fetal nutrition is indirect. The fetus is nourished by a complex supply line that includes the mother’s diet and absorption, endocrine status and metabolism, cardiovascular adaptations to pregnancy and placental function. Micronutrients are essential for growth, and maternal micronutrient deficiency, frequently multiple in developing countries, may be an important cause of IUGR. Supplementation of undernourished mothers with micronutrients has several benefits but there is little hard evidence of improved fetal growth. However, this has been inadequately tested. Most trials have only used single micronutrients and many were inconclusive because of methodological problems. Several food-based studies (some uncontrolled) suggest benefits from improving maternal dietary quality with micronutrient-dense foods. One trial of a multivitamin supplement (HIV-positive mothers, Tanzania) showed increased birth weight and fewer fetal deaths. Well-conducted randomized controlled trials of adequate sample size and including measures of effectiveness are needed in populations at high risk of micronutrient deficiency and IUGR and should include food-based interventions and better measurements of fetal growth, maternal metabolism, and long-term outcomes in the offspring.


Abstract: BACKGROUND: One way of attempting to improve fetal growth has been nutrient supplementation for the mother when fetal growth is impaired. Different nutrients such as carbohydrates and amino acids have been suggested as treatments for impaired fetal growth. OBJECTIVES: The objective of this review was to assess the effects of nutrient administration for suspected fetal growth impairment on fetal growth and perinatal outcome. SEARCH STRATEGY: We searched the Cochrane Pregnancy and Childbirth Group trials register and the Cochrane Controlled Trials Register. Date of last search: December 1999. SELECTION CRITERIA: Acceptably controlled trials of nutrient administration for suspected impaired fetal growth compared to placebo or no treatment. DATA COLLECTION AND ANALYSIS: Trial quality was assessed. MAIN RESULTS: Three studies involving 121 women were included. They were small and/or had methodological limitations. No difference was detected in the number of small for gestational age infants whose mothers had received nutrients compared to those who did not (relative risk for calf blood extract 0.54, 95% confidence interval (CI) 0.20 to 1.47; for glucose 1.11, 95% CI 0.64 to 1.92; for galactose 0.78, 95% CI 0.39 to 1.54. REVIEWER’S CONCLUSIONS: There is not enough evidence to evaluate the use of nutrient therapy for suspected impaired fetal growth. The studies were too small to detect any rare adverse effects.


Abstract: The effects of supplementary traditional food on pregnant women were investigated in a clinical trial in Islamshahr, a suburban area 35 km southwest of Tehran. The study comprised 53 healthy mothers who were neither addicts nor on medication and were free from genetic disorders. The pregnant mothers’ health was evaluated by their weight gain, that of lactating mothers by breast milk adequacy, and that of newborns by their weight at birth. The experimental group received traditional food (rice-milk porridge, lentils, pottage, cheese, yogurt,
eggs, and milk with bread), supplying an extra 400 kcal energy and 15 g protein from the fourth month of pregnancy until childbirth. All subjects were weighed monthly. To ascertain breast milk sufficiency, the duration of exclusive breastfeeding and the growth trend of infants were surveyed. The study showed the weight gain in the experimental and control groups to be $11.0 \pm 2.9$ and $8.5 \pm 3$ kg respectively; the difference was 29.4% and statistically significant ($p<0.02$). The confounding variables (energy and protein intake, age, height, BMI, age at first pregnancy, parity, last pregnancy spacing, number of children, number of miscarriages, duration of residence in the area, family size, education, housing, occupation of the mother or her husband) did not reveal any significant differences. Maternal weight gain was higher in the experimental compared to the control group. Birth weights in experimental and control groups were $3.33 \pm 0.4$ and $3.08 \pm 0.3$ kg, respectively. This difference, which amounts to 8.1%, was statistically significant ($p<0.05$). While the two groups of newborns had equal breastfeeding duration, heights and weights of newborns were significantly higher in the experimental group. This was also confirmed when compared to the NCHS figures.


Abstract: BACKGROUND: The effect of vitamin A supplementation on the survival of infants aged <6 mo is unclear. Because most infant deaths occur in the first few month of life, maternal supplementation may improve infant survival. OBJECTIVES: The objective was to assess the effect of maternal vitamin A or beta-carotene supplementation on fetal loss and survival of infants <6 mo of age. DESIGN: Married women of reproductive age in 270 wards of Sarlahi district, Nepal, were eligible to participate. Wards were randomly assigned to have women receive weekly doses of 7,000 microg retinol equivalents as retinyl palmitate (vitamin A), 42 mg all-trans-beta-carotene, or placebo. Pregnancies were followed until miscarriage, stillbirth, maternal death, or live birth of one or more infants, who were followed through 24 wk of age. RESULTS: A total of 43,559 women were enrolled; 15,832 contributed 17,373 pregnancies and 15,987 live born infants to the trial. The rate of fetal loss was 92.0/1,000 pregnancies in the placebo group, comparable with rates in the vitamin A and beta-carotene groups, which had relative risks of 1.06 (95% CI: 0.91, 1.25) and 1.03 (95% CI: 0.87, 1.19), respectively. The 24-wk mortality rate was 70.8/1000 live births in the placebo group, comparable with rates in the vitamin A and beta-carotene groups, which had relative risks of 1.05 (95% CI: 0.87, 1.25) and 1.03 (95% CI: 0.86, 1.22), respectively. CONCLUSIONS: Small weekly doses of vitamin A or beta-carotene given to women before conception, during pregnancy, and through 24 wk postpartum did not improve fetal or early infant survival in Nepal.

Abstract: The association between anemia during pregnancy and spontaneous preterm birth was studied with a two-stage case-control design in a large, multiethnic cohort. Results of all hematologic measurements were abstracted from the prenatal and delivery records of 1706 of the 26,901 women in the cohort. Among women delivered of infants at term, mean hematocrit value was low during the early phase of the second trimester, stable until near term, then reached a maximum at 40 weeks’ gestation. The mean hematocrit value of black women was consistently lower than that of Asian, Mexican, and white women. Anemia (hematocrit value less than the tenth percentile for ethnic group and duration of pregnancy) at any time during the second trimester was positively associated with subsequent spontaneous preterm birth (odds ratio, 1.9; 95% confidence interval, 1.3 to 2.8). Compared with white women, the odds ratios for preterm birth were 2.0 (95% confidence interval, 1.6 to 2.4) for black, 1.2 (95% confidence interval, 0.9 to 1.6) for Asian, and 1.2 (95% confidence interval, 1.0 to 1.5) for Mexican women. Adjustment for second-trimester anemia had minimal influence on the odds ratios. We conclude that anemia during the second trimester was associated with preterm birth. However, it does not account for the large ethnic differences in preterm birth.


Abstract: BACKGROUND: Observational and non-randomized studies have suggested that energy/protein supplementation in pregnant women increases gestational weight gain and fetal growth. OBJECTIVES: The objective of this review was to assess the effects of a balanced protein/energy supplement for pregnant women on gestational weight gain and the outcome of pregnancy. SEARCH STRATEGY: The Cochrane Pregnancy and Childbirth Group trials register was searched. Date of last search: January 2000. SELECTION CRITERIA: Acceptably controlled trials of energy/protein supplementation for pregnant women in which the protein content of the supplement was ‘balanced’ (protein content less than 25% of total energy content). DATA COLLECTION AND ANALYSIS: One reviewer assessed trial quality and extracted data. Study authors were contacted for additional information. MAIN RESULTS: Thirteen trials were included. They were of variable quality. Balanced protein/energy supplementation was associated with modest increases in maternal weight gain (weighted mean difference 17 grams per week, 95% confidence interval 5–29 grams per week) and fetal growth (birth weight increase, weighted mean difference 25 grams, 95% confidence interval 4–55 grams). The reduction in risk of small for gestational birth was substantial, however (odds ratio 0.64, 95% confidence interval 0.53–0.78). These effects did not appear to be greater in undernourished women, nor did they seem to confer long term benefits to the child. No significant effects were detected on preterm birth, but significant reductions in stillbirth and neonatal death (based on only 3 trials) appear important. REVIEWER’S CONCLUSIONS: Balanced energy/protein supplementation improves fetal growth and may reduce the risk of fetal and neonatal death. The evidence is insufficient to evaluate whether there are other potential benefits to pregnant women or their infants.

**Abstract:** OBJECTIVES: To assess the effects of advising pregnant women to increase their energy and protein intakes on those intakes, on gestational weight gain, and on the outcome of pregnancy. SEARCH STRATEGY: The register of clinical trials maintained and updated by the Cochrane Pregnancy and Childbirth Group. SELECTION CRITERIA: All acceptably controlled comparisons of nutritional advice, whether administered on a one-to-one basis or to groups of women. DATA COLLECTION AND ANALYSIS: Data were extracted by the author from published reports, and supplemented by additional information from trialists contacted by the author. MAIN RESULTS: Four trials involving 1108 women were included. Advice to increase energy and protein intakes seems to be successful in achieving those goals, but the increases are lower than those reported in trials of actual protein/energy supplementation. Data concerning effects on pregnancy outcome are available only from one trial, and, given the fact that its analysis was based on individual women despite randomization by clinic, the calculated confidence intervals are undoubtedly too narrow. Moreover, the ‘significant’ reduction in preterm birth associated with advice is not consistent with the total absence of effect on mean gestational age. One trial found no reduction in the incidence of pre-eclampsia. No data have been reported on potential adverse effects that might accompany increased fetal size, such as an increased risk of prolonged labour or Caesarean section. REVIEWER’S CONCLUSIONS: Nutritional advice appears effective in increasing pregnant women’s energy and protein intakes, but the implications for fetal, infant, or maternal health cannot be judged from the available trials. Given the rather modest health benefits demonstrated with actual protein/energy supplementation (see the Cochrane review of ‘Balanced protein/energy supplementation in pregnancy’), however, the provision of such advice is unlikely to be of major importance.


**Abstract:** The effect of improving maternal nutrition during pregnancy on growth of the child has not been assessed, since previous studies supplemented the diets of children as well as mothers. In a controlled randomised trial in Madura, East Java, pregnant women received a high (HE) or low (LE) energy supplement that provided 1950 kJ (465 kcal) or 218 kJ (52 kcal), respectively, in the last trimester of pregnancy. The effect of this intervention on the children’s growth was assessed longitudinally for the first 5 years of life. Only the children of mothers who had complied for at least 90 days were included. Infants entered the study at birth and their growth was measured at 4-week intervals until 12 months old; thereafter they were measured every 3 months. Growth curves were calculated from a mathematical model, based on the best fit of actual measurements and the age-related growth velocity. Up to the age of 24 months, HE children were significantly heavier than LE children (p less than 0.05). HE children were also taller throughout the first 5 years (p less than 0.005 from 15 to 48 months, p less than 0.05 at both 3–12 and 60 months). Weight-for-height by age was similar in both groups, but stunting
(height-for-age) was less prevalent in HE children. In a community characterised by chronic energy deficiency among women of reproductive age, energy supplementation of women for the last 90 days of pregnancy was effective in the promotion of postnatal growth and reduction in malnutrition of preschool children.


Abstract: Report of a 1979 workshop held in Guatemala to review findings on the relationship of maternal nutrition to subsequent infant health and survival. The information presented is examined in light of then current services designed to enhance maternal and child health through improved nutrition. 3 working groups were formed to deal with selected aspects of the problem. Research findings, current practices and policy implications are analyzed in detail. Recently completed maternal nutrition intervention surveys indicate that supplementation increases newborn birth weight, and that this effect is greatest when supplementation is provided in the 3rd trimester of pregnancy. Data from several of the studies suggest that increased birth weight may have beneficial effects on perinatal and infant mortality levels and on subsequent child development. Since a large proportion of reproductive age women in developing countries are malnourished, this knowledge should give added impetus to maternal nutrition schemes. Care must be taken, however, to clearly establish a target group, rather than assuming uniform need in planning and implementing programs of remediation. Available research, along with easily conducted community surveys can be valuable in identifying need groups. Community and government commitment and cooperation, as well as self help represent essential inputs, and this should be kept firmly in mind during program planning and implementation.


Abstract: To study the relation of maternal periconceptional vitamin use to the risk of a congenital urinary tract anomaly (CUTA), we conducted a case-control study using the Washington State Birth Defect Registry. We identified CUTA cases with no known chromosomal abnormality in seven counties in western Washington State occurring between January 1, 1990, and December 31, 1991. We randomly selected a sample, as controls, of all infants delivered in five large hospitals in King County who did not have a birth defect and who were born in the same year as the cases. About 55% of all infants in King County and a smaller proportion of infants in the other six counties are delivered in these five hospitals. We interviewed mothers of 118 cases and 369 controls to obtain information about their vitamin use during the pregnancy and during the year before the conception. After adjustment for maternal race, family income, county of maternal residence, and birth year, we found that women who used multivitamins during the first trimester had only 15% the risk of bearing a child with a CUTA compared with women who did not take vitamins [odds ratio (OR)=0.15; 95% confidence interval
(CI)=0.05–0.43]. The reduction was smaller for use restricted to the second or third trimesters (OR=0.31; 95% CI=0.09–1.02). Among women who used vitamins during the first trimester, vitamin use before conception was not associated with any further reduction in the risk, nor did there appear to be an association with the amount or brand of vitamin used. (ABSTRACT TRUNCATED AT 250 WORDS).


Abstract: The relationship between maternal hematocrit and pregnancy outcome at various times in pregnancy was studied in 17,149 iron- and folate-supplemented pregnant women. On univariate analysis, early-pregnancy hematocrits below 37% were associated with preterm delivery. However, this relationship was not confirmed by multivariate analysis controlling for other risk factors. On both univariate and multivariate analyses, both early and later in pregnancy, hematocrits above 40% were associated with preterm delivery. In every gestational time period, at least part of the excess of preterm births was explained by an increase in indicated preterm deliveries. In both early and late pregnancy, and in both the univariate and multivariate analyses, only high hematocrits were associated with fetal growth retardation. The strongest association (odds ratio above 2) between high hematocrit and both fetal growth retardation and preterm delivery occurred with hematocrits at or above 43% at 31–34 weeks’ gestation.


Abstract: BACKGROUND: Neural tube defects arise during the development of the brain and spinal cord. OBJECTIVES: The objective of this review was to assess the effects of increased consumption of folate or multivitamins on the prevalence of neural tube defects periconceptionally (that is before pregnancy and in the first two months of pregnancy). SEARCH STRATEGY: We searched the Cochrane Pregnancy and Childbirth Group trials register. Date of last search: April 2001. SELECTION CRITERIA: Randomised and quasi-randomised trials comparing periconceptional supplementation by multivitamins with placebo, folate with placebo, or multivitamins with folate; different dosages of multivitamins or folate; pre-pregnancy dietary advice and counselling in primary care settings to increase the consumption of folate-rich foods, or folate-fortified foods, with standard care; increased intensity of information provision with standard public health dissemination. DATA COLLECTION AND ANALYSIS: Two reviewers assessed trial quality and extracted data. MAIN RESULTS: Four trials of supplementation involving 6,425 women were included. The trials all addressed the question of supplementation and they were of variable quality. Periconceptional folate supplementation reduced the incidence of neural tube defects (relative risk 0.28, 95% confidence interval 0.13 to 0.58). Folate supplementation did not significantly increase miscarriage, ectopic pregnancy or stillbirth, although there was a possible increase in multiple gestation. Multivitamins alone were not associated with prevention of neural tube defects and did not produce additional preventive
effects when given with folate. One dissemination trial, a community randomised trial, was
identified involving six communities, matched in pairs, and where 1,206 women of child-bearing
age were interviewed following the dissemination intervention. This showed that the provision of
printed material increased the awareness of the folate/neural tube defects association by 4%,
(odds ratio 1.37, 95% confidence interval 1.33 to 1.42). REVIEWER’S CONCLUSIONS:
Periconceptional folate supplementation has a strong protective effect against neural tube
defects. Information about folate should be made more widely available throughout the health
and education systems. Women whose fetuses or babies have neural tube defects should be
advised of the risk of recurrence in a subsequent pregnancy and offered continuing folate
supplementation. The benefits and risks of fortifying basic food stuffs, such as flour, with added
folate remain unresolved.

Syst. Rev. no. 2, p. CD001135.

Abstract: BACKGROUND: Anaemia in pregnancy is a major health problem in many developing
countries where nutritional deficiency, malaria and other parasitic infections contribute to
increased maternal and perinatal mortality and morbidity. OBJECTIVES: The objective of this
review was to assess the effects of routine iron and folate supplementation on haematological
and biochemical parameters and on pregnancy outcome. SEARCH STRATEGY: The Cochrane
Pregnancy and Childbirth Group trials register was searched. Study authors were also
contacted. SELECTION CRITERIA: Acceptably controlled trials of routine iron and folate
supplementation for pregnant women. DATA COLLECTION AND ANALYSIS: Eligibility and trial
quality were assessed by one reviewer. Study authors were contacted for additional information.
MAIN RESULTS: Eight trials involving 5449 women were included. Routine supplementation with
iron or folate raised or maintained the serum iron and ferritin levels and serum and red cell folate
levels. Supplementation resulted in a substantial reduction of women with a haemoglobin level
below 10 or 10.5 grams in late pregnancy. Routine supplementation with iron and folate had no
detectable effect on any substantive measures of either maternal or fetal outcome.
REVIEWER’S CONCLUSIONS: Routine supplementation with iron and folate appears to prevent
low haemoglobin at delivery. There is very little information on other outcomes for either mother
or baby. There are few data derived from communities where iron and folate deficiency is
common and anaemia is a serious health problem.

no. 2, p. CD000117.

Abstract: BACKGROUND: Anaemia in pregnancy is a major health problem in many developing
countries where nutritional deficiency, malaria and other parasitic infections contribute to
increased maternal and perinatal mortality and morbidity. OBJECTIVES: The objective of this
review was to assess the effects of iron supplementation on haematological and biochemical
parameters, and on pregnancy outcome. SEARCH STRATEGY: The Cochrane Pregnancy and
Childbirth Group trials register was searched. Study authors were also contacted. SELECTION
CRITERIA: Acceptably controlled trials of iron supplementation for pregnant women. DATA
COLLECTION AND ANALYSIS: Eligibility and trial quality were assessed by one reviewer. Study
authors were contacted for additional information. **MAIN RESULTS:** Twenty trials were included. Iron supplementation raised or maintained the serum ferritin above 10 milligrams per litre. It resulted in a substantial reduction of women with a haemoglobin level below 10 or 10.5 grams in late pregnancy. Iron supplementation, however, had no detectable effect on any substantive measures of either maternal or fetal outcome. One trial, with the largest number of participants of selective versus routine supplementation, showed an increased likelihood of caesarean section and post-partum blood transfusion, but a lower perinatal mortality rate (up to 7 days after birth). **REVIEWER’S CONCLUSIONS:** Iron supplementation appears to prevent low haemoglobin at birth or at six weeks post-partum. There is very little information on pregnancy outcomes for either mother or baby. There are few data derived from communities where iron deficiency is common and anaemia is a serious health problem.


**Abstract:** BACKGROUND: Iodine deficiency is the leading preventable cause of intellectual impairment in the world. Although iodine supplementation is generally considered to be safe, there is a possibility of high doses of iodine suppressing maternal thyroid function. OBJECTIVES: The objective of this review was to assess the effects of iodine supplementation before or during pregnancy in areas of iodine deficiency. SEARCH STRATEGY: We searched the Cochrane Pregnancy and Childbirth Group trials register. SELECTION CRITERIA: All acceptably controlled trials of maternal iodine supplementation during pregnancy with clinical outcomes. DATA COLLECTION AND ANALYSIS: Eligibility and trial quality were assessed by two reviewers. **MAIN RESULTS:** Three trials involving 1,551 women were included. In two trials, iodine supplementation was associated with a statistically significant reduction in deaths during infancy and early childhood (relative risk 0.71, 95% confidence interval 0.56 to 0.90). Iodine supplementation was associated with decreased prevalence of endemic cretinism at the age of four years (relative risk 0.27, 95% confidence interval 0.12 to 0.60) and better psychomotor development scores between four to 25 months of age. **REVIEWER’S CONCLUSIONS:** Iodine supplementation in a population with high levels of endemic cretinism results in an important reduction in the incidence of the condition with no apparent adverse effects.


**Abstract:** OBJECTIVE: Our objective was to examine whether improvement in maternal zinc status during pregnancy is positively associated with fetal neurobehavioral development in a Peruvian population. STUDY DESIGN: We electronically monitored, at 32 and 36 weeks’ gestation, 55 fetuses whose mothers were randomly assigned to receive, during pregnancy, a daily supplement containing 60 mg iron and 250 andmgr;g folate, with or without 15 mg zinc. Fetal heart rate and movement patterns were quantified in 55 and 34 fetuses, respectively, as indexes of neurobehavioral development. RESULTS: Fetuses of mothers who received zinc supplementation showed fewer episodes of minimal fetal heart rate variability, increased fetal heart rate range, an increased number of accelerations, an increased number of movement
bouts, an increased amount of time spent moving, and an increased number of large movements. Differences by supplementation type increased with gestational age and were statistically significant at 36 weeks’ gestation (P<.05). CONCLUSION: Improving maternal zinc status through prenatal supplementation may improve fetal neurobehavioral development.


Abstract: A randomised double-blind prevention trial with a factorial design was conducted at 33 centres in seven countries to determine whether supplementation with folic acid (one of the vitamins in the B group) or a mixture of seven other vitamins (A,D,B1,B2,B6,C and nicotinamide) around the time of conception can prevent neural tube defects (anencephaly, spina bifida, encephalocele). A total of 1817 women at high risk of having a pregnancy with a neural tube defect, because of a previous affected pregnancy, were allocated at random to one of four groups—namely, folic acid, other vitamins, both, or neither. 1195 had a completed pregnancy in which the fetus or infant was known to have or not have a neural tube defect; 27 of these had a known neural tube defect, 6 in the folic acid groups and 21 in the two other groups, a 72% protective effect (relative risk 0.28, 95% confidence interval 0.12–0.71). The other vitamins showed no significant protective effect (relative risk 0.80, 95% CI 0.32–1.72). There was no demonstrable harm from the folic acid supplementation, though the ability of the study to detect rare or slight adverse effects was limited. Folic acid supplementation starting before pregnancy can now be firmly recommended for all women who have had an affected pregnancy, and public health measures should be taken to ensure that the diet of all women who may bear children contains an adequate amount of folic acid.


Abstract: Maternal consumption of folic acid before pregnancy and during early pregnancy is associated with a reduced risk for some birth defects. Whether folic acid can reduce the risk for imperforate anus is unknown. As part of a public health campaign conducted in China from 1993 through 1995, the outcomes of pregnancies of > or =20 weeks’ gestation were evaluated among women using folic acid supplements. The women were asked to take one pill containing 400 microg of folic acid (without other vitamins) every day from the time of their premarital examination until the end of their first trimester of pregnancy. Rates of imperforate anus and risk ratios for imperforate anus among the offspring of these women were calculated according to folic acid use. Among the offspring of women who took folic acid and women who did not take folic acid, 20 and 30 infants with imperforate anus were identified, respectively. The rate of imperforate anus was 3.1 per 10,000 among the offspring of women who did not take folic acid and 1.6 per 10,000 among the offspring of women who took folic acid; adjusted for maternal age, the risk ratio was 0.59 (95% confidence interval: 0.33, 1.07). Daily maternal consumption of 400 microg of folic acid before and during early pregnancy may reduce the risk for imperforate anus.

**Abstract:** BACKGROUND: Infant malnutrition and mortality rates are high in less-developed countries especially in low-birthweight infants. Zinc deficiency is also widely prevalent in these circumstances. We aimed to assess the effect of daily zinc supplements given to pregnant mothers on their infants’ growth and morbidity. METHODS: We did a double-blind, placebo controlled, randomised trial in 199 and 221 Bangladeshi infants whose mothers took 30 mg daily elemental zinc or placebo, respectively, from 12 to 16 weeks’ gestation until delivery. Infants were followed up until 6 months of age. We obtained data for morbidity every week by mothers’ recall. Infants’ anthropometric measurements were done every month, and their serum zinc was assessed at 1 and 6 months of age. FINDINGS: Infants of mothers who received zinc during pregnancy had at age 6 months reduced risks compared with those in the placebo group for acute diarrhoea (risk ratio 0.84; 95% CI 0.72–0.98), dysentery (0.36; 0.25–0.84), and impetigo (0.53; 0.34–0.82). These reductions were seen in low-birthweight infants but not in those with normal birthweight. There were no differences in infant growth or serum zinc concentrations between treatment groups. INTERPRETATION: Maternal zinc supplementation during pregnancy resulted in a reduction of the health risks in Bangladeshi low-birthweight infants, although this intervention did not improve birthweight. Whether zinc should be added to usual antenatal supplements in regions with high rates of low birthweight should be reviewed.


**Abstract:** Maternal zinc deficiency during pregnancy has been related to adverse pregnancy outcomes. Most studies in which pregnant women have been supplemented with zinc to examine effects on pregnancy outcome have been carried out in industrialized countries and the results have been inconclusive. This review discusses preliminary findings of eight randomized, controlled intervention trials performed recently in less-developed countries. It is based on evidence presented by investigators and discussed during a workshop held in Wageningen, The Netherlands in June 2001. Preliminary findings from these studies indicate maternal zinc supplementation has a beneficial effect on neonatal immune status, early neonatal morbidity and infant infections. With respect to labor and delivery complications, gestational age at birth, maternal zinc status and health and fetal neurobehavioral development, evidence is conflicting and more research is required. Data currently available do not support the hypothesis that maternal zinc supplementation promotes intrauterine growth. Thus despite the emerging evidence for a positive effect of zinc on some outcomes of pregnancy, the workshop concluded that the full results of studies carried out need to be known and that more research is required to determine the benefits of large-scale introduction of zinc supplementation of pregnant women in less-developed countries.

**Abstract:** Birthweight data from 197 rural Gambian women who received an energy-dense prenatal dietary supplement over a 4-yr period (net intake = 430 kcal/d) was compared with data from 182 women from 4 baseline years. Preintervention birthweights averaged 2944 +/– 43 (SEM) g when women were in positive energy balance during the dry harvest season (pregnancy weight gain greater than 1,200 g/mo). Birthweights decreased to 2808 +/– 41 g (p less than 0.01) in the wet season when food shortages and agricultural work caused negative energy balance (weight gain less than 500 g/mo). There were no detectable secular trends in the baseline data. Supplementation was ineffective during the dry season but highly effective during the wet season: +225 +/– 56 g, p less than 0.001 (unadjusted) or +200 +/– 53 g, p less than 0.001 (adjusted for sex, season, and parity) by between-child multiple regression analysis; +231 +/– 65 g, p less than 0.001 by within-mother analysis. The proportion of low-birthweight babies (less than 2,501g) decreased from 23.7–7.5%, p less than 0.002. The observed threshold effect emphasizes the importance of selective targeting of interventions to truly at-risk groups.


**Abstract:** We studied the effect of iron supplementation on the iron status of mothers and on biochemical iron status and clinical and anthropometric measures in their infants. The subjects were 197 pregnant women selected at 28 wk +/– 21 d of gestation at a mother-and-child health center in Niamey, Niger. Ninety-nine women received 100 mg elemental Fe/d throughout the remainder of their pregnancies and 98 received placebo. The prevalence of anemia and iron deficiency decreased markedly during the last trimester of pregnancy in the iron-supplemented group but remained constant in the placebo group. Three months after delivery, the prevalence of anemia was significantly higher in the placebo group. At delivery, there were no differences between the two groups in cord blood iron variables. Three months after delivery, serum ferritin concentrations were significantly higher in infants of women in the iron-supplemented group. Mean length and Apgar scores were significantly higher in infants with mothers in the iron group than in those with mothers in the placebo group.


**Abstract:** An extensive literature review was conducted to identify whether iron deficiency, iron-deficiency anemia and anemia from any cause are causally related to low birth weight, preterm birth or perinatal mortality. Strong evidence exists for an association between maternal hemoglobin concentration and birth weight as well as between maternal hemoglobin concentration and preterm birth. It was not possible to determine how much of this association is attributable to iron-deficiency anemia in particular. Minimal values for both low birth weight and
preterm birth occurred at maternal hemoglobin concentrations below the current cut-off value for anemia during pregnancy (110 g/L) in a number of studies, particularly those in which maternal hemoglobin values were not controlled for the duration of gestation. Supplementation of anemic or nonanemic pregnant women with iron, folic acid or both does not appear to increase either birth weight or the duration of gestation. However, these studies must be interpreted cautiously because most are subject to a bias toward false-negative findings. Thus, although there may be other reasons to offer women supplemental iron during pregnancy, the currently available evidence from studies with designs appropriate to establish a causal relationship is insufficient to support or reject this practice for the specific purposes of raising birth weight or lowering the rate of preterm birth.


Abstract: The activity of 81 pregnant, lactating and non-pregnant, non-lactating women in the rural subsistence farming village of Keneba, The Gambia, was measured for 12 months using a combination of 24-hour activity recall and activity diaries. During the course of pregnancy women became gradually less active and in the month before giving birth were 25% less active than non-pregnant, non-lactating women and lactating women when women in the month after birth were excluded. There were striking seasonal changes in activity. During the dry season, from January to April, lactating women were active 55% of the 15-hour working day. At the start of the farming season in June and July this figure increased to 92%. Similar changes were observed in the pregnant women whose activity increased from a mean 50% in April to 83% in June. The period of intense activity coincided with a general shortage of food and increased incidence of disease. The intense activity of pregnant women in the farming season coupled with the low food intakes are most probably the main factors responsible for the striking fall in birth weights observed at this time of the year. Reduced lactational performance was apparent in relation to high activity when it necessitated the mother regularly spending much of the day away from her child. FAO/WHO-recommended energy intakes during pregnancy and lactation are inappropriate for this community.


Abstract: The potential cost-effectiveness of antenatal nutrition interventions to improve pregnancy outcomes in the developing world has not undergone formal evaluation. Furthermore, the effectiveness of antenatal care in improving maternal or fetal and neonatal health has been questioned. However, reasonably compelling evidence from randomized trials shows that nutrition interventions can prevent both infant (iodine supplementation) and maternal (vitamin A and beta-carotene supplementation) deaths, and informal analysis suggests that the cost-effectiveness of nutrition interventions would be comparable and, in some cases, markedly superior to several standard antenatal interventions. Future efforts to establish the cost-
effectiveness of nutrition interventions in developing countries will depend on conducting large, pragmatic clinical trials that use region- and resource-appropriate interventions with mortality or valid, incontrovertibly severe morbidity endpoints. If such trials establish effectiveness, credible cost-effectiveness analyses can then be performed.


Abstract: Using criteria from the Centers for Disease Control, anemia and iron-deficiency anemia (anemia with serum ferritin concentrations less than 12 micrograms/L) were assessed in greater than 800 inner-city gravidas at entry to prenatal care. Iron-deficiency anemia was associated with significantly lower energy and iron intakes early in pregnancy and a lower mean corpuscular volume. The odds of low birth weight were tripled and of preterm delivery more than doubled with iron deficiency, but were not increased with anemia from other causes. When vaginal bleeding at or before entry to care accompanied anemia, the odds of a preterm delivery were increased fivefold for iron-deficiency anemia and doubled for other anemias. Inadequate pregnancy weight gain was more prevalent among those with iron-deficiency anemia and in those with anemias of other etiologies. The prevalence of iron-deficiency anemia (3.5%), however, was lower than anticipated for an inner-city, minority population in whom most anemias had been attributed clinically to iron deficiency.


Abstract: Anemia diagnosed early in pregnancy is associated with increased risks of low birth weight and preterm delivery. In several studies, the association between anemia and outcomes reversed direction during the third trimester; maternal anemia was no longer a risk factor for poor pregnancy outcomes. Camden study data were used to examine the probable cause of this observation. Maternal iron-deficiency anemia, diagnosed at entry to prenatal care, was associated with low dietary energy and iron, inadequate gestational gain, and twofold or greater increases in the risks of preterm delivery and low birth weight. During the third trimester, these associations (except with inadequate gestational gain) were no longer present. This reversal of risk status may be attributable to the poor predictive value of anemia and iron deficiency tests during the third trimester. However, the relationship between poor diet (with inadequate iron intake) and increased likelihood of preterm delivery persisted during the third trimester.


Abstract: The objective of this study was to examine the association of prenatal multivitamin/mineral supplement use during the first and second trimesters of pregnancy by low income, urban women in the Camden Study (1985–1995, n = 1,430) and preterm delivery (< 37 completed weeks) and infant low birth weight (< 2,500 g). Prenatal supplement use was
corroborated by assay of circulating micronutrients at entry to care (no differences) and week 28 gestation (increased concentrations of folate and ferritin for supplement users). Compared with women who entered care during the first or second trimester but did not use prenatal supplements, supplement use starting in the first or second trimester was associated with approximately a twofold reduction in risk of preterm delivery. After controlling for potential confounding variables, risk of very preterm delivery (<33 weeks' gestation) was reduced more than fourfold for first trimester users and approximately twofold when use dated from the second trimester. Infant low birth weight and very low birth weight (<1,500g) risks were also reduced. Risk of low birth weight was reduced approximately twofold with supplement use during the first and second trimester. Diminution in risk was greater for very low birth weight infants, amounting to a sevenfold reduction in risk of very low birth weight with first trimester supplementation and a greater than sixfold reduction when supplement use started in the second trimester. Thus, in low income, urban women, use of prenatal multivitamin/mineral supplements may have the potential to diminish infant morbidity and mortality.


Abstract: The periconceptional use of folic acid-containing supplements reduces the first occurrence, as well as the recurrence, of neural tube defects. Women of populations in which adverse pregnancy outcomes are prevalent often consume diets that contain a low density of vitamins and minerals, including folate. Folate intake may need to be sustained after complete closure of the neural tube to decrease the risk of other poor pregnancy outcomes. A central feature of embryonic and fetal development is widespread cell division; folate is central because of its role in nucleic acid synthesis. During gestation, marginal folate nutriture can impair cellular growth and replication in the fetus or placenta. Folate deficiency can occur because dietary folate intake is low or because the metabolic requirement for folate is increased by a particular genetic defect or defects. During pregnancy, low concentrations of dietary and circulating folate are associated with increased risks of preterm delivery, infant low birth weight, and fetal growth retardation. A metabolic effect of folate deficiency is an elevation of blood homocysteine. Likewise, the presence of maternal homocysteine concentrations have been associated both with increased habitual spontaneous abortion and pregnancy complications (eg, placental abruption and preeclampsia), which increase the risk of poor pregnancy outcome and of decreased birth weight and gestation duration.


Abstract: Women are advised to take folic acid before they conceive as a precaution against neural-tube defects. However, the use of folic acid in preventing orofacial clefts is unknown. We investigated whether a woman’s periconceptional use of multivitamins containing folic acid was associated with a reduced risk of orofacial clefts. We derived data from a population-based case-control study of fetuses and liveborn infants with orofacial anomalies among a 1987–89 cohort of births in California. We interviewed 731 (84.7%) of eligible mothers with orofacial cleft
case infants and 734 (78.2%) mothers with non-malformed control infants. We found a reduced risk of orofacial clefts if the mother had used multivitamins containing folic acid during the period from one month before through two months after conception. The odds ratios ranged from 0.50–0.73 depending on cleft phenotype. Controlling for the potential influence of other variables did not substantially alter the results. Maternal daily consumption of cereal containing folic acid was also associated with a reduced risk of orofacial clefts. Women who used multivitamins containing folic acid periconceptionally had a 25–50% reduction in risk for offspring with orofacial clefts compared to women who did not use such vitamins. However, this association may not be attributable to folic acid specifically, but may be a consequence of other multivitamin supplement components, or behaviours, that are highly correlated with the use of multivitamins containing folic acid.


Abstract: This brief review explores the available epidemiologic data to investigate the question of whether strenuous work by women during pregnancy in developing countries influences micronutrient status and thereby increase risks of adverse pregnancy outcomes. Some data exist on the potential relationship between strenuous work or physical activity and nutrient compromise, strenuous work or physical activity and adverse reproductive outcomes and micronutrient intakes or status and adverse reproductive outcomes. No substantial body of data exists that has directly investigated the potential causal path of whether strenuous work during pregnancy alters micronutrient status leading to adverse reproductive outcome. Search of the literature identified only a few papers from developing countries that provided even remotely related data on the topic. Thus, the available data are insufficient for drawing firm inferences that strenuous work, in a developing country, alters a pregnant woman’s nutritional status and therefore affects her risk of an adverse pregnancy outcome. Effects on nutritional status, micronutrients in particular, of pregnant women from strenuous physical activities at work or in other lifestyle events require further study in developing countries.


Abstract: Pregnancy requires additional maternal absorption of iron. Maternal iron status cannot be assessed simply from hemoglobin concentration because pregnancy produces increases in plasma volume and the hemoglobin concentration decreases accordingly. This decrease is greatest in women with large babies or multiple gestations. However, mean corpuscular volume does not change substantially during pregnancy and a hemoglobin concentration <95 g/L in association with a mean corpuscular volume <84 fL probably indicates iron deficiency. Severe anemia (hemoglobin <80 g/L) is associated with the birth of small babies (from both preterm labor and growth restriction), but so is failure of the plasma volume to expand. Hemoglobin concentrations >120 g/L at the end of the second trimester are associated with a <\=3-fold increased risk of preeclampsia and intrauterine growth restriction. The minimum incidence of low birth weight (<2.5 kg) and of preterm labor (<37 completed weeks) occurs in association with a
hemoglobin concentration of 95–105 g/L. This is widely regarded as indicating anemia in the pregnant woman but, if associated with a mean corpuscular volume >84 fL, should be considered optimal.


Abstract: Populations of Mexican descent have high occurrences of neural tube defects (NTDs). A recent study suggested that folic acid supplements may not protect these populations from NTDs. In a case-control study, the authors investigated the role of folic acid and dietary folate intake in NTD risk among Mexican Americans living along the Texas-Mexico border. From January 1995 to February 1999, 148 Mexican-American women with NTD-affected pregnancies and 158 women with normal live births were interviewed in person about use of vitamin supplements and dietary intakes during a 6-month periconceptional period (from 3 months before conception to 3 months after conception). Daily preconceptional consumption of vitamin supplements containing folic acid was 2.5% in control women and 2.0% in case women (odds ratio = 0.77; 95% confidence interval (CI): 0.19, 3.22). With adjustment for maternal age, education, obesity, and previous stillbirth or miscarriage, the risk estimate was essentially null (odds ratio = 1.12; 95% CI: 0.22, 5.78). Combined folic acid intake from diet and supplements showed only a modest risk reduction for intakes of > or = 1.0 mg per day (adjusted odds ratio = 0.73; 95% CI: 0.31, 1.72). The fact that the primary folic acid exposure was in the form of dietary polyglutamates rather than the more easily absorbed supplemental monoglutamates may explain an apparent decreased effect in this population.


Abstract: The study attempted to determine if heavy physical labour by mothers during pregnancy affected fetal growth when such mothers had calorie intakes which were below 70 per cent of WHO/FAO recommended standards. Full term infants of such mothers had a mean birth weight of 3060 +/- 355 (SD) g compared to 3270 +/- 368 SD g for the newborn of less physically active mothers on similar low calorie diets (P less than 0.01). The mothers who engaged in heavy labour had a mean pregnancy weight gain of 3.3 +/- 2.4 (SD) kg, independent of the birth weight of their offspring, compared with 5.9 +/- 3.3 kg for the less active mothers (P less than 0.001). The mothers' weight in early pregnancy had an insignificant influence on birth weights when mothers were on low calorie intakes.

**Abstract:** Early fetal vitamin A supplies must be regulated to avoid teratogenic consequences from too little or too much. Late in gestation, adequate maternal vitamin A status is important for newborn reserves and for sustaining adequate breast-milk concentrations. Vitamin A supplements are not needed for most pregnant women in Western countries who consume the recommended dietary allowance during their reproductive years. Increased consumption of vitamin A-rich foods can meet increased needs during lactation. Women in developing countries whose habitual intakes are near basal needs should receive an additional 100 micrograms retinol equivalents (RE) during pregnancy and 300 micrograms RE during lactation. Supplements not above 3000 micrograms RE (10,000 IU) daily are safe for fertile women where circumstances preclude obtaining the needed increment through diet. The first postpartum month is the only safe period during which to provide deficient lactating women with a single high-dose supplement to benefit the mother and breast-feeding infant for several months.


**Abstract:** The study consisted of 169 mothers enrolled during two consecutive pregnancies and the intervening lactation period in the Guatemalan Nutritional Supplementation Study. Women were grouped for this analysis according to the levels of caloric supplementation that they received (high or low) during two consecutive pregnancies and the period between them. The supplement also contained minerals and vitamins. Data were analyzed adjusting for maternal height, birth interval, parity, length of lactation, socioeconomic status, birth weight of the first offspring, gestational age of the second offspring, and caloric supplementation, expressed either in continuous fashion (total intake) or as caloric supplementation per week. The adjusted mean birth weights of the second offspring of women with high supplementation during two pregnancies (about an extra 180 kcal/d), and the in-between lactation period (about an extra 245 kcal/d), were up to 301 g greater than that of the low supplementation group. Women with high supplementation while breast-feeding their first offsprings and during their second pregnancies had babies up to 150 g heavier than the reference group; those mothers with high supplementation only during the second pregnancy had infants about 124 g heavier than those of the low supplementation group. Therefore, high supplementation during two consecutive pregnancies and their intervening lactation period among chronically, yet moderately, malnourished women was capable of increasing the mean birth weight to levels closer to those reported for industrialized populations. The mean birth weight increase is between two and three times greater than the effect shown in almost all of the previous studies of this topic.


**Abstract:** A state-of-the-art report on the use of simple, inexpensive anthropometric indicators to measure the nutritional status of pregnant women, predict pregnancy outcome, and identify women at risk. Emphasis is placed on measurements and reference values that are simple and sensitive, have high predictive value, require inexpensive equipment, and are suitable for
immediate use in settings where resources, equipment, and staff are limited. Tools evaluated range from charts for recording weight gain during pregnancy to a simple band, made from used X-ray film, for measuring arm circumference.

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Abstract: There is accumulating evidence that periconceptional multivitamin use may prevent the occurrence of some birth defects other than neural tube defects. Using data from the population-based Atlanta Birth Defects Case-Control Study, we investigated the possible association between periconceptional multivitamin use and the occurrence of limb deficiency. We examined the periconceptional use of multivitamins among mothers of 117 babies with nonsyndromic limb deficiency who were liveborn or stillborn to residents of metropolitan Atlanta from 1968 to 1980 and among mothers of 3,029 control babies born without birth defects who were randomly selected through birth certificates. We found that children whose mothers were periconceptional multivitamin users had a lower risk of having a limb deficiency [odds ratio (OR)=0.47; 95% confidence interval (CI)=0.23–0.97]. This protective effect, however, was mostly seen for transverse limb deficiency (OR=0.30; 95% CI=0.07–1.32) and not for longitudinal deficiency (including preaxial and postaxial deficiencies; OR=1.03; 95% CI=0.17–4.30). Adjustment for potential confounding factors did not change these findings. We found a trend of decreasing risk for all transverse limb deficiencies with earlier vitamin use. These data indicate that mothers’ periconceptional multivitamin use may reduce the risk for some types of limb deficiency among their offspring. In addition, because we did not find the protective effect for all types of limb deficiency, the data may also indicate causal heterogeneity of limb deficiencies.


Abstract: Iron supplementation is a commonly used strategy to meet the increased requirements of at-risk groups, such as women of childbearing age, especially during pregnancy. Other at-risk groups for which iron supplementation may be appropriate include infants, young children, adolescents and the elderly. There is a need to consider iron supplementation as part of a comprehensive strategy for the prevention of iron deficiency, and not just as a treatment for anemia that is stopped as soon as clinical improvement is noted. Experience in developing countries indicates that often the poorest women with the most deficient intakes are the least likely to receive iron supplements during pregnancy. Providing supplements to women during antenatal care visits is useful but often inadequate, so other delivery channels must also be explored, including private sector markets and community networks. Communication efforts must
be expanded to increase understanding of the importance of taking supplements and to address any fears or misconceptions relating to supplementation. Overall, we must increase the capacity of individuals and communities to define, analyze and act to address their own health needs.
Maternal Infections


Abstract: These guidelines for the treatment of patients who have sexually transmitted diseases (STDs) were developed by the CDC staff members after consultation with a group of invited experts who met in Atlanta on February 10–12, 1997. The information in this report updates the “1993 Sexually Transmitted Diseases Treatment Guidelines” Included are new recommendations for treatment of primary and recurrent genital herpes and management of pelvic inflammatory disease; a new patient-applied medication for treatment of genital warts; and a revised approach to the management of victims of sexual assault. Revised sections describe the evaluation of urethritis and the diagnostic evaluation of congenital syphilis. These guidelines also include expanded sections concerning STDs among infants, children, and pregnant women and the management of patients who have asymptomatic human immunodeficiency virus infection, genital warts, and genital herpes. Guidelines are provided for vaccine-preventable STDs, including recommendations for the use of hepatitis A and hepatitis B vaccines.

Available at: http://www.cdc.gov/mmwr/PDF/RR/RR4701.pdf


Abstract: OBJECTIVE: To study the human teratogenic potential of isoniazid and other anti-tuberculosis drug treatment during pregnancy. DESIGN AND SETTING: Cases from a large population-based dataset at the Hungarian Case-Control Surveillance of Congenital Abnormalities, and controls from the National Birth Registry, between 1980 and 1996. Information on all oral anti-tuberculosis drug treatments during pregnancy was medically recorded. STUDY PARTICIPANTS: Women who had newborns or fetuses with congenital abnormalities (case group), and women who had babies with no congenital abnormality (control group). MAIN OUTCOME MEASURES: Congenital abnormalities in newborn infants and fetuses diagnosed prenatally during the second and third trimesters, and postnatally from birth to the age of one year. RESULTS: Of 38,151 controls, 29 (0.08%) were exposed to anti-tuberculosis drug treatment during pregnancy; the corresponding figures for cases were 22,865 and 11 (0.05%). The prevalence odds ratio was 0.6 (95%CI 0.3–1.3). Analysis of isoniazid and other oral antituberculosis drug use during the second and third months of gestation, i.e., in the critical period for most major congenital abnormalities, in case-control pairs did not indicate a teratogenic effect of these drugs in any group with congenital abnormality. CONCLUSION: Maternal exposure to oral anti-tuberculosis drugs during pregnancy did not show a detectable teratogenic risk to the fetus; however, the number of pregnant women who were treated with these drugs during the critical period of most major congenital abnormalities was limited (six cases vs. 21 controls).

Abstract: BACKGROUND: Up to 30% of mothers develop acute pyelonephritis if asymptomatic bacteriuria is untreated. Asymptomatic bacteriuria may have a role in preterm birth or it may be a marker for low socioeconomic status which is associated with low birth weight. OBJECTIVES: The objective of this review was to assess the effect of antibiotic treatment for asymptomatic bacteriuria on persistent bacteriuria during pregnancy, the risk of preterm delivery, and the development of pyelonephritis. SEARCH STRATEGY: I searched the Cochrane Pregnancy and Childbirth Group trials register. Date of last search: December 2000. SELECTION CRITERIA: Randomised trials comparing antibiotic treatment with placebo or no treatment in pregnant women with asymptomatic bacteriuria found on antenatal screening. DATA COLLECTION AND ANALYSIS: Trial quality was assessed. MAIN RESULTS: Fourteen studies were included. Overall the study quality was not strong. Antibiotic treatment compared to placebo or no treatment was effective in clearing asymptomatic bacteriuria (odds ratio 0.07, 95% confidence interval 0.05 to 0.10). The incidence of pyelonephritis was reduced (odds ratio 0.24, 95% confidence interval 0.19 to 0.32). Antibiotic treatment was also associated with a reduction in the incidence of preterm delivery or low birth weight babies (odds ratio 0.60, 95% confidence interval 0.45 to 0.80). REVIEWER’S CONCLUSIONS: Antibiotic treatment is effective in reducing the risk of pyelonephritis in pregnancy. An apparent reduction in preterm delivery is consistent with current theories about the role of infection in preterm birth, but this association should be interpreted with caution.


Abstract: BACKGROUND. Bacterial vaginosis is believed to be a risk factor for preterm delivery. We undertook a study of the association between bacterial vaginosis and the preterm delivery of infants with low birth weight after accounting for other known risk factors. METHODS. In this cohort study, we enrolled 10,397 pregnant women from seven medical centers who had no known medical risk factors for preterm delivery. At 23 to 26 weeks' gestation, bacterial vaginosis was determined to be present or absent on the basis of the vaginal pH and the results of Gram's staining. The principal outcome variable was the delivery at less than 37 weeks' gestation of an infant with a birth weight below 2500 g. RESULTS. Bacterial vaginosis was detected in 16 percent of the 10,397 women. The women with bacterial vaginosis were more likely to be unmarried, to be black, to have low incomes, and to have previously delivered low-birth-weight infants. In a multivariate analysis, the presence of bacterial vaginosis was related to preterm delivery of a low-birth-weight infant (odds ratio, 1.4; 95 percent confidence interval, 1.1 to 1.8). Other risk factors that were significantly associated with such a delivery in this population were the previous delivery of a low-birth-weight infant (odds ratio, 6.2; 95 percent confidence interval, 4.6 to 8.4), the loss of an earlier pregnancy (odds ratio, 1.7; 1.3 to 2.2), primigravidity (odds ratio, 1.6; 1.1 to 1.9), smoking (odds ratio, 1.4; 1.1 to 1.7); and black race (odds ratio, 1.4; 1.1 to 1.7). Among women with bacterial vaginosis, the highest risk of preterm delivery of a low-birth-
weight infant was found among those with both vaginal bacteroides and Mycoplasma hominis (odds ratio, 2.1; 95 percent confidence interval, 1.5 to 3.0). CONCLUSIONS. Bacterial vaginosis was associated with the preterm delivery of low-birth-weight infants independently of other recognized risk factors.


Abstract: Congenital rubella syndrome (CRS) can lead to deafness, heart disease, and cataracts, and a variety of other permanent manifestations. In developing countries, the burden of CRS has been assessed as follows: by surveillance of CRS; by surveillance of acquired rubella; by age-stratified serosurveys; and by serosurveys documenting the rubella susceptibility of women of childbearing age. During rubella outbreaks, rates of CRS per 1,000 live births were at least 1.7 in Israel, 1.7 in Jamaica, 0.7 in Oman, 2.2 in Panama, 1.5 in Singapore, 0.9 in Sri Lanka, and 0.6 in Trinidad and Tobago. These rates are similar to those reported from industrialized countries during the pre-vaccine era. Special studies of CRS have been reported from all WHO regions. Rubella surveillance data show that epidemics occur every 4-7 years, similar to the situation in Europe during the pre-vaccination era. In developing countries, the estimated average age at infection varies from 2–3 years to 8 years. For 45 developing countries we identified serosurveys of women of childbearing age that had enrolled > or = 100 individuals. The proportion of women who remained susceptible to rubella (e.g. seronegative) was < 10% in 13 countries. 10–24% in 20 countries, and > or = 25% in 12 countries. Discussed are methods to improve the surveillance of rubella and CRS in developing countries.


Abstract: In 1995–96 we conducted a review of rubella immunization strategies. Worldwide, 78 countries (more than one-third) reported a national policy of using rubella vaccine. This was closely related to country economic status. Based on the United Nations country classification, rubella vaccine is used in 92% of industrialized countries, 36% of those with economies-in-transition, and 28% of developing countries. Cases of congenital rubella syndrome (CRS) may be prevented as follows: by providing direct protection to women and/or schoolgirls (a selective vaccination strategy); by vaccinating boys and girls to provide indirect protection by reducing the transmission of rubella virus (a childhood vaccination strategy); or by a combination of these approaches (a combined strategy). A combined strategy was most commonly reported (60% of countries); seven countries (9%) reported a selective strategy; and 24 countries (31%) reported only childhood immunization. Experience has shown that it is essential to include vaccination of women of childbearing age in any rubella control strategy. Childhood vaccination alone may pose a risk of an increase in CRS cases. Although many countries have introduced rubella vaccine, few report any data on the impact of vaccination. Countries using rubella vaccine need to establish surveillance for rubella and CRS and monitor coverage in each of the target groups.

**Abstract:** Virological and clinical data from 73 hepatitis C virus (HCV)-infected pregnant women who gave birth to 75 children were merged retrospectively, by logistic regression analysis, to investigate risk factors for vertical transmission of HCV. Eighty-two percent of the HCV-infected mothers were HCV-RNA-positive during pregnancy, and 10% were coinfected with human immunodeficiency virus (HIV). Nine children were HCV infected, 1 was HIV infected, but none was HIV-HCV coinfected. Among vaginal deliveries, the mean HCV load of mothers who transmitted HCV to their infants was higher than that of those who did not (8.1 x 10^5 vs. 1.4 x 10^4 copies/mL; P=.056). A reduction in umbilical cord-blood pH (relative risk, 3.9; P=.04) or the occurrence of perineal or vaginal laceration (relative risk, 6.4; P=.028) during vaginal delivery significantly increased the risk of vertical HCV transmission. In conclusion, high maternal viremia, infantile hypoxia, and intrapartum exposure to virus-contaminated maternal blood increased the risk of HCV transmission during vaginal deliveries. Consequently, cesarean section may reduce the risk of vertical HCV transmission in selected cases.


**Abstract:** Infection of the pregnant woman may affect fetal growth indirectly through interference with the woman's nutritional status, which in turn may result in diminished fetal nutrition. In addition, there may be a direct effect on the fetus by infection across the placental barrier. However, not enough is known about the effects of specific maternal infections. The best available information relates to urinary tract infections and indicates a correlation between such infections in the pregnant woman and low birth weight and neonatal mortality throughout the world. It does not seem to be affected by the mother's social class. Likewise, vaginal colonization with T-strain of Mycoplasma, Listeria monocytogenes, HVH type 2, and CMV has been associated with low birth weight and fetal wastage. On the other hand, data relating such common diseases as upper-respiratory tract infections and diarrhea, which are highly prevalent among the rural women we studied, and fetal survival and well being are lacking. However, in view of the high incidence of stillbirths, prematurity, and fetal growth retardation in the Indian village we studied, it is reasonable to suspect causal influence of the highly prevalent maternal infections. There is a great need for a precise assessment of this problem. Our prospective study, designed to answer this question, is in progress.


**Abstract:** In a survey of 283 deliveries in Swaziland, active syphilis (positive results in the Treponema pallidum haemagglutination assay (TPHA) and the rapid plasma reagin (RPR) test) was found in 37 (13.1%) and possibly active infection (positive TPHA but negative RPR test results) in a further 87 (30.7%). The perinatal mortality of untreated mothers with active disease
was 21.9% (7/32). The RPR test carried out antenatally by nurses had a sensitivity of 36% (13/36) and predictive accuracy of 48% (13/27). Awareness of this incidence of syphilis led to improved antenatal clinic measures and the prophylactic treatment of all newborn infants. More comprehensive serology is discussed and the prophylactic treatment of mothers considered. The need for health education aiming at safer sexual practices is of paramount importance in a society facing the arrival of the human immunodeficiency virus.


Abstract: BACKGROUND: Neisseria gonorrhoeae can be transmitted from the mother’s genital tract to the newborn during birth and can cause gonococcal ophthalmia neonatorum. OBJECTIVES: The objective of this review was to assess the effects of antibiotic regimens in the treatment of genital infection with gonorrhoea during pregnancy with respect to neonatal and maternal morbidity. SEARCH STRATEGY: The Cochrane Pregnancy and Childbirth Group trials register and the Cochrane Controlled Trials Register were searched. Date of last search: October 1998. SELECTION CRITERIA: Randomised trials of one regimen of antibiotic versus another in pregnant women with culture confirmed genital gonococcal infection. DATA COLLECTION AND ANALYSIS: Eligibility and trial quality were assessed by one reviewer. MAIN RESULTS: Two trials involving 329 women were included. Amoxycillin with probenicid or spectinomycin or ceftriaxone have a similar effect on microbiological cure, defined by negative gonococcal culture. REVIEWER’S CONCLUSIONS: Any of the antibiotic regimens tested in these trials appear to be effective for the treatment of gonorrhoea in pregnancy in terms of their effect on microbiological cure. For women who are allergic to penicillin, this review provides reassurance that treatment with ceftriaxone or spectinomycin appears to be at least as equally effective in producing microbiological cure.


Abstract: BACKGROUND: Bacterial vaginosis has been associated with poor perinatal outcome. Since the infections are amenable to treatment, identification during pregnancy and treatment may reduce the risk of preterm birth and its consequences. OBJECTIVES: The objective of this review was to assess the effects of antibiotic treatment of bacterial vaginosis in pregnancy. SEARCH STRATEGY: We searched the Cochrane Pregnancy and Childbirth Group trials register and the Cochrane Controlled Trials Register. SELECTION CRITERIA: Randomised trials comparing one antibiotic regimen with placebo or no treatment, or which compare two or more alternative antibiotic regimens in pregnant women with bacterial vaginosis. DATA COLLECTION AND ANALYSIS: Trial quality assessments and data extraction were done independently by three reviewers. Study authors were contacted for additional information. MAIN RESULTS: Five trials involving 1504 women were included. These trials were of good quality. Antibiotic therapy was highly effective at eradicating infection during pregnancy as judged by ‘test-of-cure’ following therapy (odds ratio 0.22, 95% confidence interval 0.17 to 0.27). The effect of treating bacterial vaginosis during pregnancy showed a trend to less births before 37 weeks gestation (odds ratio 0.78, 95% confidence interval 0.60 to 1.02). The prevention of preterm birth
less than 37 weeks gestation was most marked in the subgroup of women with a previous preterm birth (odds ratio 0.37, 95% confidence interval 0.23 to 0.60). REVIEWER’S CONCLUSIONS: The current evidence does not support screening and treating all pregnant women for bacterial vaginosis to prevent preterm birth and its consequences. For women with a history of a previous preterm birth there is some suggestion that detection and treatment of bacterial vaginosis early in pregnancy may prevent a proportion of these women having a further preterm birth. It is not known whether this is associated with an improvement in neonatal well-being.


Abstract: BACKGROUND: Chlamydia trachomatis is a sexually transmitted infection. Mother-to-child transmission can occur at the time of birth and may result in ophthalmia neonatorum or pneumonitis in the newborn. OBJECTIVES: The objective of this review was to assess the effects of antibiotics in the treatment of genital infection with Chlamydia trachomatis during pregnancy with respect to neonatal and maternal morbidity. SEARCH STRATEGY: We searched the Cochrane Pregnancy and Childbirth Group trials register and the Cochrane Controlled Trials Register (Cochrane Library issue 1, 1999). SELECTION CRITERIA: Randomised trials of any antibiotic regimen compared with placebo or no treatment or alternative antibiotic regimens in pregnant women with genital Chlamydia trachomatis infection. DATA COLLECTION AND ANALYSIS: Trial quality assessments and data extraction were done independently by two reviewers. Study authors were contacted for additional information. MAIN RESULTS: Eleven trials were included. Trial quality was generally good. Amoxycillin appeared to be as effective as erythromycin in achieving microbiological cure (odds ratio 0.54, 95% confidence interval 0.28 to 1.02). Amoxycillin was better tolerated than erythromycin (odds ratio 0.16, 95% confidence interval 0.09 to 0.30). Clindamycin and azithromycin also appear to be effective, although the numbers of women included in trials are small. REVIEWER’S CONCLUSIONS: Amoxycillin appears to be an acceptable alternative therapy for the treatment of genital chlamydial infections in pregnancy when compared with erythromycin. Clindamycin and azithromycin may be considered if erythromycin and amoxycillin are contra-indicated or not tolerated.


Abstract: OBJECTIVE: To elucidate whether microbial infections are involved in the etiology of intrauterine death. METHODS: One hundred four cases of stillbirth of unknown etiology and 96 age- and parity-matched referents with live births were analyzed with respect to microbial infection by cultures from the placenta, endocervix and internal organs of the fetuses, external sites of the babies and fetuses, and by serology for bacteria, viruses and Toxoplasma gondii. RESULTS: In 17 cases in whom no other infectious agent was diagnosed, Escherichia coli was isolated from the placenta and one or more internal fetal organs. Tests for Treponema pallidum and Toxoplasma gondii were more frequently positive in cases than in referents (O.R. 8.3 and 3.9, respectively). There was no increased risk for intrauterine death in women with human
immunodeficiency virus, cytomegalovirus, herpes simplex virus or rubella virus.  

CONCLUSIONS: Our findings indicate that infections remain an important cause of intrauterine death in Zimbabwe.


Abstract: Vertical transmission of hepatitis B virus (HBV) can occur occasionally despite vaccination of the child. This vaccination breakthrough has been associated with high maternal viraemia. We treated eight highly viraemic (HBV-DNA $\geq 1.2 \times 10^9$ geq/mL) mothers with 150 mg of lamivudine daily during the last month of pregnancy. HBV-DNA, hepatitis B surface antigen (HBsAg), anti-HBs and anti-HBc of their offspring were measured at birth and at 3, 6 and 12 months, respectively. Twenty-four children, born to untreated HBsAg-positive mothers with HBV-DNA levels $\geq 1.2 \times 10^9$ geq/mL served as historical controls. All children received passive-active immunization at birth and were followed-up for 12 months. In the lamivudine group one of the eight children (12.5%) was still HBsAg and HBV-DNA positive at the age of 12 months. All other children seroconverted to anti-HBs and maintained seroprotection. In three children, HBV-DNA was temporarily detected by polymerase chain reaction. In the untreated historical control group, perinatal transmission occurred in seven of 25 children (28%). In highly viraemic HBsAg-positive mothers, reduction of viraemia by lamivudine therapy in the last month of pregnancy may be an effective and safe measure to reduce the risk of child vaccination breakthrough. This approach should be evaluated in a large controlled trial.


Abstract: OBJECTIVES: The present study was carried out in seven maternity hospitals to determine the prevalence of maternal syphilis at the time of delivery and the associated risk factors, to conduct a pilot project of rapid syphilis testing in hospital laboratories, to assure the quality of syphilis testing, and to determine the rate of congenital syphilis in infants born to women with syphilis at the time of delivery—all of which would provide baseline data for a national prevention programme in Bolivia. METHODS: All women delivering either live-born or stillborn infants in the seven participating hospitals in and around La Paz, El Alto, and Cochabamba between June and November 1996 were eligible for enrolment in the study. FINDINGS: A total of 61 out of 1428 mothers (4.3%) of live-born infants and 11 out of 43 mothers (26%) of stillborn infants were found to have syphilis at delivery. Multivariate analysis showed that women with live-born infants who had less than secondary-level education, who did not watch television during the week before delivery (this was used as an indicator of socioeconomic status), who had a previous history of syphilis, or who had more than one partner during the pregnancy were at increased risk of syphilis. While 76% of the study population had received prenatal care, only 17% had syphilis testing carried out during the pregnancy; 91% of serum samples that were reactive to rapid plasma reagin (RPR) tests were
also reactive to fluorescent treponemal antibody-absorption (FTA-ABS) testing. There was 96% agreement between the results from local hospital laboratories and national reference laboratories in their testing of RPR reactivity of serum samples. Congenital syphilis infection was confirmed by laboratory tests in 15% of 66 infants born to women with positive RPR and FTA-ABS testing. CONCLUSION: These results indicate that a congenital syphilis prevention programme in Bolivia could substantially reduce adverse infant outcomes due to this disease.


**Abstract:** CONTEXT: Vaccine development to prevent congenital cytomegalovirus (CMV) infection has been impeded by the uncertainty over whether maternal immunity protects the fetus. OBJECTIVE: To determine whether the presence of maternal antibodies to CMV significantly reduces the risk of congenital CMV infection in future pregnancies. DESIGN, SETTING, AND PARTICIPANTS: Cohort study of 3461 multiparous women from a population with a high rate of congenital CMV infection who delivered newborns screened for congenital CMV infection between 1993 and 1998, and whose cord serum specimen from a previous delivery could be retrieved and tested for antibody to CMV. MAIN OUTCOME MEASURE: Congenital CMV infection according to maternal immune status, age, race, parity, and socioeconomic status. RESULTS: Of 604 newborns born to initially seronegative mothers, congenital CMV infection occurred in 18 (3.0%). In contrast, of 2857 newborns born to immune mothers, congenital CMV infection occurred in 29 (1.0%). Two factors, preconception maternal immunity (adjusted risk ratio, 0.31; 95% confidence interval, 0.17–0.58) and maternal age of 25 years or older (adjusted risk ratio, 0.19; 95% confidence interval, 0.07–0.49), were highly protective against congenital CMV infection. No other factors were associated with a reduction in the risk of congenital CMV infection. CONCLUSION: Naturally acquired immunity results in a 69% reduction in the risk of congenital CMV infection in future pregnancies.


**Abstract:** BACKGROUND: As of 1997, less than one-third of developing countries included rubella vaccine in their national immunization programme. In countries that have achieved high coverage of measles vaccine, an ideal opportunity exists to include control of rubella and congenital rubella syndrome (CRS) in enhanced measles control activities. Data on the burden of congenital rubella syndrome are important to guide rubella vaccination policies. METHODS: We reviewed the literature to identify studies of rubella antibody prevalence in developing countries that were conducted on populations with no major selection bias, prior to wide-scale rubella vaccination in the country. We used a simple catalytic model to describe the age-specific prevalence of susceptibility to rubella virus infection in given populations. Estimates of the incidence of infection among pregnant women were calculated using expressions for the average prevalence of susceptibility to infection and the incidence of infection during gestation. To estimate the number of cases of CRS, we assumed an overall risk of 65% after infection in the first 16 weeks of pregnancy and zero risk thereafter. These estimates were derived for each country for which data were available, then for each World Health Organization region, excluding
Europe. RESULTS: The estimated mean incidence of CRS per 100,000 live births was lowest in the Eastern Mediterranean region (77.4, range 0–212) and highest in the Americas (175, range 0–598). The mean of the estimates of the total number of cases of CRS in developing countries in 1996 was approximately 110,000. The range was, however, very wide, from as few as 14,000 to as many as 308,000 cases. CONCLUSIONS: Congenital rubella syndrome is an under-recognized public health problem in many developing countries. There is an urgent need for collection of appropriate data to estimate the cost-effectiveness of a potential global rubella control programme.


Abstract: A meeting on Preventing Congenital Rubella Syndrome (CRS): Immunization Strategies, Surveillance Needs, was held in Geneva 12–14 January 2000. The meeting was organized by the WHO Department of Vaccines and Biologicals (VandB), with financial support from the US Centers for Disease Control and Prevention and the March of Dimes Birth Defects Foundation. This was the first international meeting on CRS and rubella since 1984.

http://www.who.int/vaccines-documents/DocsPDF00/www508.pdf


Abstract: BACKGROUND: Pregnant women with bacterial vaginosis may be at increased risk for preterm delivery. We investigated whether treatment with metronidazole and erythromycin during the second trimester would lower the incidence of delivery before 37 weeks’ gestation. METHODS: In 624 pregnant women at risk for delivering prematurely, vaginal and cervical cultures and other laboratory tests for bacterial vaginosis were performed at a mean of 22.9 weeks’ gestation. We then performed a 2:1 double-blind randomization to treatment with metronidazole and erythromycin (433 women) or placebo (191 women). After treatment, the vaginal and cervical tests were repeated and a second course of treatment was given to women who had bacterial vaginosis at that time (a mean of 27.6 weeks’ gestation). RESULTS: A total of 178 women (29 percent) delivered infants at less than 37 weeks’ gestation. Eight women were lost to follow-up. In the remaining population, 110 of the 426 women assigned to metronidazole and erythromycin (26 percent) delivered prematurely, as compared with 68 of the 190 assigned to placebo (36 percent, P=0.01). However, the association between the study treatment and lower rates of prematurity was observed only among the 258 women who had bacterial vaginosis (rate of preterm delivery, 31 percent with treatment vs. 49 percent with placebo; P=0.006). Of the 358 women who did not have bacterial vaginosis when initially examined, 22 percent of those assigned to metronidazole and erythromycin and 25 percent of those assigned to placebo delivered prematurely (P=0.55). The lower rate of preterm delivery among the women with bacterial vaginosis who were assigned to the study treatment was observed both in women at risk because of previous preterm delivery (preterm delivery in the treatment group, 39 percent; and in the placebo group, 57 percent; P=0.02) and in women who weighed less than 50 kg before pregnancy (preterm delivery in the treatment group, 14 percent; and in the placebo
group, 33 percent; P=0.04). CONCLUSIONS: Treatment with metronidazole and erythromycin reduced rates of premature delivery in women with bacterial vaginosis and an increased risk for preterm delivery.


Abstract: We emphasize again that the prevalence of maternal infections may vary in different populations, and others might arrive at different estimates about the percentage of infants colonized and, concerning those infants colonized, about the percentage with adverse outcomes. Additionally, many women are colonized or infected simultaneously with several of the organisms discussed in this review, and this may result in different projections of morbidity and mortality rates than those presented here. We realize also that new information is generated continually describing the relationship between various maternal colonizations and preterm birth, and that screening and treatment protocols for several diseases may reduce the prevalence of adverse outcomes reported here. Therefore, we emphasize that the prevalences of various adverse pregnancy outcomes, as presented in this article, are only approximations and may change as new information becomes available. Nevertheless, we believe it is reasonable to estimate the relative effect of various maternal sexually transmitted diseases on adverse pregnancy outcome as we have done in this article. By comparing the effect of direct transmission of sexually transmitted organisms on adverse outcomes with the effect on overall outcome through an increase in the rate of preterm births, we should be able to use this type of analysis to establish some basis for allocation of resources to future research as well as intervention programs aimed at reducing sexually transmitted disease-related adverse outcomes of pregnancy. Finally, the appreciation of the effect of bacterial vaginosis on outcomes of pregnancy associated with preterm birth gives bacterial vaginosis a greater public health importance than has been attributed to it in the past as the subject of sexually transmitted disease research and prevention.


Abstract: Because of the high incidence of congenital syphilis at the University Teaching Hospital, Lusaka, Zambia, the potential risks of congenital infection and fetal loss due to syphilis were assessed by screening 202 antenatal patients, 340 pregnant women admitted to the hospital whose pregnancies ended in either spontaneous abortion or stillbirth, and 469 consecutive babies delivered at the hospital. Primary serological screening was performed with the rapid plasma reagin test, and reactive sera were confirmed by the Treponema pallidum haemagglutination test. In all cases detailed histories were obtained and patients were examined for clinical signs of syphilis. The TPHA test result was reactive in 12.5% of antenatal patients and in 42% of women who aborted in the later half of pregnancy. Among 469 consecutive babies delivered at the hospital, 30 had reactive results to the TPHA test; of these two were stillborn and four had signs of congenital syphilis at birth. Thus, syphilis appears to affect adversely an
appreciably high number of pregnant women in Zambia. For this reason a special campaign to screen adequately and treat pregnant women and neonates is needed.


Abstract: To ascertain what proportion of preterm deliveries are attributable to the association with chorioamnionitis, the authors examined prospectively the placentas from all 2774 women who delivered at the Johns Hopkins Hospital during 1980. The incidence of preterm delivery was 5.4% (110 of 2027) when neither chorioamnionitis nor premature rupture of membranes (PROM) was present, 11.9% (29 of 243) when chorioamnionitis was present without PROM, and 56.7% (51 of 90) when both chorioamnionitis and PROM were present (P less than .05). Only 27 of 333 cases of histopathologic chorioamnionitis or 8.1% had maternal antepartum fever, and only 11 of 333 or 3.3% had neonatal sepsis. Using logistic regression analysis to control for confounding variables, approximately 25% of the preterm deliveries were statistically attributable to histopathologic chorioamnionitis, occurring either alone or in association with PROM. In light of the infrequency with which histopathologic chorioamnionitis is clinically evident, the strong relationship between histopathologic chorioamnionitis and preterm delivery suggests that occult antepartum infection of the genital tract is an important cause of preterm delivery.


Abstract: OBJECTIVE: To investigate the effects of treatment of syphilis in pregnancy on perinatal prognosis. METHODS: Patients of syphilis in pregnancy from Hainan Provincial People’s Hospital and Haikou Municipal Maternal and Child Health Center during 1995.1 to 2001.1 were collected for retrospective analysis. Pregnant women with syphilis were divided into treated group and untreated group according to whether they received penicillin anti-syphilis treatment or not during pregnancy. RESULTS: The total number of deliveries in the 2 hospitals during that period was 18,701, and 61 out of 9,805 women screened for syphilis were positive, giving an incidence of 6.2/1,000. The perinatal mortality rates were 11.2% in treated group and 83.3% in untreated group, and incidences of congenital syphilis were 17.6% and 72.7% respectively. CONCLUSION: Syphilis in pregnancy is a serious complication to harm the fetus. Screening of syphilis during pregnancy is necessary, and penicillin treatment is effective which may reduce the perinatal mortality rate and the birth of congenital syphilis baby.
Prevention of Maternal and Neonatal Tetanus


**Abstract:** A hospital-based case-control study was conducted to further examine the risk factors for neonatal tetanus (NNT) in the North-west Frontier Province of Pakistan. Three control infants were concurrently evaluated for each of 102 consecutively diagnosed NNT cases hospitalized over an 8-week period. Application of clarified butter (ghee) during the first few days of life was shown to be a significant risk factor, confirming our previously reported finding. However, the risk appeared to be limited to ghee made in the home from cow’s milk. The tool used to cut the umbilical cord was again refuted to be a risk factor; application of topical antibiotics conferred significant protection. Multivariate analysis of the matched data showed that delivery by persons with academic training (physicians, nurses, and lady health visitors) was also protective. Mothers with a past history of NNT babies were shown to have a significantly increased risk, and accounted for more than one-third of all cases in the present study. The findings suggest possible ways to augment the effectiveness of NNT elimination programmes.


**Abstract:** Neonatal tetanus (NT) elimination, <1 case per 1,000 live births (LB), was assessed at district level in Zimbabwe using a combined lot quality assurance-cluster sampling survey (LQA-CS). Three of the highest risk districts were selected. NT was considered eliminated if fewer than a specified number of NT deaths (proxy for NT cases) were found in the sample determined using operating characteristic curves and tables. TT2 + vaccine coverage was measured in mothers who gave birth 1–13 months before the survey and women aged 15–49 years. NT was considered as eliminated, TT2+ coverage was 78% (95% CI 71–82%) in women aged 15–49 and 83% (95% CI 76–89%) in mothers. The survey cost 30,000 US dollars excluding costs of consultants. NT incidence was below the elimination threshold (<1/1,000 LB) in the surveyed districts and probably in all districts. LQA-CS is a practical, relatively cost effective field method which can be applied in an African setting to assess NT elimination status.


**Abstract:** BACKGROUND: Bundling, which consists of wrapping an infant for prolonged periods in a sheepskin cover after dried cow dung is applied, is a common and apparently unique practice limited to the rural, mountainous regions of Northern Pakistan. The practice is initiated at various ages during the neonatal period. Its potential contribution to neonatal tetanus (NNT)
had not been evaluated. METHODS: A population-based, matched, case-control study was undertaken to assess bundling and other factors potentially related to NNT in rural parts of the Northern Areas, Pakistan. RESULTS: Bundling instituted within the first 3 days of life was a substantial risk factor for NNT (odds ratio [OR]=2.5, 95% confidence interval [CI]: 1.3–4.9). Other factors found risky for NNT were delivery on a straw surface and pre-delivery intravaginal application of ghee to the mothers. Handwashing by the delivery attendant and use of a new razor to cut the umbilical cord were protective. CONCLUSIONS: Bundling is a significant risk factor for NNT in the mountainous regions of Northern Pakistan. While this practice is seemingly limited to these remote areas, the findings have broad implications since they indicate that NNT can derive from exposures of the umbilical wound at any time during the first several days of life. Thus, clean cord care at delivery is not itself sufficient to prevent NNT and control programmes need to address post-delivery sources of NNT.


Abstract: BACKGROUND: Previous case-control studies have paradoxically suggested that circumcisions protect against neonatal tetanus (NNT), but these observations have not been adjusted for differences in the length of survival of cases and controls. METHODS: Boy cases (n=133) and their sex-matched controls (n=399) were extracted from a population-based study of NNT undertaken in Punjab Province, Pakistan. In the resulting file, circumcisions were censored such that analysis was restricted to only those that occurred before onset in cases or before age of onset in the matched case for controls. The effect of topical antibiotics in circumcision wounds was then evaluated. RESULTS: After adjusting for confounders, circumcision before onset posed a significant risk for NNT (matched odds ratio [OR]=3.1, 95% CI: 1.2–8.0). The risk of NNT in those circumcised before onset and treated with topical antibiotics did not differ significantly from the referent group who had not been circumcised before onset (matched OR=1.1, 95% CI: 0.2–6.8), whereas the lack of topical use was associated with significant risk (matched OR=4.2, 95% CI: 1.4–12.6). This suggests that topical antibiotics are likely to be highly effective in preventing NNT from circumcision wounds. We estimated an overall risk of about 16 fatal NNT cases per 1000 live boy births with circumcision wounds that were not protected by topical antibiotics, and that circumcision and umbilical wounds each accounted for about half of this overall risk in these boys. CONCLUSIONS: Topical antibiotics should be routinely applied to all wounds created by traditional circumcisions, to prevent NNT and sepsis from these frequently unsterile procedures.


Abstract: Experience in the control of tetanus neonatorum (TN) in a rural area is presented. TN was reduced by training of dais, increasing the coverage of tetanus toxoid to pregnant women and distribution of presterilized delivery kits to pregnant ladies for use by birth attendants. The problems of untrained birth attendants, effectiveness of tetanus toxoid coverage and place of delivery are discussed.

**Abstract:** The Maasai have high rates of death from neonatal tetanus, partly due to their custom of packing the umbilical stump with cow dung. We report on the effect of a simple health promotion programme, designed in consultation with the local community and carried out by local women. After introduction of the programme in 1981, neonatal (<6 weeks of age) tetanus rates fell sharply, and by 1988 annual death rates had dropped to 0.75 (range 0–3) per 1000 births in the intervention areas compared with 82 (74–93) per 1000 in control areas.


**Abstract:** BACKGROUND: Neonatal tetanus is the cause of 23 to 73% of neonatal deaths in developing countries and continues to be an important killer in many parts of India. METHODS: In this nonrandomized cohort study in a rural area in India, tetanus toxoid immunization status was recorded for 1688 pregnant women. Liveborn children were followed up for 30 days for the occurrence of neonatal tetanus. Nonimmunized and partially immunized women were asked their reasons for not receiving tetanus toxoid vaccine. RESULTS: Complete prenatal immunization with tetanus toxoid during pregnancy (two doses 1 month apart) was associated with an 88% reduction in the risk of neonatal tetanus among the newborn children [95% confidence interval (CI) 59 to 98%]. In multivariable analysis only complete immunization and the use of clean instruments for cutting the umbilical cord were independently associated with a reduction in risk of neonatal tetanus. Registration by the health care provider before 29 weeks of gestation, being 5 km or less from the vaccination facility, having two or more contacts with the health provider and having some school education were independently associated with complete immunization. CONCLUSIONS: Immunization of pregnant women with tetanus toxoid was the single most effective intervention against neonatal tetanus independent of other interventions.


**Abstract:** Full text available at: [http://www.who.int/wer/2003/wer7805.pdf](http://www.who.int/wer/2003/wer7805.pdf)


**Abstract:** An estimated 400,000 deaths occur annually from neonatal tetanus (NT). In 1989 WHO adopted the goal of eliminating NT as a public health problem worldwide. To achieve this, and to control non-neonatal tetanus (non-NT), WHO recommends that newborns be passively protected at birth by the antepartum administration of at least two doses of tetanus toxoid (TT) to their mothers and that all children subsequently receive at least three doses of diphtheria-
tetanus-pertussis (DTP) vaccine. For this strategy to be effective, the TT used must be immunogenic. Potential factors that may affect TT immunogenicity need to be evaluated if NT is to be eliminated and if non-NT is to be controlled. Although data are conflicting, concurrent malarial infection may decrease the immune response to TT; however, malarial chemoprophylaxis may enhance the immune response. Malnutrition does not appear to affect immunogenicity; nevertheless, one study suggests that vitamin A deficiency is associated with an impaired immune response. Although it has been postulated that placental transfer of tetanus antibody is impaired in African women, a survey of the published literature suggests that this is not the case. Freezing TT has been shown to decrease its potency, but its impact on immunogenicity needs more evaluation.


Abstract: Accelerated disease control initiatives, such as polio eradication by the year 2000, may substantially benefit public health programs in general. In Egypt, the control of other vaccine-preventable diseases, most noticeably neonatal tetanus (NT), has been facilitated by the polio eradication initiative. Linking NT reporting with the acute flaccid paralysis (AFP) surveillance system, which had been established for polio eradication, markedly improved the capacity to identify NT high-risk areas and target supplementary immunization activities appropriately. While the close integration of surveillance activities was to the benefit of both programs, mass immunization activities were not conducted simultaneously because of differences in the objectives, target populations, and operational aspects of oral polio vaccine and tetanus toxoid campaigns. In addition to substantial progress toward polio eradication in Egypt since 1988, there has been an 80% reduction in annual NT cases, in part due to the integration of appropriate aspects of these two disease control initiatives.


Abstract: These guidelines describe the strategies for achieving elimination of maternal and neonatal tetanus by the year 2005 and, once elimination is achieved, maintaining it. They are intended for public health managers at the national and district levels in countries that have not yet reached the goal and for the organizations that provide them with technical assistance. They will also be useful for development partners that are planning financial or other support.


Abstract: BACKGROUND: Previous studies in Pakistan have shown that ghee (clarified butter) is commonly applied to umbilical wounds of neonates, and have documented that such applications are a risk factor for neonatal tetanus (NNT). In-use contamination of ghee with
Clostridium tetani has been demonstrated, but mechanisms underlying the risk of ghee have been incompletely evaluated epidemiologically. METHODS: Detailed information on ghee usage, including fuels used to heat it, was obtained from cases of NNT (n=229) and their matched controls (n=687) from a population-based study of NNT in Punjab Province, Pakistan. Design variables were created to evaluate the impact of different fuel sources on risk of ghee applications. RESULTS: Nearly one-third of all infants had ghee applied, and it was nearly always heated before application to umbilical wounds of newborns. After controlling for all factors found to be significantly associated with NNT in conditional logistic regression, only ghee that had always been heated with dried cow dung fuel was significantly associated with NNT. Topical antimicrobials and ghee were never applied together. CONCLUSIONS: Ghee applications to umbilical wounds, when heated with ‘clean’ fuels, appear to pose no increased risk of NNT, although handling practices undoubtedly result in hazardous microbial contamination. In contrast, ghee heated with dung fuel was significantly associated with NNT. The effective promotion of topical antimicrobials might help reduce ghee use, since the intended purpose of each is to enhance healing.


Abstract: Neonatal tetanus (NNT) is a serious but preventable disease, and the World Health Organization (WHO) wants to eliminate NNT globally by reducing its incidence to <1 case per 1000 live births. South Africa adopted this goal in 1995, but Mpumalanga, a rural province, has consistently reported cases of NNT despite an appropriate vaccination strategy to eliminate the disease. The aim of the study was to investigate the completeness of the passive notification system and to explore reasons for ongoing NNT cases despite implementation of the provincial vaccination strategy. We reviewed all hospital admissions in the province between 1996 and 2000 meeting the case definition for NNT and interviewed mothers of the NNT cases reported in 2000. We identified 26 NNT cases, of which only 14 (54%) were reported through the routine notification system. Most cases occurred as a result of the cultural practice of applying cow dung or rat faeces to the umbilical stump in the neonatal period. Although all districts met the WHO elimination target during the review period, there is scope to prevent unnecessary NNT deaths through culturally acceptable public awareness campaigns aimed at changing harmful practices, and encouraging hygienic births and postnatal cord care.


Abstract: Although neonatal tetanus (NT) can be prevented by immunization of expectant mothers and by good hygiene and asepsis during delivery, it is still a common cause of neonatal mortality in developing countries. The objective of this study was to determine indicators in NT. We reviewed the clinical records of 73 neonates admitted to the Pediatric Infectious Diseases Ward of Dicle University Hospital, Diyarbakir, Turkey, with the diagnosis of NT. Delivery had occurred at home by untrained traditional birth attendants in all cases. None of the mothers had
immunization with tetanus toxoid during pregnancy. The median age of infants at presentation was 7.3 days and the mean age at onset of symptoms was 5.6 +/- 2.8 days. The overall mortality was found to be 52 percent. Mortality was significantly associated with an incubation period of 4.3 days or less and fever. The incidence of NT in Turkey is on the decline due to widespread tetanus toxoid use in pregnant women, but in some regions, especially in the so-called rural poor areas, there is still risk of preventable diseases. Hygienic deliveries and immunization of pregnant women are very important for the prevention of NT deaths, and universal prenatal care, including education programs on appropriate perinatal and cord care, can significantly reduce NT incidence and mortality in developing countries.


Abstract: Neonatal tetanus (NT) still causes significant mortality in developing countries, although in 1989 WHO adopted the goal of eliminating the disease by 1995–2000. To characterize the regional characteristics, clinical charts of 55 neonates (42 males and 13 females) admitted to the Pediatric Infectious Diseases Ward of Dicle University Hospital, Diyarbakir, Turkey with the diagnosis of NT from 1991 to 1997 were reviewed. Mean age at admittance was 8.9 +/- 4.3 days with a range of 3–25 days. Mean period for the appearance of first symptoms was 5.8 days ranging between 1 and 21 days. Mean birth weight of the patients was 3369 +/- 560g. All patients were from rural areas and were delivered at home by untrained traditional birth attendants with no prior antenatal healthcare services. Razor blade (55%), scissors (27%), and knife (18%) were the instruments used to cut the cord in non-hygienic conditions. No mothers had prior vaccination with tetanus toxoid during their pregnancy. Spasticity (76%), lack of sucking (71%), trismus (60%), fever (49%), omphalitis (44%), irritability (24%), risus sardonicus (22%), and opisthotonus (15%) were the most common presenting signs and symptoms. Age at admission <7.5 days and symptoms of onset <4.9 days, risus sardonicus and opisthotonus were associated with fatal outcome. All patients were treated with human tetanus immunglobulin or equine tetanus antitoxin where available, antibiotic therapy by penicillin G (100.000 U/kg/day) and intravenous high dose diazepam (40 mg/kg/day). Overall mortality rate was 40% (22 cases), without any equipment for mechanical ventilation. Health education of mothers and birth attendants, promotion of hospital delivery and prenatal tetanus immunization of all pregnant women particularly in rural areas are recommended, if NT is to be prevented.


Abstract: OBJECTIVE: Neonatal tetanus (NNT) is the leading cause of neonatal deaths in developing countries. The objective of this study was to determine prognostic indicators in NNT. METHODS: We reviewed the clinical records of all neonates (n=174) admitted to Ife State Hospital with the diagnosis of NNT from 1991 through 1995. RESULTS: Delivery had occurred at home in 73.3% of cases. Only 37/164 of the mothers had had adequate immunization with tetanus toxoid. The umbilical cord appeared to be the portal of entry in 58.6% of cases. Mean age of infants at presentation was 7.2 days. Mortality was 57.5%; non-survivors succumbed after
mean stay in the hospital of 5.0 days. Mortality was significantly associated with an incubation period of 6 days or less (P=0.0026), infant’s weight of less than 2.5 kg (P=0.0113), lack of antenatal care in a health facility (P=0.0279), birth at home (P=0.0455), but not with lack of adequate maternal immunization (P=0.2081; not significant). Multivariable analysis showed that a short (< or = 6d) incubation period was the strongest predictor of mortality (OR=3.11, P =0.0030) while low infant weight (<2.5 kg) was also a significant predictor (OR=2.46, P=0.0408).

CONCLUSIONS: Hygienic deliveries and adequate cord care are very important for the prevention of neonatal tetanus deaths, and universal prenatal care, including education programmes on appropriate perinatal and cord care, can significantly reduce NNT incidence and mortality in developing countries.


Abstract: BACKGROUND: Case-control studies previously conducted in Pakistan suggested that topical antimicrobials might provide protection against neonatal tetanus (NNT) when applied to the umbilical cord wound during the first several days of life. The present case-control study, the largest such study yet reported, was undertaken in Punjab Province, Pakistan and afforded further opportunities to evaluate such effects. METHODS: A population-based, matched, case-control study was undertaken to assess topical antimicrobials and other factors related to NNT risk in rural parts of Punjab Province. RESULTS: Continuous use of antimicrobial agents (antibiotics and antiseptics) at delivery and during the first few days after delivery was highly protective in univariate testing (matched odds ratio 0.2 [95% confidence interval: 0.11–0.64], P=0.003), and remained significantly protective when other delivery and cord care practices were controlled. In contrast, applying nothing to the wound was risky compared with antimicrobial exposures. Hand washing and delivery by a trained birth attendant appeared protective. Application of animal dung or ash to the umbilical wound was hazardous. Similarly, predelivery cutaneous or intravaginal exposure of mothers to ghee (clarified butter) and delivery on a surface prepared with dried cow dung were risky, with significant interaction noted between them. Mortality and NNT were far more likely among previous births to mothers of cases. CONCLUSIONS: Topical antimicrobials offer a new, effective and inexpensive means to prevent NNT, and could usefully complement maternal immunization with tetanus toxoid in controlling the disease. Special prevention efforts should be directed towards mothers of NNT cases.


Abstract: The protection from neonatal tetanus afforded by 1–2 doses of tetanus and diphtheria toxoids was determined by analyzing neonatal mortality among infants born to the subjects 9–32 months after immunization in rural Bangladesh. The neonatal mortality rate for children whose mothers had received 2 injections of tetanus toxoid was 20/1,000 births less than the rate among children whose mothers had received cholera toxoid, representing a 1/3 reduction in...
neonatal mortality. The reduced mortality rate was attributable almost entirely to a 75% lower
death rate among infants 4–14 days of age. In the period up to 20 months after vaccination, the
reduction in deaths among 4–14-day-old infants after a single dose of tetanus-diphtheria toxoids
was about the same as that after 2 doses; however, beyond 20 months, a single dose did not
appear to confer protection. In countries with a high rate of neonatal tetanus and with little or no
prenatal care, mass tetanus toxoid immunization of all women of reproductive age may be
indicated. The 2 initial immunizations can be spaced 1 year apart, if necessary, and booster
doses should be scheduled at subsequent 3-year intervals.

developing world. XXII. Tetanus: a preventable problem,” Rev. Infect. Dis., vol. 8, no. 1,
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**Abstract:** Tetanus, although an eminently preventable disease, remains common and
uncontrolled in many developing countries. The persistence of tetanus is attributable to health
service policies that ignore the disease because of a dearth of reliable epidemiologic and
economic information. In many developing countries there have, as yet, been few public or
professional demands for preventive action. For the prevention of neonatal tetanus, the
immediate priority is immunization timed to produce and maintain protective levels of maternal
antitoxin during pregnancy. This strategy should be accompanied by the extension and
improvement of scientific standards of midwifery. To protect the rest of the population from
wound tetanus, the strategy of first choice consists of continuous multiple-antigen immunization
in infancy and childhood. Such a program should be reinforced by the routine administration of a
toxoid booster following all accidental wounds as well as before all ritual procedures known to
carry risk. These strategies, which are of proven efficacy and adaptable to local conditions of the
large populations still in need of protection, together provide powerful justification for the
expansion of primary maternal and child health services. Careful measurement of the incidence
of neonatal tetanus would provide a good indicator of the degree of effectiveness such services
have attained in many rural communities.

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against neonatal tetanus,” Bull. World Health Organ., vol. 80, no. 9, pp. 696–703.

**Abstract:** OBJECTIVE: A Multiple-Indicator Cluster Survey (MICS) was conducted at mid-
decade in more than 60 developing countries to measure progress towards the year 2000 World
Summit for Children goals. These goals included the protection of at least 90% of children
against neonatal tetanus through the immunization of their mothers, as measured by tetanus
toxoid (TT) coverage. In the Central African Republic (CAR), serological testing was added to
the MICS to understand better the relationship between survey estimates of TT coverage and
the prevalence of serological protection. METHODS: In the CAR MICS, mothers of children
younger than one year of age gave verbal histories of the TT vaccinations they had received,
using the MICS TT questionnaire. A subsample of mothers was tested for tetanus antitoxin,
using a double-antigen enzyme-linked immunoabsorbent assay (ELISA). Seropositivity was
deﬁned as a titre of > or =0.01 IU/ml, and TT coverage was deﬁned as the proportion of mothers
protected at delivery, according to their history of TT vaccinations. FINDINGS: Among the 222 mothers in the subsample, weighted TT coverage was 74.4% (95% Confidence Interval (CI); 67.0%–81.7%) and tetanus antitoxin seroprevalence was 88.7% (95% CI; 83.2%–94.2%). The weighted median antitoxin titre was 0.35 IU/ml. CONCLUSIONS: Tetanus toxoid coverage in the CAR was lower than the prevalence of serological protection against neonatal tetanus. If this relationship holds for other countries, TT coverage estimates from the MICS may underestimate the extent to which the year 2000 goal for protecting children against neonatal tetanus was reached. We also showed that a high level of serological protection had been achieved in a country facing major public health challenges and resource constraints.


Abstract: 1 approach to the prevention of tetanus neonatorum (a leading cause of infant death throughout the world) is improving the quality of prenatal, obstetric, and postnatal maternal and child health services. Another complementary approach is the active immunization of women before or during pregnancy with tetanus toxoid. Work in progress at the Matlab field station of the International Center for Diarrheal Disease Research in Bangladesh (ICDDR,B) provided a unique opportunity to study the effectiveness of certain aspects of these 2 strategies. In 1974, during a field trial of cholera toxoid vaccine, 2 injections of an aluminum phosphate tetanus-diptheria toxoid were provided as a control to a randomly assigned group of nonpregnant women. Beginning in June 1978, a program of immunizing women during pregnancy with aluminum phosphate-absorbed tetanus toxoid was initiated in conjunction with the implementation of a village based maternal and child health and family planning program in half of the same Matlab surveillance area. Throughout the period of these 2 programs, the ICDDR,B maintained an independent, longitudinal, vital registration system, identifying all births and deaths in the study area. In this analysis, all live births registered in the Maternal and Child Health-Family Planning and comparison areas during the September 1, 1978 until December 31, 1979 period were identified. These records were linked with any deaths recorded within 28 days of birth. The acceptance of tetanus vaccination during the 1974 cholera vaccine trial, by the mothers of these live births, was ascertained from the 1974 vaccine registers. The acceptance of vaccination during the 1978–1979 program was obtained from the field registers. For infants whose mothers had received 2 tetanus injections 48–64 months prior to delivery, the neonatal mortality rate was 63.8/1,000 live births compared with 78.3/1,000 for infants whose mothers did not receive tetanus immunization. Immunization of women with 2 tetanus injections during pregnancy reduced neonatal mortality rates to 42.8/1000, a reduction of 35.5/1000. Mortality on days 4–14 was reduced by about 70%. 1 injection during pregnancy did not appear to provide protection against tetanus neonatorum. (summary in FRE).

**Abstract:** Demographic and health surveys are a useful source of information on the levels and trends of neonatal mortality in developing countries. Such surveys provide data on mortality occurring at 4–14 days of life, which is a sensitive indicator of neonatal tetanus mortality. We analyze birth history data from 37 national surveys in developing countries to assess the quality of neonatal mortality data and to estimate levels and trends in mortality occurring at 4–14 days. It is shown that mortality at 4–14 days has declined considerably during the last decade in most developing countries, concomitant with development and expansion of programs to reduce neonatal tetanus. These declines show that reductions in neonatal tetanus mortality probably have been an important contributor to the decline of neonatal and infant mortality during the 1980s.
Malaria in Pregnancy and Impact on the Newborn Infant


Abstract: The effectiveness of insecticide-treated bednets (ITBN) in preventing malaria and anaemia among primigravidae living in Kilifi District, Kenya, was assessed by a randomized controlled trial between September 1994 and November 1995. All residents within 28 community clusters received ITBN in July 1993, whilst residents of another 28 clusters served as contemporaneous controls. All resident primigravid women with singleton pregnancies attending antenatal care at Kilifi District Hospital were eligible for recruitment. 503 primigravidae were recruited. 91.4% were anaemic antenatally (Hb <11 g/dl): 91.0% from the intervention arm and 92.0% from the control arm. Severe anaemia (Hb <7 g/dl) was found among 15.1% of intervention women and 20.1% of control women (P=0.28). No significant differences were observed in reports of febrile illness or the presence of chloroquine in the serum or peripheral parasitaemia during the third trimester between the two groups. In the women delivering in hospital (n=130), there was no association between placental malaria infection and the intervention: 77.4% of placentas from control women had evidence of past or active infection, compared with 72.0% of placentas from intervention women (P=0.76). Similarly, in the women delivering in hospital, ITBN did not improve birth weight, and there were no differences in perinatal mortality between the two study groups. Despite ITBN having a great impact on paediatric severe malaria and mortality in this transmission setting, there was very little impact of ITBN on the morbidity associated with malaria infection in primigravidae. Alternative strategies are required to tackle this continued public health problem for pregnant women living in endemic areas similar to the Kenyan Coast.


Abstract: Current global recommendations for routine malaria chemoprophylaxis in pregnant women living in endemic malarious areas are not clear. To assist in policy formulation, the evidence from randomized controlled trials was reviewed. The literature was extensively searched, and studies identified were systematically analysed in relation to outcomes in the mother and the baby. Routine chemoprophylaxis appears to have an effect on antenatal morbidity episodes and packed cell volume. There is a trend towards higher birth-weight values in chemoprophylaxis groups, which reached statistical significance in some studies. Evidence of an effect on gestation was only examined in one study. The effects on perinatal and neonatal mortality have only been examined in a few studies, with small sample sizes. The analysis
questions whether routine malaria chemoprophylaxis is the best use of scarce resources in developing countries, and suggests that chemoprophylaxis might be targeted at anaemic women and primigravidae. Large controlled trials, with treatment available to placebo groups, are required to test whether routine chemoprophylaxis has advantages over early, effective treatment of clinical malaria.


Abstract: The peripheral blood of 101 pregnant women at delivery, their 105 new born babies and the corresponding placental, and cord blood smears were examined cross sectionally for malaria parasites, during a 3 month period (May–July, 1986). The average maternal age was 26.3 years. Positive parasitaemia was found in 2.97% of maternal peripheral thick blood films; in 2.94% of placental smears, and in 0.95% of cord blood films. Congenital malaria did not occur in the babies.


Abstract: The prevalence of infection with malarial parasites and the incidence of anaemia and delivery of infants with low birthweight (LBW) were investigated in 575 Malawian mothers who received one, two or three doses of sulfadoxine-pyrimethamine (SP) during pregnancy. All the subjects were enrolled at their first antenatal visit and all delivered at hospital. The prevalence of Plasmodium falciparum infection at first antenatal visit was 35.3% in primigravidae and 13.6% in multigravidae (P <0.001). Mean haemoglobin concentration was significantly lower in primigravidae than in multigravidae (8.8 v. 9.5 g/dl; P <0.001). Of the 233 women tested for HIV infection, 18.8% of the primigravidae and 23.7% of the multigravidae were seropositive. At delivery, there was no significant difference in parasite prevalence in peripheral or placental blood between women who had received one or two antenatal doses of SP. The multigravidae who had received two doses of SP had higher mean haemoglobin concentrations than those who had received just one (P=0.009) [this difference was not seen in the primigravidae (P=0.92)]. However, linear regression analysis indicated that the haematinic supplements given to the subjects contributed more to this increase in haemoglobin concentration than the SP. The mean birthweights were higher, and incidence of LBW lower in babies born to primi-and multigravidae who had received two or three doses of SP treatment than those seen in babies born to women who had had just one dose (P < 0.03 for each). The odds ratio for LBW in primigravidae compared with multigravidae decreased from 3.2 to 1.0 as the number of SP doses increased from one to three. The benefit of three doses (compared with none) was equivalent to the population-attributable risk of LBW in primigravidae being reduced from 34.6% to 0%. Subjects who were seropositive for HIV were twice as likely to give birth to LBW babies as the other subjects. The use of SP was not associated with maternal side-effects or perinatal complications. The present results indicate that multiple doses of SP taken during pregnancy will
lead to a highly significant reduction in the incidence of LBW in infants born to primigravidae, even if the women have HIV infections. This reduction is observable even when parasite prevalence at delivery is high because of re-infections in late pregnancy; reduction in parasite prevalence earlier in pregnancy, as the result of SP treatment, leads to improved foetal growth.


Abstract: We studied 7300 singleton births in the highlands and 4881 in coastal Papua New Guinea in order to examine the separate contribution of anaemia or malaria to low birthweight. The highland sample was selected from a non-malarious area (Goroka) and the coastal sample from an area with perennial malaria transmission (Madang). There was an approximately three-fold increased risk of low birthweight (<2500 g) in live-births in Madang compared to Goroka. The prevalence of anaemia in the two areas was strikingly different, with 29.2% of Goroka and 89.0% of Madang women anaemic. There was a trend towards increased low birthweight with decreasing haemoglobin levels in both areas, but this was significant only for Madang. It was assumed that for a given haemoglobin level the increased low birth weight percentage in Madang compared to Goroka was due to malaria exposure, and on this basis relative risk values were estimated for the effect of malaria exposure on low birthweight. Using this approach separate estimates for anaemia and malaria population-attributable risk for low birth weight in Madang were calculated. These indicated that up to 40% of low birthweight babies born in malarious areas may be attributable to malaria and less than 10% attributable to severe anaemia (Hb <7.0 g dl–1). The magnitude of the malaria effect estimated in this analysis places a high priority on malaria control in pregnancy as a strategy for improving birthweight and child survival.


Abstract: To determine the causes of stillbirths and neonatal deaths in the community in rural Tanzania and to evaluate whether the deaths were avoidable under the prevailing circumstances.Review of stillbirths and neonatal deaths.Rural northern Tanzania, Mbulu and Hanang districts. One hundred and nineteen stillbirth and neonatal deaths identified in a prospective cohort of antenatal attendees and 21 stillbirths and neonatal deaths identified retrospectively in a household survey in seven rural communities. Verbal autopsy was done to reach a diagnosis, in many cases supplemented with information from antenatal records and hospital records. The avoidability of deaths under the prevailing circumstances was assessed for each case. An account of risk factors detectable at antenatal clinic was done and compared with the woman’s recall of the risk assessment and recall of being referred. Avoidability of stillbirths and neonatal deaths. There were 60 stillbirths, 49 early neonatal deaths and 27 late neonatal deaths. Infection-related deaths were most common (n=53), followed by asphyxia-related deaths (n=32) and immaturity-related deaths (n=20). Malaria was the most common infectious agent observed (21 children and 20 mothers). Twenty-one deaths (15%) were probably avoidable and 13 (10%) were possibly avoidable. A patient-oriented avoidable factor was identified in 17 (51%)
and a provider-oriented avoidable factor was identified in 22 cases (65%). Twenty-six of the 34 avoidable deaths had risk factors, but only two of the women were aware of it and only one recalled being referred to a hospital for the risk factor. There were eight deaths among the 133 mothers who experienced a perinatal death. Our data indicate that prevention and adequate treatment of infections and asphyxia in the newborn should have high priority in low-income settings. The relatively low proportion of avoidable stillbirths and neonatal deaths may be partly due to accessible emergency obstetric care in the area. Future efforts should emphasise improving the communication between midwife and women at the antenatal clinics, preparing the women and their families for the delivery and to be ready for complications.


Abstract: A prospective comparison of the antimalarial efficacy of bed nets was conducted with 341 pregnant women living in a mesoendemic malarious area of the Thai-Burmese border. Women in 3 adjacent study sites were allocated at random to receive either a single size permethrin-impregnated bed net (PIB), a non-impregnated bed net (NIB), or to a control group who used either their own family size non-impregnated bed net (FNIB) or no net. In one study site, but not the other 2, PIB significantly reduced parasite densities and, together with FNIB, reduced the incidence of malaria in pregnancy from 56% to 33% (relative risk=1.67, confidence interval=1.07–2.61, \( P=0.03 \), allowing for parity). Anaemia proved a more sensitive marker of bed net antimalarial efficacy than parasite rates. The incidence of anaemia (haematocrit < 30%) at all study sites was significantly lower at delivery in the PIB (27%) and FNIB groups (21%) than in the NIB group (41%) or those using no net (56%). This suggests that a significant proportion of the malaria in pregnancy in this mesoendemic area was sub-patent. Both patent Plasmodium falciparum parasitaemia and anaemia were associated with a reduction in birth weight. Infant mortality was high (16%) and strongly associated with prematurity, low birth weight and maternal anaemia. PIB were well tolerated and had no apparent adverse effect on the pregnancy or infant development. Although the overall effect of bed nets on patent parasitaemia was marginal, they were associated with a significant reduction in maternal malaria-associated anaemia. (ABSTRACT TRUNCATED AT 250 WORDS).


Abstract: The effects of weekly chloroquine prophylaxis, daily iron-weekly folic acid supplementation or passive case management on maternal haemoglobin and parasitaemia and on birthweight were examined in primigravidae in a randomized, double-blind placebo-controlled intervention trial in 1996-98 in Hoima District, western Uganda. Iron-folic acid supplementation significantly increased mean birthweight as compared to case management \( (P=0.03) \). Low birthweight \( (<2.5 \text{ kg}) \) occurred in 2% of babies of women receiving chloroquine prophylaxis for \( >8 \) weeks and in 9% in the case management group \( (RR=0.36, 95\% \text{ CI } 0.13–1.00, P=0.009) \).
Parasitaemia at enrolment significantly correlated with low birthweight in the case management group as compared to the intervention groups (P=0.02). Women in the case management group who were parasitaemia and had haemoglobin levels <100 g/L at delivery had babies with lower mean birthweight as compared to babies in the other groups (P=0.04). Low haemoglobin level at enrolment, irrespective of parasitaemia status, was a predictor of low birthweight in the case management group only (P=0.04). Chloroquine prophylaxis and iron-folic acid supplementation significantly increased maternal haemoglobin levels during pregnancy as compared to case management (P=0.01 and 0.007, respectively) and the increase correlated to the duration of the intervention.


Abstract: The clinical characteristics of 16 neonates with malaria parasitaemia diagnosed on Giemsa stained smears were documented during a 3-month rainy season period in a tropical African city. The prevalence of neonatal malaria was 8 per cent. Seventy-five per cent of these neonates had congenital malaria, 13 per cent transfusional malaria, and 13 per cent had acquired malaria. Plasmodium falciparum was found in all positive smears. Bacterial cultures of blood, urine, and cerebrospinal fluid were sterile. The predominant clinical features were those of fever (88 per cent), respiratory distress (57 per cent), pallor and anaemia (38 per cent each), hepatomegaly (31 per cent), and jaundice and diarrhoea (25 per cent each). Twenty-five per cent of the neonates were resistant to chloroquine sulphate; 19 per cent of the chloroquine resistant babies were also resistant to quinine sulphate 13 per cent of whom responded to halofantrine hydrochloride. One died a day after completing a full course of quinine, with a post-mortem blood smear showing no change in the density of parasitaemia.


Abstract: Congenital Plasmodium falciparum malaria in newborns is uncommon in sub-Saharan Africa. A significant number of infants, however, become infected or exposed to malarial antigens either in utero or at delivery and have the potential to produce antimalarial antibodies and memory cells before their first natural infection. In Yaounde, Cameroon, parasite-specific immunoglobulin M (IgM) was detected in 14% of cord blood samples. The IgM antibodies reacted with a wide range of asexual-stage antigens, with each newborn having its own unique pattern of IgM reactivity. PCR-based detection and genotyping of cord blood parasites found that the prevalence, total number of parasite genotypes, and complexity of infection were higher in newborns who had produced antimalarial IgM than those who had not. Maternal placental malaria and anemia were associated with the production of P. falciparum-specific IgM by the fetus. The effect of early immune priming on acquisition of immunity by infants is unknown and merits further investigation, since a significant proportion of Cameroonian newborns developed a humoral response to malaria before birth.

**Abstract:** The prevalence of *Plasmodium falciparum* malaria was evaluated in all near-term pregnant women and their newborns at the Macha Hospital in the Southern Province of Zambia during part of the rainy season, when malaria prevalence is at its peak. Peripheral parasitemia was noted in 19 (29%) of 65 newborns and in 40 (63%) of 63 mothers. All but one of the infected neonates had an infected mother, and 17 of 40 infected mothers gave birth to infected newborns. The parasite densities measured were uniformly low (less than 25,000/cc), and only seven of 19 infected neonates had fever within 48 hours of delivery suggestive of malaria infection. Parasitized newborns had a 469-gm lower average birthweight, but they did not have a higher incidence of prematurity or preterm delivery compared with uninfected newborns. In addition, the Apgar scores of infected and uninfected newborns were not significantly different. There was no correlation between neonatal parasitemia and either the sex of the child or the parity of the mother. Maternal chloroquine prophylaxis did not appear to be effective in preventing infection in the fetus or the gravida, and the emergence of chloroquine resistance may explain, in part, the greater prevalence of congenital malaria in endemic areas in recent years.


**Abstract:** The prevalence of *Plasmodium falciparum* parasitaemia was evaluated in 59 neonates admitted to the University College Hospital, Ibadan in South-western Nigeria between August and December 1991—a period spanning part of both wet and dry seasons. Peripheral parasitaemia was present in 14 (23.7%) neonates; of these, four were preterm (4/26, 15%) and ten were term babies (10/33, 30.3%). The difference in the prevalence of *P. falciparum* parasitaemia in the two groups was not statistically significant (chi 2=1.78; p=0.10). Parasite densities in all neonates were uniformly low (<2000 asexual forms/microliters blood), and only four of the neonates had fever within 48 hrs of birth. Infected neonates weighed 200 g more than non-infected neonates, but the difference was not statistically significant. Maternal weekly pyrimethamine prophylaxis did not appear to be effective in preventing infection as six (21.4%) of the 28 neonates whose mothers had regular prophylaxis had parasitaemia compared with seven (26.9%) of the 26 neonates whose mothers had no prophylaxis (chi 2=0.22; p>0.05). These data indicate that congenital malaria is not as uncommon as was previously thought and that the recent increase in reported cases may be due to an interplay of several factors.


**Abstract:** Screening of 104 mother-baby pairs for *P. falciparum* malaria revealed that 29% of mothers from low socio-economic group and 11% of their babies had malaria parasitaemia. The corresponding figures for middle and high socio-economic groups were 15% and 7%, respectively. The parasite densities in the babies were not proportional to maternal load and
were generally low, although higher in the low socio-economic group. Maternal pyrimethamine prophylaxis did not appear to protect babies from parasitisation and there was no demonstrable beneficial effect on the babies’ birth-weights.


Abstract: Congenital malaria is defined as the presence of Plasmodium parasites in the erythrocytes of newborns less than seven days old. The aim of this study was to determine the incidence of congenital malaria and its possible clinical consequences. We carried out a prospective survey in Niamey, the capital of Niger (600,000 inhabitants) from July to September 1993. Niamey is an area of mesoendemic malaria and this period of the year corresponds to the rainy season, when malaria transmission is maximal. Ninety mothers and their newborns were included. We assessed the clinical status of the mother and child at the time of the delivery, and took blood smears to check for parasitemia and blood samples to check for antimalaria antibodies by indirect immunofluorescence (IIF). The placenta was not examined. Clinical signs of malaria (fever, splenomegaly, anemia and jaundice) were absent in all mothers and children and 88 of the 90 children had normal birth weights. Plasmodium falciparum was the only parasite detected, with 49 of the 90 mothers and 12 of the 90 newborns having positive blood smears. Serological tests detected the presence of antimalaria antibodies in 73 of the 90 mothers (81.1%) and 68 of the 90 newborns (75.5%). Thus, we found no cases of congenital malaria with clinical signs in this study, despite the high frequency of parasites and antimalaria antibodies. The reasons for this absence of cases of congenital malaria with symptoms are discussed.


Abstract: Even in malaria-endemic areas, congenital malaria has been considered to be rare. Some recent reports suggest, however, that up to one fourth of newborns in some areas may be parasitemic. In an effort to determine current prevalence rates of congenital malaria, malaria smears were done on peripheral blood from 100 peripartum mothers and on cord blood from their offspring at each of seven sites spanning sub-Saharan Africa. The prevalence rate of maternal parasitemia was 15% overall and varied from 4% to 30% at the different sites. Congenital malarial infection was found in 7% of newborns, the prevalence rate varying from 0% to 23% at the different sites. There was no apparent relationship between the season of sampling and either the prevalence rates of parasitemia or the penetrance of malaria from mother to offspring. In summary, congenital malarial infection is not rare in sub-Saharan Africa, but the prevalence rate of neonatal parasitemia varies from site to site.

Abstract: The aim of this work was to differentiate in an endemic area congenital malaria diseases (CMD) from congenital malaria infestations (CMI) or other maternal-fetal infections. METHODS: Four hundred and seventy-five newborn (0–7 d) suspected of infection were prospectively studied. CMD was diagnosed when clinical manifestations were associated with positive thick and thin blood films in a mother and her newborn. The diagnosis of CMI was retained when despite positive parasitemia, no clinical manifestations were observed. RESULTS: Forty newborns (1.7% of the cases of maternal malaria) were diagnosed as CMD and ninety-one (19% of live births) were considered as CMI. The main clinical manifestations were related to cerebral (100%), respiratory (95%) and hemodynamic (90%) systems. Hematologic signs were present in 95% of cases. The level of parasitemia varied from 700 to 3,000 parasites/mL in CMD and from 360 to 870 parasites/mL in CMI. Death occurred in ten cases (25%) of CMD. CONCLUSION: In this malaria-endemic area, neither clinical manifestations nor parasitemia allow one to distinguish CMD from CMI associated with bacterial materno-fetal infections. Studying placental or systemic immunity and antimalaria IgM in the newborn could be of interest to clarify this problem.


Abstract: Prevention of placental malaria through administration of antimalarial medications to pregnant women in disease-endemic areas decreases the risk of delivery of low birth weight (LBW) infants. In areas of high Plasmodium falciparum transmission, two intermittent presumptive treatment doses of sulfadoxine-pyrimethamine (SP) during the second and third trimesters of pregnancy are effective in decreasing the prevalence of placental malaria in human immunodeficiency virus (HIV)-negative women, while HIV-positive women may require a monthly SP regimen to reduce their prevalence of placental parasitemia. A decision-analysis model was used to compare the cost-effectiveness of three different presumptive SP treatment regimens with febrile case management with SP in terms of incremental cost per case LBW prevented. Factors considered included HIV seroprevalence, placental malaria prevalence, LBW incidence, the cost of SP, medical care for LBW infants, and HIV testing. For a hypothetical cohort of 10,000 pregnant women, the monthly SP regimen would always be the most effective strategy for reducing LBW associated with malaria. The two-dose SP and monthly SP regimens would prevent 172 and 229 cases of LBW, respectively, compared with the case management approach. At HIV seroprevalence rates greater than 10%, the monthly SP regimen is the least expensive strategy. At HIV seroprevalence rates less than 10%, the two-dose SP regimen would be the less expensive option. When only antenatal clinic costs are considered, the two-dose and monthly SP strategies cost US $11 and $14, respectively, well within the range considered cost effective. Presumptive treatment regimens to prevent LBW associated with malaria and the subsequent increased risk of mortality during the first year of life are effective and cost effective strategies in areas with both elevated HIV prevalence and malaria transmission rates.

Abstract: The control of malaria in pregnant African women, one of several child survival strategies applied through antenatal care, has been particularly challenging. Prevention and control recommendations for typical areas of high Plasmodium falciparum transmission have promoted the use of antimalarial chemoprophylaxis to prevent placental infection. Persistently low program coverage coupled with diminishing intervention effectiveness have forced a re-evaluation of the relative importance of malaria in pregnancy. The Mangochi Malaria Research Project (MMRP), a prospective evaluation of malaria prevention in pregnant women in rural Malawi conducted during 1987–1990, contributed to establishing new criteria for policy and program development for malaria prevention in pregnancy. The principle findings of the MMRP include: 1) populations at risk of the adverse consequences of malaria in pregnancy include women with low parity, women infected with human immunodeficiency virus, pregnancy during the high malaria transmission season, and the use of a malaria drug that is suboptimally efficacious; 2) the estimated maximum benefits of an antimalarial intervention that clears placental and umbilical cord parasitemia are a 5–12% reduction of low birth weight (LBW), an approximately 35% reduction in the risk of LBW for risks that are actually preventable once a woman has become pregnant (e.g., risks such as infectious disease or poor nutrition during gestation), and a 3–5% reduction in the rate of infant mortality; 3) the intervention must be capable of rendering the woman malaria parasite free, including clearance of parasites from the placental vascular space and umbilical cord blood; 4) other diseases adversely affect pregnancy outcome and, while the control of malaria in pregnancy may not warrant independent programming, if coupled with prevention programs to provide a range of antenatal services, the incremental costs of malaria control may prove to be highly cost-effective; and 5) the choice of a regimen must balance intervention efficacy with safety, availability, affordability, and simplicity of delivery, and several antimalarials may meet these criteria. The Malawi Ministry of Health has modified its malaria prevention in pregnancy recommendations and now faces the challenge of effective programming to improve child survival.


Abstract: BACKGROUND: Malaria contributes to maternal illness and anaemia in pregnancy, especially in first-time mothers, and could harm the mother and the baby. Interventions to prevent or mitigate the effects of malaria during pregnancy are often recommended. OBJECTIVES: To assess drugs given to prevent malaria infection and its consequences in pregnant women living in malarial areas. SEARCH STRATEGY: We searched the Cochrane Infectious Diseases Group trials register (July 2002); the Cochrane Controlled Trials Register (Issue 3, 2002); MEDLINE (1966–July 2002); EMBASE (1974–July 2002); and LILACS (accessed July 2002). We contacted researchers in the field. SELECTION CRITERIA: Randomised and quasi-randomised trials in pregnant women of drugs given regularly that aim to mitigate the effects of malaria in pregnancy. DATA COLLECTION AND ANALYSIS: Trial quality
was assessed. Data extraction was done by two reviewers using standard criteria. MAIN
RESULTS: 14 trials included (n=3454); only 2 were adequately concealed. For women of all
parity groups, the meta-analysis (n=2890) showed lower parasitaemia and placental malaria in
the intervention arm. For women having the first or second baby, there were 9 studies (n=3454).
Severe antenatal anaemia was less common (RR 0.62, 95%CI 0.50 to 0.78, 4 studies), perinatal
mortality appeared lower (RR 0.73, 95% CI 0.73 to 0.99, 3 studies). Maternal parasitaemia was
lower with the intervention (RR 0.24, 95%CI 0.14 to 0.42, random effects model, 6 studies), and
mean birthweight higher (WMD 122g, 95%I 81 to 164g, 8 studies), and low birthweight was less
common (RR 0.49, 95%CI 0.36 to 0.65, 6 studies). REVIEWER’S CONCLUSIONS: Drugs given
routinely for malaria during pregnancy reduce severe antenatal anaemia in the mother, and are
associated with higher birthweight and probably reduced perinatal mortality. This effect appears
to be limited to low parity women.

“Effect of chloroquine chemoprophylaxis during pregnancy on birth weight: results of

Abstract: To determine the effect of chloroquine chemoprophylaxis during pregnancy on birth
weights, a randomized trial was carried out in 1987 and 1988 in Banfora, Burkina Faso (West
Africa). Seven hundred forty-five randomly selected women treated with chloroquine sulfate were
compared to with 719 controls who received no treatment. In spite of an unquestionable effect of
chloroquine in preventing placental infection (4.1% infected placentas in the treated group
versus 19.0% in the controls), the mean difference in birth weights between the two groups (6 g)
was not significant. The difference in the proportion of low birth weight (LBW) newborn babies in
two groups (16.3% versus 16.4%) was also not significant. However, there was a strong
relationship between placental infection and birth weight (the mean birth weight difference
between infected and uninfected placentas was 113 g, and the proportion of LBW babies was
26.0% in infected placentas versus 14.8% in uninfected placentas). The small difference in birth
weights observed between the two groups may be due to the fact that the prevalence rate of
placental infection is low and that prophylaxis is effective only on a portion of the subjects in the
treated group. It may also indicate that malaria is only one of several risk factors responsible for
LBW. The relatively small increase in birth weight, the expected poor acceptance of mass
prophylaxis, and the spreading of chloroquine-resistant Plasmodium strains should be
considered before extending malaria chemoprophylaxis to all pregnant women. It might be worth
considering to limit prophylaxis to primigravidae.

White, and F. Nosten. 2001. “Effects of malaria during pregnancy on infant mortality in

Abstract: Malaria during pregnancy reduces birth weight, and low birth weight is a major
determinant of infant mortality. The authors estimated the impact of malaria during pregnancy on
infant mortality in a Karen population living in Thailand. Between 1993 and 1996, a cohort of
1,495 mothers and their infants was followed weekly from admission of the mother to antenatal
clinics until the first birthday of the infant. Both falciparum malaria and vivax malaria during
pregnancy were associated with low birth weight but did not shorten gestation. Febrile illness in the week before delivery was associated with premature birth. Preterm and full-term low birth weight and fever in the week before delivery were associated with neonatal mortality. Maternal fevers close to term were also associated with the deaths of infants aged between 1 and 3 months, whereas no risk factors could be identified for deaths that occurred later in infancy. Thus, malaria during pregnancy increased neonatal mortality by lowering birth weight, whereas fever in the week before birth had a further independent effect in addition to inducing premature birth. The prevention of malaria in pregnancy and, thus, of malaria-attributable low birth weight should increase the survival of young babies.


Abstract: As part of a community-based group-randomized trial on the impact of permethrin-treated bed nets (ITNs) on malaria in pregnancy in a holoendemic area of western Kenya, we assessed their effects on antibody responses to Plasmodium falciparum pre-erythrocytic antigens (recombinant circumsporozoite protein [CSP] and peptides complimentary to the repeat region of the liver stage antigen-1 [LSA-1]) and blood stage antigen (recombinant C-terminal domain of the merozoite surface protein-1 [MSP-1(19) kD]) in paired maternal/cord plasma samples obtained from 296 deliveries (157 from ITN villages and 139 control villages). Levels of total IgG and IgG subclasses 1–3 to LSA-1 and total IgG and IgG3 to MSP-1 were lower, whereas those of total IgG to CSP were significantly higher in women from ITN villages than those from control villages. In cord plasma, levels of total IgG and IgG2 to LSA-1 and IgG3 to MSP-1 were lower in ITN villages than in control villages, but antibody responses to CSP were similar. Our results suggest that the use of ITNs decreases antibody responses to LSA-1 and MSP-1 antigens in pregnant women with associated reductions in levels of the same antibodies in cord blood. In contrast, ITN use was found to be associated with increased antibody responses to CSP in pregnant women, but had no effect on antibody levels to CSP in cord blood.


Abstract: A fever case management (CM) approach using sulfadoxine-pyrimethamine (SP) was compared with two presumptive intermittent SP treatment regimens in the second and third trimesters in pregnant primigravidae and secundigravidae in an area of intense Plasmodium falciparum malaria transmission in western Kenya. The investigation evaluated efficacy of the antimalarial regimens for prevention of placental malaria and examined the effect of human immunodeficiency virus (HIV) infection on antimalarial drug efficacy and adverse drug reactions. Twenty-seven percent (93 of 343) of pregnant women in the CM group had placental malaria
compared with 12% (38 of 330; P < 0.001) of women who received two doses of SP and compared with 9% (28 of 316; P < 0.001) of women who received monthly SP. Fourteen percent (49 of 341) of women in the CM group delivered low birth weight (LBW) infants compared with 8% (27 of 325; P = 0.118) of women who received two doses of SP and compared with 8% (26 of 331; P = 0.078) of women who received monthly SP. Seven percent (7 of 99) of the HIV-negative women on the two-dose SP regimen had placental malaria compared with 25% (10 of 39; P = 0.007) of HIV-positive women on the same regimen; the rate of placental malaria in HIV-positive women was reduced to 7% (2 of 28; P = 0.051) for women on the monthly SP regimen. Less than 2% of women reported adverse drug reactions, with no statistically significant differences between HIV-positive and HIV-negative women. Intermittent treatment with SP is safe and efficacious for the prevention of placental malaria in pregnant primigravidae and secundigravidae in sub-Saharan Africa. While a two-dose SP regimen may be effective in areas with low HIV seroprevalence, administration of SP monthly during the second and third trimesters of pregnancy should be considered in areas of high HIV seroprevalence to prevent the effects of maternal malaria on the newborn.


Abstract: Analysis of three years of data from a malaria clinic operated by the Indian Council of Medical Research (ICMR) in the Government Medical College Hospital in Jabalpur, central India, showed a high malaria prevalence among pregnant women, which was statistically highly significant (P < 0.0001) compared with the situation among nonpregnant women. Cerebral malaria was a common complication of severe Plasmodium falciparum infection, with a high mortality during pregnancy, requiring immediate attention. The study also showed that malaria infection was more frequent in primigravidae, falling progressively with increasing parity. Mean parasite densities were significantly higher in pregnant women compared with nonpregnant women for both P. falciparum (P < 0.001; df=137) and P. vivax (P < 0.05; df=72) infection. Pregnant women with falciparum or vivax malaria were significantly more anaemic than noninfected pregnant women or infected nonpregnant women. The average weight of 155 neonates from infected mothers was 350 g less than that of 175 neonates from noninfected mothers. This difference in birth weight was statistically significant for both P. falciparum (P < 0.0001; df=278) and P. vivax (P < 0.0001; df=223) infection. Congenital malaria was not recorded. We conclude that pregnant women from this geographical area require systematic intervention owing to their high susceptibility to malaria during pregnancy and the puerperium.


Abstract: With the knowledge that an efficacious antimalarial administered to pregnant women would markedly reduce placental malaria and its associated risk of low birth weight (LBW), investigations were conducted to identify an antimalarial regimen practical for nationwide implementation through the antenatal clinic (ANC) system. Maternal practices, including ANC
utilization and malaria treatment and prevention during pregnancy were evaluated as part of a national malaria knowledge, attitudes, and practices survey. A second study was conducted to evaluate the efficacy and cost of selected alternative antimalarial regimens. Women in their first or second pregnancy were placed on chloroquine (CQ) treatment (25 mg/kg) followed by weekly CQ (300 mg) (CQ/CQ); sulfadoxine-pyrimethamine (SP) treatment followed by CQ (300 mg weekly) (SP/CQ); or SP treatment during the second trimester and repeated at the beginning of the third trimester (SP/SP). With 87% of women attending ANC two or more times during pregnancy, most pregnant women in Malawi could be reached with an antimalarial intervention. Among 159 women in their first or second pregnancy receiving CQ/CQ, SP/CQ, and SP/SP, placental malaria parasitemia rates were 32%, 26%, and 9%, respectively (P=0.006, by chi-square test). The SP/SP regimen was also markedly more cost-effective in preventing infant deaths, costing $75 per infant death prevented, compared with $481 for SP/CQ and $542 for CQ/CQ. These investigations suggest that a regimen consisting of two treatment doses of SP during pregnancy is an efficacious and cost-effective intervention to prevent placental malaria, and LBW-associated mortality, that can be delivered to pregnant women through ANCs in settings similar to those found in rural Malawi.


Abstract: In West Africa, administration of chloroquine chemoprophylaxis during pregnancy is common, but little is known about its impact on Plasmodium falciparum infection during pregnancy. Therefore, cross-sectional studies in antenatal care clinics (ANCs) and delivery units (DUs) were conducted in Koupela District, Burkina Faso. Chloroquine chemoprophylaxis was reported by 69% of 597 pregnant women at ANC and by 93% of 853 women in DUs. P. falciparum peripheral parasitemia was identified in 29% of women at both ANCs and DUs. Placental parasitemia was identified in 22% of delivering women and was strongly associated with low birth weight (LBW) (risk ratio [RR], 1.7; 95% confidence interval [CI], 1.2–2.4) and prematurity (RR, 2.9; 95% CI, 1.6–5.4). In multivariate analysis, use of chemoprophylaxis was not associated with a reduction in the prevalence of placental parasitemia, LBW, or prematurity. Despite the high reported chloroquine chemoprophylaxis coverage, peripheral and placental malaria rates remain high and are associated with known adverse outcomes during pregnancy, including maternal anemia, prematurity, and LBW. Alternative prevention strategies, such as use of insecticide-treated mosquito nets and intermittent preventive treatment with more-effective antimalarials, are needed.


Abstract: Kenya’s National Malaria Strategy states that insecticide-treated nets (ITNs) would be considered as a free service to pregnant women assuming sufficient financial commitment from donors. In 2001, United Nation’s Children’s Fund (UNICEF) and the Government of Kenya...
brokered support to procure and distribute nets and K-O TABs (deltamethrin) to 70,000 pregnant women in 35 districts throughout Kenya around Africa Malaria Day. This intervention represented the single largest operational distribution of ITN services in Kenya to date, and this study evaluates its success, limitations and costs. The tracking process from the central level through to antenatal clinic (ANC) facilities suggests that of the 70 000 nets procured, 37 206 nets (53%) had been distributed to pregnant women throughout the country within 12 weeks. One-fifth of the nets procured (14,117) had gone out to individuals other than pregnant women, most of these at the request of the district teams, with only 2870 nets estimated to have gone astray at the ANC facilities. At 12 weeks, the remaining 18 677 nets were still in storage awaiting distribution, with more than two-thirds having reached the district, and nearly half already being held at ANC facilities. The cost of getting a net and K-O TAB to an ANC facility ready for distribution to a pregnant woman was US$ 3.81. Accounting for the 14,117 nets that had gone to other users, the cost for an ITN received by a pregnant woman was US$ 5.26. Delivering ITNs free to pregnant women through ANCs uses an existing system (with positive spin-offs of low delivery cost and simple logistics), is equitable (as it not only targets those who can afford it) and can have the added benefits of strengthening ANC service, delivery and use.


**Abstract:** OBJECTIVE: To study the importance of HIV infection for malaria in pregnancy in Kisumu, Kenya. SUBJECTS AND METHODS: Healthy women with an uncomplicated pregnancy of 32 weeks or more attending the prenatal clinic in the Provincial Hospital between June 1996 and March 1999 were tested for HIV and malaria after consent had been obtained. For participating women who delivered in the same hospital, a blood smear of the mother and the placenta were obtained. RESULTS: In the third trimester, 5093 women consented to testing: the prevalence of malaria and HIV was 20.1 and 24.9%, respectively. Among the 2502 screened women who delivered in the hospital, the prevalence of HIV, peripheral parasitaemia and placental malaria was 24.5, 15.2, and 19.0%, respectively. Compared with HIV-seronegative women, HIV-seropositive women were more likely to be parasitaemic, to have higher parasite densities, and to be febrile when parasitaemic. Placental infections in HIV-seropositive women were more likely to be chronic, as indicated by the presence of moderate to heavy pigment depositions. When adjusted by age, the typical gravidity-specific pattern of malaria in pregnancy disappeared in HIV-seropositive women; HIV-seropositive primigravidae had a similar risk of malaria as HIV-seropositive multigravidae. The excess malaria attributable to HIV in the third trimester increased from 34.6% among HIV-seropositive primigravidae, to 41.5% among HIV-seropositive secundigravidae, and 50.7% among HIV-seropositive gravidae with three or more pregnancies. CONCLUSION: HIV infection alters patterns of malaria in pregnant women; in areas with both infections, all pregnant women should use malaria prevention.

Abstract: A nested case-control hospital study and a midwife-based community cohort study were conducted in Central Sudan during 1989 and 1990 to assess the contribution of mesoendemic malaria to low birth weight. Malarial infection was determined by maternal history, parasitology, and histopathology. There were significant associations between a maternal history of malaria and low birth weight in the hospital study (adjusted odds ratio (OR)=1.6, 95% confidence interval (CI) 1.2–2.1) and the community study (OR=1.7, 95% CI 1.3–2.3). Attributable risk percentages were high and were comparable in the hospital study (22.2%) and the community study (24.5%). A significant trend of increased risk of low birth weight was observed with increasing number of reported malaria attacks, with attacks occurring earlier in pregnancy, and with higher parasitemia. In addition, the risk of low birth weight associated with malaria was higher among primiparous women than among multiparous women. The mean birth weight of infants whose mothers had malaria during pregnancy was significantly lower than the mean birth weight of infants whose mothers did not. Malaria treatment, chemoprophylaxis, and use of insecticides decreased the risk of low birth weight and are recommended as appropriate interventions. These measures should target primigravid women and should be initiated early in pregnancy.


Abstract: The choice of interventions for improving malaria control during pregnancy depends on several factors. These include the efficacy of the intervention, consumer acceptability and compliance, provider acceptability, cost, safety, integration with other interventions and the local system of health-care delivery, and the degree of combination of these factors. For successful implementation the following should be recognized: appropriate policy formulation based on a process of advocacy, research and demonstration programmes; regulation and legislation; resource mobilization; consumer awareness; and appropriate delivery, targeting, monitoring and evaluation. Malaria in pregnancy is a priority area for control and a major public-health problem. Improved control of such disease requires better integration into health-care practices.


Abstract: The malaria prophylactic effects of chloroquine (CQ), proguanil (PROG), and chloroquine-proguanil combination (CQ+PROG) during pregnancy on maternal haemoglobin levels (Hb), placental malaria, and birth weight were assessed in Muheza, Tanzania. Within 2 months of prophylaxis, severe anaemia in primigravidae (PG) was reduced from 21% (22 cases) to 13% (13 cases). There was no positive effect in multigravidae (MG). Sustained increases in the mean Hb occurred in PG of the PROG and CQ+PROG groups. The mean Hb of PG of the CQ group decreased after an initial increase, possibly due to the selection of more and highly chloroquine-resistant strain(s). The mean birth weight of PG was highest in the CQ+PROG (2.89
kg) and least in the CQ group (2.71 kg). The CQ group had the highest low birth weight rate (LBW). The prevalence of placental malaria was highest in the CQ (28%) and lowest in the PROG group (12%). For all the prophylactic effects, PROG and CQ+PROG did not differ significantly. Hence, the deployment of CQ+PROG for prophylaxis would be unnecessary. Proguanil is a suitable alternative to chloroquine prophylaxis. Due to possible emergence of proguanil resistance, deployment of this drug should incorporate constant monitoring for resistance and the eventual prophylaxis efficacy. The search for other effective malaria control measures should continue.


Abstract: In malaria-endemic regions, the impact of malaria upon pregnancy and the value of chemoprophylaxis for malaria for pregnant women remain controversial. We prospectively studied 302 pregnant women who presented in labor to Centre Medical Evangelique, Nyankunde, Zaire. We evaluated the incidence of malarial infection in mothers, placentas, and neonates and examined the effect of infection on birth weight and perinatal mortality. We analyzed the outcome of pregnancy in relation to prophylaxis with chloroquine, controlling for parity and prenatal clinic attendance. Peripartum smears of maternal blood (21%), placentas (33%), cord blood (9%), and neonatal blood (7%) were positive for Plasmodium falciparum. Maternal malaria increased the risk of perinatal death (relative risk [RR]=12.4) and low birth weight (RR=3.7). Neonatal malaria increased the risk of perinatal death (RR=7.2). Chloroquine prophylaxis protected against maternal (RR=0.4) and fetal malaria (RR=0.2), low birth weight (RR=0.39), and perinatal death (RR=0.38). Peripartum malaria increases the risk of perinatal death and low birth weight. Chemoprophylaxis with chloroquine during pregnancy may have a protective effect, even in certain areas where chloroquine-resistant P. falciparum is endemic.


Abstract: Maternal malaria and anaemia, pregnancy and infant outcomes are reviewed among a cohort of mothers and their babies living in Chikwawa district, southern Malawi. Overall, 4104 women were screened at first antenatal visit and 1523 at delivery. Factors independently associated with moderately severe anaemia (MSA; <8g haemoglobin/dl) in primigravidae were malaria (relative risk=1.9; 95% confidence interval=1.6–2.3) and iron deficiency (relative risk=4.2; 95% confidence interval=3.5–5.0). Only iron deficiency was associated with MSA in multigravidae. After controlling for antimalarial use, parasitaemia was observed in 56.3% of the HIV-infected primigravidae and 36.5% of the non-infected (P=0.04). The corresponding figures for multigravidae were 23.8% and 11.0%, respectively (P=0.002). Over 33% of the infants born alive to primigravidae were of low birthweight (LBW; < 2500 g), and 23.3% of all newborns had foetal anaemia (<12.5g haemoglobin/dl cord blood). LBW was significantly associated in primigravidae with pre-term delivery, placental malaria and frequency of treatment with sulfadoxine-pyrimethamine (SP), and in multigravidae with pre-term delivery, adolescence, short
stature and MSA. LBW was significantly reduced with a second SP treatment in primigravidae, and with iron-folate supplementation in multigravidae. Mean haemoglobin concentrations were significantly lower in the infant who had been LBW babies than in the others, and significantly associated with parity, peripheral parasitaemia at delivery and placental malaria. At 1 year post-delivery, life status was known for 364 (80.7%) of the 451 infants enrolled in the follow-up study. Independent risk factors for post-neonatal mortality were maternal HIV infection, LBW, and iron deficiency at delivery. This study identifies priorities for improving the health of pregnant women and their babies in this rural area of Malawi.


Abstract: Although randomized controlled trials of interventions to reduce malaria in pregnancy have demonstrated an increase in the birthweight of the newborn in primigravidae, the subsequent impact on infant mortality in all-parities has not been assessed. The aim of this paper was to model the possible impact of placental malarial infection on infant mortality through reduced birthweight. An extensive literature search was undertaken to define a series of parameters describing the associations between placental infection, birthweight and premature mortality in sub-Saharan Africa. It was shown that a baby is twice as likely to be born of low birthweight if the mother has an infected placenta at the time of delivery (all-parities: 23% vs 11%, primigravidae only: 32% vs 16%), and that the probability of premature mortality of African newborns in the first year of life is 3 times higher in babies of low birthweight than in those of normal birthweight (16% vs 4.6%). Assuming 25% of pregnant women in malaria-endemic areas of Africa harbour placental malarial infection, it is suggested that 5.7% of infant deaths in malarious areas could be an indirect cause of malaria in pregnancy. This would imply that, in 1997, malaria in pregnancy could have been responsible for around 3700 infant deaths under the diverse epidemiological conditions in Kenya. Placental infection with Plasmodium falciparum appears to have a more significant role in infant survival in Africa than has been previously assumed. This may explain the high reduction in infant mortality rates from interventions aimed at reducing transmission, over and above that expected from a decline in direct malaria-specific mortality alone.


Abstract: BACKGROUND: In areas of endemic transmission, malaria in pregnancy is associated with severe maternal anaemia and low birthweight babies. The prevalence of infection is highest in primigravidae (PG), and hence control efforts are usually geared towards this high risk group. Using a sensitive measure of placental infection, we investigated the relationship between active-acute, active-chronic and past placental infection with maternal anaemia and low birthweight in women of all gravidities. METHODS: Between January 1996 and July 1997, 912 women delivering in Kilifi District Hospital, Kenya, were recruited. Haemoglobin and peripheral malaria slides were taken prior to delivery, placental biopsies and smears were
taken at the time of delivery and birthweight and maternal height and weight were measured soon after birth. Information was obtained on socio-economic and educational status. The association between placental malaria, severe anaemia and low birthweight was investigated for women of different gravidities. FINDINGS: By placental histology, the prevalence of active or past malaria in all gravidities was high, ranging from 64% in PG to 30% in gravidities 5 and above. In gravidities 1–4, active malaria infection was associated with severe maternal anaemia, adjusted OR 2.21 (95% CI 1.36, 3.61). There was a significant interaction between chronic or past malaria and severe anaemia in their effects on birthweight, whereby the risk of low birthweight was very high in women with both chronic or past placental malaria and severe anaemia: OR 4.53 (1.19, 17.2) in PG; 13.5 (4.57, 40) in gravidities 2–4. INTERPRETATION: In this area of moderate malaria transmission, women of all parities have substantially increased risk of low birthweight and severe anaemia as a result of malaria infection in pregnancy. The risk of low birthweight is likely to be particularly high in areas with a high prevalence of severe anaemia.


Abstract: Despite international recommendations to use malaria treatment and prevention in pregnant women in malaria-endemic areas, few studies have evaluated the efficacy of available antimalarial regimens. This issue is of particular concern in the face of spreading chloroquine (CQ)-resistance of Plasmodium falciparum in malarious areas of sub-Saharan Africa. In a prospective trial in rural Malawian pregnant women, we examined three regimens using CQ (including the existing national policy regimen) and one regimen using mefloquine (MQ). The efficacy of the regimens was determined by comparing rates of clearance of initial parasitemia; prevention of breakthrough infection; and parasitemia at delivery in maternal peripheral blood, placental blood, and in infant umbilical cord blood. Among 1,528 parasitemic women at enrollment, 281 (18.4%) had persistent infections; and among 1,852 initially aparasitemic women, 320 (17.3%) had breakthrough parasitemia on one or more follow-up visits. Compared with women on MQ, women on a CQ regimen were at significantly greater risk of persistent and breakthrough infection (odds ratios [OR]=30.9 and 11.1, respectively, P<10(–6)). Other significant risk factors for persistent and breakthrough infections in a multivariate model included first pregnancy; enrollment in the rainy or postrainy season; maternal age < or = 25 years; seropositivity to the human immunodeficiency virus (HIV) (persistent infections only); and no use of antimalarial prophylaxis before enrollment (breakthrough infections only). At delivery, compared with women on MQ, women on a CQ regimen were at significantly greater risk of peripheral, placental, or umbilical cord blood parasitemia (OR=8.7, 7.4, and 4.1, respectively, P<10(–6)). Additional risk factors for parasitemia at delivery in multivariate models included first pregnancy; delivery in the rainy or postrainy season; HIV-seropositivity; and maternal age < or =
25 years (risk for peripheral and placental blood parasitemia only). Maternal anemia (hematocrit <30%) at enrollment or at delivery was not associated with persistent or breakthrough parasitemia or parasitemia at delivery in these multivariate models. While factors leading to increased malaria parasite exposure (high transmission seasons) and lowered or altered host immune response (low pregnancy number, young age, and HIV infection) are important risk factors for malaria in pregnant women, the use of an ineffective intervention (CQ in a setting with CQ-resistant parasites) was the most important determinant of P. falciparum parasitemia in these pregnant women. Strategies to reduce the impact of malaria in pregnant women must use efficacious interventions and may need to consider targeting the intervention to the most susceptible women during the seasons of high malaria exposure.


Abstract: The human malarial parasite Plasmodium falciparum is responsible for an estimated 300–500 million clinical cases and 1–3 million deaths annually. At particular risk of developing severe, life-threatening malaria-associated complications are women during their first pregnancy. The observed pathologies, such as premature delivery, intrauterine growth retardation, abortion, and death of the mother and the newborn, are in large parts due to the parasite’s ability to render infected erythrocytes adhesive and sequester in the intervillous space of infected placentas. In subsequent pregnancies, women are protected from maternal malaria through antibodies that prevent cytoadhesion of P. falciparum-infected erythrocytes in the placenta. Here, we summarize our current knowledge of the pathophysiological processes underpinning maternal malaria and discuss emerging concepts for intervention.


Abstract: In the developing world, young women, pregnant women, and their infants and children frequently experience a cycle where undernutrition (macronutrient and micronutrient) and repeated infection, including parasitic infections, lead to adverse consequences that can continue from one generation to the next. Among parasitic infections, malaria and intestinal helminths coexist widely with micronutrient deficiencies and contribute importantly to anemia and this cycle of retarded growth and development. In somewhat more limited or focal geographic settings, other parasitic diseases (e.g., schistosomiasis, filariasis) contribute similarly to this cycle. It is undoubtedly much better to enter a pregnancy free of infection and nutritionally replete than the various alternatives. Existing intervention strategies for micronutrient support and for the control of common parasitic infections before or during pregnancy, particularly malaria and intestinal helminths, should be followed. However, further research to identify barriers and priority approaches to achieving this goal remain very important in resource-poor settings where targeted public health efforts are required.

Abstract: OBJECTIVES: Malaria contributes to antenatal anaemia and slowing of fetal growth, especially in first-time mothers. It is thought that these effects harm the mother and baby, and interventions to prevent or mitigate the effects of malaria are often recommended. The objective of this review was to assess the effects of anti-malarial interventions in pregnant women living in malarial areas on the mother and the infant. SEARCH STRATEGY: We searched the Cochrane Infectious Diseases Group trials register, the Cochrane Controlled Trials Register, Medline, Embase. We contacted researchers in the field. SELECTION CRITERIA: Randomised and quasi-randomised trials in pregnant women of interventions that aim to mitigate the effects of malaria in pregnancy, including drugs given routinely and mosquito control measures. DATA COLLECTION AND ANALYSIS: Trial quality was assessed. Data extraction was done by two reviewers using standard criteria. MAIN RESULTS: Fifteen trials were included. Drugs given regularly and routinely were associated with fewer episodes of fever in the mother, fewer women with severe anaemia antenatally, and higher average birthweight in infants. These effects appear to be greater in primigravidae. No difference in perinatal, neonatal and infant mortality were detected in studies of prophylaxis in all parity groups, or studies confined to women of low parity. REVIEWER’S CONCLUSIONS: Drugs locally effective for malaria when given routinely for malaria during pregnancy may reduce the incidence of low birth weight and anaemia. This effect appears to be limited to low parity women. Given the costs and inputs required to effectively deliver widescale prophylaxis programmes, we believe a large simple placebo-controlled trial testing the impact of drugs given routinely on pregnancy outcome and neonatal/infant survival is warranted.


Abstract: The impact of insecticide (permethrin)-treated bed nets (ITNs) on malaria in pregnancy was studied in a rural area in western Kenya with intense perennial malaria transmission. All households in 40 of 79 villages were randomized to receive ITNs by January 1997. The ITNs were distributed in control villages two years later. Complete data on birth outcome were available on 2,754 (89.6%) of 3,072 deliveries. Women (n=780) were followed monthly throughout pregnancy in 19 of 79 villages. Among gravidae 1–4, ITNs were associated with reductions of 38% (95% confidence interval [CI]=17–54%) in the incidence of malaria parasitemia and 47% (95% CI=6–71%) in the incidence of severe malarial anemia (hemoglobin level < 8 g/dL with parasitemia) during pregnancy. At the time of delivery, mean hemoglobin levels were 0.6 g/dL (95% CI=0.01–1.2 g/dL) higher, the prevalence of placental or maternal malaria was reduced by 35% (95% CI=20–47%), and the prevalence of low birth weight was reduced by 28% (95% CI=2–47%) in gravidae 1–4 from ITN villages. No beneficial impact was observed in gravidae five or higher. In areas of intense perennial malaria transmission, permethrin-treated bed nets reduce the adverse effect of malaria during the first four pregnancies.

Abstract: The impact of malaria on low birthweight was investigated in Bougoula village (Sikasso region, Mali). In two successive years, pregnant women were followed until delivery. Phase I (1992) was observational, with 135 complete observations. Phase II (1993) included 126 participants, who were offered malaria prophylaxis with proguanil (200 mg/day) and chloroquine (300 mg/week). The results show that 1) infants of first and second pregnancies had lower birth weights (–382.7 +/- 62.6 g; P <0.0001) compared with higher rank pregnancies; 2) strong seasonal variation in birthweight was observed in Phase I, with an annual cycle, a nadir in January, and an amplitude of 372.4 g (P=0.0002); 3) parasitemia measured during pregnancy was associated with lower birthweight in infants from first and second pregnancies, but not from higher parity mothers; and 4) malaria prophylaxis taken for 20 weeks or more in Phase II suppressed the seasonal variation of birthweight and the effect of low parity (+423.4 +/- 118.8g; P=0.0004). We conclude that malaria in pregnancy has an important negative impact on birthweight in first and second pregnancies. Prophylaxis with proguanil and chloroquine is an effective prophylaxis when taken for 20 weeks or more.


Abstract: Pregnant women in malarious areas may experience a variety of adverse consequences from malaria infection including maternal anemia, placental accumulation of parasites, low birth weight (LBW) from prematurity and intrauterine growth retardation (IUGR), fetal parasite exposure and congenital infection, and infant mortality (IM) linked to preterm-LBW and IUGR-LBW. We reviewed studies between 1985 and 2000 and summarized the malaria population attributable risk (PAR) that accounts for both the prevalence of the risk factors in the population and the magnitude of the associated risk for anemia, LBW, and IM. Consequences from anemia and human immunodeficiency virus infection in these studies were also considered. Population attributable risks were substantial: malaria was associated with anemia (PAR range = 3–15%), LBW (8–14%), preterm-LBW (8–36%), IUGR-LBW (13–70%), and IM (3–8%). Human immunodeficiency virus was associated with anemia (PAR range = 12–14%), LBW (11–38%), and direct transmission in 20–40% of newborns, with direct mortality consequences. Maternal anemia was associated with LBW (PAR range = 7–18%), and fetal anemia was associated with increased IM (PAR not available). We estimate that each year 75,000 to 200,000 infant deaths are associated with malaria infection in pregnancy. The failure to apply known effective antimalarial interventions through antenatal programs continues to contribute substantially to infant deaths globally.

**Abstract:** Preliminary results are presented from this study which indicate that 84.8% of pregnant women present at first antenatal visit with anemia (Hb 11g/dl) an 8.7% of their infants (n=230) have a hemoglobin at birth below 14g/dl. There is an association between pregnancy anemia and malaria. A case control study in pregnant women and an infant cohort study to 18 months of age, are employed to study the cause and effects of anemia and malaria on women and their infants health.


**Abstract:** OBJECTIVE: To determine the effect of dual infection with HIV and malaria on birth outcomes and maternal anaemia among women delivering at a large public hospital in Kisumu, western Kenya. SUBJECTS AND METHODS: Data on obstetric and neonatal characteristics, maternal and placental parasitaemia, and postpartum haemoglobin levels were collected from women enrolled in a cohort study of the interaction between malaria and HIV during pregnancy. RESULTS: Between 1996 and 1999, data were available from 2466 singleton deliveries. The maternal HIV seroprevalence was 24.3%, and at delivery 22.0% of the women had evidence of malaria. Low birthweight, preterm delivery (PTD), intrauterine growth retardation (IUGR) and maternal anaemia (haemoglobin <8 g/dl) occurred in 4.6, 6.7, 9.8 and 13.8% of deliveries, respectively. Maternal HIV, in the absence of malaria, was associated with a 99 g (95% CI 52–145) reduction in mean birthweight among all gravidae. Malaria was associated with both IUGR and PTD, resulting in a reduction in mean birthweight of 145 g (95% CI 82–209) among HIV-seronegative and 206 g (95% CI 115–298) among HIV-seropositive primigravidae, but not among multigravidae. Both HIV and malaria were significant risk factors for postpartum maternal anaemia, and HIV-seropositive women with malaria were twice as likely to have anaemia than HIV-seronegative women with or without malaria. CONCLUSION: Women with dual infection are at particular risk of adverse birth outcomes. In areas with a moderate or high prevalence of HIV and malaria, all pregnant women should be the focus of malaria and anaemia control efforts to improve birth outcomes.


**Abstract:** A randomized, double-blind, placebo-controlled community-based trial of oral iron supplementation (200 mg ferrous sulphate daily) administered to multigravid pregnant women by traditional birth attendants (TBAs) was carried out in a rural area of The Gambia. Iron supplementation led to a significant reduction in the prevalence of anaemia and of iron deficiency. Iron supplementation was not accompanied by increased susceptibility to malaria infection; there was no difference in the prevalence and severity of peripheral blood or placental
malaria infection between the 2 groups of women. The birth weight of children born to women who received iron prophylaxis was increased by an average of 56g. It is concluded that oral iron prophylaxis can be successfully delivered through TBAs integrated into a primary health care programme. This simple intervention can produce significant beneficial effects on the health of the mother without inducing increased susceptibility to malaria and has the potential for reducing perinatal mortality by increasing birth weight.


Abstract: A trial of malaria chemoprophylaxis given by traditional birth attendants was undertaken in a rural area of The Gambia where access to antenatal clinics is difficult. Women received one or more doses of Maloprim or placebo from a traditional birth attendant during 1,049 of 1,208 pregnancies (87%) recorded in 16 villages over a 3-year period. Primigravidae who received Maloprim had a lower parasite rate and a significantly higher mean packed cell volume than primigravidae who received placebo, and their babies were significantly heavier (6% low birth weight vs 22%). In multigravidae chemoprophylaxis reduced malaria parasitaemia but it had no beneficial effect on haemoglobin level and much less effect on birth weight than was observed in primigravidae. However, the mean birth weight of babies born to grandemultigravidae who received chemoprophylaxis was significantly higher than that of babies born to grandemultigravidae who did not.


Abstract: Histological and ultrastructural studies of four placentae heavily infectd with Plasmodium falciparum revealed large intervillous accumulations of erythrocytes containing parasites together with monocytes which had ingested pigment. These appearances were associated with focal syncytial necrosis, loss of syncytial microvilli and proliferation of cytotrophoblastic cells. In addition, marked irregular thickening of trophoblastic basement membranes and protrusion of tongue-like projections of syncytiotrophoblast into the basement membrane were observed. In six other placentae which contained scanty amounts of pigment but no parasites, representing past or inactive infection, no large collections of monocytes or abnormalities of trophoblast were apparent but basement membrane thickening was evident. Immunohistological studies revealed no significant differences between placentae positive for parasites and those containing pigment only, although the amount of certain immunoproteins and clotting factors was clearly increased above normal. These findings establish that P. falciparum infection in the placenta may result in substantial damage although lesions within the villus are rare. Furthermore, previous infection, although adequately controlled, may leave a heritage of pigment deposition, basement membrane thickening and immunopathological lesions. These results may thus account for both the high frequency of intra-uterine growth retardation and the rarity of congenital malaria in the presence of P. falciparum malaria.

**Abstract:** In 1992, the Gambian national impregnated bed net programme (NIBP) introduced insecticide treatment of bed nets into half of the primary health care villages in The Gambia. One component of the evaluation of this programme was the determination of whether it had any impact on the outcome of pregnancy in primigravidae. From February 1992, 651 primigravidae were recruited into the study. Less than 50% of them used an insecticide-treated bednet. During the rainy season the prevalence of Plasmodium falciparum among primigravidae was lower, fewer babies were classified as premature, and the mean birth weight was higher in villages where treated bed nets were used than in control villages. Therefore, during the rainy season, despite the low use of insecticide-treated bed nets by Gambian primigravidae, the NIBP had some impact on the outcome of pregnancy, particularly on the percentage of premature babies, and this was probably due to the decreased risk of malaria infection achieved during this period.


**Abstract:** Maternal malaria is associated with reduced birth weight, which is thought to be effected through placental insufficiency, which leads to intrauterine growth retardation (IUGR). The impact of malaria on preterm delivery is unclear. The effects of placental malaria-related changes on birth weight and gestational age were studied in 1177 mothers (and their newborns) from Tanzania. Evidence of malaria infection was found in 75.5% of placental samples. Only massive mononuclear intervillous inflammatory infiltration (MMI) was associated with increased risk of low birth weight (odds ratio inverted question markOR, 4.0). Maternal parasitized red blood cells and perivillous fibrin deposition both were associated independently with increased risk of premature delivery (OR, 3.2; OR, 2.1, respectively). MMI is an important mechanism in the pathogenesis of IUGR in malaria-infected placentas. This study also shows that placental malaria causes prematurity even in high-transmission areas. The impact of maternal malaria on infant mortality may be greater than was thought previously.


**Abstract:** There is evidence that pregnancy enhances the clinical severity of malaria, especially of P. falciparum infections. In pregnant women with little or no prior experience of the disease, P. falciparum causes severe clinical illness, substantial malaria mortality, increased rates of abortion and stillbirth and low birthweight of offspring; moreover, in such women, the clinical consequences seen unmodified by maternal parity. However, in pregnant women resident in highly endemic areas who have acquired considerable immunity through prolonged prior contact with malaria, parity appears to influence susceptibility to an important degree. Women who are
pregnant for the first time are most affected, showing increased prevalence and density of parasitaemia, increased frequency of clinical illness (but not mortality) and significantly increased frequency of delivery of low birthweight children. In contrast, in multigravid women these clinical features are much less obvious and rarely attain statistical significance. The differences in susceptibility to malaria of pregnant women associated with parity and previous immunological experience require that protective strategies must be planned with full knowledge of the local epidemiology of malaria and be specifically targeted to the women who require them. Furthermore, the effectiveness of each strategy requires careful monitoring to permit such modifications as may be required by change in the immune status of the resident population.
Section 3: Programs Targeted for Newborn Health and Experiences in Newborn Care
Programs for and Experiences in Newborn Care


Abstract: The impact of maternal health services on perinatal and neonatal mortality depends on both the quantitative and qualitative coverage of pregnant women with obstetric services. In rural areas this becomes all the more difficult because of the requirement of a large decentralized infrastructure extending from village based health workers and subcentres to the Primary Health Centre and tertiary levels of referral. An effective introduction of socio-cultural, biomedical and managerial interventions is required to reduce perinatal and neonatal mortality. A community based surveillance and monitoring system is central to and facilitates the introduction of all other interventions. Finally, the system operated by grass-root level workers is a motivational tool for achieving expected levels of performance.


Abstract: This document presents three descriptive and qualitative country assessment reports focusing on the Safe Motherhood Initiatives in Ghana, Malawi, and Uganda. Health representatives of each country were able to complete facility-based assessments that describe the level of maternal and newborn services in their respective country. They also described specific interventions that can increase both the quality and access of care. Each country assessment report contains a country profile, assessment methodology and assessment findings, and recommendations. The key findings in the Ghana report are: increasing coverage of maternal newborn and neonatal statistics; increased knowledge and positive attitudes as a result of information, education, and communication on safe motherhood activities; successful cooperation and collaboration with the formal health system; decentralization of health care systems; and existence of essential equipment and supplies for emergency obstetric care. The report from Malawi also describes the strength and weaknesses of their obstetric and neonatal care services. Meanwhile, assessment findings in the country of Uganda were classified into community-specific needs, sociocultural needs, and individual and organizational health policy needs.

Available from: mothercare_project@jsi.com


Abstract: Anganwadi worker [community health volunteer] was involved in rural newborn care as a link between a dai [TBA] and a health worker. She was trained to ensure that, (i) borderline LBW/preterm baby was kept warm at home and (ii) a very small baby was referred to hospital. The training was conducted during routine monthly meetings and cost of equipping each
anganwadi worked out to be Rs 110. Newborn survival, infant survivals and overall MCH performance improved. Thus, newborn care formed an ideal entry point into MCH activities.


Abstract: BACKGROUND: The ethical allocation of scarce resources is a major challenge for physicians working in the developing world. Guidelines currently employed by health care workers in the developed world may be considered impractical or inappropriate in the “Third World.” OBJECTIVE: To gain insight into the attitudes of doctors, nurses, and mothers of recent neonatal intensive care unit (NICU) survivors toward the utilization and withdrawal of life support in the context of a developing society. DESIGN: Descriptive cohort study. PARTICIPANTS: Thirty-three doctors, 20 nurses, and 70 mothers of recent NICU survivors. The cohort of mothers surveyed were predominantly unmarried, poorly educated, and either unemployed or still at school. RESULTS: In response to hypothetical scenarios, mothers exhibited very conservative attitudes toward withdrawal of life support compared to caregivers. Only 2.9% (2/70) of mothers would contemplate any degree of life support withdrawal for infants with probable “moderate” handicap compared with 51.0% (26/51) of the medical staff. One mother (1.4%, 1/70) accepted the concept of withdrawal of life support where extremely poor outcome was anticipated, compared with 85% (45/53) of the caregivers. Doctors and nurses exhibited very utilitarian attitudes toward NICU resource allocation, with emphasis directed toward avoidance of significant handicap. The majority of these caregivers considered the anticipated burden of the handicapped child in the society to be a major factor in the justification of their decision. CONCLUSION: The nonideal conditions under which doctors and nurses work in developing nations mandate resource allocation to be an integral component of NICU care.


Abstract: OBJECTIVE: To evaluate the role of the ICA (Identification, Cause, Avoidable factor) Solution method of perinatal audit in reducing perinatal mortality. DESIGN: Retrospective audit of 1,060 perinatal deaths between 1 January 1991 and 31 December 1992. SETTING: Livingstone Hospital Maternity Service. SUBJECTS: One thousand and sixty perinatal deaths, where the gestational age exceeded 28 weeks or, when gestational age was unknown, the birth weight was equal to or exceeded 1,000 g. MAIN OUTCOME MEASURES: All perinatal deaths were identified and classified by primary obstetric cause for perinatal loss. In the second year of the study avoidable factors were sought and, if found, graded and categorised. RESULTS: The major primary obstetric causes of perinatal loss identified and amenable to intervention were intrapartum trauma, intrapartum asphyxia and infection. In the second year of study potentially avoidable factors were sought and identified in almost 50% of perinatal deaths. Appropriate intervention lowered the perinatal mortality rate by 23% (P<0.05; odds ratio 0.76; 95% confidence interval 0.67–0.86). CONCLUSION: The ICA Solution method of perinatal audit identified problems in overall obstetric care, facilitating a significant fall in perinatal mortality.

Abstract: Data was analyzed on all infants born at Hlabisa Hospital and at seven village clinics in northern Zululand, South Africa, and those born before arrival at the hospital between May 1991 and April 1993 (total deliveries 8,237) to determine the perinatal mortality rate (PNMR), to evaluate the quality of care, and to identify avoidable factors associated with the deaths. Findings were used to develop ways to enable effective monitoring of quality of care and to develop intervention strategies to prevent recurrence of avoidable deaths. There were 280 perinatal deaths (PNMR 34/1,000). The PNMR increased 30% in the second year (29–39/1,000; p=0.01), mostly due to increased rates of attendance of high risk cases at the hospital and clinics. 27 of the perinatal deaths were considered avoidable. Had these deaths not happened, the overall PNMR would have stayed at 31/1,000. The percentage of avoidable deaths decreased over time (19% in first 6 months vs. 3% in the last 6 months; p<0.01 and p<0.01 for linear trend) because of interventions implemented throughout the study period to improve quality of care. There were three groups of interventions: reorganization of the maternity services in the health ward, development of key standing orders and management guidelines, and creation of a monitoring system for perinatal mortality.


Abstract: Reviews a wide range of experiences in maternal, child health, and family planning programmes in an effort to identify factors and conditions that encourage effective community participation. Addressed to health planners, the book concentrates on questions of management and human behaviour that need to be considered when planning health programmes based on the concept or methods of community participation. Throughout the book, numerous case studies are used to develop an analytical framework for understanding why such programmes so often fail to reach their goals.

Available at: http://www.who.int/dsa/cat98/mat8.htm


Abstract: BACKGROUND: Neonatal care is not available to most neonates in developing countries because hospitals are inaccessible and costly. We developed a package of home-based neonatal care, including management of sepsis (septicaemia, meningitis, pneumonia), and tested it in the field, with the hypothesis that it would reduce the neonatal mortality rate by at least 25% in 3 years. METHODS: We chose 39 intervention and 47 control villages in the Gadchiroli district in India, collected baseline data for 2 years (1993–95), and then introduced neonatal care in the intervention villages (1995–98). Village health workers trained in neonatal care made home visits and managed birth asphyxia, premature birth or low birthweight, hypothermia, and breast-feeding problems. They diagnosed and treated neonatal sepsis. Assistance by trained traditional birth attendants, health education, and fortnightly supervisory...
visits were also provided. Other workers recorded all births and deaths in the intervention and the control area (1993–98) to estimate mortality rates. FINDINGS: Population characteristics in the intervention and control areas, and the baseline mortality rates (1993–95) were similar. Baseline (1993–95) neonatal mortality rate in the intervention and the control areas was 62 and 58 per 1000 live births, respectively. In the third year of intervention 93% of neonates received home-based care. Neonatal, infant, and perinatal mortality rates in the intervention area (net percentage reduction) compared with the control area, were 25.5 (62.2%), 38.8 (45.7%), and 47.8 (71.0%), respectively (p<0.001). Case fatality in neonatal sepsis declined from 16.6% (163 cases) before treatment, to 2.8% (71 cases) after treatment by village health workers (p<0.01). Home-based neonatal care cost US$5.3 per neonate, and in 1997–98 such care averted one death (fetal or neonatal) per 18 neonates cared for. INTERPRETATION: Home-based neonatal care, including management of sepsis, is acceptable, feasible, and reduced neonatal and infant mortality by nearly 50% among our malnourished, illiterate, rural study population. Our approach could reduce neonatal mortality substantially in developing countries.

**Mexico. Secretaria de Salud. Direccion General de Salud Reproductiva. 2000. Healthy and safe motherhood. Care of the mother during pregnancy, childbirth and the postpartum period and care of the newborn / Maternidad saludable y sin riesgos. Atencion de la mujer durante el embarazo, parto y puerperio y del recien nacido.**

**Abstract:** Mexico’s Reproductive Health and Family Planning Program 1995–2000 is being implemented in coordination with the decentralization of health services, the basic packet of health services, and the new model of health care for the uncovered population, which guarantees the right to timely information and quality health services. This work begins by identifying the juridical basis for perinatal health care in the Mexican constitution, the 1995–2000 development plan, and specific health laws. A section follows on the “Official Mexican Norms for Care of the Mother during Pregnancy, Delivery, and the Puerperium and Care of the Newborn.” Guidelines for prenatal health care are then discussed in general terms, including the risk focus and care at each stage. The timing, number, and content of prenatal consultations are prescribed, along with procedures for delivery and postpartum care of the mother and infant. Strategies and actions to reduce maternal and perinatal morbidity and mortality are then discussed, including broadening coverage of prenatal care, multimedia campaigns, participation of the organized civil society, maternal-child health cards and information materials for mothers, and improving the quality of care through training and the risk focus. Specific interventions are discussed, including preparation of training manuals, training in emergency care of obstetric patients, provision of supplies for management of preeclampsia-eclampsia, creation of a directory of state blood banks, treatment of incomplete abortion, vigilance of cesarean deliveries, neonatal cardiopulmonary resuscitation and screening for congenital metabolic anomalies, promotion of breastfeeding, modified hospital procedures, and mortality study committees. The work ends with an outline of research conducted recently or planned for the near future.

**Source:** Mexico City, Mexico, Secretaria de Salud, Direccion General de Salud Reproductiva, 2000 Sep.; 55pgs.

**Abstract:** Homebirth with unskilled attendants is the norm and maternal and neonatal mortality are high in much of the developing world. Consequently, there is great need for an innovative and empowering community-based intervention. The American College of Nurse Midwives (ACNM) has reached another milestone in the Life-Savings Skills Series with the development and field-testing of Home Based Life Saving Skills (HBLSS). HBLSS is a competency-based program that aims to reduce maternal and neonatal mortality by increasing access to basic life saving measures within the home and community and by decreasing delays in reaching referral facilities where life-threatening problems can be managed. The ACNM recognizes that it is not sufficient to only upgrade referral facilities and strengthen the skills of trained health care providers. Rather, the education, motivation, cohesion and mobilization of pregnant women, families and communities- whose members must come to a common understanding of the need for and the means to prevent death of a woman or neonate- are also necessary to improve pregnancy outcomes.

Available from:
American College of Nurse Midwives, Department of Global Outreach
818 Connecticut Ave. NW, Suite 900
Washington, DC 20006
email: dbond@acnm.org


**Abstract:** An intervention to improve maternal and child health was conducted in a remote Bolivian province with limited access to modern medical facilities. The intervention focused on initiating and strengthening women’s organizations, developing women’s skills in problem identification and prioritization, and training community members in safe birthing techniques. Its impact was evaluated by comparing perinatal mortality rates and obstetric behavior among 409 women before and after the intervention. Perinatal mortality decreased from 117 deaths per 1,000 births before the intervention to 43.8 deaths per 1,000 births after. There was a significant increase in the number of women participating in women’s organizations following the intervention, as well as in the number of organizations. The proportion of women receiving prenatal care and initiating breast-feeding on the first day after birth was also significantly larger. The number of infants attended to immediately after delivery likewise increased, but the change was not statistically significant. This study demonstrates that community organization can improve maternal and child health in remote areas.

**Abstract:** We identified high rates of intrapartum and neonatal mortality among children born in a traditional indigenous community in rural Guatemala. To examine the potential association of maternal characteristics and obstetric and newborn care practices with this mortality, we conducted a retrospective case-control study. Case were infants born in 1986 and 1987 who died during birth or in the first month of life, as identified by civil records; for each case, the next child born who survived the first month of life was selected as control. In interviews with mothers of cases and controls standardized data were collected on demographic and socioeconomic characteristics of the mother, her general obstetric history, history of the pregnancy, labor, and delivery, condition and care of the infant at birth, and morbidity and treatments of the infant after birth. Sixty-one cases and their controls were included in the study. Based on clinical condition at birth, we subcategorized cases into infants stillborn or dying in the first 24 hours of life (intrapartum cases) and those dying in the first month after day 1 (neonatal cases). Factors significantly associated with both subcategories of cases were maternal illiteracy, primagravity, failure to use “modern” prenatal care, and inter-birth interval less than 14 months. Intramuscular injection of oxytocin by the midwife during labor, and performance of greater than or equal to 3 vaginal examinations by the midwife were each significantly associated only with the intrapartum subcategory of cases. Mother’s estimate of infant size as “smaller than normal” was associated with neonatal, but not with intrapartum, cases. (ABSTRACT TRUNCATED AT 250 WORDS)


**Abstract:** We observed a significant fall in neonatal mortality in babies weighing less than 2kg during 1986 as compared to 1973 (7.94% vs 12.88%; p less than 0.005), and in preterm babies the mortality fell from 26.88 to 11.5% (p less than 0.001) during 1986. This was achieved despite 2–3 fold increase in the high risk babies and without any increase in the number of neonatal special care beds or nurses. Effective utilisation of the facilities was made possible through: (a) reduction in admissions to neonatal special care unit of babies with birth weight more than 1500g; (b) early discharge of babies to home from NSCU; (c) involvement of the mothers in the care of their high risk babies: and (d) care of babies with sucking difficulties and asymptomatic birth asphyxia outside NSCU. All babies discharged home at less than 2kg weight, and living in Chandigarh were followed for 3 months and 98.2% were doing well. This observation highlights the judicious use of neonatal special care facilities and mothers for the care of high risk neonates.


**Abstract:** The Ganjad primary health center provides services to a population of 22,000 people 140 km northwest of Bombay. A rural neonatal care program was put into operation in 1988 in the area covered by the health center. Under the program, the care of newborns was administered at home mainly by trained traditional birth attendants. The “foot length” was used
as a substitute for birth weight to help identify very low birth weight (VLBW) babies in need of hospital care. Among the 660 births in 1990 there were 20 referrals to the Ganjad center and the rural community hospital in Kasa, 18 of whom had a foot length of less than 6.5cm. The parents of six of these infants with a foot length of less than 6cm were unwilling to secure hospital care for them due to the time constraints imposed by harvest season or the need to care for other young children. VLBW babies usually need to receive in-hospital, special care in order to survive. The parents of these six infants agreed to cooperate with the health staff in managing the babies at home. The subjects were not so premature as to require intragastric feeding and showed no asphyxia or respiratory distress requiring the administration of oxygen. Their homes were 1–7 km from the center. The authors describe how important proper feeding and temperature control are to the home management of VLBW babies. The infants’ home care was supervised by the auxiliary nurse-midwife, the anganwadi worker and the traditional birth attendant, with good relations between them and the family members. All six babies survived without requiring hospital admission. This example of successful management, by a rural primary health center, of high-risk newborns at home demonstrates how important it is to have a suitably trained health worker and community health workers to coordinate with the family and give them the support and supervision they need.


Abstract: Despite efforts to improve prenatal and perinatal health care in developing countries, child-birth remains hazardous for both mother and child. Several measures have been initiated to try to improve maternal and perinatal morbidity and mortality. One such measure is the establishment of maternity waiting shelters at hospitals where mothers can wait so that, when they go into labour or develop antenatal complications, they can transfer to the hospital wards for management and safe delivery. From May 1987 to April 1989, we evaluated pregnancy outcome among 280 women using such a shelter in a remote rural district in Zimbabwe. Perinatal mortality was higher (29.8 per 1,000) among 773 non-waiting mothers than among the waiting mothers (25.0 per 1,000), although this was not statistically significant (p>0.05). However, there were significantly more low birthweight babies (11.4%) among the non-waiting mothers than among the waiting mothers (4.3%) (p<0.01). Fetal deaths were more common than early neonatal deaths, suggesting that maternal factors accounted for most of the perinatal deaths. Poor pregnancy outcome was associated more with primigravidae and grand multigravidae than with those who had had one to four pregnancies. We conclude that maternity waiting shelters can contribute to preventing low birthweight and, to a lesser extent, improve perinatal outcome. There is a need to strengthen health care referral systems and to increase efforts to improve other determinants of perinatal and maternal morbidity and mortality.

Abstract: We conducted a 1-year longitudinal prospective study of infants born in a traditional rural indigenous community of Guatemala. Three hundred twenty-nine infants surviving birth and the first day of life were followed during the first 3 months of life. Surveillance included routine household and well baby clinic visits and clinic visits for minor illnesses. Detection of potentially lethal illnesses depended on orientation of families and midwives to important symptoms and to the need for immediate medical evaluation if such symptoms were identified. We identified 38 episodes of lethal and potentially lethal illness. Thirty-five (92%) of these episodes were infectious diseases, principally sepsis during the neonatal period and acute lower respiratory infection in Months 2 and 3. Of all study infants, low birth weight (less than 2500g) infants comprised 14% and premature (less than 37 weeks gestation) infants comprised 1%. Premature infants had a relative risk of lethal and potentially lethal illnesses of 11.1 (95% confidence interval, 3.6 to 34.4) compared with normal term infants, and no premature infant survived the first 3 months of life despite medical intervention. Low birth weight infants had a relative risk of 3.2 (95% confidence interval, 1.5 to 6.6), but with medical intervention all but 2 survived. Despite their lower risk, because of their much greater number normal term infants experienced 60% of lethal and potentially lethal illnesses. Among all study infants medical intervention was associated with survival of 86% of lethal and potentially lethal infectious illnesses and with a rate of neonatal mortality among study children significantly lower than rates documented in previous years in the same community.


Abstract: Primary health centres, sub-district hospitals (first referral units) and district hospitals constitute the backbone of the health services in the country. These facilities are expected to cater to the care of the newborn infants who are delivered there, as well as those brought from the community with sickness. This paper, based on a survey in Orissa, and studies in a district hospital in Himachal Pradesh and a sub-district hospital in Haryana, is an attempt to piece together the present status of neonatal care at these facilities. In Orissa, the district and sub-district hospitals cater to a median of 100 and 30 deliveries per month, respectively. Most of the deliveries at these facilities are conducted by the nurses and not the physicians. Neonates are generally kept in the facility only for a day. Hardly any deliveries take place at primary health centres. Cesarean deliveries are mostly confined to the district hospitals. The commonest diagnosis of neonates admitted in the district and sub-district facilities is sepsis (septicemia pneumonia, skin infections, diarrhea and meningitis). Primary health centres seldom admit a sick neonate. It is reassuring to note that the outcome of sick neonates admitted at a functional district or sub-district hospital manned by a pediatrician is highly rewarding with low mortality rates.

**Abstract:** This report focuses on the “Promising Practices” workshops for nongovernmental organizations (NGOs) in Burkina Faso and Senegal conducted by the Basic Support for Institutionalizing Child Survival in 1997. The workshops aim to assist NGOs in examining the effectiveness of their own programs, and identify and document which of their activities held the most promise for improving child survival and community health. The participating NGOs then shared these promising practices with each other. The workshops can be considered as a catalyst for participants in at least four ways. First, NGOs that participated implemented practices they learned from other NGOs. Second, many participants used the community mapping analysis and other analytical tools they learned to critically examine and improve their programs and practices. Third, the workshops have initiated an active process of networking and collaboration among participating NGOs. Lastly, the workshops have increased collaboration between NGOs and the Ministries of Health in both countries. Results suggest that such workshops may be an effective method for improving NGO programs in child survival and community health for building sustainable networks of NGOs.

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**Abstract:** Early neonatal mortality is unacceptably high in most developing countries. A large majority of births in rural areas of these countries occur at home, attended by relatives or traditional birth attendants and without easy access to skilled professional care. Under these circumstances cause of death has to be based on lay descriptions of terminal events. Analysis of cause of death shows that 74% of the early neonatal deaths are amenable to intervention. Admittance to hospital of the “at risk” neonates is not practicable. Intervention through primary health care can be effective if based on scientific principles and offered through female community health workers. Objectives of domiciliary care given by these workers should be to educate and guide the mother to protect the delicate newborn from the effects of adverse environmental conditions, to ensure adequate nutrition, and to prevent infections. Interventions supporting beneficial traditional cultural practices as well as simple techniques for care of the newborn are discussed.


**Abstract:** In a prospective community based study of the distribution and determinants of stillbirths in a rural area of Maharashtra, India, that was carried out for two years, 3,129 singleton and 22 twin births were recorded in a population of 47,000. Of the 3173 babies, 85 singletons and five of the twins were stillborn giving a stillbirth rate of 28.4/1,000 births. The causes of stillbirths are analysed and the possibility of reducing the unacceptably high stillbirth
rate by adequate training of grassroot level workers in screening pregnant women for detection of “at risk” mothers and their timely referral is discussed.


Abstract: Neonatal pneumonia kills about two million children a year worldwide. The World Health Organisation recommends hospitalisation of all cases of pneumonia in the first two months of infancy. In a field trial of community based management of childhood pneumonia in Gadchiroli, India, neonatal pneumonia contributed more than half of the pneumonia deaths. Parents refused referral even when advised therefore community based health workers and traditional birth attendants managed cases of neonatal pneumonia with co-trimoxazole. Case fatality was 15% (10/65) in all cases and 6% (3/52) in cases without high risk or referral indications. Case fatality in 56 babies aged 30–59 days treated for pneumonia was zero. During the two years of the trial, pneumonia specific mortality rate in the intervention area was 40% less in the neonates and about 80% less in the second month and rest of infancy compared with the control area. Pneumonia in the second month of infancy and uncomplicated cases of neonatal pneumonia can be safely and effectively managed in the community using co-trimoxazole.


Abstract: The Department of Obstetrics and Gynecology of the University of Pretoria developed a Perinatal Problem Identification Program (PPIP) based upon the ICA Solution system of audit. The PPIP can document any improvement in the perinatal and neonatal mortality rates in the Atteridgeville area and allow for feedback to be given to the community. This paper reports upon the changes in perinatal and neonatal mortality rates and upon the format of a meeting with the community. The perinatal mortality rate (PNMR) and neonatal mortality rate (NMR) during the period August 1, 1991, through June 30, 1992, were compared with the PNMR and NMR during May 1–October 30, 1994. The PNMR fell from 26.6/1000 to 16.6/1000, a 38% decrease in mortality, while there was an even greater decrease in the NMR. Some decrease was observed in the number of stillbirths. The pattern of causes of death also changed over the three years, with spontaneous preterm labor and unexplained stillbirths having become the major causes of mortality, assuming the former importance of hypertensive disease and antepartum hemorrhage, causing only 17.5% of deaths compared to 36.2% previously. The occurrence of avoidable factors decreased between 1991/2 and 1994, but the pattern remained the same, with patient-oriented avoidable factors being by far the majority: 36.1% in 1991/92 and 42.5% in 1994. It is not clear why PNMR and NMR have improved. The economy has not improved over the three years and no new equipment has been procured due to budgetary constraints. Improvement in the PNMR is most likely due to an improvement in care rather than a change in the environment. In the attempt to further improve the PNMR in Atteridgeville, community participation was sought through the organization and convening of a feedback meeting with the
community. The meeting was, however, unsuccessful because of a physician-centered instead of a client-centered approach. In closing, the authors suggest that persons involved in perinatal care use PPIP to audit their service and discuss their results with the community.


**Abstract:** At the neonatal intensive care unit of the Institute of Child Health, Grant Medical College in Bombay, India, the main features are: 1) provision of warmth through inexpensive room heaters; 2) mother’s milk as a sole source of nutrition; 3) mother’s participation in the care of a baby; and 4) minimum handling and minimum interventions. Supportive aspects of this care include: 1) establishment of warm chain starting from labor room; 2) ‘aggressive’ stabilization of a nursery admission; 3) establishment of perinatal audit sessions; 4) developing management schedules for common problems like respiratory distress, and asphyxia; 5) teaching and training of staff nurses at neonatal unit as well as at labor ward; and 6) utilization of postnatal care ward as an intermediate care unit. The features were arrived at because of compulsions of circumstances such as broken incubators, limited medical supply budgets to buy infant formula and shortage of trained nurses. The results of these changes are seen in the reduction of neonatal deaths for very low birth weight babies (from 84.6% dying using conventional methods from Jan. 1–Mar. 9, 1987 to 50% mortality from Mar. 10–June. 20, 1987 under the new set-up). Follow-up of discharged babies showed that the post-neonatal mortality in this high-risk group was for the general population in the city of Bombay. An important reason may be that few mothers had given up breastfeeding when surveyed at 1 year. The qualitative follow-up also revealed that the quality of survival is comparable with that under conventional care. With the declining trend in mortality, the difference is reduced from approximately 25 years to about 10 years in various weight categories when compared with England and Wales. More importantly, this kind of neonatal care can be made available outside of teaching institutions at an affordable cost. The total yearly expenditure of the unit was Rs 326,830 (about US$40,000). Capital cost was Rs 186,830 (About US$23,350) and the running cost for each year was Rs 140,000 (about US$16,650). Appendices give detailed instructions for the routine care and for managing respiratory distress.


**Abstract:** The purpose of this article is two-fold: (i) to lay out conceptual frameworks for programming in the fields of maternal and neonatal health for the reduction of maternal and peri/neonatal mortality; (ii) to describe selected MotherCare demonstration projects in the first 5 years between 1989 and 1993 in Bolivia, Guatemala, Indonesia and Nigeria. In Inquisivi, Bolivia, Save the Children/Bolivia, worked with 50 women’s groups in remote rural villages in the Andean mountains. Through a participatory research process, the ‘autodiagnosis’, actions identified by women’s groups included among others: provision of family planning through a local non-governmental organization (NGO), training of community birth attendants, income generating projects. In Quetzaltenango, Guatemala, access was improved through training of traditional birth attendants (TBAs) in timely recognition and referral of pregnancy/delivery/neonatal
complications, while quality of care in health facilities was improved through modifying health professionals’ attitude towards TBAs and clients, and implementation of management protocols. In Indonesia, the University of Padjadjaran addressed issues of referral and emergency obstetric care in the West-Java subdistrict of Tanjunsari. Birthing homes with radios were established in ten of the 27 villages in the district, where trained nurse/midwives provided maternity care on a regular basis. In Nigeria professional midwives were trained in interpersonal communication and lifesaving obstetric skills, while referral hospitals were refurbished and equipped. While reduction in maternal mortality after such a short implementation period is difficult to demonstrate, all projects showed improvements in referral and in reduction in perinatal mortality.


Abstract: The rural areas of developing countries like India are still faced with the problem of high neonatal mortality rates. High proportions of low-birth-weight babies and home deliveries, as well as ignorance about the need for asepsis and early referral of difficult cases, make the newborn infants highly vulnerable to birth asphyxia and neonatal infections. To lessen the imbalance between the limited availability of and the need for health care, the risk-approach strategy was applied to a cohort of newborns with the aim of giving extra care to at-risk neonates by optimum utilization of existing resources.


Abstract: The Rural Neonatal Care Project, started by the Government of Maharashtra in the Ganjad Primary Health Centre, Dahanu block in Maharashtra, had the TBA as the sheet anchor for delivery of neonatal care. Maintenance of “warm chain” and resuscitation of an asphyxiated baby were recognized as the most important interventions besides detection of a very low birth weight/preterm baby and safe transportation of such a baby. Foot length measurement from footprint was used as a surrogate to birth weight as an indicator for referral. Neonatal and perinatal mortality rates dropped appreciably over 3 years and the antenatal registration went up by 30%. The cost of this programme is affordable and the programme itself was acceptable to the community and the TBAs because of its simplicity.


Abstract: A workable model for the special care of newborns has been developed at a community hospital in a predominantly tribal block. Adequate warmth, prompt resuscitation, proper feeding and oxygen administration, when necessary, formed the key interventions. This facility was developed with existing staff and infrastructure and with minimal material inputs. Neonatal survivals were 61.5% in the 1000–1500 g category and 92.5% in the 1520–2000 g category during a five year period. We believe that this model is both replicable and affordable. It has the potential for developing horizontal links with perinatal care and child survival programmes.

**Abstract:** This examination shows how routinely-collected perinatal mortality statistics can help to improve the quality of care among deliveries in hospitals. Data were obtained on 6488 consecutive hospital and clinic births over a 19-month period in Zululand, South Africa, excluding birth weights below 1,000g. Graphs were constructed to show perinatal mortality, the potential perinatal mortality which eliminates avoidable death, and the differences between the rates. Basic problems with delivery of health care, which can be avoided, were failure to take prenatal blood samples to test for syphilis, failure to refer hypertensive patients for hospital care and subsequent intrauterine death, and failure to manage basic labor ward emergencies correctly. Avoidable death accounted for about 33% of all perinatal mortality. Perinatal mortality over the study period (1991/92) was 35/1,000 total births. Prevention of avoidable deaths would have reduced perinatal mortality to 31/1,000. The graph depicted the dramatic decline in avoidable deaths in the first six months and the stabilization at an average of 11.8% over the whole 19 months. 14/77 deaths (8%) were due to mistakes in the first 9 months, and 12/151 deaths (8%) were due to mistakes in the last 10 months. The interventions that influenced mortality decline include improvements in guidelines for management of care and referral, repeated in-service training of midwives and doctors, reorganization of care, and an emphasis on strengthening community services. Careful scrutiny of the graphs shows that even though perinatal mortality gradually increased, the differences between the potential and the actual mortality rate line decreased. The rise in perinatal mortality is considered unrelated to quality of care.


**Abstract:** A retrospective study was done to assess the effect on in-hospital neonatal mortality of a series of interventions in neonatal care in the highlands of Papua New Guinea. Between 1995 and 1997, prior to the interventions, the mortality among neonates admitted to the Goroka Hospital Special Care Nursery was 18% and two-thirds of very low birthweight (1–1.5 kg) neonates died. The interventions began in December 1997 and were aimed at reducing mortality among all neonates and particularly among those with very low birthweight. Compared to the 30-month period prior to the interventions, the in-hospital neonatal mortality in the 30-month period after the interventions began was 44% lower (relative risk (RR) 0.56, 95% confidence interval (CI) 0.45–0.69). After adjustment for a higher number of neonates <1500 g in the pre-intervention period, the relative risk was 0.59 (0.48–0.74). The mortality in the intervention phase for very low birthweight babies was 56% lower (RR 0.44, 95% CI 0.30–0.65) and for moderate low birthweight (1.5–2 kg) 50% lower (RR 0.50, 95% CI 0.28–0.90). Mortality was also significantly lower in the intervention phase in neonates with a diagnosis of sepsicaemia or pneumonia (RR 0.36, 95% CI 0.19–0.67), but there were no differences in mortality from birth asphyxia, meconium aspiration or extremely low birthweight (<1 kg). We estimate that in the 30 months after beginning the interventions 82 neonatal deaths that would previously have occurred were avoided. The costs of the improvements in technology described are estimated at US$445 (K1000) per life saved, but substantial training and improved supervision of staff and
other human factors may have been more important than equipment. Apnoea monitors were the single most important technology introduced. A similar evaluation of the effect of minimal standards should be done without the use of incubators and overhead heaters, as these are costly and may be dangerous when used by less experienced operators. The 33 neonatal deaths that we estimate were avoided each year because of the interventions represent less than 10% of all neonatal deaths in the province. Although this study provides justification for increasing the technology for supportive neonatal care and training in medium-sized hospitals in rural areas in developing countries, estimates of cost-effectiveness must be compared with other interventions that will effectively lower neonatal mortality, both in and out of hospitals.


Abstract: OBJECTIVES: To evaluate impact of postnatal health education for mothers on infant care and postnatal family planning practices in Nepal. DESIGN: Randomised controlled trial with community follow up at 3 and 6 months post partum by interview. Initial household survey of study areas to identify all pregnant women to facilitate follow up. SETTING: Main maternity hospital in Kathmandu, Nepal. Follow up in urban Kathmandu and a periurban area southwest of the city. SUBJECTS: 540 mothers randomly allocated to one of four groups: health education immediately after birth and three months later (group A), at birth only (group B), at three months only (group C), or none (group D). INTERVENTIONS: Structured baseline household questionnaire; 20 minute, one to one health education at birth and three months later. MAIN OUTCOME MEASURES: Duration of exclusive breast feeding, appropriate immunisation of infant, knowledge of oral rehydration solution and need to continue breast feeding in diarrhoea, knowledge of infant signs suggesting pneumonia, uptake of postnatal family planning. RESULTS: Mothers in groups A and B (received health education at birth) were slightly more likely to use contraception at six months after birth compared with mothers in groups C and D (no health education at birth) (odds ratio 1.62, 95% confidence interval 1.06 to 2.5). There were no other significant differences between groups with regards to infant feeding, infant care, or immunisation. CONCLUSIONS: Our findings suggest that the recommended practice of individual health education for postnatal mothers in poor communities has no impact on infant feeding, care, or immunisation, although uptake of family planning may be slightly enhanced.


Abstract: OBJECTIVE: To assess whether incorporating a system of identifying, classifying and grading avoidable factors into a perinatal audit can be useful in identifying problem areas. DESIGN: Descriptive study. SETTING: Black urban population, Pretoria, South Africa. SUBJECTS: All perinatal deaths of infants weighing more than 1,000 g from urban areas served by Kalafong Hospital between August 1991 and July 1992. METHODS: All perinatal deaths were classified according to the primary obstetric cause of death and neonatal cause of death, and whether any avoidable factors were present which could have contributed to the death. RESULTS: The perinatal mortality rate was 26/1,000 deliveries. Avoidable factors occurred in
58% of perinatal deaths. Our problem areas which were immediately remedial were identified as labour management-related problems, administrative problems in obtaining syphilis results, and estimation of fetal weight. Other problem areas which need to be solved are patient education, early attendance at clinics, improved documentation and continuing education of medical personnel. CONCLUSION: The use of this classification of avoidable factors has enabled the detection of problem areas that can be improved immediately at very little cost.


Abstract: This manual is intended to be used as an implementation manual by PVOs who want to adopt a participatory approach to improve maternal and neonatal health. It includes a guide to the steps followed by the Warmi Project in a format that can be replicated. Various examples of the activities and outcomes of the Warmi Project are presented as an illustration of the type of action that can be taken when adopting a participatory approach.

The manual is divided into four sections:

Section 1: contains an explanation of the underlying philosophy of the project and describes the conditions within the project area. It deals with the training of SC/B’s staff and the preparation for the project, including the baseline study that was carried out prior to initiating project activities.

Section 2: is the main section of the manual and is a step-by-step guide to the project. It contains four subsections detailing all the stages that need to be followed and includes a comprehensive guide for facilitators.

Section 3: describes the implementation components of the Warmi Project and includes information on lessons learned by SC/B during the three-year implementation period.

Section 4: presents the results of the Warmi Project, along with conclusions and recommendations for PVOs who wish to use the project methodology.

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Abstract: Perinatal audit is a measure of quality of care given in pregnancy and it gives an idea as to how the resources need to be allocated for better outcome. The perinatal mortality data in the National University Hospital over a 7-year period (1986–1992) were compiled and compared with that of the year 1982. The perinatal mortality rate (PNMR) of 14.6/1,000 in 1982 declined to 8.9/1,000 for the period 1986 to 1992 and the reduction was noticeable in all ethnic groups, particularly in the Malays. When lethal congenital malformations (LCMs) were excluded, the
PNMR decreased to 5.7/1,000. Such reduction is due to easy availability and acceptance of antenatal care, improvement in antenatal and intrapartum fetal surveillance and advances in neonatal care. Neonatal audit was extended beyond the first 7 days of birth which showed that the majority (65%) of deaths occurred in the first week and 15% occurred after the first month. The fear that intensive neonatal care serves to postpone death is not entirely substantiated. There was nearly a ten-fold rise in PNMR between the non-low birthweight and low birthweight groups. The important causes of perinatal mortality during the review period were LCMs (35.7%), complications of prematurity (17.9%) and asphyxia (15.3%). No cause was identifiable in 28.5%. Detailed analysis revealed that the standard of care could have been improved in a third of the cases (83/235) which could have led to further reduction of perinatal mortality rate.


**Abstract:** A decade of perinatal audit in the Maputo Central Hospital is reviewed with the objective of addressing the potential value of the audit process in monitoring the different constituents of morbidity and mortality in the perinatal period. The perinatal mortality showed a significant but transient change during the observation period 1982–1991, while intrapartum fetal mortality was significantly reduced from 10.9 to 3.9 per thousand (p<0.0005). Staff members were sensitized towards immediate and long-term effects of implemented surveillance routines by regular feedback of perinatal data on visible wall charts and by weekly conferences. The advantages of a comprehensive audit approach in perinatal medicine comprising both maternal and fetal/infant aspect are underscored. An ethical commitment to nonconfidential straightforwardness and open-mindedness in critical discussions regarding mismanagement is emphasized for a successful audit strategy.
Capacity Building, including Training Materials/Tools


**Abstract:** This manual is a comprehensive, clinical guide for providing care to pregnant women and their infants, particularly in areas that are far from maternity centres, or where care is not widely available to poor people. It offers guidance for providing high quality prenatal, delivery, and postnatal care; treating or referring complications of labour and birth; providing family planning; treating STDs and raising awareness of how to prevent them; and promoting positive health practices among women and their families. The manual is designed to be accessible to a broad range of care-givers, including professional midwives and nurse-midwives, auxiliary midwives, TBAs, and community health workers who attend births. Although highly detailed, the manual is written in simple, clear language to make it useful to people with limited formal education. Illustrations and cartoons are included throughout to describe clinical procedures, or convey information to clients. A final section reviews additional procedures midwives can learn; among them home methods to start or strengthen labour; and common hospital practices like vaginal exams. The manual also includes a section with information on key medications and when to prescribe them, and an extensive glossary.

518 pp. English.

**ORDERING INFORMATION:** Document can be ordered for U.S. $22.00 and at a subsidised price for developing countries, using the online form at: [http://www.hesperian.org/hespordr.htm](http://www.hesperian.org/hespordr.htm)

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**Abstract:** Geneva, 1994.

Written for health planners and programme managers, this guide defines the functions, tasks, and skills necessary to provide comprehensive, integrated care to mothers and babies before, during, and after pregnancy within health centres and in communities. It breaks health centres into two categories: type I, in which reproductive health care is usually limited to prenatal care and family planning services; and type II, which provide more comprehensive ambulatory and curative services and are staffed by a team of professional and auxiliary health workers. Within these two typologies, the guide outlines facility- and community-based reproductive health care
interventions that can and should be provided. It also discusses how health centres can establish functional referral systems, undertake training and supervision of staff, collect data, and promote and support community-based care by TBAs and/or community health workers. A final section covers evaluation and monitoring of quality maternal and infant care, and annexes list essential drugs and equipment for providing such care.

54 pp. English.

WHO/FHE/MSM/94.2/Order no. 1930063

ORDERING INFORMATION: Document can be ordered for Sw. fr. 10.00 / U.S. $9.00; in developing countries, for Sw.fr. 7.00 / U.S. $6.30; using the online form at:
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care_of_mother_and_baby_at_the_health_centre_abstract.en.html


Ref Type: Generic


Abstract: This curriculum is designed to help private midwives increase their effectiveness and client base by expanding their involvement in their communities, both rural and urban. Specifically, the curriculum provides activities and teaching methods, along with notes for trainers, to enable midwives to: assess the family planning/reproductive health needs and resources of their community and their role in meeting those needs; identify ways to expand the number of clients they serve through community participation; and develop their confidence in taking on a leadership role within the community. Included in the curriculum are pre- and post-tests, worksheets, registration forms, a sample action plan and illustrations. The curriculum requires approximately 15 hours of classroom time, and coordinates with a related curriculum, Business Management Skills for Private Midwives: Curriculum and Guide for Trainers.

Available at: http://www.jsi.com/intl/seats/publications/pub01_02.html

Abstract: The aim was to compare the effectiveness of two training strategies for improving essential newborn care in the state of Pernambuco, Brazil. 8 hospitals were selected, divided into 2 groups of 4, and paired by geographical, structural, and functional characteristics. Doctors and nurses working at hospitals in Group 1 were given a conventional 5-day training course. Those in Group 2 were given the same manual used by Group 1 but the training course was organized as self-directed learning, with the participants having 5 weeks to complete the course. Participants’ knowledge was tested at baseline, immediately after the course, and 3–6 months later. Participants’ practices were observed before training and 3–6 months after training during 20 births and by interviewing 20 mothers before discharge at each hospital. Not all participants completed all of the tests. The scores on the tests of knowledge improved more among those in Group 2 than those in Group 1 when the answers were classified as right or wrong, but there was no difference between groups when a scoring method was used that classified answers as correct, partially correct, incorrect, or missing. Practices related to thermal control after birth improved among those in Group 2 after training but practices related to thermal control on the ward worsened. The promotion of breastfeeding improved in both groups. There was no difference between the two training strategies, although self-directed learning was cheaper than conventional training. Neither strategy brought about the expected improvements in the quality of care. Other interventions in addition to training may be needed to improve care. (author’s).


Abstract: A set of five spiral-bound training manuals developed to help equip midwives with essential life-saving skills. The manuals, which were widely field tested in Africa, Asia, and the Pacific prior to finalization, respond to the need for midwives to understand the conditions that lead to maternal death and know how to treat or prevent them. Logically organized and abundantly illustrated, the manuals aim to communicate in an imaginative way the sound knowledge that midwives need in order to think critically, make the right decisions, and apply the appropriate clinical skills, particularly in life-and-death emergencies.

Available at: http://www.who.int/dsa/cat98/mat8.htm

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**Abstract:** 1996—WHO/FRH/MSM/96.13

Available in French.

Summarizes the discussions of the Technical Working Group on elements of essential newborn care at home, at the health centre and at hospital. It presents simple and effective interventions that are available and affordable (most of them at almost no cost) at all three levels of care. Despite the simplicity of the interventions, the recommendations may need to be adapted to local conditions. The document is intended as a guide for action after adaptation.


**American College of Nurse-Midwives and MotherCare/John Snow, Inc. 1998. Healthy Mothers and Healthy Newborn Care: A Guide for Caregivers.**

**Abstract:** Washington, DC, 1998.

This pocket-sized guide for midwives and other care providers is designed to provide a quick reference to maternal and infant care during pregnancy, delivery and in the postpartum period. This is not a “how-to guide”; it has been written jointly with Healthy Mothers and Healthy Newborn Care: A Reference for Caregivers (see description below), which is a comprehensive manual for providing maternal and infant care. Divided into four sections, this pocket guide contains four chapters: 1) management of complications or abnormalities in the antenatal period, during labour, postpartum and in the newborn; 2) standard tests and procedures (e.g., treatment for fever, haemoglobin test); 3) use of medications (e.g., antibiotics, oxytocics); and 4) a comprehensive set of checklists that outline problem-solving steps for each stage of maternal and infant care. These are provided so that midwives can rate their own skills, or so supervisors can evaluate midwives’ performance. The guide’s chapters are organised into concise tables, boxes or short sections of text so that information can be found quickly and easily. Guide is sold as a set with the manual, Healthy Mothers and Healthy Newborn Care: A Reference for Caregivers. American College of Nurse-Midwives and MotherCare/John Snow, Inc., Washington, DC, 1998 (described below).

104 pp. English.

**ORDERING INFORMATION:** The set can be ordered for U.S. $32.00, using the online form at: [http://www.acnm.org/prod/](http://www.acnm.org/prod/) or by phone at: 1-202-728-9860. Methods of payment include cheque, money order or credit card (Visa or MasterCard).
American College of Nurse-Midwives and MotherCare/John Snow, Inc. 1998. Healthy Mothers and Healthy Newborn Care: A Reference for Caregivers.


This manual compiles clinical information on how to provide basic midwifery care, as well as ideas and strategies for ensuring positive interactions between midwives and community members. Designed for practising midwives and nurse-midwives, this manual may also be useful to other health staff providing maternal and infant care; health planners seeking to increase training and deployment of skilled birth attendants; practising midwives, to review their skills before enrolling in an advanced midwifery training course; or by midwifery educators developing lesson plans for midwifery trainings. At the beginning of the manual, a short section describes the four step “midwifery problem-solving process” to determine what care clients need and how best to provide it; this process is applied throughout the manual. Subsequent chapters cover infection prevention; antenatal care; care during the three stages of labour; and postpartum care for new mothers and infants up to six weeks after delivery. Each chapter contains a set of objectives followed by step-by-step guidance to determining the need for and providing various aspects of maternal and infant care; within the chapters are exercises, quizzes, sample scenarios, practise problems and illustrations that highlight and apply the information and skills covered and assess progress in learning. An opening chapter offers ideas for how midwives can better work with their communities, including helping community members identify health problems, understand their causes, and agree on ways to solve these problems to improve maternal and infant health.

249 pp. English.

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Abstract: The home-based maternal record—like the child growth chart—represents a simple, appropriate technology that can have a significant impact on maternal and child health. A prototype home-based maternal record was developed by the World Health Organization (WHO) in 1982 to facilitate the early detection of risk conditions, promote timely referral of at-risk cases, improve the monitoring of health status for up to 10 years after pregnancy, and increase community involvement in health care. A multicenter review of the maternal health card conducted by WHO in 14 countries in 1984–88 indicated this tool increased the referral rate, the use of prenatal care, attendance at postpartum check-ups, and childhood immunization rates while also promoting self-reliance and the participation of mothers in their own health care. Since that time, the WHO prototype record has been adapted to local health needs and conditions by almost 30 centers. The protocol presented in this volume is intended for use by decision makers in health ministries, obstetricians, program managers, and community health leaders who want to introduce the maternal record to their own health system. Detailed information is provided on the functions and benefits of the records, how they should be adapted...
and introduced to the primary care system, and steps that should be taken in advance of large-scale use. Also included is information on the training of community health workers, nurse-midwives, and physicians.


1994, viii + 85 pages [C, E, F, S]
ISBN 92 4 1544464 3
Sw.fr. 20.-/US $18.00; in developing countries: Sw.fr. 14.-
Order no. 1150408

**American College of Nurse-Midwives. 1998. Life-Saving Skills Manual for Midwives, 3rd edition.**

**Abstract:** Washington, DC, 1998.

This manual, comprised of 10 modules in five volumes, is designed for use by practising midwives in continuing education programs to improve their ability to provide lifesaving interventions for women and infants. The manual employs a competency-based clinical training methodology. Midwives are encouraged to manage their own learning, share responsibility with trainers, and draw on their own experience. Active problem solving is encouraged, and each module contains several case studies—real and hypothetical—through which midwives can apply the skills they have learned. The 10 modules that comprise the manual are: 1) Introduction to Maternal Mortality; 2) Quality Antenatal Care; 3) Monitoring Labour Progress; 4) Episiotomies and Repair of Lacerations; 5) Prevention and Treatment of Haemorrhage; 6) Resuscitation; 7) Prevention and Management of Sepsis; 8) Hydration and Rehydration; 9) Vacuum Extraction; and 10) Other Emergencies (labour and delivery problems, postabortion care (PAC), and symphysiotomy). Each module follows the same format, including: goals, objectives and a brief introduction to the material to be covered; a short case example of a midwife’s experience; step-by-step clinical instructions in specific procedures and the use of equipment and forms; case studies that apply the material covered; review questions; and a skills checklist for use by midwives to self-check their own skills and by supervisors to evaluate midwives’ performance. Key points are illustrated and accompanied by charts and tables. A separate booklet compiles all of the modules’ skills checklists.


**ORDERING INFORMATION:** Document can be ordered for U.S. $45.00 using the online form at: [http://www.acnm.org/prod/](http://www.acnm.org/prod/) or by phone at: 1-202-728-9860. Methods of payment include cheque, money order, or credit card (Visa or MasterCard).

**World Health Organization. 1996. Management of the sick newborn.**

**Abstract:** The Mother-Baby Package,1 introduced by WHO’s Maternal Health and Safe Motherhood Programme in 1995, comprises a cluster of interventions designed to support countries in striving to attain the goals of the Safe Motherhood Initiative—substantial reductions in maternal, perinatal and neonatal mortality and morbidity.
A Technical Working Group was convened by WHO in Ankara, Turkey, 5–8 June 1995, to discuss the health factors that relate to newborn deaths and the interventions that can reduce a number of these deaths. The specific objectives of the Technical Working Group meeting were:

- to review the epidemiology of illnesses affecting the newborn in developing countries;
- to identify the illnesses that contribute the most to newborn mortality and morbidity, and that are most amenable to prevention or management;
- to identify risk factors related to pregnancy, delivery and the postpartum period in developing countries that are amenable to interventions;
- to assess current knowledge and ability in the detection and management of selected newborn illnesses at three levels of care (home, health centre and district hospital) in developing countries;
- to develop strategies to reduce deaths resulting from those illnesses;
- to identify critical areas for research and development.

Available at: http://www.who.int/reproductive-health/publications/MSM_96_12/MSM_96_12_introduction.en.html


Abstract: 2000 Ref. WHO/RHR/00.7

French edition in preparation

A must for midwives and doctors at the district hospital who are responsible for the care of women with complications of pregnancy, childbirth or the immediate postpartum period, including immediate problems of the newborn. Both physicians and midwives will find this manual essential for promoting and assessing the quality of health services, in the training of providers and in supporting quality services through supervision and performance feedback.

The main text of the manual is arranged by symptoms (e.g. vaginal bleeding in early pregnancy). Because this symptom-based approach is different than most medical texts, which are arranged by diseases or conditions, a list of diagnoses with the page number of the corresponding table for each diagnosis, is also provided.

Available at: http://www.who.int/reproductive-health/publications/Abstracts/managing_complications_in_pregnancy_and_childbirth.html


A step-by-step guide to the development and management of a lifesaving skills (LSS) programme for midwives, this manual is designed for use by policy makers, programme planners and trainers. It includes detailed guidance for first planning a LSS programme at the national level (e.g., reviewing current policies and standards; developing a detailed plan; and identifying trainers and a training site); then assessing midwives’ training needs and preparing for training; and finally undertaking the training itself. Curricula are provided for training of trainers in LSS
and a two-week LSS training for midwives themselves. Also included are guidelines on supervision of the trained midwives (follow up and support visits) and continuing education. Each part of the manual, which is broken into short sections called steps, contains an overview of that section’s contents and clear, concise discussions of topics. Charts, diagrams and checklists are included throughout, and at the end of the manual there is an extensive set of lesson plans for teaching LSS along with relevant forms.

305 pp., English.

ORDERING INFORMATION: Document can be ordered using the online form at: http://www.acnm.org/prod/ or by phone at: 1-202-728-9860. Methods of payment include cheque, money order or credit card (Visa or MasterCard).


Abstract: Midwifery training modules: Community module WHO/FRH/MSM/96.1
Midwifery training modules: Postpartum haemorrhage module WHO/FRH/MSM/96.2
Midwifery training modules: Obstructed labour module WHO/FRH/MSM/96.3
Midwifery training modules: Puerperal sepsis module WHO/FRH/MSM/96.4
Midwifery training modules: Eclampsia module WHO/FRH/MSM/96.5
Midwifery training modules: Notes for students WHO/FRH/MSM/96.6


Abstract: Explains how the new WHO Mother-Baby Package can be used as a powerful tool for improving the health of mothers and infants—immediately and dramatically. Designed for use in national programmes in the developing world, the package consists of 18 simple interventions that have proven their capacity to reduce maternal and infant mortality in resource-poor settings. Recommended interventions were selected on the basis of considerable scientific knowledge about the causes of complications during pregnancy and childbirth and the best ways to prevent them. Pragmatic as well as scientifically valid, the package can be implemented within the existing health care system and without the need for sophisticated equipment, expensive drugs, or additional resources and facilities.

The document, which is addressed to national decision-makers and health planners, provides both an explanation of general strategies crucial to the success of the Package and a detailed guide to the actions required to implement each of the 18 core interventions. Concerning strategic issues, the book advocates an integrated approach to service delivery aimed at reducing the number of high-risk and unwanted pregnancies, reducing the number of complications, and reducing case fatality rates when complications occur. Essential service-related components of the package are identified as family planning, quality antenatal care, clean and safe delivery, and access to essential obstetric care for high-risk pregnancies and complications.

Available at: http://www.who.int/dsa/cat98/mat8.htm#Mother-Baby Package: Implementing Safe Motherhood in Countries

**Abstract:** This self-study manual provides accurate and accessible information on postpartum and newborn care to trainers of traditional birth attendants (TBAs) and other community-level Maternal and Child Health (MCH) Workers. The information can be integrated into existing training curricula and materials or it can be adapted into additional units for an ongoing program of instruction for TBAs. The manual is organized into 8 units: 1) Community assessment, 2) Postpartum assessment and care, 3) Nutrition and breast-feeding, 4) Postpartum blues and postpartum depression, 5) Postpartum family planning, 6) Postabortion care, 7) Newborn assessment and care, and 8) Management of common newborn problems. Each unit begins with a purpose, learning objectives, a pretest, self-study content, a posttest, and a vocabulary list. Some units include case stories and exercises for practice in applying the new information. The appendices of the manual include a checklist to document the users progress; answers to the pre- and post-tests; and information on training TBAs and community-level MCH workers, including preparing for training, planning, conducting and evaluating the training, as well as a sample training course timetable.

*Source: Chapel Hill, North Carolina, University of North Carolina at Chapel Hill, School of Medicine, Program for International Training in Health [INTRAH], PRIME Project, 1999. 144 p.*


**Abstract:** This technical reference manual aims to assist program managers in the promotion of quality maternal and newborn care through a better design, effective interventions, and proper implementation, monitoring, and implementation of maternal and child health services. Information is presented in six chapters. Chapter 1 describes the magnitude of the problem and causes of maternal and neonatal death and explains the concept of lifetime risk. Chapter 2 outlines the influencing factors of maternal and neonatal mortality and morbidity before pregnancy, while the factors that influence maternal and neonatal mortality during pregnancy are outlined in chapter 3. Chapter 4 focuses on program design, planning, and implementation of the maternal and child health services. Chapter 5 provides strategies and intervention to address the “four delays” in acquiring maternal care. Chapter 6 reviews specific activities, results and lessons learned from different country programs.

*Source: CARE, 1998 Dec.[300 pages]*

Ordering Information:
CARE USA, Program Division
115 Ellis Street, NE
Atlanta, GA 30303-2440
tel: 404-681-252
www.care.org

**Abstract:** “Reproductive Health Training for Primary Providers: A SourceBook for Curriculum Development” is comprised of 8 modules for use in the design of training activities for clinic-based integrated reproductive health services. This manual contains the fourth module: providing basic maternal and newborn care services. Its goal is to prepare trainees to perform the following tasks: apply knowledge of anatomy and physiology to prenatal and postpartum care, take a health history and perform a physical examination of the mother, identify each pregnant women’s specific counseling and care needs, provide maternal health/reproductive health counseling and care, refer high-risk women for additional services not available on site, record assessment and diagnostic findings, apply knowledge of anatomy and physiology to the newborn’s care, take a newborn’s health history from the mother and perform a newborn physical examination, identify newborn health counseling and care needs, provide indicated newborn education and care, refer high-risk newborns for off-site services, record newborn assessment and diagnostic findings, and educate mothers and the community on child survival and safe motherhood. The knowledge and skills required for each of these tasks are presented. Knowledge assessment questions and skills assessment tools are also included. Appendices contain the pregnant patient’s bill of rights and suggested materials for training providers in basic maternal and newborn care.

*Source: University of North Carolina at Chapel Hill, School of Medicine, Program for International Training in Health [INTRAH], 1997.* [2], 227 p.


Abstract: Ordering Information:
Unit 13, Oxford Enterprise Centre
Standingford House, Cave Street
Oxford, OX4 1BA
info@e-talc.org / www.e-talc.org

**Abstract:** Of the estimated 8 million babies who die just before birth or in the first 28 days of life, 98 percent die in developing countries. Yet almost all the books about newborn health are aimed at the two percent of deaths in high-technology care in industrialized countries. There is a dearth of information to enable program managers to design, implement and evaluate effective interventions to address the important problem of improving newborn health. This manual has grown out of a partnership between the WHO Collaborating Center in Perinatal Care at the Centers for Disease Control and CARE. While implementing programs to address fetal and neonatal mortality, we realized the need for such a reference manual and CD-ROM resource.

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Traditional Birth Attendants


**Abstract:** Traditional birth attendants (TBAs) are still respected in rural and urban societies and are influential leaders in the community. They can be guided towards positive roles in MCH services through a carefully planned training program with emphasis on the use of simple aids for reporting and identification of high risk infants. This study designed special weight scales in which calibration was put in different colors for each 500 gm interval. A pictorial form showing the condition of the child directly after birth, based on 3 indicators—color, activity and presentation—was also designed. The risk-score was calculated for each indicator. 20 out of 40 TBAs were selected by simple random sampling in an urban community. They were required to report the condition of the child using the colored weight scales by filling out forms. A midwife was present at each delivery; she would examine the infant using the Apgar score and report the infant’s birthweight in grams. Both worked independently. No significant differences were found between the mean birthweight as reported by the TBA and the midwife. Comparing the Apgar score and the risk score, it showed that a low Apgar score correlates with a high risk score. This study showed that the TBAs were able to report and identify high risk infants based on birthweight and condition after delivery. Tables and charts present data on age, parity, birthweight distribution, infant mortality and causes, and delivery complications.


**Abstract:** The study was carried out in a slum cum resettlement colony (Area-I) and four villages (Area-II) of Delhi. Management of the newborn by the 25 functioning Traditional Birth Attendants (TBA’s) who conducted 83.64% deliveries in Area-I and 16.22% in Area-II was studied. Majority of TBA’s did not have the concept of washing hands before conducting per vaginum (P/V) examinations or deliveries. Most of the TBA’s, i.e., 21 out of 25 used a razor blade to cut the umbilical cord of which 9 used a fresh blade. No TBA left the cord untied. Vigorous patting in upright and also after holding the baby upside down was the commonest (68%) method of neonatal resuscitation. All TBA’s massaged and bathed the baby everyday. Majority of the TBA’s (18 out of 25) referred the baby to a health agency for immunization though they did not know the exact schedule.


**Abstract:** Seventy nine traditional birth attendants (TBAs) of Raipur Rani community development block, Haryana were interviewed to assess the effectiveness of continuing training in changing their knowledge and practices regarding maternal and newborn care. Seventy three
percent of them reported participation in continuing training sessions. However, analysis of attendance register showed that only 35.4% had attended more than 50% sessions in year 1993. Most (83.5%) of the TBAs gave advice to pregnant women for increased food intake, 47% advised tetanus toxoid, 16.5% for more rest, and 31.6% for iron tablets. Many of them were aware of maternal complications i.e. anaemia (64.6%), oedema (26.6%), bleeding per veginum (39.2%), abnormal presentation (77.2%) and high fever (48.1%). Risks to newborn like low birth weight, fever, cough/rapid breathing and hypothermia were known to 20.2%, 31.6%, 17.7% and 1.3% of the TBAs respectively. Knowledge regarding causes of low birth weight baby like ‘weak’ mother, less diet in pregnancy, short birth interval and preterm delivery were reported by 69.6%, 63.3%, 12.6% and 3.8% respectively. About two fifth of TBAs advised referral to hospital in case of prolonged labour and 88.6% for very low birth weight babies. Disposable Dai Kit and weighing machine were available with 32% and 73% TBAs. Significantly higher proportion of TBAs participating in continuing training advised tetanus toxoid vaccination, appropriate feeding practices of the newborn, hospital referral in case of prolonged labour and were less inclined to advise injection to speed up labour. Therefore, efforts should be made to increase the attendance of TBAs in continuing training sessions so as to sustain modern maternal and newborn care practices acquired after initial training.


**Abstract:** Training programs in more modern methods of birth asphyxia resuscitation were started for traditional birth attendants (TBAs) in 54 villages (population 62,427) of Raipur Rani Block near Chandigarh, India during 1989–1991. A continuing training program by the primary health center staff at 4 focal villages, for one day each month, had been in progress for several years. About 80–100 TBAs attended these sessions. Resuscitation methods included gravity drainage of secretions, physical stimulation by flicking at the soles of the feet, cleaning the mouth by a finger wrapped in gauze, mouth-to-mouth breathing, cardiac massage, and prevention of heat loss by wrapping the baby in multiple layers of cloth. In 1988, 31 TBAs also received advanced training in the use of the mucus extractor and bag-and-mask ventilation. Two trained field workers visited the villages once a fortnight to contact child workers, TBAs and health workers, and checking the local register of vital events to record births. Family members and/or the TBA who assisted at the delivery were interviewed, and a detailed birth history was recorded for stillborn and asphyxiated babies. TBAs assisted with the delivery of 1,884 babies (93.7%). Of these, 31 asphyxiated babies and 30 recently stillborn babies were eligible for the resuscitation survey, but information could not be collected for 2 of the stillborn infants. Both traditional and modern resuscitation methods were used in 30 cases (51%), modern methods only in 13 (22%), traditional methods in 2 (3%), and no resuscitation effort was made in 14 cases (24%). Among 21 cases delivered by the trained TBAs, mucus traps and bag-and-mask were used in 33.3% and 42.6%, respectively. Instillation of onion juice and warming of placenta were practiced in a significantly higher proportion of cases by traditionally trained TBAs than by those who had received advanced training. Adoption of modern resuscitation methods by the TBAs demonstrates that they are likely to change their practices.

**Abstract:** In 1983 a primary health care (PHC) programme was introduced into the Farafenni area of The Gambia; an important component of this programme was the identification and training of a traditional birth attendant (TBA) in each village with a population of 400 or greater. The outcome of pregnancy has been documented among women resident in 15 villages which joined the PHC programme and in 26 which were too small to do so, for 1 year before and for 3 years after the start of the programme. In PHC villages 65% of women were assisted at delivery by a trained TBA during the post-implementation period and the proportion of women who delivered in a hospital or health centre increased. Both maternal and neonatal death rates fell in PHC villages during the post-intervention period, declining to about half the levels recorded during pre-intervention surveys during the last year of the study. In non-PHC villages there was also a fall in the maternal death rate but little change in the neonatal death rate. Trained traditional birth attendants probably played some part in improving the outcome of pregnancy in the Farafenni area but other factors, such as improvements in transport, may also have contributed.


**Abstract:** In an effort to reduce infant and maternal morbidity and mortality in developing countries, the World Health Organization has promoted the training of traditional birth attendants (midwives) and their incorporation into the formal health care system. In this paper, we examine several aspects of the integration of traditional and biomedical maternity care that are likely to reflect the quality of care received by Guatemalan women. Specifically, we examine the extent to which women combine traditional and biomedical pregnancy care, the frequency with which midwives refer women to biomedical providers, the content and quality of care offered by midwives, and the effects of midwife training programs on referral practices and quality of care. The analysis is based on data from the 1995 Guatemalan Survey of Family Health. The results offer a mixed assessment of the efficacy of midwife training programs. For example, although trained midwives are much more likely than other midwives to refer their clients to biomedical providers, most pregnant women do not see a biomedical provider, and the quality of midwife care, as defined and measured in this study, is similar between trained and untrained midwives.


**Abstract:** Training of TBAs has received a lot of attention and international support in the last century. Yet no country in the world has been able to make motherhood safer than before by only training TBAs. The rare success stories are of those countries which trained, supervised and supported the TBAs with a fairly organized referral system. Pakistan is not one of these countries. It would be wise for a country with limited resources for health care, to move with extreme caution in designing and implementing TBA training programmes. At their best TBAs
should be considered a very temporary approach to manage a permanent situation by any developing country. The authorities need to concentrate on a “Replacement Strategy” and start investing in an achievable goal of training midwives for promoting safer motherhood particularly though domiciliary midwifery.


**Abstract:** Traditional midwives (TM) have been involved in delivering babies, and providing a broad range of other services to women, for hundreds of years. They are usually local women with little formal education. As they are well known in their communities they are often called to assist women at the time of delivery. Two opposite views persist about the continuation of their role; some health workers would like to see them trained better and incorporated into the formal health system. Other health workers feel that all deliveries should be attended by either a nurse/midwife or a doctor, and that TM should eventually be phased out. Traditional midwives currently perform >60% of deliveries in some developing countries and have had their role expanded in some places. Recruiting nurse/midwives and doctors to work in remote areas remains difficult and, even if they were recruited, there is no guarantee that their obstetric services would be used. The evaluation of training programmes has not produced any clear-cut answers in the debate about the long-term role or existence of TM. Rather, the studies have shown that the success of the programmes depends on the resources available, the people involved in the training and how the training is carried out. Some of the lessons learnt from working with TM apply to any two groups of people working together. If TM are going to be offered training, and this must be a local decision made after consultation and an evaluation of prevailing resources and conditions, the training should be a two-way process, with both parties learning from each other.


**Abstract:** A comparative study of knowledge, attitude, and practice of perinatal care was conducted amongst 50 untrained and 50 trained traditional birth attendants (TBAs) from 2 community development blocks of Rewa division in Madhya Pradesh (Central India). All the TBAs belonged to Chamar (Cobbler) community, a scheduled caste, were illiterate, and were regarded as social inferiors irrespective of being trained or untrained. In spite of having undergone the training, the trained TBA was never consulted for antenatal care, nor for conducting the delivery. This job was done by the elderly lady of the house. The role of the TBA started only after the placenta was delivered and the labor room labelled ‘impure.’ However the trained TBAs differed from the untrained ones in their knowledge and attitude regarding perinatal care and in their practices of neonatal and puerperal care. 96% of the trained TBAs realized need for antenatal care as opposed to only 34% of the untrained TBAs. 66% of the trained TBAs washed their hands with soap prior to cutting the cord as opposed to only 36% of the untrained TBAs. Only 4% of the trained TBAs used sickel and knife for cord cutting whereas 50% of the
untrained TBAs used these crude instruments. None of the untrained TBAs approved administration of colostrum to newborns whereas 50% of the trained TBAs counseled its administration. 80% of the untrained TBAs were eager to undergo training.


Abstract: Birth asphyxia is an important cause of perinatal mortality, especially in developing countries. A study in India has shown that traditional birth attendants can recognize the condition but mostly cannot deal with it. The authors suggest that this deficiency could be overcome if suitable training were given.


Abstract: In a field trial in Gadchiroli, India, we trained 30 paramedical workers (PMWs), 25 village health workers (VHWs) and 86 traditional birth attendants (TBAs) from 58 villages to diagnose childhood pneumonia and treat it with sulfamethoxazole+trimethoprim. Continued training, the development of a breath counter, and educative supervision progressively reduced errors in case management made by the TBAs. Over the 3.5-year period 1988–91, 2568 attacks of childhood pneumonia were managed and the case fatality rate was 0.9%, compared with a rate of 13.5% in the control area. The case fatality rates for the three types of worker were similar. The TBAs were superior to the other workers in terms of their availability, outreach, access to neonates, and cost. Satisfaction with the VHWs, and PMWs was expressed by 85%, 69% and 18% of users, respectively. In the intervention area the mortality rate attributable to pneumonia among neonates declined by 44% (P<0.01) while the total neonatal mortality fell by 20%, presumably because of the involvement of TBAs in the control of acute respiratory infections (ARI). If adequately supported by the health system, TBAs can successfully manage childhood pneumonia in villages at the lowest possible cost and with a high degree of community acceptance. TBAs and VHWs are the most suitable community-based health workers for ARI control programmes in developing countries.


Abstract: A survey of 40 trained and 40 untrained traditional birth attendants (TBAs) was done over a 3-week period in two counties in Uganda to evaluate the impact of training and supervision on TBAs. Forty womens’ groups and 20 mothers were also interviewed. The result showed that the most utilized birth attendants were mothers-in-law, trained and untrained TBAs, and the pregnant woman herself. Childbirth was regarded as a normal, private event and the birth attendants were normally called when labour was well advanced or in case of complications. Trained TBAs were attending three times the number of deliveries as untrained TBAs. There was no difference in the knowledge and practices of trained and untrained TBAs, and in the performance of supervised versus unsupervised trained TBAs. All TBAs demonstrated
poor knowledge and practices in the management of complications of pregnancy and labour. Reasons suggested for the poor performance included an over ambitious, inappropriate initial training, and lack of useful supervision. Overall the study concluded that there was a case for continuing with the training and supervision of TBAs provided changes were made to the selection, training and supervision processes.


Abstract: The preliminary findings of a prospective study of perinatal, neonatal and maternal mortality carried out in a rural community of Sudan are reported. Out of 6275 deliveries monitored over a period of 3 years, 150 stillbirths, 167 neonatal deaths and 27 maternal deaths were observed. An intervention program to upgrade the skills of the village midwives started in the middle of the second year. There was a 25% reduction in the risk of unfavorable outcome of pregnancy (i.e. stillbirth and neonatal death) in the third year relative to the first 2 years. Peer review of the 40 village midwives who took part in the study revealed their tremendous potentials in mobilization of mothers as well as participation in primary health care. Their role in detection of high risk pregnancies and newborns cannot be overemphasized.


Abstract: The traditional birth attendant (TBA) is an institution as old as the birthing process in the human species. Generally a female, in the absence of a better alternative, continues to deliver two thirds of the world's babies. A number of studies generated international interest in training TBAs. A review of TBA training and utilization programs in more than 70 countries over the past three decades revealed that there are very limited examples of their successful utilization. If unsupervised the TBA tends to slide back into her old ways and if unsupported she is rendered helpless when a killer strikes during child birth. The impact of trained TBAs on maternal mortality ratios is not palpable because of other factors such as accessibility of essential obstetric services. The challenge for the policy makers is to make the best use of this available human resource but simultaneously plan and implement a definite replacement strategy.


Abstract: One of the most compelling reasons for giving medical training to developing country traditional birth attendants (TBAs) is the high number of annual deaths from neonatal tetanus (estimated in the 100s of 1000s), resulting from poor care of the cut umbilical cord. While neonatal tetanus is almost nonexistent in developed countries, its mortality rate has been measured at 72/1,000 live births in Sierra Leone in 1979–80, and 78/1,000 in Colombia in 1961–66. Neonatal tetanus has developing-country case-fatality rates of between 40% and 90%. The umbilical cord is considered a frequent infection route, and many of the TBAs (who perform
2/3 of developing country deliveries) not only are not trained in aseptic technics, but increase the dangers of infection by applying cow dung or other substances to the severed umbilical cord. Programs to train TBAs in aseptic technics as well as in giving tetanus toxoid injections showed significant positive results in a group of 11 villages in Sierra Leone, where neonatal tetanus mortality dropped from 72 to 11/1,000 live births, and total infant mortality from 305/1,000 to 172 between 1979–80 and 1980–81. Less dramatic results are reported for studies performed on Filipino programs. Even in the absence of tetanus toxoid administration, the training of TBAs in Haiti showed measurable results. Studies in Senegal, the Punjab, India, Malaysia, and Bangladesh are reviewed. Despite possible confounding factors, the results appear to indicate that TBA training is an effective way to reduce infant mortality, especially through the reduction of neonatal tetanus. Combination of training with effective immunization programs would probably have considerable impact.


Abstract: In developing countries traditional birth attendants help at 60–70% of births, despite rapidly expanding “Western-style” health services. Recognising the potential of this established service, the World Health Organisation has been involved in a programme of training and supervision of traditional birth attendants (TBAs) in developing countries since 1973. An evaluation of training programmes in 1986 showed considerable success with improved antenatal care, decreased neonatal tetanus, increased recognition and transfer to hospital of complications of pregnancy and delivery and encouraging improvements in many other indices of improved management. This short paper describes the health services available in a developing country, The Gambia, in West Africa, and reports an interview with a trained traditional birth attendant in a rural area of the country.


Abstract: Re-examines the role that traditional birth attendants can be expected to play in efforts to reduce maternal morbidity and mortality. Addressed to policy-makers and planners, the booklet aims to encourage realistic decisions based on a firm understanding of what TBAs can and cannot do and the extent to which their strengths and limitations might be affected by training programmes. Throughout, the use of traditional birth attendants is regarded as an interim solution in pursuit of the greater goal of giving all women and children access to acceptable, professional, modern health care.

An explanation of the goals and objectives of TBA programmes is followed by an outline of 12 steps which can be initiated in order to implement a programme with the greatest chance of achieving its objectives. Of particular practical value is a section explaining nine issues—from licensing and certification to the risk of HIV transmission—that invariably emerge when decisions about a particular programme are made. The remaining sections alert readers to the limitations of TBA training programmes, including their inability, when used as a single approach, to improve maternal and child health care.
Available at: http://www.who.int/dsa/cat98/nur8.htm#Traditional Birth Attendants

1992, 18 pages [E, F, S]
ISBN 92 4 156150 5
Sw.fr. 9.–/US $8.10; in developing countries: Sw.fr. 6.30
Order no. 1150388


Abstract: The experiences in TBA training in five countries are contrasted. Successful training must impart improved skills to the TBAs and follow-up that both provides continuing support and meets the self-interest of the TBAs. The preference of mothers for services of TBAs is explained.


Abstract: OBJECTIVE: To obtain socioeconomic information about TBAs in the State of Pernambuco and information concerning their practices. METHOD: Statistical analysis of the answers to structured questionnaires applied to 127 TBAs. RESULTS: The results of a survey with 127 TBAs conducted in the rural area of the State of Pernambuco (Brazil) is presented in this paper. TBAs in rural Pernambuco are a group of basically old and very poor and uneducated women. Most of them learned to attend births by themselves or by helping another TBA. Thirty percent learned midwifery in hospital delivery rooms, helping doctors and nurses. How the TBAs learned to help births seemed to be the most influential factor on the kind of practices they use. TBAs who learned from other TBAs from the community seem to have the least interventionist approach, followed by the TBAs who learned by themselves. They are more likely to perform more home births and avoid practices such as shaving the pubic hair, vaginal exams, artificial rupture of the membranes, episiotomy and early cord clamping. CONCLUSION: The way women learned midwifery is the most important determinant of their practice.


Abstract: Traditional birth attendants (TBAs) are regarded as essential child health care providers in Bangladesh. A community-based cross-sectional study was completed using questionnaires and interviews to compare trained and untrained TBAs’ advice on (1) breast-feeding, (2) immunizations and (3) oral rehydration therapy as an extended part of their maternity care training. Twenty-eight trained TBAs (TTBAs) and 27 corresponding untrained TBAs (UTBAs) in the Dhaka district were interviewed to investigate the effect of their advice on the three outcome variables of maternal health care. Additionally, 276 questionnaires were distributed to the mothers cared for by these TBAs to determine their knowledge of infant-care practices. In-depth interviews with 25 mothers provided additional insight. While TTBAs may
have more knowledge and be more willing to disseminate health care information to mothers with new infants than UTBAs, the mother’s health practices were independent of the advice provided by the two groups of TBAs. Additionally, the mother’s health practices equaled or exceeded expected norms.


Abstract: Traditional Birth attendants (TBAs) remain a major workforce in maternity care in developing countries. Yet, after more than three decades of experience, the evidence in support of TBA training is limited and often conflicting. Moreover, there is controversy over the cost-effectiveness of TBA training in relation to the global Safe Motherhood Initiative. The American College of Nurse-Midwives undertook this meta-analysis of TBA training effectiveness with support from USAID Bureau for Africa (SARA Project), USAID Bureau for Global Health (PRIME I Project), and the World Bank Safe Motherhood Special Grants Program. The meta-analysis of published and unpublished studies describes the effect of TBA training on TBAs and on women cared for or living in areas served by trained TBAs, including maternal and perinatal deaths. The findings are relevant in light of the current controversy on efficacy of TBA training where home birth is common and maternal and neonatal mortality remain high and in light of the recent shift to skilled attendance at delivery—a distant reality for some.

Available from:
American College of Nurse Midwives, Department of Global Outreach
818 Connecticut Ave. NW, Suite 900
Washington, DC 20006
email: dbond@acnm.org


Abstract: Training Manual for Traditional Birth Attendants: G Gordon. 1990. This book is a storehouse of facts and information which can be adapted to meet the needs of trainers and TBAs. The book is based on 20 years’ experience by the author. £6.95.

Available from: Teaching Aids at Low Cost (TALC) www.talcuk.org
http://www.talcuk.org/a-z_booklist.htm


Abstract: Appropriate training of traditional birth attendants (TBAs) can both increase the proportion of births attended by trained persons and enhance linkages between rural communities and modern health services. Described is a TBA training program in newborn care developed by the Rural Neonatal Care Project in Maharashtra State, India. To improve attendance, a sub-center was established for TBAs from the northern part of the primary health care area. In addition, an effort was made to train women who assist the TBAs (usually a close relative). Two training sessions per month were held for 6 months, then the frequency was reduced to once a month. TBAs received 5 rupees for attending a training session and an
additional 5 rupees for each registered birth. The training, delivered by lady health visitors and auxiliary nurse midwives, used photographs and dolls to communicate information about keeping the newborn warm, resuscitating a depressed baby, identifying very small infants, and safely transporting at-risk infants to the primary health care center. Also addressed were immunization, management of diarrhea, and referral of acute respiratory infection cases. Program evaluation highlighted the importance of brief, task-oriented sessions that use demonstrations, case histories, oral questioning, and reviews of material presented in earlier sessions. Since TBAs have extensive experience in deliveries in village conditions, they should be regarded by trainers as equal partners.


Abstract: The experience of the pilot project shows that after receiving training, TBAs did change their practices in favor of modern resuscitation procedures. Perinatal mortality declined by 19%. Asphyxia case-fatality rate was reported to have declined from 7.1% to 0.45% after resuscitation training was given to grassroots maternal and child personnel in a county in China. The use of a mucus extractor and bag-and-mask ventilation needs to be tried in other areas for improving the resuscitation facilities in home deliveries in the developing countries where such facilities are almost non-existent. In scattered rural populations most of the TBAs conduct only a few deliveries, therefore, very few asphyxiated babies will be encountered by a TBA in a given year. Therefore maintenance of the skills learnt by TBAs is important. Periodic retraining on a mannequin with inflatable lungs is necessary for learning and retention of the resuscitation skills.


Abstract: Many of the half million women per year who die in childbirth are attended by traditional birth attendants (TBAs). Whether they fare better when such an attendant is trained remains uncertain; even the World Health Organization seems to have tempered its enthusiasm for TBA training recently. With some nations outlawing the practice of TBAs and others actively promoting it, there seems to be no consensus on what to do about this major and continuing workforce in maternity care. By themselves TBAs cannot reduce maternal mortality, whether they are trained or not. They need skilled, equipped and available support. As the professional group who must co-operate with TBAs and provide that support, midwives must, collectively and individually, assess, state and act on their attitude towards TBAs.
Section 4: Selected Issues Related to the Newborn Infant
**Care at Birth**


**Abstract:** Immediate clamping of the umbilical cord can reduce the red blood cells an infant receives at birth by more than 50%, resulting in potential short-term and long-term neonatal problems. Cord clamping studies from 1980 to 2001 were reviewed. Five hundred thirty-one term infants in the nine identified randomized and nonrandomized studies experienced late clamping, ranging from 3 minutes to cessation of pulsations, without symptoms of polycythemia or significant hyperbilirubinemia. Higher red blood cell flow to vital organs in the first week was noted, and term infants had less anemia at 2 months and increased duration of early breastfeeding. In seven randomized trials of preterm infants, benefits associated with delayed clamping in these infants included higher hematocrit and hemoglobin levels, blood pressure, and blood volume, with better cardiopulmonary adaptation and fewer days of oxygen and ventilation and fewer transfusions needed. For both term and preterm infants, few, if any, risks were associated with delayed cord clamping. Longitudinal studies of infants with immediate and delayed cord clamping are needed.


**Abstract:** Iron deficiency anemia is a serious health problem that affects the physical and cognitive development of children. Therefore, it is important to develop cost-effective interventions to improve the hematologic status of the millions of children affected by this condition worldwide. We studied 69 Guatemalan infants who had been randomly assigned to one of three groups at the time of delivery: 1) cord clamping immediately after delivery (n=21); 2) clamping when the cord stopped pulsating, with the infant placed at the level of the placenta (n=26); or 3) clamping when the cord stopped pulsating, with the newborn placed below the level of the placenta (n=22). Maternal and infant hematologic assessments were performed at the time of delivery and 2 mo postpartum. At baseline the groups had similar socioeconomic, demographic, and biomedical characteristics and the newborns had similar hematocrit status. Two months after delivery, infants in the two groups with delayed cord clamping had significantly higher hematocrit values and hemoglobin concentrations than did those in the early-clamping group. The percentage with hematocrit values < 0.33 was 88% in the control group compared with 42% in group 2 and 55% in group 3 (P=0.01). These results suggest that waiting until the umbilical cord stops pulsating (approximately 1 min after delivery) is a feasible low-cost intervention that can reduce anemia in infants in developing countries.

**Abstract:** OBJECTIVE: To study the effects of cord clamping on iron stores of infants born to anemic mothers at 3 months of age. DESIGN: Randomized controlled trial. SETTING: Teaching hospital. METHODS: Infants born to mothers with hemoglobin (Hb)<100 g/L were randomized at delivery to either immediate cord clamping (early group) or cord clamping delayed till descent of placenta into vagina (delayed group). The outcome measures were infant's hemoglobin and serum ferritin 3 months after delivery. RESULTS: There were 102 neonates randomized to early (n=43) or delayed cord clamping (n=59). The groups were comparable for maternal age, parity, weight and supplemental iron intake, infant's birth weight, gestation and sex. The mean infant ferritin and Hb at 3 months were significantly higher in the delayed clamping group (118.4 microg/L and 99 g/L) than in the early clamping group (73 microg/L and 88 g/L). The mean decrease in Hb (g/L) at 3 months adjusted for co-variates was significantly less in the delayed clamping group compared to the early clamping group (−1.09, 95% CI−1.58 to −0.62, p >0.001). The odds for anemia (<100 g/L) at 3 months was 7.7 (95% CI 1.84–34.9) times higher in the early compared to the delayed clamping group. CONCLUSION: Iron stores and Hb in infancy can be improved in neonates born to anemic mothers by delaying cord clamping at birth.


**Abstract:** Vitamin K deficiency remains a world-wide problem in the newborn. Vitamin K traverses the placenta from mother to infant very poorly and is present only in very low concentrations in human milk. Thus, it is not surprising that the newborn infant has undetectable vitamin K serum levels with abnormal amounts of the coagulation proteins and undercarboxylated prothrombin. Hemorrhagic disease of the newborn, secondary to vitamin K deficiency, remains largely a disease of breastfed infants. Lactating mothers easily achieve the recommended dietary allowance for vitamin K (1 microg kg(−1) d(−1)) and the breast milk concentration is readily increased by increasing maternal vitamin K intake. Breastfed infants do not receive the recommended vitamin K intake via human milk. To prevent vitamin K deficiency in the newborn, intramuscular or oral vitamin K prophylaxis is necessary.


**Abstract:** Vitamin K prophylaxis prevents hemorrhagic disease of the newborn. The present review estimates the potential magnitude of this problem in less developed countries, assessing the need for prophylaxis, along with its cost-effectiveness and feasibility. Late hemorrhagic disease, occurring between 2 and 12 weeks, often leads to death or permanent disability. Its median incidence in developed countries is 7 per 100,000 births. Incidences in less developed countries may be much higher. Three incidence scenarios are proposed and the corresponding losses of disability-adjusted life-years (DALYs) calculated. Under the intermediate scenario, late hemorrhagic disease accounts for 0.1% to 0.2% of DALYs lost to children less than 5 years of age.
age. Assuming a cost of +1.00 per injection, each DALY saved would cost +133. Decisions on prophylaxis must be made on a national basis, considering mortality levels and causes, health budgets, and feasibility. Comparison with the impact of diseases prevented by breast-feeding shows that concern with hemorrhagic disease should not affect breast-feeding promotion efforts, although strategies for supplementing breast-fed infants must be explored.


**Abstract:** OBJECTIVES: To investigate policies on neonatal vitamin K and their implementation. DESIGN: Two phase postal survey. SETTING: United Kingdom. PARTICIPANTS: A 10% random sample of midwives registered with the United Kingdom Central Council for nursing, midwifery, and health visiting. Of 3,191 midwives in the sample, 2,515 (79%) responded to phase one and 2294 (72%) completed questionnaires on their current jobs (November 1998 to May 1999). In phase two, 853 (62%) of 1383 eligible midwives gave details on 2,179 of their earliest jobs (start dates before 1990). RESULTS: All the midwives in clinical practice at the time of the survey (2271, 99%) reported that they were working in areas with official policies on neonatal vitamin K. Seven distinct policies were described: intramuscular vitamin K for all babies (1,159, 51.0%); intramuscular vitamin K for babies at “high risk,” oral for others (470, 20.7%); oral vitamin K for all babies (323, 14.2%); parental choice for all (124, 5.5%); parental choice for all except babies at high risk, (119, 5.2%); intramuscular vitamin K for babies at high risk only (33, 1.5%); oral vitamin K for babies at high risk only (17, 0.7%); and a disparate group of policies including intravenous vitamin K for some babies (26, 1.1%). Previous policies were (and some may still be) open to individual interpretation and were not always followed. CONCLUSIONS: Hospital policy is not necessarily a good guide to individual practice. The primary purpose of clinical records is to document patient care, and recording practices reflect this. There is considerable variation in vitamin K policies and midwifery practice in the United Kingdom, and there is no clear consensus on which babies should receive vitamin K intramuscularly.


**Abstract:** While there have been controversies on its use, the general consensus is to recommend the use of intramuscular or oral vitamin K. In developing countries, the oral route has several advantages provided the drug is available. Breastfed babies in particular need vitamin K due to the low content in human milk. In addition, the type of bacterial flora supported by breast milk does not produce much vitamin K. In communities with inadequate health care and poor hygiene and where babies receive other liquids, the gut in breastfed babies may develop flora that produce more vitamin K. In poor communities and in peripheral centers it may also be difficult to administer vitamin in any form. However, as practices improve and more babies are on exclusive breastfeeding, the need for vitamin K will not only become greater but such areas may be in a better position to administer it.

Abstract: Healthy term infants born at the University of Missouri have received vitamin K prophylaxis as a single oral dose since 1967. A retrospective study was undertaken to determine whether either hemorrhagic disease of the newborn or any unexplained intracranial hemorrhage occurred in an infant who received orally administered vitamin K, but none could be found in three separate databases. We conclude that we have met our duty of providing appropriate care.


Abstract: Kanki demonstrated a high prevalence and frequency of enema practised with newborns in the South-West of Burkina Faso. Little is known about the risks on children’s health possibly associated with this practice and about its impact on other treatments in paediatrics. In this study, the authors describe daily administered enema (DAE) and analyse local conceptual frameworks underlying this practice through in-depth-interviews and focus group discussions with 30 mothers, 5 traditional healers and 5 health agents. Various medications are used to compose the liquid introduced by the mothers in the child’s anus. Many of these substances are prone to irritate intestinal mucus, others are simply toxic. Practically, enema aims at curing or preventing a variety of diseases caused by an accumulation of impurities (nogo) in the intestines due to the consumption of inappropriate food. With newborns, diseases are transmitted by mothers through breastfeeding after eating food which is too sweet or too fat. In addition to provoking diseases, the nogo also “block” the child’s physical and psychic development during his/her first year of life. Therefore, as soon as the child has excreted for the first time, most mothers give enema daily both to protect their children from diseases and to speed their development. In fact, beside prophylaxy and therapy lies a “didactic” function of enema as a medication used to help the child to stand up, to get teeth, to gain independence from his/her mother. DAE therefore plays an important role in the process of acquiring bio-social aptitudes, i.e., important educational virtues to achieve a successful first step in the socialisation process. Exploring more deeply local perceptions explaining the origin of the nogo, the authors found an interesting relationship with religious taboos. Beside prohibited food, the nogo are also due to transgression of various taboos surrounding birth and breastfeeding and even suggest a religious, rather than hygienic, explanation for the food prohibited. DAE ultimately consists in re-adjusting the child and his mother according to moral and cultural rules, avoiding the negative consequences of transgression. Consistently, DAE also facilitates the process of acquiring bio-social aptitudes for the child and therefore help him to enter his/her family as a fully accepted member. Moreover, religious prohibitions surrounding birth end as soon as the child is able to eat solid food and free him/herself. Therefore, DAE also helps the parents to get back to their normal life conditions. In conclusion, in addition to prophylactic and therapeutic explanations, the DAE participates in a general process of socialisation of newborns. To a certain extent, the child’s health depends on the respect of the social and religious system and rules. The study reveals the important conceptual gap that may exist between two different logical frameworks—biomedical and popular—prone to explain health risk for newborns. The authors then reflect on
the possible impact of health education programmes seeking to intervene at the hygienic level and ultimately facing an important set of cultural values aiming at keeping the social and cultural organisation coherent.


**Ref Type:** In Press  
**Abstract:** In Press (Disseminated by Family Care International on behalf of the Inter-Agency Group for Safe Motherhood).


**Abstract:** BACKGROUND: Vitamin K deficiency can cause bleeding in an infant in the first weeks of life. This is known as Hemorrhagic Disease of the Newborn (HDN). HDN is divided into three categories: early, classic and late HDN. Early HDN occurs within 24 hours post partum and falls outside the scope of this review. Classic HDN occurs on days one to seven; common bleeding sites are gastrointestinal, cutaneous, nasal and from a circumcision. Late HDN occurs from week 2–12; the most common bleeding sites are intracranial, cutaneous, and gastrointestinal. Vitamin K is commonly given prophylactically after birth for the prevention of HDN, but the preferred route is uncertain. OBJECTIVES: To review the evidence from randomized trials in order to determine the effectiveness of vitamin K prophylaxis in the prevention of classic and late HDN. Main questions are: Is one dose of vitamin K, given after birth, able to significantly reduce the incidence of classic and late HDN? Is there a significant difference between the oral route and the intramuscular route in preventing classic and late HDN? Are multiple oral doses of vitamin K, given after birth, able to significantly reduce the incidence of classic and late HDN? SEARCH STRATEGY: The standard search strategy of the Cochrane Neonatal Review Group was used. SELECTION CRITERIA: All trials using random or quasi-random patient allocation, in which methods of vitamin K prophylaxis in infants were compared to each other, placebo or no treatment, were included. DATA COLLECTION AND ANALYSIS: Data were extracted independently by each author and were analysed with the standard methods of the Cochrane Collaboration and its Neonatal Review Group, using relative risk, risk difference and weighted mean difference. MAIN RESULTS: Two eligible randomized trials, each comparing a single dose of intramuscular vitamin K with placebo or nothing, assessed effect on clinical bleeding. One dose of vitamin K reduced clinical bleeding at 1–7 days, including bleeding after circumcision, and improved biochemical indices of coagulation status. Eleven additional eligible randomized trials compared either a single oral dose of vitamin K with placebo or nothing, a single oral with a single intramuscular dose of vitamin K, or three oral doses with a single intramuscular dose. None of these trials assessed clinical bleeding. Oral vitamin K improved biochemical indices of coagulation status at 1–7 days. There was no evidence of a difference between the oral and intramuscular route in effects on biochemical indices of coagulation status. A single oral compared with a single intramuscular dose resulted in lower plasma vitamin K levels at two weeks and one month, whereas a 3-dose oral schedule resulted in higher plasma vitamin K levels at two weeks and at two months than did a single
intramuscular dose. REVIEWER'S CONCLUSIONS: A single dose (1.0 mg) of intramuscular vitamin K after birth is effective in the prevention of classic HDN. Either intramuscular or oral (1.0 mg) vitamin K prophylaxis improves biochemical indices of coagulation status at 1–7 days. Neither intramuscular nor oral vitamin K has been tested in randomized trials with respect to effect on late HDN. Oral vitamin K, either single or multiple dose, has not been tested in randomized trials for its effect on either classic or late HDN.


Abstract: Newborn babies are born vitamin K deficient; however, the deficiency is not sufficiently severe to cause a vitamin K deficiency coagulopathy and haemorrhagic disease of the newborn (HDN). Severe vitamin K deficiency can develop quickly in breast-fed newborns and can result in the appearance of classic HDN during the first week of life or late HDN during the first 2 months of life. Both forms of the disease can be severe, causing brain damage and death. Classic and late HDN are prevented by the intramuscular administration of vitamin K at birth. Oral prophylaxis prevents classic HDN but is ineffective in preventing late HDN. Despite proven effectiveness of intramuscular vitamin K prophylaxis there have been concerns about the need for, and safety of, this therapy. This review provides evidence that there is need for intramuscular vitamin K prophylaxis for all babies in order to eradicate haemorrhagic disease of the newborn and concludes that there is no evidence that this therapy is harmful.


Abstract: Meconium stained liquor (MSL) is a common problem in obstetrics, but its management at district level causes some specific questions. Recent literature was reviewed to obtain an insight in the current knowledge about the significance, the related pathology and the possible strategies to prevent adverse fetal outcome. The acquired data were used to propose some recommendations to tackle this problem at district level.


Abstract: BACKGROUND: Despite the common occurrence of intrauterine meconium passage and resultant meconium aspiration syndrome (MAS), controversies regarding the pathophysiology and use of appropriate preventive strategies abound. METHODS: Databases from MEDLINE, MD Consult, and the Science Citation Index were searched from 1964 to the present to find relevant sources of information. RESULTS AND CONCLUSIONS: Meconium passage occurs by three distinct mechanisms: (1) as a physiologic maturational event, (2) as a response to acute hypoxic events, and (3) as a response to chronic intrauterine hypoxia. Meconium passage might merely be a marker of chronic intrauterine hypoxia or can predispose to aspiration of meconium and resultant inflammatory pneumonitis, surfactant inactivation, and mechanical airway obstruction. Aspiration can occur in utero with fetal gasping, or after birth with the first breaths of life. Many cases of MAS can be prevented by the strategies addressed in this
article, but some will occur despite appropriate preventive techniques. There is not enough evidence to support the use of amnioinfusion as a standard of care for all pregnancies complicated by meconium. Pharyngeal suctioning before delivery of the shoulders is an effective preventive intervention, as is the combination of pharyngeal suctioning followed by intubation and tracheal suctioning. Suctioning of the trachea may be done on a selective basis depending on fetal vigor and consistency of meconium.


**Abstract:** BACKGROUND: On the basis of evidence from non-randomised studies, it has been recommended that all babies born through thick meconium should have their tracheas intubated so that suctioning of their airways can be performed. The aim is to reduce the incidence and severity of meconium aspiration syndrome. However, for term babies who are vigorous at birth endotracheal intubation may be both difficult and unnecessary. OBJECTIVES: To determine if endotracheal intubation and suction of the airways at birth in vigorous term meconium-stained babies is more beneficial than routine resuscitation including aspiration of the oro-pharynx. SEARCH STRATEGY: The search was made from Oxford Database of Perinatal Trials, the Neonatal Trials Registry of the Cochrane Neonatal Collaborative Review Group and information obtained from knowledgeable practising neonatologists. SELECTION CRITERIA: Randomised trials which compared a policy of routine vs no (or selective) use of endotracheal intubation and aspiration in the immediate management of vigorous term meconium-stained babies at birth. DATA COLLECTION AND ANALYSIS: Data regarding clinical outcomes including mortality, meconium aspiration syndrome, other respiratory conditions, pneumothorax, need for oxygen supplementation, stridor, convulsions and hypoxic-ischaemic encephalopathy were abstracted and analysed using Revman 3.1.1. MAIN RESULTS: Four randomised controlled trials of endotracheal intubation at birth in vigorous term meconium-stained babies were identified. Meta-analysis of these trials does not support routine use of endotracheal intubation at birth in vigorous meconium-stained babies to reduce mortality, meconium aspiration syndrome, other respiratory symptoms or disorders, pneumothorax, oxygen need, stridor, HIE and convulsions. REVIEWER’S CONCLUSIONS: Routine endotracheal intubation at birth in vigorous term meconium-stained babies has not been shown to be superior to routine resuscitation including oro-pharyngeal suction. This procedure cannot be recommended for vigorous infants until more research is available.


**Abstract:** BACKGROUND: Neonates on exclusive breast feeding that do not receive vitamin K at birth are at higher risk hemorrhagic disease of the newborn. AIM: To compare the effect of oral or intramuscular administration of vitamin K1 (VK1), on clotting factors II, VII, IX, X and PIVKA II, in children until the 60 days of age with exclusive breast feeding or mixed feeding.
PATIENTS AND METHODS: Forty healthy full term infants, distributed in two groups, A: 20 with mixed feeding (formula-feeding and breast-feeding) and B: 20 with exclusive breast feeding, were studied. Nine infants of each group received 1 mg of VK1 intramuscularly and eleven 2mg VK orally. 5ml of cord blood was collected initially from each infant. Venous blood samples were taken on 15, 30 and 60 days of age. RESULTS: All factors increased in a progressive form reaching levels over 50% at 60 days of age, in both groups. PIVKA II decreased significantly during the study period (p<0.01). Factor II increased more in children with mixed feeding that received intramuscular vitamin K, than in the rest of study groups. No other differences between groups were observed. No infant had an abnormal bleeding during the study period.

CONCLUSIONS: Oral administration of vitamin K is as effective as the intramuscular route in the prevention of the hemorrhagic disease of the newborn.


Abstract: OBJECTIVE: To determine (1) the most effective method of administering vitamin K to infants to prevent hemorrhagic disease of the newborn (HDNB) and (2) the safest method, in light of preliminary evidence suggesting that intramuscular administration of vitamin K is associated with childhood cancer. DATA SOURCES: A MEDLINE search of articles published between Jan. 1, 1991, and Apr. 30, 1994, with the use of MeSH terms “hemorrhagic disease of the newborn,” articles were limited to those involving human subjects, from birth to adolescence, and to articles from journals indexed through Index Medicus and written in English. References of all articles found through the initial search, the earliest of which was published in 1967, were also reviewed. STUDY SELECTION: Six controlled trials met the selection criteria: a minimum 4-week follow-up period, a minimum of 60 subjects and a comparison of oral and intramuscular administration or of regimens of single and multiple doses taken orally. All retrospective case reviews were evaluated. Because of its thoroughness, the authors selected a meta-analysis of almost all cases involving patients more than 7 days old published from 1967 to 1992. Only five studies that concerned safety were found, and all of these were reviewed. DATA EXTRACTION: In controlled trials, the risk of HDNB caused by vitamin K deficiency among infants receiving different regimens of vitamin K; in case studies, method of vitamin K administration and incidence of hemorrhagic disease; and in studies concerning safety, odds ratios and relative risks of childhood cancer following intramuscular administration of vitamin K. DATA SYNTHESIS: Vitamin K (1 mg, administered intramuscularly) is currently the most effective method of preventing HDNB. The previously reported relation between intramuscular administration of vitamin K and childhood cancer has not been substantiated. An oral regimen (three doses of 1 to 2mg, the first given at the first feeding, the second at 2 to 4 weeks and the third at 8 weeks) may be an acceptable alternative but needs further testing in large clinical trials. CONCLUSION: There is no compelling evidence to alter the current practice of administering vitamin K intramuscularly to newborns.

Abstract: OBJECTIVE: To measure the effects of supportive companionship on labour and various aspects of adaptation to parenthood, and thus by inference the adverse effects of a clinically orientated labour environment on these processes. DESIGN: Randomized controlled trial. SETTING: A community hospital familiar to most of the participants, with a conventional, clinically-orientated labour ward. SUBJECTS: Nulliparous women in uncomplicated labour. INTERVENTION: Supportive companionship from volunteers from the community with no medical nor nursing experience, concentrating on comfort, reassurance and praise. MAIN OUTCOME MEASURES: Duration of labour, use of analgesia, perceptions of labour and breastfeeding success. RESULTS: Companionship had no measurable effect on the progress of labour. Diastolic blood pressure and use of analgesia were modestly but significantly reduced. The support group were more likely to report that they felt that they had coped well during labour (60 vs 24%, P less than 0.00001). Their mean labour pain scores (26.0 vs 44.2, P less than 0.00001) and state anxiety scores (28.2 vs 37.8, P less than 0.00001) were lower than those of the control group. Compared with the control group (n=75), at 6 weeks women in the support group (n=74) were more likely to be breastfeeding exclusively (51 vs 29%, P less than 0.01); and to be feeding at flexible intervals (81 vs 47%, P less than 0.0001). CONCLUSIONS: Labour in a clinical environment may undermine women’s feelings of competence, perceptions of labour, confidence in adapting to parenthood and initiation of successful breastfeeding. These effects may be reduced by the provision of additional companionship during labour aimed to promote self-esteem.


Abstract: BACKGROUND: Social support may include advice or information, tangible assistance and emotional support. OBJECTIVES: The objective of this review was to assess the effects of continuous support during labour (provided by health care workers or lay people) on mothers and babies. SEARCH STRATEGY: I searched the Cochrane Pregnancy and Childbirth Group trials register and the Cochrane Controlled Trials Register. Date of last search: October 2001. SELECTION CRITERIA: Randomised trials comparing continuous support during labour with usual care. DATA COLLECTION AND ANALYSIS: Trial quality was assessed. Study authors were contacted for additional information. MAIN RESULTS: Fourteen trials, involving more than 5000 women, are included in the review. The continuous presence of a support person reduced the likelihood of medication for pain relief, operative vaginal delivery, caesarean delivery, and a 5-minute Apgar score less than 7. Continuous support was also associated with a slight reduction in the length of labour. Six trials evaluated the effects of support on mothers’ views of their childbirth experiences; while the trials used different measures (overall satisfaction, failure to cope well during labour, finding labour to be worse than expected, and level of personal control during childbirth), in each trial the results favoured the group who had received continuous support. REVIEWER’S CONCLUSIONS: Continuous support during labour from
caregivers (nurses, midwives or lay people) appears to have a number of benefits for mothers and their babies and there do not appear to be any harmful effects.


**Abstract:** 1997–WHO/FRH/MSM/96.24
Sw.fr. 10.—/US$9.00 (In developing countries: Sw.fr. 7.—) Order No. 1930104
Available in French

Establishes universal guidelines for the routine care of women during uncomplicated labour and childbirth. Reflecting the consensus reached by an international group of experts, the report responds to the recent proliferation of practices designed to start, augment accelerate, regulate or monitor the physiological process of labour in industrialized and developing countries alike. Recommendations for routine care are based on a critical review of what considerable research has to say about the effectiveness and safety of 59 common procedures and practices.

Available at: [http://www.who.int/dsa/cat98/mat8.htm#Care in Normal Birth](http://www.who.int/dsa/cat98/mat8.htm#Care in Normal Birth)


**Abstract:** The review by Drs. Brousson and Klein (see pages 307 to 315 of this issue) identifies controversies surrounding the administration of vitamin K to babies shortly after birth. Controlled studies comparing the effect of oral and intramuscular administration are unlikely to be conducted because of the large number of subjects needed. The evidence presented in the review should dispel concerns that intramuscular administration may be associated with childhood cancer. Oral administration of a single dose of vitamin K soon after is associated with significant biochemical vitamin K deficiency by 1 month of age, but the relation of biochemical abnormality to clinical manifestations of late hemorrhagic disease of the newborn is less clear. Epidemiologic studies indicate a small, but significant, increase in the incidence rate of hemorrhagic disease after oral administration of vitamin K (1.0 to 6.4 incidents per 1,000,000 infants), compared with the incidence rate after intramuscular administration (0.25 incidents per 100,000 infants). Although repeated oral doses of vitamin K may be and effective alternative regimen, there is no approved oral vitamin K formulation, there are concerns about patient compliance, and there has been limited investigation of such regimen. Therefore, intramuscular administration of a single dose of 1.0 mg of vitamin K shortly after birth is recommended.


**Abstract:** Available from:

PATH
4 Nickerson Street
Seattle, WA 98109-1699
tel: 206-285-3500
www.path.org
Temperature Maintenance


**Abstract:** This prospective study compared standard newborn care under radiant heat with two methods of warming babies that provided immediate parent-infant contact. Fifty-one mother-infant dyads were randomly assigned to three treatment groups. Control group babies had no skin-to-skin contact with their mothers during the study period. One group of experimental infants began skin-to-skin contact after completion of initial nursing care in a radiant heater. The second group of experimental babies had the earliest, most continuous skin-to-skin contact with their mothers and were never under radiant heat. Skin temperatures of all 51 newborns were noted every 3 minutes for 45 minutes using an electronic thermometer. Rectal temperatures were also taken at 21 and 45 minutes after birth. Results supported the hypothesis that body temperatures would be warmest in experimental babies given the earliest skin-to-skin contact, less warm in experimental infants beginning skin-to-skin contact after initial nursing care, and coolest in control babies given no skin-to-skin contact with their mothers (p<0.001). Significantly more control than experimental newborns had skin and rectal temperatures below the neutral thermal range at 21 and 45 minutes of life. High delivery room temperature and drying babies well immediately after birth did not differ significantly among the three groups, but were found to be positively correlated with neonatal body temperature for the sample as a whole.


**Abstract:** A nonelectrical human incubator for premature infants has been designed and built for use in rural areas of developing nations where electricity is not readily available. This incubator may be operated using kerosine or gas as the source of energy. The unit uses an automatic self-activating regulator which controls the flow of hot water through a simple heat exchanger; the air in the incubator is heated by natural convection, and the humidity is adjusted by water evaporation. The temperature inside incubator can be maintained to within +/− 0–3 degrees C of the desired level. The unit operates for extended periods of time with little or no supervision.


**Abstract:** Oxygen saturation was studied in eight newborn babies, seven preterm and one term, with and without caressing by the mother while receiving gavage feeds. The babies were stable with regard to cardiorespiratory and neurological status. Four babies were still receiving head-box oxygen. The oxygen saturation levels were similar before feeds. However, the levels were significantly higher with caressing at 10, 20 and 30 min after the feed in babies not receiving oxygen and at 20 and 30 min after feeds in babies receiving oxygen.

Abstract: Ability of mothers and field worker in assessing the temperature of the baby by touching at the abdomen was poor in this study. Nearly half of the hypothermic (axillary temperature <36.5°C) and more than one third of the hyperthermic babies were missed by all of them. However, their perception of moderate hypothermia was better. As none of the babies in this study had severe hypothermia, mothers’ and field workers’ ability of detecting severe hypothermia by touch could not be evaluated. However, perception of mothers and field workers was observed to be better as temperature of the baby decreased (mothers and field worker had correctly detected 2 babies as “cold” who had temperature between 32.0–32.9°C). Research assistants in a Kathmandu Maternity Hospital could correctly perceive temperature by touching the foot of the baby in 81% of the cases who had rectal temperature of <36°C(4). A good correlation has also been reported between physicians’ perception of temperature by touching at abdomen and foot with values recorded with a digital thermometer (5). A study, therefore, needs to be done to determine if training mothers and field worker can improve their ability of identifying hypothermic babies by human touch method without using a thermometer.


Abstract: OBJECTIVE: Solar energy could be used as an alternate energy source for keeping neonates warm especially in tropical countries. The present study investigated the efficacy of solar powered room heating system. SETTING: Referral center for neonatal care. INTERVENTION: A fluid system heated by solar panels and circulated into a room was used to maintain room temperature. A servocontrolled heating device was used to regulate and maintain desired room temperature. MAIN OUTCOME MEASURES: Neonatal rectal temperature and room temperature. RESULT: Infants between 1,750–2,250g were observed to require a mean room temperature of 32.5 degrees C to maintain normothermia. In 85 infants less than 1,500g, of the 5,050 infant temperature records, only 3% showed a record less than 36 degrees C. CONCLUSIONS: Solar powered room heating is effective in maintaining infant temperature and is cost-effective as compared to the existing warming devices.


Abstract: Provision of a thermoneutral environment to the newborns has made an important contribution to improved neonatal survivals. Modern systems which only warm one baby are expensive and their maintenance not very easy. Warming a room with three to four babies by means of simple devices is cost-effective and should be preferred by those to whom cost matters very much.

**Abstract:** Fifty healthy term neonates delivered at All India Institute of Medical Sciences Hospital were assessed by three pediatricians for skin temperature to the nearest +/− 0.5 degrees C at the three body sites, i.e., mid-forehead, abdomen and dorsum of right foot by touch. The predicted temperatures at different sites were compared with simultaneously recorded temperatures at the same sites with the help of an electronic thermometer having a sensitivity of +/− 0.1 degree C. Rectal temperature was also recorded in all the babies with a rectal thermister to compare the variations between the core and skin temperatures. There was a good correlation between the skin temperatures of the babies as perceived by touch and values recorded with the help of an electronic thermometer. All the hypothermic babies were correctly picked up by all the observers. There was good correlation between core temperature and skin temperature at different sites except forehead. It is amazing that even during the month of May, when ambient temperature was maintained between 26–28 degrees C, nearly one fifth of the healthy term babies were under cold stress as evidenced by greater than 2 degrees C difference between the core and peripheral skin temperatures. It is recommended that health professionals and mothers should be explained the importance of evaluating the core and peripheral skin temperature by touch for early identification of babies under cold stress in order to prevent occurrence of life threatening hypothermia.


**Abstract:** In this prospective study, axillary temperature of newborns delivered at home were recorded by a field worker once within a period of 24h after the birth in 10 villages of Haryana, India, during 1992–1993. Room air temperature was measured at the same time. Family members were interviewed to record newborn care practices. Of the 189 babies, 11.1% were found to be hypothermic (temperature <35.6 degrees C) and 22.8% were hyperthermic (temperature > 37.3 degrees C). During winter months 19.1% were hypothermic as compared to only 3.1% in summer whereas 8.5% were hyperthermic in winter compared to 36.8% in summer. Room air temperature of <24 degrees C was recorded in 41%. A strong correlation was observed between room air temperature and neonatal temperature. At the time of birth, 13.2% of the delivery rooms in summer and 73.6% in winter were reported to have heat source: 58.2% babies were reported to be wiped soon after birth; 97.3% were wrapped in cloth; the head was covered in 59.1% cases in winter and 10.5% in summer; 97.3% babies were kept with mother in same bed but not in skin-to-skin contact; and 65% were bathed within 24h after delivery. Neonatal hypothermia is a common problem in developing countries. It is important that information, education and communication strategy about appropriate technologies for prevention and management of neonatal hypothermia is provided at domiciliary level. A significant proportion of babies are likely to suffer from hyperthermia in warm countries, specially in summer. Therefore, guidelines for thermal control in home births should be tailored to the specific environmental situation.

Abstract: Liquid crystal thermometer (LCT) readings of skin temperatures were compared with mercury thermometer (MT) rectal temperature readings to assess the reliability of LCTs. Temperatures of 498 children were measured at two points in time. LCT skin temperature readings of children 0 to 52 months were on average 0.50 degrees C and 1.97 degrees C lower than MT rectal temperature readings. A strong correlation between temperature differences and LCT readings indicated that the greatest differences occurred at the lower LCT readings. These conclusions indicate LCT skin readings underestimate temperature. Some of these differences were due to MTs not measuring temperatures below 35 degrees C. Children under 1 year of age had significantly greater differences than any other age group. Their LCT readings were, on average, 1.65 degrees C lower than their MT readings. Using MTs as a standard, LCTs were 100% sensitive and 92% specific for detecting children with hypothermia. LCTs were 38.5% sensitive and 100% specific for detecting fevers. These results suggest that LCTs leave undetected a large proportion of children who have fevers. However, they are sensitive for identifying children with hypothermia. A knowledge, attitude and practice (KAP) study indicated that local mothers can be identified who understand principles and procedures of LCTs, and accept them for health care of their child.


Abstract: BACKGROUND: Prevention of excessive heat loss is fundamental to survival of low birthweight (LBW) newborns. The use of infant incubators (INC) is beyond the resources of developing countries, and the space-heated room (SHR) has been the only feasible means of providing thermal protection to LBW newborns. Recently a thermostatically controlled, heated, water-filled mattress (HWM) has been developed as a potentially simpler and affordable alternative. METHODS: In a neonatal care ward of a referral hospital in Addis Ababa, 62 <1 week old newborns, weighing 1,000–1,999g, who were well enough to breathe comfortably in room air and tolerate oral feeds, were randomly allocated to INC, HWM or SHR and followed for 3 weeks. The level of cold stress as assessed by core-to-skin temperature gradient and the rate of weight gain were the main outcome measures. RESULTS: The level of cold stress was lowest in the INC, intermediate in the HWM and highest in the SHR. Relative to the INC group, the HWM group exhibited a modest increase in the occurrence of clinically important hyperthermic or hypothermic deviations in core temperature (rate ratio (RR)=2.3; 95% CI: 0.9, 5.6), and the SHR displayed a definite increase (RR=4.0; 95% CI: 1.7, 9.3). During the first week, the rate of weight gain was highest in the INC group (3.6 g/kg/day), lowest in the SHR group (–2.3 g/kg/day, P<0.05 versus INC) and intermediate in the HWM group (1.6 g/kg/day, P>0.1 versus INC). CONCLUSION: Care in the SHR produced clinically significant thermal stresses and was associated with deficient early neonatal growth, but the use of HWM may constitute a feasible and clinically acceptable alternative in providing warmth to LBW newborns during the neonatal period.

Abstract: The purpose of this study was to determine whether the practice of early suckling, through an effect on maternal behaviour, would improve neonatal temperature control. One hundred and sixty mothers having daytime spontaneous deliveries of healthy babies at term were randomized into two groups. The treatment group were encouraged to put the baby to the breast immediately after delivery. In the control group, the baby was placed in a cot immediately after birth and breastfeeding occurred some time later at a time of the mother's choice. Observations of the mother's behaviour towards her baby and the baby's core body temperature were recorded at 2 and 4 hours after birth and at 8 a.m. the next day. The early suckling group mothers were observed breastfeeding their babies more often than those of the control group. Significantly more of the control babies had temperatures below 36.5 degrees C at 8 a.m. the next day. Women of either group who were breastfeeding immediately prior to temperature recording were significantly less likely to have a baby with a low body temperature. It is concluded that a policy of early suckling, when compared with one of delayed contact, appears to reduce the incidence of low body temperature in the neonate.


Abstract: OBJECTIVE: This study was done to evaluate the effect of an increase in environmental temperature in healthy infants on breathing patterns during sleep. STUDY DESIGN: Ten preterm infants (mean gestational age 30.6 [SD 1.5] weeks) who reached maturity and 10 term comparison infants underwent polysomnographic studies before, during, and after exposure to raised environmental temperature. Core temperature and instances of central and obstructive apnea during active sleep and quiet sleep were recorded and compared between and within the two groups. RESULTS: At environmental temperatures between 29 degrees and 30 degrees C, both groups of infants had longer and more frequent apneic episodes than at 24 degrees C. Compared with baseline findings, in preterm infants at a postconceptional age of 38 (SD 1) weeks, the apnea index increased during quiet sleep, whereas in term infants aged 36 to 72 hours (similar postconceptional age), an increased index was observed during active sleep. CONCLUSION: A mild increase in environmental temperature has an effect on breathing patterns in both preterm (even when they have reached maturity) and term infants. However, a different response related to sleep state was observed in the two groups. We speculate that these effects may play a role in the association between a life-threatening event and elevated environmental temperature in both groups of infants.


Abstract: A prospective observational study of post-delivery care and neonatal body temperature, carried out at Kathmandu Maternity Hospital, was followed by a randomized controlled intervention study using three simple methods for maintaining body temperature.
There were 500 infants in the initial observation study and 300 in the intervention study. In the observation study, 85% (420/495) of infants had temperatures <36 degrees C at 2h and nearly 50% (198/405) had temperatures <36 degrees C at 24h (14% were <35 degrees C). Most of the infants who were cold at 24 h had initially become cold at the time of delivery (only seven infants had been both well dried and wrapped). In the intervention study, all infants were dried and wrapped before random assignment to one of the three methods: the “kangaroo” method, the traditional “oil massage” or a “plastic swaddler”. All three were found to be equally effective. Overall, 38% (114/298) of the infants had temperatures <36 degrees C at 2h and 18% (41/231) at 24 h (when none was <35 degrees C).


Abstract: OBJECTIVE: Because the risks and benefits of early bathing of newborn infants are not well established, we investigated the effects of bathing immediately after birth on rectal temperature, respiratory rate, heart rate, blood pressure, percutaneous arterial blood oxygen saturation (SpO2) and early neonatal morbidity. METHODS: The study was designed as a randomized prospective comparative study in the neonatal care unit of a university hospital. A total of 187 healthy term and near-term newborn infants, who were delivered vaginally without asphyxia, between January and December 1997 were the study subjects. We compared findings in newborns who were bathed 2–5 min after birth (n=95) with those of a control group (n=92) who received dry care instead. Groups were comparable with respect to gestational age, birthweight, male: female ratio, Apgar score and umbilical blood pH. Rectal temperature was measured with an electronic thermometer immediately before the intervention bathing or dry care and at 30 min and 1, 2, 3, 8 and 12h after birth. Heart rate, respiratory rate, systolic and diastolic blood pressure and SpO2 were measured at 1, 2, 8 and 12h after birth. The incidence of early neonatal morbidity, including hyperbilirubinemia and gastrointestinal and respiratory problems, was also compared. RESULTS: Rectal temperature changed over time postnatally in both groups (P<0.0001, ANOVA) and there was a significant difference in rectal temperature between groups (P<0.0001, ANOVA). Mean (+/– SEM) rectal temperature at 30 min after birth (i.e. approximately within 20 min after intervention) was significantly higher in the bathed group than in the control (dry care) group (37.30 +/- 0.06 is 37.00 +/- 0.05 degrees C, respectively; P=0.000022). Respiratory rate, heart rate, blood pressure and the ratio of the number of infants with SpO2 90–94% and 95–100% did not differ significantly between the two groups. The incidence of early neonatal morbidity, including vomiting, acute gastric mucosal lesion, polycythemia, need for tube feeding, phototherapy and oxygen therapy, also did not differ between the two groups. CONCLUSIONS: Early bathing, minutes after birth, did not appear to adversely affect the adaptation of healthy full-term and near-term newborn infants.

Note from the Editor: This applies only if the water and environment is warm and specific care is taken to keep the baby warm with quick drying and appropriate wrapping—and where necessary, skin to skin contact. Such conditions may be difficult to provide in a developing country—especially at the community level.

Abstract: A study on the incidence and high risk factors of hypothermia in the newborn was carried out in a period of four months (Nov. 1988–Feb. 1989) in 6 counties of 3 provinces. Totally 14,809 newborns were studied, in whom 100 cases were found to be ill with sclerema, having an incidence of 6.7%. Gestational age, body weight, low room temperature, improper methods of thermopreservation during delivery and asphyxia are determined as the most probable high risk factors, in which gestational age and body weight are negatively correlated with the contraction of the disease. It suggests that the prevention of prematurity and asphyxia, and promotion of thermopreservation during delivery should be helpful in preventing sclerema of newborns.


Abstract: Heat injury due to prolonged exposure to excessively high environmental temperatures, a previously unreported entity, in 52 neonates who were born at the hospital and sustained the disease during their stay in non-airconditioned wards, is reported. The diagnostic criteria included the presence of high fever (>39.4°C) with or without other symptoms and absence of clinical and laboratory evidence to account for any other cause of the illness. The critical environmental temperature which caused the syndrome was 42.5°C or above. Two distinct clinical patterns were noted, one consisting of fever alone and the other which additional associated manifestations such as weight loss, abdominal distension, cerebral irritability, hypertonia and haemorrhagic diathesis. The heat injury seemed to cause widespread pathological changes and affected mainly the central nervous system, liver and kidney. Significant biochemical alterations included hypo and hypernatraemia and hypo and hyperchloremia. Nearly 20 percent of cases with symptomatic manifestations ended fatally. Excessive weight loss, hypertonia and bleeding signified poor prognosis. Actiopathogenesis and problems in management of the condition are discussed.


Abstract: OBJECTIVE: To determine whether there is a significant difference between the temperatures of very-low-birth-weight (VLBW) premature infants in the incubator and in the mothers’ arms. DESIGN: Repeated measures, with random assignment to treatment order and the infants serving as their own controls. SETTING: A 40-bed tertiary-level nursery in a university teaching hospital. PARTICIPANTS: A convenience sample of 20 preterm infants weighing 1,095 to 1,500g and from 30 to 37 weeks postconceptional age. The infants were screened for factors that would interfere with temperature maintenance. MAIN OUTCOME MEASURES: Axillary temperatures were measured with an electronic thermometer for equal periods of time in incubators and mothers’ arms. The mean temperature differences between the two study conditions were compared using two-tailed t tests and repeated analysis of variance (ANOVA). Weight was monitored and analyzed for evidence of increased metabolic activity. RESULTS: No significant variations were found in the infants’ mean temperatures in the
incubator, but the infants were significantly warmer while in their mothers’ arms. CONCLUSION: VLBW premature infants can maintain a stable temperature in their mothers’ arms without evidence of increased metabolic activity. Nurses can encourage mothers to hold their infants without fear of cold stress or weight loss.


Abstract: The present study was undertaken to evaluate the knowledge, attitude and practices about neonatal hypothermia among medical and paramedical staff dealing with newborn care. A total of 160 subjects were assessed (40 pediatric medicine residents, 40 obstetric residents, 40 private practitioners and 40 paramedical staff working in labor room and postnatal wards) A pre-tested structured questionnaire was used. Only 47.8% of the subjects defined neonatal hypothermia correctly. As many as 52.2% of the interviewees considered it to be an uncommon problem. Lethargy, refusal for feed and cold to touch were mentioned as common symptoms of neonatal hypothermia by 97.5%, 80% and 77.5% of the respondents respectively. Decreased body temperature, cyanosis, apnea and edema of feet were found as common signs. Only 18.6% of the interviewees had knowledge about correct method of recording the temperature in a newborn. The present study reveals the gross lacunae in the knowledge regarding various aspects of neonatal hypothermia among pediatric and obstetric residents and paramedical staff working in labor room and postnatal wards. To reduce the neonatal morbidity and mortality due to neonatal hypothermia, greater emphasis should be laid on this problem while designing curriculum for training of undergraduate and postgraduate doctors, paramedical staff and traditional birth attendants.


Abstract: We assessed the sensitivity, specificity and likelihood ratio of a low cost liquid crystal strip thermometer (LCT) compared with axillary mercury thermometry for the detection of neonatal hypothermia in Nepal. The subjects were 76 healthy newborns in the government maternity hospital of Kathmandu, Nepal in winter. The validity of LCT for the detection of neonatal hypothermia (less than 36 degrees C) showed a sensitivity of 83 per cent, specificity 96 per cent, positive predictive value 98 per cent and a likelihood ratio of 23. Use of LCT on newborns in this setting raises a measured pretest probability of first day hypothermia of 63 per cent to a post-test probability of 97 per cent. Liquid crystal thermometry is a simple, low-cost, and valid method for identifying core hypothermia in newborns. It is ideal for isolated rural communities where LCT strips could be added to delivery kits.

Abstract: A number of midwifery practices might if properly applied prevent unnecessary heat loss in the newborn. The care of 62 normal newborns was observed following birth at 4 levels of institutions, the majority being at the University Teaching Hospital in Lusaka. At discharge after an average of 14 hours, 1/2 the babies had a body temperature below 36 degrees C, i.e. mildly hypothermic. There was a significant decrease in body temperature between 30 and 120 minutes postpartum. Proper wiping and wrapping of the babies was rarely carried out. Unnecessary separation of babies from their mothers and no extra provision of heat during suction at the resuscitation table were common. Among both mothers and staff there was a lack of understanding of the newborns’ non-shivering thermogenesis. Traditional practices were often more appropriate than so-called modern. Midwifery education did not positively affect practices. With available resources it should be possible to limit neonatal heat loss. (author's).


Abstract: Fourteen very low birthweight infants were studied positioned either prone horizontal or skin-to-skin at 60 degree tilt between the mother’s breasts. Heart rate, skin temperature and oxygenation by transcutaneous PO2 and pulse oximetry were measured. Nine of the infants had normal lungs when studied. These infants showed no change in tcPO2 or oxygen saturation but heart rate increased significantly by a mean of 6.5 beats per min during skin-to-skin contact. Five infants with chronic lung disease, including two on nasal catheter oxygen, showed a significant 1.0 kPa rise in tcPO2 during skin-to-skin contact. Back skin temperature was well maintained during skin-to-skin contact with the room temperature at 26 to 29 degrees C. None of the infants had a significant apnoea or bradycardia during the study. Stable very low birthweight infants can enjoy such close contact with their mothers and the tilted position may improve pulmonary function in some cases.


Abstract: AIMS: To describe the pattern of hypothermia and cold stress after delivery among a normal neonatal population in Nepal; to provide practical advice for improving thermal care in a resource limited maternity hospital. METHODS: The principal government funded maternity hospital in Kathmandu, Nepal, with an annual delivery rate of 15,000 (constituting 40% of all Kathmandu Valley deliveries), severe resource limitations (annual budget Pounds 250,000), and a cold winter climate provided the setting. Thirty five healthy term neonates not requiring special care were enrolled for study within 90 minutes of birth. Continuous ambulatory temperature monitoring, using microthermistor skin probes for forehead and axilla, a flexible rectal probe, and a black ball probe placed next to the infant for ambient temperature, was carried out. All probes
were connected to a compact battery powered Squirrel Memory Logger, giving a temperature reading to 0.2 degree C at five minute intervals for 24 hours. Severity and duration of hypothermia, using cutoff values of core temperature less than 36 degrees C, 34 degrees C, and 32 degrees C; and cold stress, using cutoff values of skin-core (forehead-axilla) temperature difference greater than 3 degrees C and 4 degrees C were the main outcome measures. RESULTS: Twenty four hour mean ambient temperatures were generally lower than the WHO recommended level of 25 degrees C (median 22.3 degrees C, range 15.1–27.5 degrees C). Postnatal hypothermia was prolonged, with axillary core temperatures only reaching 36 degrees C after a mean of 6.4 hours (range 0–21.1; SD 4.6). There was persistent and increasing cold stress over the first 24 hours with the core-skin (axillary-forehead) temperature gap exceeding 3 degrees C for more than half of the first 24 hours. CONCLUSIONS: Continuous ambulatory recording identifies weak links in the “warm chain” for neonates. The severity and duration of thermal problems was greater than expected even in a hospital setting where some of the WHO recommendations had already been implemented.


Abstract: BACKGROUND: The provision of a thermoneutral environment is an essential component of the immediate and longer term care of newborn infants. A variety of methods are currently employed including incubators and open-care systems, with or without modifications such as heat shields and plastic wrap. The system used must allow ready access to the infant but should also minimise alterations in the immediate environment. OBJECTIVES: To assess the effects of radiant warmers versus incubators on neonatal fluid and electrolyte balance, morbidity and mortality. SEARCH STRATEGY: The standard search strategy of the Cochrane Neonatal Review Group was used. This included searches of electronic databases: Oxford Database of Perinatal Trials, Cochrane Controlled Trials Register (Cochrane Library Issue 4 2001), MEDLINE (1966–2001), and CINAHL (1982–2001). SELECTION CRITERIA: Randomised or quasi-randomised trials in which radiant warmers were compared to incubators in a neonatal population. DATA COLLECTION AND ANALYSIS: Independent data extraction and quality assessment of included trials was conducted by the authors. Data were analysed using relative risk (RR) and weighted mean difference (WMD). Results are presented with 95% confidence intervals. Meta-analysis was undertaken using a fixed effect model. MAIN RESULTS: Eight studies are included in this review; six employed a crossover design. In the overall comparison of radiant warmers vs incubators, radiant warmers caused a statistically significant increase in insensible water loss (IWL) [WMD 0.94g/Kg/day (95% CI 0.47, 1.41)] and a trend towards increased oxygen consumption which was not statistically significant [WMD 0.27mL/kg/min (95% CI –0.09, 0.63)]. Due to small numbers, effects on important clinical outcomes could not be adequately assessed. A comparison of radiant warmers with heat shields vs incubators without heat shields showed a trend for increased IWL in the radiant warmer group, which was not statistically significant. No difference was shown in oxygen consumption. REVIEWER’S CONCLUSIONS: Radiant warmers result in increased IWL compared to incubators. This needs to be taken into account when calculating daily fluid requirements. The results of this review do not provide sufficient evidence concerning effects on important outcomes to guide clinical
practice. Further randomised controlled trials are required to assess the effects of radiant warmers versus incubators in neonatal care on important short and long term outcomes, with particular attention to extremely low birthweight infants in the early neonatal period.


Abstract: Sixty low birthweight infants (1 000–2 000 g) admitted to a neonatal care unit in Turkey were studied. Those not requiring intensive care were randomly assigned for treatment either in a cot on a heated, water filled mattress kept at 37 degrees C (n=28) or in air heated incubators with a mean air temperature of 35 degrees C (n=32). On admission 53 (88.3%) of the infants had body temperatures between 30 degrees and 36 degrees C. There was good correlation between axillary and rectal temperatures in the infants while they were hypothermic. Normal temperatures were achieved within the first day and remained within this range during the subsequent days after admission in all the infants treated on the heated, water filled mattress, whereas they were not achieved until three days later in the incubator group. The neonatal mortality among those treated on the heated, water filled mattress was 21%, and among those treated in the incubator 34%. The heated, water filled mattress provides a good alternative to skin to skin contact with the mother, and to the use of a complex and expensive incubator for rapidly attaining and maintaining normal temperatures in the low birthweight newborn.


Abstract: Cleaning newborn infants with coconut oil shortly after birth is a common practice in Malaysian labour rooms. This study aimed: (1) to determine whether this practice was associated with a significant decrease in the core temperature of infants; and (2) to identify significant risk factors associated with neonatal hypothermia. The core temperature of 227 randomly selected normal-term infants immediately before and after cleaning in labour rooms was measured with an infrared tympanic thermometer inserted into their left ears. Their mean post-cleaning body temperature (36.6 degrees C, SD=1.0) was significantly lower than their mean pre-cleaning temperature (37.1 degrees C, SD=1.0; p<0.001). Logistic regression analysis showed that the risk factors significantly associated with pre-cleaning hypothermia (<36.5 degrees C) were: (1) not being placed under radiant warmer before cleaning (p=0.03); and (2) lower labour room temperature (p<0.001). Logistic regression analysis also showed that the risk factors significantly associated with post-cleaning hypothermia were: (1) lower labour room temperature (p<0.001); (2) lower pre-cleaning body temperature (p<0.001); and (3) longer duration of cleaning (p=0.002). In conclusion, to prevent neonatal hypothermia, labour room temperature should be set at a higher level and cleaning infants in the labour room should be discouraged.

Abstract: The aim of the present study was to compare temperatures, metabolic adaptation and crying behavior in 50 healthy, full-term, newborn infants who were randomized to be kept either skin-to-skin with the mother or next to the mother in a cot “separated”. The babies were studied during the first 90 min after birth. Axillary and skin temperatures were significantly higher in the skin-to-skin group; at 90 min after birth blood glucose was also significantly higher and the return towards zero of the negative base-excess was more rapid as compared to the “separated” group. Babies kept in cots cried significantly more than those kept skin-to-skin with the mother. Keeping the baby skin-to-skin with the mother preserves energy and accelerates metabolic adaptation and may increase the well-being of the newborn.


Abstract: From July 1997 to June 1998, 25 preterm infants (birth weight <1800g) were included in a prospective study to compare the clinical effects of breast- and bottle-feeding. Oxygen saturation, heart rate, respiratory rate, and body temperature were recorded every minute for 20 minutes during feeding periods. Eighty pairs of breast- and bottle-feeding sessions were observed at the chronological age of 9.3 +/- 4.3 (range = 2.1–25.3) weeks. Oxygen saturation and body temperature of the preterm infants were significantly higher when they were directly breastfed. There were 2 episodes of apnea (breath pause more than 20 seconds) and 20 episodes of oxygen desaturation (PaO2<90%) during bottle-feeding and none during breastfeeding. We conclude that breastfeeding is a more physiological feeding method for the preterm infant and bottle-feeding may be more stressful.


Abstract: The effect of environment on temperature was examined by comparing tympanic, rectal, inguinal, and axillary temperatures for 63 term infants in three environments: incubator, bassinet, and radiant warmer. Tympanic temperatures were collected with a FirstTemp (Intelligent Medical Systems, Carlsbad, CA) infrared thermometer in the cal-tympanic mode. Rectal, inguinal, and axillary temperatures were collected with an IVAC digital thermometer (San Diego, CA) in the predictive mode. There were moderate correlations between the body site temperatures. The environment significantly influenced temperature readings at the different sites. Temperatures assessed in the superheated environments of the radiant warmer and the incubator were consistently higher than temperatures in the bassinet.

Abstract: A prospective cohort study was carried out at the University Teaching Hospital, Lusaka, Zambia, to investigate the prevalence of neonatal hypothermia, type of infant care and incidence of mortality. Two-hundred-and-sixty-one infants, aged 0–7 days, admitted to the pediatric unit during the ‘warm’ season were recruited to the study. Forty-four per cent of the infants were hypothermic (<36 degrees C) on admission, and admission hypothermia correlated to admission weight and home delivery in the youngest age group (0–24 hours). Exclusively breastfed infants (age group 1–7 days) were less likely to be hypothermic at admission. ‘Hypothermia’ was not recorded as an admission diagnosis and no special attention was given to those infants in terms of clinical management. Mean time to reach a body temperature above 35.9 degrees C did not differ between infants kept in a cot and in an incubator. Total numbers of death was 82 (31 per cent) and the mortality was higher in infants who were hypothermic at admission compared to those who were not. This study demonstrates that a change of existing care routines is needed.


Abstract: The effects of medically-orientated labour ward routines were studied during the first hour after birth, in 48 vaginal, single deliveries. All infants were immediately separated from their mothers and left on a resuscitation table. There was no significant difference in onset of crying if the infant received cutaneous stimulation or not. It was found that 17 infants, not showing hand-to-mouth activity, were bathed at an average time of 17 min (12–23 min) after birth, while those who did were bathed at 28.5 (24.5–41.5) min (P=0.002). One infant was breastfed during the first hour. Being separated from its mother, bathed early, and swaddled after birth seemed to interfere with the infant’s inborn ability to signal hunger. Forty-one infants were hypothermic at 1 hour. According to a multiple regression analysis infant body temperature at 60 min of age corresponded positively with birth weight (P=0.0001) and time of oxygen administration (P=0.0002). A plausible explanation for the effect of oxygen exposure is that there is brown fat inactivation in normal newborn infants and administration of oxygen activates the brown fat. It might be advantageous to let the mother keep the baby warm, rather than manipulate the baby’s metabolism with oxygen.


Abstract: Hypothermia is a common problem in neonates, particularly in developing countries where it is an important contributory factor to neonatal mortality and morbidity. An evaluation of the knowledge and practices of health professionals on the thermal control of newborns was carried out in seven countries: Brazil, India, Indonesia, Kazakhstan, Mozambique, Nepal and
Zimbabwe. The evaluation, conceived as a preliminary phase for a one-day training course on thermal control, involved 28 health facilities and 260 health professionals (61 doctors and 199 nurses and midwives). It included an assessment of thermal control practices carried out in each health facility by external investigators and a questionnaire on knowledge about thermoregulation administered to health professionals involved in newborn care. The findings of the evaluation were consistent across countries and showed that thermal control practices were frequently inadequate in the following areas: ensuring a warm environment at the time of delivery; initiation of breastfeeding and contact with mother, bathing; checking the baby’s temperature; thermal protection of low birth weight babies, and care during transport. Knowledge on thermal control was also insufficient, especially concerning the physiology of thermoregulation and criteria for defining hypothermia. During the one-day course that followed the evaluation, participants were able to recognize the existing gaps and to identify appropriate interventions. Knowledge and practice on the thermal control of the newborn are currently insufficient. However, awareness of the importance of thermal control and basic knowledge on thermal regulation and thermal protection can be easily acquired and on this basis motivation for improving thermal control practices can be developed.


**Abstract:** This clinical guide is designed for use by health care providers and managers to ensure that newborns maintain a normal body temperature, as well as to help health facilities develop strategies and protocols for newborn thermal protection. The guide reviews the importance of thermal protection of newborns and use of the 10-step “warm chain” to achieve it in both health facilities and homes. Detection and treatment of hypo- and hyperthermia are detailed, along with strategies to ensure thermal protection of low birthweight and sick newborns. Throughout the text, information is clearly laid out, and key strategies are illustrated. 64 pp. English.

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**Cord Care**


**Abstract:** One million newborn infants die every year by bacterial infections, which often have entered the body via the umbilicus. A Cochrane systematic review on “Topical umbilical cord care at birth” by J Zupan and P Garner is reviewed. Zupan and Garner conclude that simply to keep the umbilical cord dry and clean is sufficient for healthy, term neonates in rich countries; disinfectants do not offer any advantage. However, cleaning the umbilical cord with disinfectants may reduce the risk of serious bacterial infections in babies in poor countries or in neonatal wards. Observational studies in poor countries indicate that the life of numerous infants can be saved if pregnant women are vaccinated against tetanus and disinfectants are substituted for harmful cord care traditions. This Cochrane review is credible, but it should be updated and considered tentative since no data on sepsis are included. The search strategy should be better described and observational studies (case control and cohort studies) from poor countries should be included since there are no randomized control trials from these countries.


**Abstract:** Owing to a high incidence of superficial infection in the newborn period the existing cord care treatment of Iodosan 10% in surgical spirit was compared with 4% chlorhexidine detergent solution. A prospective crossover study was performed between two comparable maternity units. Cord bacteriology was assessed at the time of discharge from hospital and the day of cord separation recorded. The number of infections involving skin, eyes and umbilical cord occurring in hospital and at home were recorded. Chlorhexidine treatment of the cord was associated with an overall reduction in bacterial colonisation of the cord. This was most marked for coagulase positive staphylococci and was not associated with an increase in gram negative organisms. Cord separation occurred at a mean of 10 days with Iodosan and 20 days with chlorhexidine. Chlorhexidine treatment was associated with fewer infections overall; 21% of babies v 38% of babies treated with Iodosan. Conjunctival infection was most commonly recorded; 48 babies being affected in the Iodosan group and 20 in the chlorhexidine group. The use of 4% chlorhexidine detergent solution is supported, but the length of treatment may have to be limited in order to encourage cord separation.


**Abstract:** Proper care of the umbilical cord of newborn infants may prevent later infections. When St Joseph’s Hospital in Hamilton, Ontario, started using alcohol instead of triple dye for umbilical cord care, there was a dramatic increase in the incidence of bacterial colonization in
newborns in the nursery and, later, in the number of cases of staphylococcus-related skin infections in infants born at the hospital. Follow-up on 1,545 infants revealed that triple dye was significantly more effective than alcohol in reducing the growth of gram-positive organisms, especially Staphylococcus aureus and group B streptococcus, and several gram-negative organisms. Because hospital medical staff had carefully collected data on bacterial colonization, they were quickly aware of the problem and could justify resuming the use of triple dye.


Abstract: During a study of pregnancy in a poor rural tropical area, a high prevalence of neonatal fever and umbilical cord infection was detected. Interim analysis showed that this was associated with subsequent development of neonatal sepsis. Therefore an intervention was introduced in two stages. In the first stage, acriflavine spirit and new razor blades were supplied to mothers, along with instructions for use, through antenatal clinics. In the second stage, when excessive cord bleeding was reported, umbilical cord clamps were added to the pack. The packs were associated with reduction of serious morbidity in the neonatal period. The study demonstrates the importance of umbilical cord care in the aetiology of life threatening neonatal morbidity in village births in a developing country and the effect of a simple intervention in reducing morbidity episodes in the neonate.


Abstract: 1998—WHO.

This document reviews the available evidence on cord care of the newborn and attempts to provide policy-makers, managers of health facilities and senior health professionals with recommendations on clean cord care based on the evidence.

Available at: http://www.who.int/reproductive-health/publications/MSM_98_4/MSM_98_4_abstract.en.htm


Abstract: This research project was undertaken at a teaching hospital to determine whether no treatment of newborns’ umbilical cords was more effective than the current treatment employed. One hundred and three babies were included in the study. The cords of babies nursed in one postnatal ward were not treated (trial group); babies nursed in another postnatal ward became the control group whose cords were treated with spirit (alcohol 70%) and ties. Cords separated earlier for the trial group (mean 6.4 days) than the control group (mean 8.04 days) and mothers of trial group babies reported fewer problems with umbilical cords than those of control group babies.

**Abstract:** A randomized controlled study was undertaken to compare the effectiveness of three umbilical cord treatment regimens in controlling neonatal bacterial colonization. The regimens studied included daily application of castile soap, triple dye and silver sulfadiazine. The triple dye and silver sulfadiazine regimens inhibited bacterial colonization. Staphylococcal colonization was inhibited most effectively by triple dye treatment. Group B streptococcal colonization was equally inhibited by triple dye and silver sulfadiazine. Silver sulfadiazine was more effective in controlling colonization with gram-negative microorganisms.


**Abstract:** The incidence and types of staphylococcal purulent lesions were prospectively studied among 3,602 newborn infants. During an epidemic of post-discharge pyoderma, 87 per cent of all Staphylococcus aureus isolates from lesions could be traced to the nursery. The risk of post-discharge disease was related to the degree of staphylococcal skin colonization in the nursery. A method for routine cord care in the nursery with 4 per cent chlorhexidine-detergent solution was evaluated and proved to be effective in reducing staphylococcal colonization in the nursery as well as purulent skin disease at home. The clinical effectiveness of the regimen was followed up for 19 months and a persistent low infection rate was obtained among infants in the post-discharge period.


**Abstract:** Following an outbreak of group B beta-hemolytic streptococcal neonatal infection (GBS), a prevalence survey of GBS colonization was performed on 238 infants. No important differences were noted in the prevalence of colonization when the infants were grouped according to age. Follow-up of 24 colonized babies for three months disclosed that most had persistence of GBS at the rectum and pharynx. Local umbilical cord care with triple dye (TD) or hexachlorophene skin cleanser was compared with untreated controls with respect to rates of GBS colonization. At birth the colonization rates of the three groups were similar. The rate of acquisition of colonization with GBS was 1.0% in the TD group, 6.3% in the hexachlorophene group, and 8.3% in the control group. Triple dye was much more effective than no specific cord care or hexachlorophene in preventing acquisition of GBS colonization.

Abstract: Control of nosocomial group B streptococcal (GBS) colonization of newborn infants was attempted in a four-cycle study alternately employing single applications of povidone-iodine (iodophor) and triple dye to the umbilical cord stump and periumbilical area. GBS colonization rates were 49% and 34% following iodophor cord care (cycles II and III) and 11% and 50% following triple dye cord care (cycles II and IV). The apparent significant reduction of GBS colonization during triple dye cycle II could not be reproduced in a subsequent follow-up culture survey and remains unexplained.


Abstract: OBJECTIVE: To determine the knowledge, attitudes and practices (KAP) of mothers and the knowledge of health workers regarding care of the newborn umbilical cord. DESIGN: Cross-sectional survey. SUBJECTS: Mothers with infants less than three months of age attending well child clinics and health workers (HW) in the clinics, maternity and newborn units of public health, facilities serving an urban slum area in Nairobi, Kenya. RESULTS: Of the 307 mothers interviewed, 91% and 28% of mothers knew of the need for hygiene whilst cutting and tying the cord, respectively. Regarding postnatal cord care, 40% had good knowledge and 66% good practice. Fifty-one percent of mothers knew and 54% practised postnatal cord care for the appropriate duration of time. Seventy-nine percent of mothers were afraid of handling an unhealed cord. After multivariate analysis, the following variables showed significant independent association with good maternal KAP; increased level of education (OR 2.3, p<0.001), living in middle class areas rather than slums (OR 1.5, p<0.03), increased maternal age (OR 1.8, p<0.001), acquisition of knowledge from a HW rather than from other sources (OR 1.5, p<0.001), and living in stone/brick houses rather than mud houses (p=0.01). Fifty per cent of HW had correct knowledge on type of postnatal cord care, and 79% had correct knowledge on duration required for the same. The knowledge of 50% on type of care was incorrect by international standards, but was in keeping with Nursing Council of Kenya teaching.

CONCLUSION: Mothers had good knowledge on the need for hygiene when cutting the cord, had poor knowledge and practice in other aspects of cord care, and were afraid of handling the cord. Poor KAP was associated with young, poor mothers of low education, who had acquired their knowledge from sources other than HW. The knowledge of a large proportion of HW was incorrect and outdated. We recommend that health education on cord care be given at all levels of contact with mothers and that knowledge of all primary HW on cord care be updated.


Abstract: BACKGROUND: Previous studies in Pakistan have shown that ghee (clarified butter) is commonly applied to umbilical wounds of neonates, and have documented that such
applications are a risk factor for neonatal tetanus (NNT). In-use contamination of ghee with Clostridium tetani has been demonstrated, but mechanisms underlying the risk of ghee have been incompletely evaluated epidemiologically. METHODS: Detailed information on ghee usage, including fuels used to heat it, was obtained from cases of NNT (n=229) and their matched controls (n=687) from a population-based study of NNT in Punjab Province, Pakistan. Design variables were created to evaluate the impact of different fuel sources on risk of ghee applications. RESULTS: Nearly one-third of all infants had ghee applied, and it was nearly always heated before application to umbilical wounds of newborns. After controlling for all factors found to be significantly associated with NNT in conditional logistic regression, only ghee that had always been heated with dried cow dung fuel was significantly associated with NNT. Topical antimicrobials and ghee were never applied together. CONCLUSIONS: Ghee applications to umbilical wounds, when heated with ‘clean’ fuels, appear to pose no increased risk of NNT, although handling practices undoubtedly result in hazardous microbial contamination. In contrast, ghee heated with dung fuel was significantly associated with NNT. The effective promotion of topical antimicrobials might help reduce ghee use, since the intended purpose of each is to enhance healing.


Abstract: BACKGROUND: Case-control studies previously conducted in Pakistan suggested that topical antimicrobials might provide protection against neonatal tetanus (NNT) when applied to the umbilical cord wound during the first several days of life. The present case-control study, the largest such study yet reported, was undertaken in Punjab Province, Pakistan and afforded further opportunities to evaluate such effects. METHODS: A population-based, matched, case-control study was undertaken to assess topical antimicrobials and other factors related to NNT risk in rural parts of Punjab Province. RESULTS: Continuous use of antimicrobial agents (antibiotics and antiseptics) at delivery and during the first few days after delivery was highly protective in univariate testing (matched odds ratio 0.2 [95% confidence interval: 0.11–0.64], P=0.003), and remained significantly protective when other delivery and cord care practices were controlled. In contrast, applying nothing to the wound was risky compared with antimicrobial exposures. Hand washing and delivery by a trained birth attendant appeared protective. Application of animal dung or ash to the umbilical wound was hazardous. Similarly, pre-delivery cutaneous or intravaginal exposure of mothers to ghee (clarified butter) and delivery on a surface prepared with dried cow dung were risky, with significant interaction noted between them. Mortality and NNT were far more likely among previous births to mothers of cases. CONCLUSIONS: Topical antimicrobials offer a new, effective and inexpensive means to prevent NNT, and could usefully complement maternal immunization with tetanus toxoid in controlling the disease. Special prevention efforts should be directed towards mothers of NNT cases.

Abstract: Over a 4-month period, all infants admitted to the well-baby nursery were enrolled in a prospective study designed to compare cord separation times between infants treated with triple dye once, followed by daily alcohol application, to infants treated with daily alcohol application alone. Follow-up phone calls were done 7 days after discharge, with weekly calls until cord separation occurred. The objective was to determine whether the umbilical cord care regimen of triple dye followed by alcohol has an advantage over the alternative regimen of alcohol alone, with regard to cord separation, parenting, or healthcare caretaker preferences. In total, 634 infants were enrolled, with 599 infants (94%) completing the study. Infants in the alcohol alone group had a shorter cord separation time by 3 days (10 versus 13 days) (p<0.0001). There was no reported increase in infection, and monetary savings were noted. We conclude that alcohol applied once a day appears to be a safe and effective means of promoting cord detachment.


Abstract: A randomized trial to compare two methods of umbilical cord tying in neonates, immediately after birth, was undertaken from February to April 1997 in the Department of Obstetrics and Gynaecology, Zewditu Memorial Hospital, Addis Ababa, Ethiopia. In less than 3 months, we investigated 300 neonates, of whom 150 infants were randomly assigned to the traditional ligation of the umbilical cord (using a piece of thread) and the rest to a rubber ring clamping method. Among the former group, 13.3% (20/150) of the neonates bled from their umbilical cords which necessitated re-tying, whereas in the later group, there was no sign of haemorrhage or infection within 12 h of clamping. We suggest that the rubber ring method described is a superior procedure and can easily replace the traditional, cumbersome and time-consuming umbilical cord ligation.


Abstract: A randomized controlled study was undertaken to compare the effectiveness of three umbilical cord treatment regimens in controlling neonatal bacterial colonization. The three regimens studied included castile soap, triple dye, and silver sulfadiazine. The triple dye and silver sulfadiazine application inhibited bacterial colonization. Staphylococcal colonization was inhibited by both treatment regimens but most effectively by triple dye. Group B streptococcal colonization was inhibited most effectively by silver sulfadiazine while triple dye application to the umbilicus promoted colonization with this microorganism. Silver sulfadiazine was more effective in controlling colonization with Gram-negative microorganisms.

**Abstract:** Two different neonatal umbilical cord treatment regimens were studied prospectively. Although a greater proportion of cords had separated by the seventh day in those babies not treated with topical antiseptics (47% vs. 26%), there was a significant excess (53% vs. 30%) of umbilical colonization by *Staphylococcus aureus* compared to those neonates whose cords were treated with alcohol wipes and hexachlorophane powder. The main purpose of treating cords is to prevent significant *S. aureus* colonization, and therefore current proposals to stop antiseptic treatment of umbilical cords should be disregarded.


**Abstract:** The effectiveness of single and multiple applications of triple dye for umbilical cord care in the umbilical cord separation time (UCST) was evaluated in 180 neonates. Seven neonates were excluded, three where the cord stump separation time was uncertain and four to whom contact was lost. The participating neonates were randomly assigned to two groups. Group 1, 101 neonates, were treated with a regimen of a single application of triple dye. Group 2, 79 neonates, were treated with multiple applications of triple dye. Complete information was obtained from 97 neonates (96.2%) in group 1 and 76 (96%) in group 2. The UCST was 12.6 +/− 0.45 (mean +/− SE) days in group 1 and 16.68 +/− 0.65 days in group 2 (P<0.0001) and showed no significant association with infants’ gender, mode of delivery, gravidity, gestational age, birth weight, or hospital stay. CONCLUSION: A single application of triple dye may be a more favourable regimen with a similarly antimicrobial effect, a shorter UCST and may be more cost effective than multiple applications of triple dye in umbilical cord care.


**Abstract:** BACKGROUND: Topical regimens have been used for umbilical cord care for different purposes, but their drying efficacy has rarely been statistically analyzed. We designed an in vitro study with six regimens to determine which one can achieve the best drying and antimicrobial effects in umbilical cord care. METHODS: Twenty-seven umbilical cords were resected when babies were born. Each cord was cut into seven segments in appropriate length and randomly labeled to seven groups. Six regimens including 75% alcohol, 90% alcohol, tincture povidone-iodine, aqua povidone-iodine, Chinese herbs, and one powder agent (M) were used topically on six groups of umbilical cords once daily. The control group received no treatment. Daily weight of the cords was recorded for 7 days, and bacterial culture was performed on the sixth day. RESULTS: All study groups presented similar algebraic functional relationship between weight change and time. The drying effect occurred mostly within the first 3 days (weight loss 88.6%), especially on the first day (62.1%). Mean ratio of the final weight/initial weight was 10.2%. Significant day-by-day weight loss was noted from day 1 to day 5 (p<0.001). Both aqua and tincture povidone-iodine groups showed not only satisfied drying effect but also significantly
better antimicrobial effect than other groups. CONCLUSIONS: Povidone-iodine has both good drying and antimicrobial effects in umbilical cord care. As the topical use of povidone-iodine has been reported to relate to transient neonatal hypothyroidism, we suggest it to be used only as a good substitute if there are signs of umbilical cord infection.


*Abstract:* The time of cord separation and the umbilical changes post cord falling were studied in 394 infants, 35 to 42 weeks gestation, 1,900 to 4,500g birth weight. Two methods of treatment; alcohol 70% with 0.5% chlorhexidine, and Rikospray were compared. The mean +/- SD age of cord separation was 6.36 +/- 2.64 days (range 3–20 days) in all infants studied. The time of cord separation and post fall umbilical complications were similar in the two treated groups. The only point of difference was the repulsive odor in the alcohol-treated group, making handling of the infants very unpleasant.


*Abstract:* OBJECTIVE: The use of antibacterial agents to clean and dry the stump of the newborn’s umbilical cord after birth has recently been abandoned by many neonatal units in favor of dry cord care. The objective of this study was to compare cord bacterial colonization and morbidity among newborns whose cords were treated with triple dye and alcohol versus dry cord care. METHODOLOGY: We randomly allocated 766 newborns to either 2 applications of triple dye to the umbilical cord stump on the day of birth with alcohol swabbing twice daily until the cord fell off (n=384) or dry care (n=382). Dry care consisted of spot cleaning soiled skin in the periumbilical area with soap and water, wiping it with a dry cotton swab or cloth, and allowing the area to air dry. Umbilical stumps on all subjects were swabbed and cultured. Community health nurses visiting at 2 or 3 days after hospital discharge observed the stump for signs of infection. Follow-up phone calls were made to mothers within 3 weeks of discharge. RESULTS: One infant in the dry care group was diagnosed with omphalitis. The umbilical stump was colonized with alpha-hemolytic streptococcus and coagulase-negative staphylococcus. Infants in the dry care group were significantly more likely to be colonized with Escherichia coli (34.2% vs 22.1%), coagulase-negative staphylococci (69.5% vs 50.5%), Staphylococcus aureus (31.3% vs 2.8%), and group B streptococci (11.7% vs 6.0%). Community health nurses were
significantly more likely to observe exudate (7.4% vs 0.3%) and foul odor (2.9% vs 0.7%) among infants allocated to the dry care group during the home visit. CONCLUSIONS: Omphalitis remains a clinical issue. Cessation of bacteriocidal care of the umbilical stump must be accompanied by vigilant attention to the signs and symptoms of omphalitis.


**Abstract:** BACKGROUND: Previous case-control studies of neonatal tetanus (NNT), a leading cause of infant mortality in developing countries, have suggested that antimicrobials applied after delivery to the umbilical cord stump may protect against this disease. However, assessment of their protective effect has been limited by the low prevalence of antimicrobial use in developing countries. METHODS: We conducted a population-based, matched, case-control study to assess the use of antimicrobials and other factors potentially related to NNT in rural parts of Bangladesh. We studied 359 cases (infants who were normal at birth but who died between the 3rd and 30th day of life after an illness characterized by signs of NNT), each matched to three living controls for gender, residence, and date of birth. RESULTS: In univariate analyses, the application of either antibiotics or disinfectants at delivery, and the continuous or any application of disinfectants were protective against NNT. The application of antibiotics at delivery (odds ratio [OR]=0.21, P=0.019), hand washing by the delivery attendant (OR=0.64, P=0.005), and prior maternal immunization with tetanus toxoid (OR=0.50, P<0.001) remained protective in conditional logistic-regression analyses. Application of animal dung to the umbilical stump (OR=2.31, P=0.047) was hazardous. CONCLUSIONS: Effective and inexpensive topical antimicrobials provide a new prevention opportunity that could be used by traditional birth attendants and mothers to provide additional benefits to NNT control programmes based on maternal immunization with tetanus toxoid. Promotion of hygienic delivery and cord-care practices and increasing tetanus toxoid coverage remain cornerstones for the prevention of NNT deaths.


**Abstract:** BACKGROUND: Umbilical cord infection caused many neonatal deaths before aseptic techniques were used. OBJECTIVES: The objective of this review was to assess the effects of topical cord care in preventing cord infection, illness and death. SEARCH STRATEGY: We searched the Cochrane Pregnancy and Childbirth Group trials register, the Cochrane Controlled Trials Register (Cochrane Library issue 4, 1997) and Medline. We also contacted experts in the field. SELECTION CRITERIA: Randomised and quasi-randomised trials of topical cord care compared with no routine care, and comparisons between different forms of care. DATA COLLECTION AND ANALYSIS: Two reviewers assessed trial quality and extracted data. MAIN RESULTS: Ten studies were included, all from developed countries. No systemic infections or deaths were observed in any of the studies reviewed. Cord and other skin infections within six weeks of observation were not affected by use of antiseptics. There was a trend to reduced colonization with antibiotics compared to antiseptics and no treatment. Antiseptics prolonged the
time to cord separation. Use of antiseptics was associated with a reduction in maternal concern about the cord. REVIEWER’S CONCLUSIONS: Simply keeping the cord clean appears to be as effective and safe as using antibiotics or antiseptics.


Abstract: Four different treatments for the care of the umbilical cord were compared in a randomised, controlled study. Triple dye was associated with a significantly earlier separation of the cord than either 1% neomycin or 1% silver sulphadiazine ointment, and it was nearly as effective as bismuth subgallate (an astringent powder) in causing rapid sloughing. If the mother is made aware that care of the umbilical cord may delay cord separation she may be spared unnecessary concern.


Abstract: Umbilical cord colonization rates were examined over a 4-year period following topical application of bacitracin (1978–1980) or triple dye (1980–1982). A total of 2,402 cords were cultured: 1229 following bacitracin cord care and 1,173 after triple dye application. Cords treated with bacitracin had significantly higher colonization rates when compared to triple dye prophylaxis. Bacterial colonization with Staphylococcus epidermidis and group B beta-hemolytic streptococcus was found only after bacitracin prophylaxis. Our data support the use of triple dye for routine cord care and suggest that bacitracin application may increase the rate of group B streptococcal colonization.


Abstract: In this study we evaluate the effect of eight cord-care regimens on cord separation time and other secondary outcomes: omphalitis, sepsis, death, cord bleeding, compliance, satisfaction or dissatisfaction with regard to the type of treatment, umbilical cord colonization—in 1,535 healthy term infants. The eight cord-care regimens studied were: 70% alcohol, natural drying, salicylic sugar powder, triple dye, micronized green clay powder, colloid silver-benzylperoxide powder, neomycin-bacitracin powder, 1% basic fuchsine. None of the newborns developed sepsis or died and we found only sporadic cases of omphalitis. With regard to cord separation time the best results were obtained with salicylic sugar powder (5.6 +/- 2.3 days) and green clay powder (6.7 +/- 2.2 days). Both forms of treatment proved to be more effective (p<0.05) than all the others. We found that salicylic sugar powder allows for early cord detachment resulting in excellent parent treatment compliance and reduction of their concern, notwithstanding higher percentages of cord bleeding. The rate of positive umbilical swabs was low and was significantly higher only than the results obtained with neomycin-bacitracin powder treatment. This study demonstrates that, in hospital nurseries of developed countries, salicylic sugar powder can be effectively and safely used for umbilical cord care of healthy term infants.

**Abstract:** During a 13-month period, 363 infants were followed up through the first six weeks to determine the effect of perinatal factors (birth weight, gestational age, type of delivery, and pregnancy and neonatal complications) on umbilical cord separation. Also, breast-feedings and umbilical cord care were studied. Except for cesarean section deliveries, study infants were similar to all infants (N=1474) admitted to the same nursery during the study period. Cord separation occurred from days three to 45, with a mean of 13.9 days. Infants born by cesarean section were found to have an increased interval for cord separation when compared with infants born vaginally (mean +/– SD, 15.9 +/– 5.0 days vs 12.9 +/– 4.2 days). In this study, delays in separation of the umbilical cord beyond 3 weeks of age was not associated with an increased risk of infection.


**Abstract:** The separation time of the umbilical cord was studied in 98 healthy Indonesian newborns with the aim of determining the normal time of separation and to evaluate factors which may influence it. The authors looked for a relationship between cord separation and sex, birthweight, gestational age, parity of the mother and nutrition of the newborn. Mean separation time was 10.9 days (S.D. 3: range 5–23 days). None of the factors analysed had a statistically significant influence. Cord care consisted of triple dye; no umbilical infections were found.


**Abstract:** The use of antiseptic treatment during cord care varies from unit to unit. Although it may reduce bacterial colonisation it may also delay cord separation. Where antiseptic treatment is used there is uncertainty as to the best agent. Hexachlorophane powder (0.3%) and 4% chlorhexidene detergent were each compared with dry cord care as a control on a two ward maternity unit in a six month open study. Of 133 infants treated with hexachlorophane 44 (33%) became heavily colonised with Staphylococcus aureus compared with 80 (47%) of 171 controls; a reduction of one third. Chlorhexidine reduced colonisation by more than half; 17 (16%) of 104 compared with 41 (42%) of 98 controls. Chlorhexidine was associated with cord attachment at 10 days in 29 (28%) infants compared with 31 of 515 (6%) infants when it was not used. Hexachlorophane was more acceptable to the nursing staff. The reduction in colonisation with the two compounds was largely due to the suppression of cross infection.
Eye Care


Abstract: Crede’s prophylaxis represented a tremendous step forward in the prevention of inflammatory eye disease in newborns in the late 19th century. But his original prophylaxis is mainly effective against gonococcal ophthalmia whereas chlamydial ophthalmia neonatorum (ON) is now more widespread, and silver nitrate may cause chemical conjunctivities. In industrialized countries ON is no longer a public health problem and different strategies for prevention are available, so some countries have chosen to stop prophylaxis at birth and to opt instead for early treatment. But growing populations, urbanization and increasing promiscuity cause a rising incidence of ON in developing countries.

Routine prophylaxis with topical antibiotics carries the risk of resistance, especially in patients with ON due to gonococcal infection. Povidone-iodine as a topical anti-infective appears to be an effective and cheap alternative. Further epidemiological research and monitoring on the incidence of ON and the prevalence of the various agents in different parts of the world are needed, so that prevention and treatment can be adjusted accordingly and experience with new options can be analysed for wide use.


Abstract: The current status of nursery routines of prophylaxis against ophthalmia neonatorum were surveyed by mail questionnaire to 100 leading maternity hospitals. More than 20% of the respondents were not using silver nitrate, mainly because of chemical conjunctivitis. The clinical significance and incidence of chemical conjunctivitis were studied in 1,000 newborns whose eyes were handled differently. Rinsing after instillation of silver nitrate does not reduce the conjunctival irritation. Although 90% of the infants had conjunctivitis in the first hours of life, the majority cleared within 24 hours. Chemical conjunctivitis did not increase secondary infection, neither did it mask bacterial infection. Silver nitrate is effective in vitro against Neisseria gonorrhoeae and Staphylococcus aureus in a concentration of 0.1% and against Escherichia coli in a concentration of 0.01%.


Abstract: Based on our literature investigation, we recommend the following:
1. Administer silver nitrate 1 percent ophthalmic solution or antibiotic solution to all newborns.
2. Do not rinse out the silver nitrate solution because rinsing is ineffective in diminishing conjunctivitis.
3. Allow infant and parent to become acquainted during the first hour of life unless contraindicated. If skin-to-skin or Leboyer techniques are used, defer eye drops prophylaxis for a short time.

Nurses need to explore further whether silver nitrate or antibiotic instillation delayed for an hour after birth still provides adequate protection from gonorrheal ophthalmia. If an hour delay in prophylaxis is harmless, then nurses have an obligation to promote change. We must work with health care colleagues, consumers, and regulatory agencies to implement care that is physiologically and psychologically sound.


Abstract: The recommendation by the Centers for Disease Control (CDC) that erythromycin and tetracycline ointments, as well as silver nitrate solution, are acceptable regimens for prophylaxis of gonococcal ophthalmia neonatorum (GON) has resulted in widespread local review of policies for ocular prophylaxis. The data concerning the efficacy and side effects of these agents are somewhat confusing or nonexistent. We discuss the etiologies of neonatal conjunctivitis and the topical and systemic agents used for prophylaxis of GON. We also review all studies that have compared the efficacy of one prophylactic agent with that of another agent or with no prophylaxis. It is found that all three agents have similar efficacy in preventing GON, although silver nitrate has been used more extensively in populations at high risk for GON. However, since Chlamydia trachomatis is the most common infectious cause of neonatal conjunctivitis in the United States at this time, and erythromycin appears to be very effective in prevention of neonatal conjunctivitis due to C. trachomatis, it may have an advantage over the other two agents. In addition, erythromycin use is associated with fewer ocular reactions than is silver nitrate.


Abstract: We evaluated the use of silver nitrate drops and tetracycline ointment for the prophylaxis of ophthalmia neonatorum in a controlled trial involving 2732 newborns in Nairobi, Kenya. The overall rates of prevalence of intrapartum maternal gonococcal and chlamydial infection were 6.4 and 8.9 percent, respectively. After prophylaxis with silver nitrate, the incidence rates of gonococcal, chlamydial, and nongonococcal, nonchlamydial ophthalmia neonatorum were 0.4, 0.7, and 6.2 percent, respectively, whereas after prophylaxis with tetracycline, the rates were 0.1, 0.5, and 4.5 percent. The attack rates of gonococcal ophthalmia neonatorum in newborns exposed to Neisseria gonorrhoeae at birth were 7.0 percent in those receiving silver nitrate and 3.0 percent in those receiving tetracycline (95 percent confidence interval for the difference in rates, –3.4 to 11.4 percent). As compared with historical controls, the incidence of gonococcal ophthalmia neonatorum decreased 83 percent among infants treated with silver nitrate and 93 percent among those treated with tetracycline. Failure of prophylaxis was associated with postpartum maternal endometritis (P=0.05). Among newborns
exposed to maternal infection with Chlamydia trachomatis, chlamydial conjunctivitis developed in 10.1 percent given silver nitrate and in 7.2 percent given tetracycline (95 percent confidence interval for the difference in rates, –4.7 to 10.5 percent), yielding reductions in the incidence of chlamydial ophthalmia of 68 and 77 percent, respectively, as compared with the historical controls. We conclude that tetracycline is as effective as silver nitrate in preventing gonococcal ophthalmia neonatorum.


Abstract: I am not publishing the following information concerning the prevention of inflammatory eye disease in the newborn in a specialist journal on ophthalmology but in this Archive because the disease is almost invariably caused by infection during delivery and is therefore directly related to a diseased condition of the female genitals. Responsibility for prevention of the disease must also lie solely with obstetricians and midwives. I shall confine my remarks exclusively to the practical question of prophylaxis.

http://www.who.int/bulletin/tableofcontents/2001/vol.79no.3.html


Abstract: We compared the efficacy of erythromycin ophthalmic ointment vs 1% silver nitrate drops for the prevention of neonatal conjunctivitis or respiratory tract infection from Chlamydia trachomatis. The organism was isolated from the cervix of 67 (12%) of 572 pregnant women. They gave birth to 559 infants who were randomly assigned to either prophylaxis immediately after birth. Thirty-six of 60 infants born to Chlamydia-positive women received silver nitrate; 24 received erythromycin. Twelve (33%) of the 36 infants who received silver nitrate had chlamydial conjunctivitis, but none of the 24 infants who received erythromycin did. Ten (29%) of 36 infants receiving silver nitrate had chlamydial nasopharyngeal infection (three later had pneumonia), as opposed to five (21%) of 24 who received erythromycin (one had pneumonia). Thus, erythromycin ointment is effective in prevention of chlamydial conjunctivitis, but it may not reduce nasopharyngeal infection or subsequent pneumonia.


Abstract: Opinions differ concerning the efficacy of prophylaxis against neonatal chlamydial and gonococcal conjunctivitis. From January 1986 through June 1988, we gave all infants born at Kings County Hospital Medical Center one of three prophylactic agents—silver nitrate drops,
erythromycin ophthalmic ointment, or tetracycline ophthalmic ointment. The treatments were rotated monthly. Gonococcal ophthalmia occurred in 8 of the 12,431 infants born during the study (0.06 percent), 1 in the silver nitrate group, 4 in the erythromycin group, and 3 in the tetracycline group (P not significant). Seven of these infants were born to women who had received no prenatal care. From September 1985 through December 1987, we screened 4,357 pregnant women for cervical chlamydial infection, of whom 341 (8 percent) had positive cultures. Of their offspring, 230 were evaluated for neonatal chlamydial conjunctivitis; the incidence was 20 percent in the silver nitrate group, 14 percent in the erythromycin group, and 11 percent in the tetracycline group (P not significant). We conclude that neonatal ocular prophylaxis with either erythromycin or tetracycline ophthalmic ointment does not significantly reduce the incidence of chlamydial conjunctivitis in the offspring of mothers with chlamydial infection as compared with silver nitrate, and that better management of maternal chlamydial infection is therefore required. We also conclude that there is a small but appreciable incidence of neonatal gonococcal ophthalmia that could be prevented by better prenatal screening and treatment of maternal gonococcal infection.


Abstract: BACKGROUND: Neonatal conjunctivitis (ophthalmia neonatorum) continues to cause blindness because the agents used prophylactically to prevent this condition are not completely effective and are not widely available in many parts of the world. Povidone-iodine ophthalmic solution is an effective antibacterial agent with broad antibacterial and antiviral activity to which no bacteria are known to be resistant, and it is far less expensive and less toxic than the agents currently used to prevent neonatal conjunctivitis. METHODS: We conducted a masked, prospective trial involving 3117 infants born over a period of 30 months in a hospital in Kenya. Shortly after birth each infant received a 2.5 percent solution of povidone-iodine (n=1076), a 1 percent solution of silver nitrate (n=929), or 0.5 percent erythromycin ointment (n=1112) in both eyes. Randomization was achieved by rotating the three medications after each was used for a week. RESULTS: Of the neonates treated with povidone-iodine, 13.1 percent had infectious conjunctivitis, as compared with 17.5 percent of those treated with silver nitrate (P<0.001) and 15.2 percent of those treated with erythromycin (P=0.01). Povidone-iodine was more effective against Chlamydia trachomatis than was silver nitrate (P < 0.001) or erythromycin (P=0.008). There were 104 cases of noninfectious conjunctivitis (9.7 percent) in the povidone-iodine group, as compared with 129 in the silver nitrate group (13.9 percent, P<0.001) and 148 in the erythromycin group (13.3 percent, P=0.004). Many cases of noninfectious conjunctivitis were probably due to a toxic reaction to the treatment itself. The incidence of Neisseria gonorrhoeae and Staphylococcus aureus infections was similar in the three groups. CONCLUSIONS: A 2.5 percent ophthalmic solution of povidone-iodine as prophylaxis against ophthalmia neonatorum is more effective than treatment with silver nitrate or erythromycin, and it is less toxic and costs less.
Breastfeeding and Use of Human Milk


Abstract: Breastfeeding provides important benefits to mothers and infants and should be encouraged strongly as the optimal feeding choice for most infants. In assessing the effects of maternal medication on breastfeeding, clinicians must weigh the many benefits of breastfeeding for mothers and infants against the risk for exposing infants to a drug as it is present in breast milk. With regard to most medications, continued breastfeeding despite drug exposure is advantageous to mothers and infants.


Abstract: This study assessed barriers to exclusive breastfeeding in rural Viet Nam and identified how a few mothers were able to exclusively breastfeed despite barriers. A cross-sectional quantitative and qualitative assessment was carried out among 120 mothers of infants less than six months old in northern Viet Nam. Only 24% of the mothers exclusively breastfed. Adjusting for infant’s age and who attended delivery, the risk of not exclusively breastfeeding was 14.0 times greater for women who had returned to work than for women who had not. Exclusively breastfeeding mothers (n=4) who worked differed from other mothers in important ways. They all felt they had enough milk, all knew the appropriate time to introduce foods and liquids, and most were supported in their breastfeeding decisions by commune health workers and family members. This research suggests strategies that can be implemented now to increase exclusive breastfeeding in rural work environments. These include improving knowledge about the introduction of water and semi-solids, addressing perceptions of milk insufficiency, securing support from others, and presenting mothers with options for exclusively breastfeeding, even when they work outside the home.


Abstract: The aim of the study was to describe breastfeeding behaviour during the first 60 hours of life of ‘normal’ dyads. The Infant Breastfeeding Assessment Tool (IBFAT) was used on a convenience sample of 37 mother-baby dyads. Individual dyads were assessed and then the group was combined to seek underlying patterns. Average time between feeds was 3.36 +/- 0.17 hours. There was a marked diurnal pattern of feeding. Parity affected the rate at which high feeding ability scores were achieved, while the majority of babies were achieving high scores within 24 hours of birth. The results provide a baseline against which future research on interventions during labour and its effect on breastfeeding initiation can be compared.

Abstract: The main objective of this analytical overview is to assess the validity of maternal perception of the onset of lactation (OL) as an indicator of lactogenesis stage II (LS-II). Prospective studies that assessed OL and/or LS-II [based on test-weighing milk volume (MV) and/or breast milk biomarkers (BMB)] were identified. OL is a clearly defined and easily identified event across cultures, with the overwhelming majority of women being able to report when they experience it. Mean OL ranges from 50 to 73 h postpartum across studies and from 1 to 148 h postpartum within studies. The wide range detected within samples is fully consistent with the wide within sample LS-II variability as determined by BMB or MV. Studies have identified similar risk factors for delayed LS-II, such as labor and delivery stress, primiparity and insulin-dependent diabetes mellitus, regardless of marker used (i.e., OL, MV or BMB). The correlation between OL and MV (r=–0.60) is of similar magnitude to that between OL and BMB (r=0.50) and that between BMB and MV (r=0.47–0.69). In conclusion, OL is a valid clinical indicator of LS-II. This has public health relevance because studies have identified delayed OL (i.e., >72 h postpartum) as a risk factor for shorter breastfeeding duration and for greater infant weight loss by d 3 postpartum. Multidisciplinary studies are needed to standardize the definition of OL and to confirm its validity in different sociocultural contexts.


Abstract: BACKGROUND: National surveys have shown that painful breasts are the second most common reason for giving up breastfeeding in the first two weeks after birth in the UK. One factor contributing to such pain can be breast engorgement. Views differ as to how engorgement arises, although restrictive feeding patterns in hospital are likely to have contributed in the past. These differing views are reflected in the range of solutions offered to treat engorgement in breastfeeding mothers and these treatments are assessed in this review. OBJECTIVES: To determine the effects of any proposed intervention to relieve symptoms of breast engorgement among breastfeeding women. SEARCH STRATEGY: The register of clinical trials maintained and updated by the Cochrane Pregnancy and Childbirth Group. CINAHL and MEDLINE were also searched. Date of last search: December 2000. SELECTION CRITERIA: All randomised and ‘quasi-randomised’ controlled trials, with or without blinding, that assess the effectiveness of treatments for the alleviation of symptoms in breastfeeding women experiencing engorgement. DATA COLLECTION AND ANALYSIS: Data were extracted by one reviewer and verified by a second reviewer. MAIN RESULTS: Eight trials, involving 424 women, were included. Three different studies were identified which used cabbage leaves or cabbage leaf extracts; no overall benefit was found. Ultrasound treatment and placebo were equally effective. Use of Danzen (an anti-inflammatory agent) significantly improved the total symptoms of engorgement when compared to placebo (odds ratio (OR) 3.6, 95% confidence interval (CI) 1.3–10.3) as did bromelain/trypsin complex (OR 8.02, 95% CI 2.8–23.3). Oxytocin and cold packs had no demonstrable effect on engorgement symptoms. REVIEWER’S CONCLUSIONS: Cabbage leaves and gel packs were equally effective in the treatment of engorgement. Since both
cabbage extract and placebo cream were equally effective, the alleviation in symptoms may be brought about by other factors, such as breast massage. Ultrasound treatment is equally effective with or without the ultra-wave emitting crystal, therefore its effectiveness is more likely to be due to the effect of radiant heat or massage. Pharmacologically, oxytocin was not an effective engorgement treatment while Danzen and bromelain/trypsin complex significantly improved the symptoms of engorgement. Initial prevention of breast engorgement should remain the key priority.


**Abstract:** Exclusive breastfeeding is rare in Bangladesh. About 90% of women have home deliveries, so the Baby-Friendly Hospital Initiative has no mechanism to reach them. Mother support groups do not exist, and community health workers do not have time to promote and support exclusive breastfeeding. To provide this kind of support at the community level, an area in Dhaka was selected for a peer-counseling intervention program. Using certain selection criteria, 1 woman from each community was trained as a peer counselor. The training was based on the World Health Organization/United Nations International Children’s Emergency Fund 40-hour breastfeeding counseling course and related books. Counseling skills were taught using demonstrations and role play, followed by practical training in the project area. The intervention was very successful, as 70% of the mothers in the project area breastfed their infants exclusively for 5 months compared to only 6% in the control area. The authors describe the peer counseling training, strategies used for peer counseling visits, and lessons learned.


**Abstract:** OBJECTIVE: To describe how maternal-child staff nurses support breastfeeding mothers during the postpartum hospital stay and how these mothers perceive the support received from the nurses. DESIGN: Ethnographic. SETTING: Data were collected at a community hospital in southeastern Florida. PARTICIPANTS: Unstructured interviews were conducted with seven maternal-child nurses caring for breastfeeding mothers. The investigator observed 12 nurses’ interactions with breastfeeding mothers and newborns. Eight breastfeeding mothers were interviewed, using a semistructured guide, in the hospital before discharge and at 2 and 6 weeks postpartum. RESULTS: Nurses supported breastfeeding mothers by providing information and interpersonal support. Breastfeeding mothers expected the nurses to support their feeding efforts by providing information, encouragement, and interpersonal support. CONCLUSION: Health care providers can help breastfeeding mothers, but the support offered must be the kind that mothers want.

Abstract: OBJECTIVES: To determine the predictors of pacifier use during the first year of life and to assess the influence of pacifier use on the duration of breastfeeding. METHODOLOGY: A prospective cohort study was conducted. Three hundred and fifty mother-infant pairs were followed to 1 year of age to determine the impact of the use of a pacifier on the duration of breastfeeding. RESULTS: A cohort of 441 mothers were enrolled and 79% participated. Ninety four per cent were followed up to 1 year. Daily pacifier use was associated with early cessation of breastfeeding (risk ratio (RR) 1.71; 95% confidence interval (95%CI) 1.29, 2.28) and a reduced duration of full breastfeeding (adjusted (adj.) RR 1.35; 95%CI 1.05, 1.74). Finger sucking was not associated with a reduced duration of breastfeeding (RR 1.05; 95%CI 0.81, 1.37). Pacifier use less than daily was not associated with a change in duration of breastfeeding (RR 1.02; 95%CI 0.75, 1.39). Most mothers commenced the use of a pacifier within the first month. Multiple logistic regression analysis found that the use of a pacifier was associated with male gender (adj. RR 1.97; 95%CI 1.23, 3.13), maternal smoking in pregnancy (adj. RR 2.23; 95%CI 1.01, 4.95), and low maternal confidence with breastfeeding (adj. RR 2.70; 95%CI 1.48, 4.93). CONCLUSIONS: Daily pacifier use is associated with a reduced duration of breastfeeding. Less frequent pacifier use does not reduce the duration of breastfeeding.


Abstract: The study investigates the association between use and knowledge of colostrum on neonatal and post-neonatal deaths. Data from a 1987 survey, conducted.[in Varanasi,] India, were used. It has been found that the neonatal and post-neonatal deaths were very low, for females familiar with the importance of colostrum and feeding it. Findings also revealed that there was no effect of social status on the use and knowledge of colostrum but at the same time a highly significant effect of residence was found on the use and knowledge of colostrum.


Abstract: This study examines the sustainability of a Guatemala City periurban project to train breast-feeding counselors (BFCs) and to sustain a mother-to-mother network for encouraging breast feeding with help from La Leche League Guatemala (LLLL). BASICS provided funding for the evaluation. Data were obtained from surveys among a sample of women living in El Limon conducted in March–April 1996, structured interviews among BFCs, and administrative and financial records from LLLL. The program was begun in 1988 with the help of USAID and the International La Leche League to implement a community-based mother-to-mother support program in poor periurban areas of Guatemala City. USAID funding ended in 1992, and the LLLL continued the project. In 1992, the program operated in 10 communities without coordinators and with about 141 BFCs, 7 paid LLLL staff working half-time, and an annual budget of US$50,000. After the transition period of 1992–93, the program operated in 7 communities with 6–7 coordinators, 3–5 subcoordinators, 3 LLLL staff working at 40% time, and
an annual budget of about US$20,000. The 141 BFCs continued to work in 10 communities. LLLG staff collected data, conducted monthly miniworkshops for coordinators and subcoordinators, and conducted monthly on-site meetings and an annual workshop with BFCs. Findings indicate that there were fewer trained BFCs who reported to LLLG or ran support groups, but BFCs continued to provide individual counseling and referrals to clinics. Success is attributed to high personal motivation of participants, the six-level support structure, participation and decision making at the community level, and monthly and annual workshops and refresher training. It is emphasized that women were most concerned about physical and economic survival and not health. The program would improve by coordinating better with local health systems.

Available through: Wellstart BASICS—www.basics.org


Abstract: BACKGROUND: Both observational and recent experimental evidence support the promotion of breastfeeding as the optimal form of infant nutrition. There is, however, uncertainty as to the most effective way of providing support to women who choose to breastfeed their children. A systematic review was performed to describe studies undertaken in this area and to assess the effectiveness of supplementary support. OBJECTIVES: The objective of this review was to assess the effects of breastfeeding support. SEARCH STRATEGY: We searched the Cochrane Pregnancy and Childbirth Group trials register, the Cochrane Controlled Trials Register, MEDLINE and EMBASE. These were last searched in March 2001. Secondary references were searched and researchers in the field were contacted. SELECTION CRITERIA: Controlled trials of acceptable quality comparing extra support for breastfeeding mothers with usual maternity care. DATA COLLECTION AND ANALYSIS: Data were extracted by one reviewer and checked by a second reviewer. MAIN RESULTS: Twenty eligible randomised or quasi-randomised controlled trials from 10 countries were identified involving 23,712 mother-infant pairs. There was a beneficial effect on the duration of any breastfeeding in the meta-analysis of all forms of extra support (relative risk (RR) for stopping any breastfeeding before six months 0.88 [95% confidence interval (CI) 0.81,0.95]; 15 trials, 21,910 women). The effect was greater for exclusive breastfeeding (RR 0.78 [95% CI 0.69,0.89]; 11 trials, 20,788 women). Extra professional support appeared beneficial for any breastfeeding (RR 0.89 [95% CI 0.81,0.97]; 10 trials, 19,696 women) and for exclusive breastfeeding (RR 0.90 [95% confidence interval 0.81,1.01]; six trials, 18,258 women) although the latter effect did not achieve full statistical significance. Lay support was effective in reducing the cessation of exclusive breastfeeding (RR 0.66 [95% CI 0.49,0.89]; five trials, 2530 women) but its effect on any breastfeeding did not reach statistical significance (RR 0.84 [95% CI 0.69,1.02]; five trials, 2224 women). Professional support in the largest trial to assess health outcomes produced a significant reduction in the risk of gastro-intestinal infections and atopic eczema. In two trials with children suffering from diarrhoeal illness extra support was highly effective in increasing short term exclusive breastfeeding rates and reducing recurrence of diarrhoea. REVIEWER’S CONCLUSIONS: Consideration should be given to providing supplementary breastfeeding support as part of routine health service provision. There is clear evidence for the effectiveness of professional
support on the duration of any breastfeeding although the strength of its effect on the rate of exclusive breastfeeding is uncertain. Lay support is effective in promoting exclusive breastfeeding while the strength of its effect on the duration of any breastfeeding is also uncertain. Evidence supports the promotion of exclusive breastfeeding as central to the management of diarrhoeal illness in partially breastfed infants. Further trials are required to assess the effectiveness (including cost-effectiveness) of both lay and professional support in different settings—in particular in those communities with low rates of breastfeeding initiation. Research is also required into the most appropriate training for those, whether lay or professional, who support breastfeeding mothers.


Abstract: OBJECTIVES: To identify potential risk factors for the development of mastitis in breastfeeding women. METHODS: A prospective cohort study with questionnaire and telephone follow-up was conducted. Women were recruited after delivery at either the teaching hospital or the only private hospital with an obstetric service during May to December 1994 in Newcastle, New South Wales and were followed up at home for six months. 1,075 breastfeeding women were recruited and were sent follow-up questionnaires at three, eight and 26 weeks post-delivery. RESULTS: Mastitis occurred in 20% (95% CI 18–22%) of women during the first six months. Factors that were statistically significantly and independently related to mastitis were: past history of mastitis (adjusted Hazard Ratio=1.74, 1.07–2.81), university or college education (HR=1.93, 1.18–3.16), blocked duct (HR=2.43, 1.68–3.49), cracked nipples (HR=1.44, 1.00–2.07), use of creams on nipples (HR=1.83, 1.22–2.73), particularly papaya cream (Relative Risk=1.83, 1.36–2.47), and always starting with the alternate breast on consecutive feeds (HR=2.28, 1.50–3.44). CONCLUSIONS: Women with a past history of mastitis had an increased risk of developing mastitis. Blocked ducts and cracked nipples serve as warning signs for mastitis. Use of some creams may increase the risk of mastitis and their value should be tested in clinical trials. IMPLICATIONS: We have identified several pre-natal and post-natal markers for increased risk of mastitis that may assist in its early identification and treatment. The use of creams on nipples may introduce pathogens that cause mastitis and should be avoided.


Abstract: OBJECTIVE: To determine if supplementary structured breastfeeding counseling (SSBC) for both parents compared with conventional hospital breastfeeding support (CHBS) improves the duration of breastfeeding in very low-birth-weight infants up to 1 year old. DESIGN: Randomized trial with longitudinal follow-up of infants at term, and ages 1, 3, 6, and 12 months (infant ages corrected for prematurity). SETTING: A tertiary-level neonatal intensive care unit (NICU) and geographically defined region in central-west Ontario, Canada. PARTICIPANTS: Parents of infants with a birth weight less than 1500 g, who planned to breastfeed. INTERVENTIONS: The SSBC consisted of viewing a video on breastfeeding for preterm infants;
individual counseling by the research lactation consultant; weekly personal contact in the hospital; and frequent postdischarge contact through the infants’ first year or until breastfeeding was discontinued. The CHBS group had standard breastfeeding support from regular staff members confined to the period of hospitalization in the NICU. MAIN OUTCOME MEASURE: Duration of breastfeeding. RESULTS: At study entry, there were no statistically significant differences in major demographic characteristics between groups. The mean duration of breastfeeding was 26.1 weeks (SD=20.8; median, 17.4) in the SSBC group and 24.0 weeks (SD=20.5; median, 17.4) in the CHBS group (not statistically significant). CONCLUSIONS: Long-term breastfeeding counseling of parents of very low-birth-weight infants in this study did not demonstrate a significant difference in duration of breastfeeding. These results may be explained by the high motivation to breastfeed in both groups, a relatively advantaged population, and the availability of community breastfeeding resources, which may have diminished any significant differences that could have resulted from a breastfeeding intervention. The results of this study, compared with previous studies of very low-birth-weight infants, indicate a new trend to longer duration of breastfeeding in preterm infants.


**Abstract:** Supplementary formula feeds inhibited the protective effect of expressed raw and pasteurised human milk in 226 high-risk neonates in a randomised controlled trial. The infection rate in the group given pasteurised human milk and formula (33%) was significantly higher than the rates in the groups given raw human milk (10.5%), pasteurised human milk (14.3%), and raw human milk and formula (16%). This accords with the impressions that some of the association of infection with artificial feeding is partly attributable to the lack of the protective effect of human milk. Heating expressed human milk to 62.5 degrees C for 30 min significantly reduces its protective effect.


**Abstract:** For copies or further information, please contact:

The LINKAGES Project
Academy of Educational Development
1825 Connecticut Avenue, NW
Washington, DC 20009
linkages@aed.org
valencij@paho.org

**Abstract:** OBJECTIVE: The purpose of the study was to identify attitudes towards breastfeeding and support for breastfeeding in public in a group of health teachers in the Department of Education. METHOD: The study design was correlational descriptive. A self-administered questionnaire was used (Cronbach’s alpha=0.83) for 125 health teachers. Descriptive and inferential statistics (chi square and t test) were used for data analysis. RESULTS: 89.6% were women, 47.1% had 39 years of age or less, 76.4% were married, the median of years in the profession was 12.5. Only 8.8% had breastfed exclusively, 46.1% used artificial feedings exclusively, and 45.1% combined artificial milk and breast milk. A moderate/negative attitude towards breastfeeding was shown by 53.1%. 60.3% stated they agreed or totally agreed that in order to breastfeed the mother must follow a specific diet, 36.0% agreed or totally agreed that breast milk should alternate with artificial milk, and 100% of participants do not support breastfeeding in public. No significant difference was found in the attitude scale towards breastfeeding and the gender, the age, years in the profession, and the type of milk given their children. CONCLUSIONS: We must train teachers in the Department of Education, on a priority basis, in the field of human lactation in view of their importance for health promotion.


**Abstract:** Given the unparalleled nutritional value of mother’s milk, it is imperative that a breastfeeding culture be established in India. This paper begins to serialize a statement jointly issued by the World Health Organization (WHO) and UNICEF on the issue. The statement will hopefully help those concerned with improving maternity services to concretely evaluate how they are helping or hindering breast feeding and whether they are encouraging and supporting mothers in every possible way. The organizations stress that breast feeding is an unequaled way of providing ideal food for the healthy growth and development of infants, and that it has an unique biological and emotional influence upon the health of mothers and children. Breast milk helps protect infants against disease, while breast feeding helps space child births. The prevalence and duration of breast feeding, however, have declined in many parts of the world for a variety of social, economic, and cultural reasons. The WHO and UNICEF recommend that professional and other workers in health care facilities make every effort to protect, promote, and support breast feeding, and to provide expectant and new mothers with objective and consistent advice in that regard. This short paper discusses preparing health workers to promote and support breast feeding, and training health workers.

Available from: WHO, bookorders@who.ch / publications@who.ch


**Abstract:** Jacobs (of the Infant and Dietetic Foods Association) and Bronner (of the International Association of Infant Food Manufacturers) object to a peer-reviewed interagency study of widespread violations of the international code of the World Health Organization (WHO)
regarding marketing of breast milk substitutes. They say that the study has been severely criticized, but provide no published peer-reviewed references in support of this. They say that the code does not apply to follow-on formulas, but the code specifically states that it applies to any product marketed to replace breast milk, partially or totally. They seek to avoid honoring the code by citing local regulations. Although not all components of the code are established in national legislation in many countries, the industry agreed to abide by the code when it was written in 1981. Marcovitch et al. state that the Royal College of Paediatrics and Child Health will support breast feeding with stronger measures and that they will not accept donations from formula manufacturers until receipt of a report from their ethics committee. However, they refused to join the interagency study because of concerns about research methodology. If the college fully supported the code, it should have joined the study and corrected the research methodology. The college research unit commenting on the methodology is funded by Nestle, which represents a conflict of interests.


**Abstract:** This study was designed to assess the knowledge and attitude towards exclusive breast feeding among 377 female students of School of Health Technology, Ilesha and to compare their responses with 60 primigravidae attending antenatal clinic in Ile-Ife, Nigeria. The ages of the subjects ranged from 15 to 34 years. Data were collected using pretested structured questionnaire. Approximately 47% of the total population were grouped under low level of knowledge of exclusive breastfeeding. There was no significant relationship in terms of knowledge between the two groups. There was, however, a significant relationship between the age of subjects and increased level of knowledge about EBF. Seventy percent of the primigravidae were graded as having poor attitudes as compared with 18% of the female students. About 42% of the total population would give water and glucose D water to neonates within 72 hours after delivery. These findings further suggest that planners of the Baby Friendly Initiative need to focus more on adolescents and the primigravidae in the promotion of breastfeeding.


**Abstract:** CONTEXT: Current evidence that breastfeeding is beneficial for infant and child health is based exclusively on observational studies. Potential sources of bias in such studies have led to doubts about the magnitude of these health benefits in industrialized countries. OBJECTIVE: To assess the effects of breastfeeding promotion on breastfeeding duration and exclusivity and gastrointestinal and respiratory infection and atopic eczema among infants. DESIGN: The Promotion of Breastfeeding Intervention Trial (PROBIT), a cluster-randomized trial conducted June 1996–December 1997 with a 1-year follow-up. SETTING: Thirty-one maternity hospitals
and polyclinics in the Republic of Belarus. PARTICIPANTS: A total of 17,046 mother-infant pairs consisting of full-term singleton infants weighing at least 2500 g and their healthy mothers who intended to breastfeed, 16491 (96.7%) of which completed the entire 12 months of follow-up. INTERVENTIONS: Sites were randomly assigned to receive an experimental intervention (n=16) modeled on the Baby-Friendly Hospital Initiative of the World Health Organization and United Nations Children’s Fund, which emphasizes health care worker assistance with initiating and maintaining breastfeeding and lactation and postnatal breastfeeding support, or a control intervention (n=15) of continuing usual infant feeding practices and policies. MAIN OUTCOME MEASURES: Duration of any breastfeeding, prevalence of predominant and exclusive breastfeeding at 3 and 6 months of life and occurrence of 1 or more episodes of gastrointestinal tract infection, 2 or more episodes of respiratory tract infection, and atopic eczema during the first 12 months of life, compared between the intervention and control groups. RESULTS: Infants from the intervention sites were significantly more likely than control infants to be breastfed to any degree at 12 months (19.7% vs 11.4%; adjusted odds ratio [OR], 0.47; 95% confidence interval [CI], 0.32–0.69), were more likely to be exclusively breastfed at 3 months (43.3% vs 6.4%; P<.001) and at 6 months (7.9% vs 0.6%; P=.01), and had a significant reduction in the risk of 1 or more gastrointestinal tract infections (9.1% vs 13.2%; adjusted OR, 0.60; 95% CI, 0.40–0.91) and of atopic eczema (3.3% vs 6.3%; adjusted OR, 0.54; 95% CI, 0.31–0.95), but no significant reduction in respiratory tract infection (intervention group, 39.2%; control group, 39.4%; adjusted OR, 0.87; 95% CI, 0.59–1.28). CONCLUSIONS: Our experimental intervention increased the duration and degree (exclusivity) of breastfeeding and decreased the risk of gastrointestinal tract infection and atopic eczema in the first year of life. These results provide a solid scientific underpinning for future interventions to promote breastfeeding.


Abstract: The objective of this study was to develop a model to predict premature cessation of breastfeeding of newborns, in order to detect at-risk groups that would benefit from special assistance programmes. The model was constructed using 700 children with a birthweight of 2000 g or more, in 2 representative cohorts in 1993 and 1995 (CLACYD I sample) in Cordoba, Argentina. Data were analysed from 632 of the cases. Mothers were selected during hospital admittance for childbirth and interviewed in their homes at 1 mo and 6 mo. To evaluate the model, an additional sample with similar characteristics was drawn during 1998 (CLACYD II sample). A questionnaire was administered to 347 mothers during the first 24–48 h after birth and a follow-up was completed at 6 mo, with weaning information on 291 cases. Premature cessation of breastfeeding was considered when it occurred prior to 6 mo. A logistic regression model was fitted to predict premature end of breastfeeding, and was applied to the CLACYD II sample. The calibration (Hosmer-Lemeshow C statistic) and the discrimination [area under the receiver operating characteristics (ROC) curve] of the model were evaluated. The predictive factors of premature end of breastfeeding were: mother breastfed for less than 6 mo [odds ratio (OR)=1.84, 95% confidence interval (CI) 1.26–2.70], breastfeeding of previous child for less than 6 mo (OR=4.01, 95% CI 2.58–6.20), the condition of the firstborn child (OR=2.75, 95% CI
1.79–4.21), the first mother-child contact occurring after 90 min of life (OR=1.88; 95% CI 1.22–2.91) and having an unplanned pregnancy (OR=1.50, 95% CI 1.05–2.15). The calibration of the model was acceptable in the CLACYD I sample (p=0.54), as well as in the CLACYD II sample (p=0.18). The areas under the ROC curve were 0.72 and 0.68, respectively. Conclusion: A model has been suggested that provides some insight onto background factors for the premature end of breastfeeding. Although some limitations prevent its general use at a population level, it may be a useful tool in the identification of women with a high probability of early weaning.


**Abstract:** In a prospective controlled study the anti-infective properties of breast-milk were evaluated in 70 high-risk low-birth-weight infants. 32 babies (group I) were given fresh expressed breast-milk during the day and milk formula at night. 38 infants (group II) received only milk formula and served as controls. The two groups were matched for other factors that could influence the occurrence of infection. The incidence of infections was significantly less (p < 0.01) in babies who received breast-milk.


**Abstract:** CONTEXT: The World Health Organization and the United Nations Children’s Fund strongly discourage use of pacifiers because of their perceived interference with breastfeeding. Observational studies have reported a strong association between pacifier use and early weaning, but such studies are unable to determine whether the association is causal. OBJECTIVES: To test whether regular pacifier use is causally related to weaning by 3 months postpartum and to examine differences in results according to randomized intervention allocation vs observational use or nonuse of pacifiers. DESIGN: Double-blind, randomized controlled trial conducted from January 1998 to August 1999. SETTING: Postpartum unit of a university teaching hospital in Montreal, Quebec. PARTICIPANTS: A total of 281 healthy, breastfeeding women and their healthy, term singleton infants. INTERVENTIONS: Participants were randomly allocated to 1 of 2 counseling interventions provided by a research nurse trained in location counseling. The experimental intervention (n=140) differed from the control (n=141) by recommending avoidance of pacifier use and suggesting alternative ways to comfort a crying or fussing infant. MAIN OUTCOME MEASURES: Early weaning, defined as weaning within the first 3 months, compared between groups; 24-hour infant behavior logs detailing frequency and duration of crying, fussing, and pacifier use at 4, 6, and 9 weeks. RESULTS: A total of 258 mother-infant pairs (91.8%) completed follow-up. The experimental intervention increased total avoidance of pacifier use (38.6% vs 16.0% in the control group), reduced daily use (40.8% vs 55.7%), and decreased the mean number of pacifier insertions per day (0.8 vs 2.4 at 4 weeks [P<.001]; 0.8 vs 3.0 at 6 weeks [P<.001]; and 1.3 vs 3.0 at 9 weeks [P=.004]). In the analysis based on randomized intervention allocation, the experimental intervention had no discernible
effect on weaning at 3 months (18.9% vs 18.3% in the experimental vs control group; relative risk [RR], 1.0; 95% confidence interval [CI], 0.6–1.7), and no effect was observed on cry/fuss behavior (in the experimental vs control groups, respectively, total daily duration, 143 vs 151 minutes at 4 weeks [P=.49]; 128 vs 131 minutes at 6 weeks [P=.81]; and 110 vs 104 minutes at 9 weeks [P=.58]). When randomized allocation was ignored, however, we observed a strong observational association between exposure to daily pacifier use and weaning by 3 months (25.0% vs 12.9% of the exposed vs unexposed groups; RR, 1.9; 95% CI, 1.1–3.3).

CONCLUSIONS: We found a strong observational association between pacifier use and early weaning. No such association was observed, however, when our data were analyzed by randomized allocation, strongly suggesting that pacifier use is a marker of breastfeeding difficulties or reduced motivation to breastfeed, rather than a true cause of early weaning.


**Abstract:** BACKGROUND: Although the health benefits of breastfeeding are widely acknowledged, opinions and recommendations are strongly divided on the optimal duration of exclusive breastfeeding. Much of the debate has centered on the so-called ‘weanling’s dilemma’ in developing countries: the choice between the known protective effect of exclusive breastfeeding against infectious morbidity and the (theoretical) insufficiency of breast milk alone to satisfy the infant’s energy and micronutrient requirements beyond four months of age. The debate over whether to recommend exclusive breastfeeding for four to six months versus ‘about six months’ has recently become heated and acrimonious. OBJECTIVES: The primary objective of this review was to assess the effects on child health, growth, and development, and on maternal health, of exclusive breastfeeding for six months versus exclusive breastfeeding for three to four months with mixed breastfeeding (introduction of complementary liquid or solid foods with continued breastfeeding) thereafter through six months. A secondary objective was to assess the child and maternal health effects of prolonged (greater than six months) exclusive breastfeeding versus exclusive breastfeeding for six months followed by mixed breastfeeding thereafter. SEARCH STRATEGY: Two independent literature searches were carried out, together comprising the following databases: MEDLINE (as of 1966), Index Medicus (prior to 1966), CINAHL, HealthSTAR, BIOSIS, CAB Abstracts, EMBASE-Medicine, EMBASE-Psychology, Econlit, Index Medicus for the WHO Eastern Mediterranean Region, African Index Medicus, Lilacs (Latin American and Caribbean literature), EBM Reviews-Best Evidence, the Cochrane Database of Systematic Reviews (The Cochrane Library Issue 3, 2000), and the Cochrane Controlled Trials Register (The Cochrane Library Issue 3, 2000). No language restrictions were imposed. The two searches yielded a total of 2,668 unique citations. Contacts with experts in the field yielded additional published and unpublished studies. SELECTION CRITERIA: We selected all internally-controlled clinical trials and observational studies comparing child or maternal health outcomes with exclusive breastfeeding for six or more months versus exclusive breastfeeding for at least three to four months with continued mixed breastfeeding until at least six months. Studies were stratified according to study design (controlled trials versus observational studies), provenance (developing versus developed countries), and timing of compared feeding groups (three to seven months versus later). DATA COLLECTION AND ANALYSIS: Two reviewers independently assessed study quality (using a priori assessment
MAIN RESULTS: Twenty independent studies meeting the selection criteria were identified by the literature search: nine from developing countries (two of which were controlled trials in Honduras) and 11 from developed countries (all observational studies). The two trials did not receive high methodologic quality ratings but were nonetheless superior to any of the observational studies included in this review. The observational studies were of variable quality; in addition, their nonexperimental designs were not able to exclude potential sources of confounding and selection bias. Definitions of exclusive breastfeeding varied considerably across studies. Neither the trials nor the observational studies suggest that infants who continue to be exclusively breastfed for six months show deficits in weight or length gain, although larger sample sizes would be required to rule out modest differences in risk of undernutrition. The data are conflicting with respect to iron status, but at least in developing country settings where newborn iron stores may be suboptimal, suggest that exclusive breastfeeding without iron supplementation through six months may compromise hematologic status. Based primarily on an observational analysis of a large randomized trial in Belarus, infants who continue exclusive breastfeeding for six months or more appear to have a significantly reduced risk of one or more episodes of gastrointestinal infection. No significant reduction in risk of atopic eczema, asthma, or other atopic outcomes has been demonstrated in studies from Finland, Australia, and Belarus. Data from the two Honduran trials suggest that exclusive breastfeeding through six months is associated with delayed resumption of menses and more rapid postpartum weight loss in the mother. REVIEWER’S CONCLUSIONS: We found no objective evidence of a ‘weanling’s dilemma’. Infants who are exclusively breastfed for six months experience less morbidity from gastrointestinal infection than those who are mixed breastfed as of three or four months, and no deficits have been demonstrated in growth among infants from either developing or developed countries who are exclusively breastfed for six months or longer. Moreover, the mothers of such infants have more prolonged lactational amenorrhea. Although infants should still be managed individually so that insufficient growth or other adverse outcomes are not ignored and appropriate interventions are provided, the available evidence demonstrates no apparent risks in recommending, as a general policy, exclusive breastfeeding for the first six months of life in both developing and developed country settings. Large randomized trials are recommended in both types of setting to rule out small effects on growth and to confirm the reported health benefits of exclusive breastfeeding for six months or beyond.


Abstract: In summary, fortification of human milk may be beneficial in preterm infants, particularly those born at less than 34 weeks’ gestation or less than 1800 g birth weight, during and after initial hospitalization. This fortification after hospital discharge is more crucial for infants who cannot consume ad libitum quantities of breast milk, have poor growth, or have abnormalities in the biochemical screen of nutritional status. Although data indicate that in-hospital, short-term gains in growth and mineral status are achieved, information is fragmentary regarding the influence on long-term growth and neurodevelopmental outcomes of feeding supplemented human milk. Also, no data are available on outcomes when providing these mixtures to premature infants after hospital discharge. It is recommended that a nutritional
survey be accomplished before and approximately 1 month after discharge and that fortification or supplementation be initiated if an infant is failing to achieve normal growth and biochemical measures of nutrition.


Abstract: The aim of the paper is to test the basic assumptions underlying the theory of reasoned action (TRA) for exclusive breastfeeding behavior taking place in the rather complicated social environment of women who have just given birth. The paper aims (i) to argue that normative rather than attitudinal considerations are more important in engaging the correct breastfeeding behavior, and (ii) to demonstrate that the TRA concept of social norm should be treated as a multi-layered construct which involves several enabling factors in predicting complex behaviors such as breastfeeding. Data were collected in three phases as part of a prospective cohort follow-up design. The first phase of data collection was conducted in the hospital with mothers after the delivery. Two follow-up questionnaires were administered at the end of the first and second months. Results did not confirm the assertions of the TRA. Logistic regression models and multiple regression analyses indicated that intention and belief/attitude measures taken at the time of birth did not predict end-of-first-month full breastfeeding behavior. Overall, results revealed that intention by itself was not a strong determinant of breastfeeding unless it was conditioned by enabling factors such as social support and subjective norms regarding breastfeeding.


Abstract: This study was conducted in 4 villages in India during the hottest and driest season of the year to determine whether exclusively breast-fed infants need additional water under extremely hot and dry climatic conditions. The ambient temperature was 35–40 degrees C and the relative humidity 10–35%, except during the early morning hours. 63 urine samples were collected from 31 infants below 6 months of age and 28 samples from 13 infants aged 6–10 months, all of whom were receiving nothing but breast milk. Specific gravity (and corresponding osmolality) of urine samples from the younger group ranged from 1.004 (66 mosmol/litre) to 1.036 (1,234 mosmol/litre), with a mean of 1.011 (322 mosmol/litre). For the older group the range was 1.005 (103 mosmol/litre) to 1.029 (978 mosmol/litre) and the mean was 1.015 (468 mosmol/litre). These values are well below levels of urine concentrations known to be attainable by infants of corresponding ages. Thus, even under hotter and drier climatic conditions than have previously been studied, healthy exclusively breast-fed infants do not require additional water. Exclusive breast feeding for the first 4–6 months is therefore a reasonable public health recommendation; it is imperative in areas where contaminated drinking water may contribute to infant morbidity, diarrhoeal disease in particular.

**Abstract:** In this study 500 full term breast fed and 500 full term top fed babies were divided into 2 groups of weight >2.5kg and < or = 2.5kg each, and were followed up for the mortality pattern. Eight hundred of these completed the full follow up period of 6 months. Neonatal mortality in term babies in the present study was 40 per thousand and mortality during 1–6 months period was 55 per thousand. Early neonatal mortality in breast fed >2.5kg was 0.55% against 7.8% in < or = 2.5kg breast fed babies. The corresponding figures in artificially fed was 1.17% and 9.37% respectively. Late neonatal mortality in breast fed >2.5kg was 0 and in < or = 2.5kg was 2.14%. These values in artificially fed were 0 and 3.12%, respectively. Mortality in 1–6 months period in breastfed >2.5kg was 0.64% and in < or = 2.5kg was 15.5%; and in artificially fed 1.66% and 23% respectively. Thus LBW babies whether breast fed or artificially fed had higher mortality and artificially fed had overall higher mortality in comparison to breast fed. It is concluded that attention should be directed towards promotion of breast feeding and on prevention of low birth weight for decreasing mortality in early infancy.


**Abstract:** BACKGROUND: Newborns not exposed to analgesia, when placed on the mother’s chest, exhibit an inborn prefeeding behavior. This study was performed to assess the effects of different types of analgesia during labor on the development of spontaneous breastfeeding movements, crying behavior, and skin temperature during the first hours of life in healthy term newborns. METHODS: Video recordings were made of 28 newborns who had been dried and placed in skin-to-skin contact between their mother’s breasts immediately after delivery. The video recordings were analyzed blindly with respect to infant exposure to analgesia. Defined infant behaviors were assessed every 30 seconds. Group 1 mothers (n=10) had received no analgesia during labor, group 2 mothers (n=6) had received mepivacaine via pudendal block, and group 3 mothers (n=12) had received pethidine or bupivacaine or more than one type of analgesia during labor. RESULTS: All infants made finger and hand movements, but the infant’s massagelike hand movements were less frequent in infants whose mothers had received labor analgesia. A significantly lower proportion of group 3 infants made hand-to-mouth movements (p<0.001), and a significantly lower proportion of the infants in groups 2 and 3 touched the nipple with their hands before sucking (p<0.01), made licking movements (p<0.01), and sucked the breast (p<0.01). Nearly one-half of the infants, all in groups 2 or 3, did not breastfeed within the first 2.5 hour of life. The infants whose mothers had received analgesia during labor had higher temperatures (p=0.03) and they cried more (p=0.05) than infants whose mothers had not received any analgesia. CONCLUSIONS: The present data indicate that several types of analgesia given to the mother during labor may interfere with the newborn’s spontaneous breast-seeking and breastfeeding behaviors and increase the newborn’s temperature and crying.

**Abstract:** Breastfeeding provides ideal nutrition, growth hormones, and antibodies that change over time as growing infants' and children's needs change and provides these inexpensively, with no harm to the environment. Breastfed infants are healthier than other infants overall, and research indicates that the health benefits may continue on into adulthood. Increasingly, women are choosing to initiate breastfeeding in the hospital, but the attrition starts early and is dramatic. For women to meet their breastfeeding goals, physicians must not only give lip service to “breast is best” but also become knowledgeable in breastfeeding management and actively promote breastfeeding in their practices and in their communities.


**Abstract:** CONTEXT: Promotional and educational programs relating to breast feeding are important for reversing the decline in this practice. Most programs are centered exclusively on breast feeding, although general knowledge about newborn health care may be important, especially among pregnant women. OBJECTIVE: To study pregnant women's knowledge about general health care of newborns, including breast feeding aspects. TYPE OF STUDY: Cross-sectional. SETTING: Prof. Samuel Barnsley Pessoa Health School Center, Faculty of Medicine, University of Sao Paulo, Brazil. PARTICIPANTS: All pregnant women who were registered in the prenatal care program during six consecutive months. MAIN MEASUREMENTS: Aspects of the current gestation, previous gestations and childbirth, knowledge of the general aspects of newborn health care and of breast feeding practices. RESULTS: The results show that only a little over half of the pregnant women had received any information on newborn health care. Misinformation was clearly present regarding proper care of the umbilical stump and the nature of jaundice, and worst regarding how to treat oral thrush and jaundice, and about vaccination. In relation to breast feeding, even though almost all the pregnant women declared their intention to breast feeding, less than half had a concrete response regarding how long to do it for. The low rates obtained in the topics dealing with the duration, nursing intervals and the attitude to be taken towards hypogalactia show unfamiliarity with the breast feeding technique. The “weak milk” belief, the misinformation about contraceptive methods during breast feeding and the cost of artificial formulas also have a negative impact on this practice. CONCLUSIONS: Pregnant women's knowledge of newborn health care is low, as much in the aspects of general care as in relation to the practice of breast feeding. These findings must be taken into consideration in educative programs promoting breast feeding.


**Abstract:** Optimal management of breastfeeding does not eliminate neonatal jaundice and elevated serum bilirubin concentrations. Rather, it leads to a pattern of hyperbilirubinemia that is normal and, possibly, beneficial to infants. Excessive frequency of exaggerated jaundice in a hospital or community population of breastfed infants may be a warning that breastfeeding
policies and support are not ideal for the establishment of good breastfeeding practices. The challenge to clinicians is to differentiate normal patterns of jaundice and hyperbilirubinemia from those that indicate an abnormality or place an infant at risk.


Abstract: OBJECTIVE: The purpose of this study was to evaluate the development of significant hyperbilirubinemia in a large unselected newborn population in a metropolitan area with particular attention to the relationship between type of feeding and incidence of neonatal jaundice in the first week of life. STUDY DESIGN: A population of 2,174 infants with gestational age >/=37 weeks was prospectively investigated during the first days of life. Total serum bilirubin determinations were performed on infants with jaundice. The following variables were studied: type of feeding, method of delivery, weight loss after birth in relationship to the type of feeding, and maternal and neonatal risk factors for jaundice. Statistical analyses were performed using the z test for parametric variables and the t test for nonparametric variables. In addition, the multiple logistic regression allows for the estimation of the role of the individual characteristics in the development of hyperbilirubinemia. Data concerning serum bilirubin peak distribution in jaundiced newborns were analyzed using a single and a double Gaussian best fit at least squares. The t test was performed to compare 2 values (high and low) of the serum bilirubin peak in breastfed and supplementary-fed infants with those in bottle-fed infants. RESULTS: The maximal serum bilirubin concentration exceeded 12.9 mg/dL (221 micromol/L) in 112 infants (5.1%). The study demonstrated a statistically significant positive correlation between patients with a total serum bilirubin concentration >12.9 mg/dL (221 micromol/L) and supplementary feeding; oppositely, breastfed neonates did not present a higher frequency of significant hyperbilirubinemia in the first days of life. However, best Gaussian fitting of our data suggests that a small subpopulation of breastfed infants have a higher serum bilirubin peak than do bottle-fed infants. Newborns with significant hyperbilirubinemia underwent a greater weight loss after birth compared with the overall studied population, and infants given mixed feeding lost more weight than breastfed and formula-fed newborns, indicating that formula has been administered in neonates who had a weight loss beyond a predetermined percentage of birth weight. Significant hyperbilirubinemia was also strongly associated with delivery by vacuum extractor, some perinatal complications (cephalohematoma, positive Coombs’ test, and blood group systems of A, AB, B, and O [ABO] incompatibility) and Asian origin. Multiple logistic regression analysis shows that supplementary feeding, weight loss percentage, ABO incompatibility, and vacuum extraction significantly increase the risk of jaundice, while only cesarean section decreases the risk. CONCLUSION: The present study confirms the important role of fasting in the pathogenesis of neonatal hyperbilirubinemia, although breastfeeding per se does not seem related to the increased frequency of neonatal jaundice but to the higher bilirubin level in a very small subpopulation of infants with jaundice. In fact, in the breastfed infants, there is a small subpopulation with higher serum bilirubin levels. These infants, when starved and/or dehydrated, could probably be at high risk of bilirubin encephalopathy.

**Abstract:** Given the importance of iron nutrition during the first year of life, there are surprisingly few true, randomized, controlled studies addressing this issue; however, it seems that iron deficiency is unlikely in full-term, breastfed infants during the first 6 months of life because these infants’ body iron stores are sufficient to meet requirements. After this time, many infants exhaust their iron stores and become dependent on a secondary dietary iron supply. Although iron deficiency is a significant nutritional problem worldwide, most of the adverse effects of iron deficiency in this age group are hypothetical and rely on extrapolation from animal studies or studies at different ages. This, however, also is true of most of the adverse effects of iron excess in this age group. Given this uncertainty, it seems prudent to use the lowest dose of iron that prevents iron-deficiency anemia. Currently, the best evidence is that this is achieved by prolonged breastfeeding, avoidance of unfortified formulas and cow’s milk, and the introduction of iron-fortified and vitamin C-fortified weaning foods at approximately 6 months of age. Despite much research, there are many areas of uncertainty regarding iron supplementation of infants, including that: 1. The optimal age for introducing iron-fortified supplemental foods is poorly defined and should be further evaluated. 2. The natural history of iron deficiency and iron-deficiency anemia during the first year of life is unclear, as are the possible long-term effects of this, especially on developmental outcome. 3. The biologic variability among infants and among their mothers that allows many infants who do not receive iron-fortified foods to prevent iron deficiency while receiving only human milk throughout the first year of life is intriguing and warrants additional study. 4. The iron requirements of small-for-gestational-age, term infants are unknown. Their iron requirements are likely to be higher than those of average term infants, but whether iron supplements are required is unclear. 5. The optimum amount of dietary iron in the weaning diet needs to be further defined. Similarly, the optimal source and amount of iron in infant formulas given to infants who receive a mixture of human milk and formula is unclear.


**Abstract:** Iodine is essential for normal growth, mental development, and survival of infants. The main source of iodine for breastfeeding infants is the iodine found in human milk. Despite the importance of iodine for infant health, there have been limited studies addressing human milk iodine concentrations. The newly recommended Adequate Intake of iodine for infants is 110 microg/day for infants 0–6 months and 130 microg/day for infants 7–12 months. Further studies of human milk iodine are needed to ensure that iodine prophylaxis is providing sufficient iodine for mothers and infants worldwide.


**Abstract:** Presents a code, developed jointly by WHO and UNICEF, for the marketing of breast-milk substitutes. The code applies to the marketing of breast-milk substitutes, including infant formula, and other milk products, foods, and beverages, including bottle-fed complementary foods, when marketed or otherwise represented to be suitable for use as a partial or total
replacement of breast milk. The code deals in successive articles with information and education needs concerning the feeding of infants, advertising or other forms of promotion to the general public, and standards for product labelling and quality.

Available at: http://www.who.int/dsa/cat98/mat8.htm#International Code of Marketing of Breast-Milk Substitutes


Abstract: Breast milk is widely accepted as the ideal source of nutrition for infants. In order to ensure success in breastfeeding, it is important that it be initiated as early as possible during the neonatal period. This is facilitated by skin-to-skin contact between the mother and infant immediately following birth. When possible, the infant should be allowed to root and latch on spontaneously within the first hour of life. Many common nursery routines such as weighing the infant, administration of vitamin K and application of ocular antibiotics can be safely delayed until after the initial breastfeeding. Postpartum care practices that improve breastfeeding rates include rooming-in, anticipatory guidance about breastfeeding problems and the avoidance of formula supplementation and pacifiers.


Abstract: Establishes the scientific basis for addressing the many questions that surround the appropriate feeding of infants during their first year of life. Noting that adequate diet is more critical in early infancy than at any other time in life, the review considers what knowledge about infant physiology can contribute to the understanding of nutritional needs. More than 500 references to the literature are included. The evidence reviewed challenges several widely held assumptions concerning the need for proprietary formulas, the most appropriate time to introduce complementary foods, and the best feeding regimen for low-birth-weight infants.

Available at: http://www.who.int/dsa/cat98/mat8.htm#Infant Feeding


Abstract: PURPOSE: To examine infant feeding practices at 1 to 2 months of age and at 4 to 6 months in a rural population of infants at risk for failure to thrive. DESIGN: A descriptive/exploratory study with 52 mothers who were interviewed twice during the infant’s first 6 months of life. Mothers were recruited from health care facilities in rural southeastern Kentucky. Mothers participated in two structured interviews about feeding practices conducted in health care clinics or in the home. RESULTS: At birth 52% of mothers chose to use formula, 41.2% chose breastfeeding, and 8% were both breastfeeding and formula feeding. By 1 month, 71% of mothers were formula feeding and only 29% were breastfeeding. At 4 to 6 months postpartum 80% of mothers were formula feeding and 20% were breastfeeding. Mothers with more children, higher family income, and more education were more likely to breastfeed. Almost all mothers began solid foods before the infant was 4 months old. Infants were fed table foods including mashed potatoes and gravy, and beverages such as apple juice, fruit juices, and soda.
Mothers relied on health professionals for support for feeding decisions at the first interview; however, they relied more on the grandmother for support at the time of the second interview. CONCLUSIONS AND CLINICAL IMPLICATIONS: Breastfeeding mothers need additional support to continue breastfeeding beyond the first month. Mothers and grandmothers need education to discourage the practice of early introduction of inappropriate solid foods, including the practice of thickening bottles of formula with cereal. Nutrition teaching should be provided to mothers and grandmothers including how to select high nutrient, lower fat-weaning foods, and limiting infant intake of high-calorie drinks.


Abstract: Longitudinal studies of the feeding practices and morbidity from infectious diseases of 153 Peruvian newborns from an underprivileged, periurban community were completed during their first year of life. Feeding practices were assessed by monthly questionnaires, and illnesses were identified by thrice-weekly, community-based surveillance. All infants were initially breast-fed, but only 12% were exclusively breast-fed at 1 month of age. At 12 months of age, 86% of children still received some breast milk. Incidence and prevalence rates of diarrhea in infants younger than 6 months of age were less among those who were exclusively breast-fed compared with those who received other liquids or artificial milks in addition to breast milk. The diarrheal prevalence rates doubled with the addition of these other fluids (15.2% v 7.1% of days ill, P less than .001). Infants for whom breast-feeding was discontinued during the first 6 months had 27.6% diarrheal prevalence. During the second 6 months of life, discontinuation of breast-feeding was also associated with an increased risk of diarrheal incidence and prevalence. Upper and lower respiratory tract infections occurred with lesser prevalence among exclusively breast-fed younger infants. The prevalences of skin infections by category of feeding practice were not as consistent, but exclusively breast-fed infants tended to have fewer skin infections during the initial months of life and older infants who continued to breast-feed had fewer infections than those who did not. None of the results could be explained by differences in the socioeconomic status of the infants’ families.


Abstract: During the past decade, considerable evidence has accrued regarding the immunologic uniqueness of human milk and of the important role that the immune system in human milk plays in protecting not only the mature, healthy newborn, but also the premature infant who is more prone to infections and the damage caused by inflammatory processes. However, there is a great deal more to learn about the prophylactic and therapeutic uses of human milk in low birth weight infants, including (1) the status of many of the host defense factors in preterm milk, (2) how to preserve the protective agents in human milk during processing and storage, (3) the dose and duration of treatment with human preterm or mature milk that will be needed to protect against a particular disorder, (4) whether non-maternal milk is
as efficacious as maternal milk for these infants, and (5) in view of the concern of potential graft
versus host reactions, whether it is desirable or contraindicated to maintain the leukocytes in
human milk used to feed premature infants. These questions are not easily answered, but will be
worthy considerations by neonatologists, clinical immunologists, epidemiologists, and others who
are concerned with providing optimal nutritional/immunologic support for the premature infant.


**Abstract:** BACKGROUND: Preterm infants are immunologically immature at birth. Previous
studies have demonstrated that human milk protects against infection in full-term infants, but
there are few studies of its effect for preterm infants. OBJECTIVE: To examine the effect of
human milk feedings on infection incidence among very low birth weight (VLBW) infants during
their initial hospitalization. STUDY DESIGN: The sample consisted of 212 consecutive VLBW
infants admitted to the Georgetown University Medical Center neonatal intensive care unit
(NICU) during 1992–1993 and surviving to receive enteral feeding. Type of feeding (human milk
vs formula), presence of infection and sepsis/meningitis (clinical signs and positive cultures for
pathogenic organisms), and potential confounding variables were abstracted from medical
records. Multiple logistic regression was used to control for confounders. RESULTS: The
incidence of infection (human milk [29.3%] vs formula [47.2%]) and sepsis/meningitis (human
milk [19.5%] vs formula [32.6%]) differed significantly by type of feeding. Major risk factors for
infection were similar in both groups. Human milk feeding was independently correlated with a
reduced odds of infection (odds ratio [OR]=0.43; 95% confidence interval [CI]: 0.23–0.81),
controlling for gestational age, 5-minute Apgar score, mechanical ventilation days, and days
without enteral feedings; and was independently correlated with a reduced odds of
sepsis/meningitis (OR=0.47, 95% CI:0.23–0.95), controlling for gestational age, mechanical
ventilation days, and days without enteral feedings. CONCLUSIONS: The incidence of any
infection and sepsis/meningitis are significantly reduced in human milk-fed VLBW infants
compared with exclusively formula-fed VLBW infants.


**Abstract:** Mastitis is a common complication of human lactation. We examined milk specimens
from eight women with clinical mastitis to determine their content of anti-inflammatory
components. Antioxidant activity (spontaneous cytochrome c reducing activity), selected pro-
inflammatory cytokines (IL-6, IL-1beta), selected endogenous cytokine control molecules (sIL-
6R, sIL-1RII, and sTNFRI), lactoferrin, Na(+) :K(+) ratios, and milk bioactivities that cause
shedding of sIL-1RII from human polymorphonuclear leukocytes (PMN), suppress PMN
aggregation, and suppress PMN adherence responses were not increased compared to normal
milks. Neither the bioactivities that deplete PMN intracellular Ca(2+) stores nor those that block
Ca(2+) influx into fMLP-stimulated PMN were significantly increased in mastitis milks. In
contrast, levels of TNFalpha, sTNFRII, and IL-1RA and bioactivities that cause shedding of
sTNFRI from human PMN were significantly increased compared to normal milks. Mastitis milk
has the same anti-inflammatory components and characteristics of normal milk, with elevations in selected components/activities that may help protect the nursing infant from developing clinical illness due to feeding on mastitis milk.


**Abstract:** Pediatricians must monitor early breastfeeding to detect and manage breastfeeding difficulties that lead to slow weight gain and subsequent low milk production. Infant growth during the first 3 months of life provides a clear indication of breastfeeding progress. Healthy, breastfed infants lose less than 10% of birth weight and return to birth weight by age 2 weeks. They then gain weight steadily, at a minimum of 20g per day, from age 2 weeks to 3 months. Any deviation from this pattern is cause for concern and for a thorough evaluation of the breastfeeding process. Evaluation includes history taking and physical examination for the mother and infant. Observation of a breastfeeding session by a skilled clinician is crucial. A differential diagnosis is generated, followed by a problem-oriented management plan. Special techniques may be used to assist in complicated situations. Ongoing monitoring is required until weight gain has normalized. In most cases, early intervention can restore promptly infant growth and maternal milk supply. Underlying illness of the infant or mother must be considered if weight gain and milk supply do not respond to the earlier-mentioned interventions as expected. Physicians are responsible for knowledge about additional resources and for coordination of breastfeeding care. Pediatricians have a pivotal role in achieving the goals of optimal breastfeeding and appropriate infant growth.


**Abstract:** BACKGROUND: There is no accepted and widely used indicator for exclusive breastfeeding since birth. Indeed, the difference between ‘current status’ data on exclusive breastfeeding and data on ‘exclusive breastfeeding since birth’ is rarely recognized. We used data from a longitudinal study to examine this issue. METHODS: A descriptive longitudinal, prospective study design was used in which 506 mother-infant pairs were included. The mothers completed daily recordings on infant feeding during the first nine months after birth. A research assistant conducted fortnightly home visits with structured interviews. The resulting data on breastfeeding patterns are presented in two different ways: analysis of ‘current status’ data based on a single 24-hour recording of infant feeding at 2, 4 and 6 months of age, and analysis of data ‘since birth’, i.e. data on infant feeding for every day, starting from birth until the ages of 2, 4 and 6 months. RESULTS: A wide discrepancy between the results obtained from the two analyses was found. The difference in the exclusive breastfeeding rate was over 40 percentage points at both 2 and 4 months of age (92% versus 51% at 2 months and 73% versus 30% at 4 months) and 9 percentage points at 6 months (11% versus 1.8%). CONCLUSIONS: Current status indicators based on a 24-hour period may be inadequate and even misleading for many purposes. We propose that in many studies an indicator called ‘exclusive breastfeeding since birth’ could be added.

**Abstract:** Breastfeeding confers lifesaving protection against infectious illness among disadvantaged populations. As a result, breastfeeding promotion has an important part in child health programs throughout the world. In this article, the evidence regarding the host defense benefits of breastfeeding for term infants of normal birth weight is reviewed, with an emphasis on recent information from industrialized countries regarding how the degree and duration of breastfeeding affect infant health.


**Abstract:** This book summarises the most up-to-date ideas about breastfeeding and gives practical guidance on how to prevent problems. There is also information about the lactational amenorrhea method.

Available from: AMREF Book Distribution Unit, amref.bdu@amref.org / www.amref.org/publications.htm


**Abstract:** Breastfeeding is not contraindicated in association with environmental hazards in the United States under ordinary circumstances. Unusual massive exposure should be assessed on an individual basis. In the face of any possible contraindication to breastfeeding, the tremendous benefits of being breastfed should be compared with the theoretic risk for the hazard involved and a decision made on an individual basis.


**Abstract:** Although the benefits of breastfeeding to mother and infant are now well established, within Britain initiation rates are low and have changed little since 1980. This is despite many health promotion initiatives aiming to increase breastfeeding. In this paper we discuss some of the findings of an exploratory qualitative research study of infant feeding decisions in Newcastle upon Tyne, England, where health professionals are actively seeking to increase local breastfeeding initiation and duration rates. Our findings suggest that for health promotion initiatives to be effective across all social groups, there needs to be (i) a socio-cultural understanding of different social groups' access to and interpretation of pre- and postnatal formal breastfeeding support health services, and (ii) more appreciation of how mothers’ informal support networks impact on their access to, interpretation and use of formal breastfeeding support.

Abstract: This study of 230 Brazilian mothers examined the associations of several sociodemographic variables, maternal attitudes and perceptions with intended breast feeding duration. The usual relationships of sociodemographic variables such as mother’s age, education, smoking, parity and infant birth weight with intended breast feeding duration were not found. However, mother’s intentions were related to gender role attitudes with both the least and the most traditional women intending to breast feed longer than women with moderately traditional gender role attitudes. Mother’s attitude toward breast feeding, help with household tasks, and the attitudes of friends and relatives toward breast feeding were also very significantly related to intended breast feeding duration. Women who did not work outside the home intended to breast feed significantly longer than those who were employed.


Abstract: OBJECTIVE: To meet the information need of Brazilian municipalities concerning breastfeeding practices as part of health care planning, a study was carried out to describe breastfeeding and to identify weaning-related factors. METHODS: Of all municipalities in the State of Sao Paulo, Brazil, openly called to participate in the study, 84 joined in. Personnel underwent training to collect data during the national mass immunization day in 1998. A sample strategy, proportional to the infant population, was developed for each participant. Standardized questionnaires were applied to assess infant feeding practices in the previous 24 hours. Descriptive statistic analysis on breastfeeding prevalence and logistic regression analysis of risk factors for discontinuing exclusive breastfeeding of infants aged less than 4 months and weaning of infants aged less than a year were performed. RESULTS: Exclusive breastfeeding rates in the first four months of life were under 30%. The risk factors were: lower maternal education status; lack of access to the so-called “Baby Friendly Hospital Initiative”; primiparity; and early age pregnancy. Around 50% of children under a year old were breastfed. CONCLUSIONS: Lacks of access to the “Baby Friendly Hospital Initiative,” primiparity, and mother’s unemployment or engagement in an informal occupation activity were risk factors for weaning. Local breastfeeding rates are extremely variable in the State of Sao Paulo, reinforcing the importance of local, swift, and easily feasible health care actions.


Abstract: BACKGROUND: Regular breastfeeding times have been thought to help establish routines and promote infant digestion, while frequent breastfeeding has been recommended to enhance breastfeeding and infant growth. OBJECTIVES: The objective of this review was to assess the effects of frequent breastfeeding compared with less frequent breastfeeding in the early days after birth. SEARCH STRATEGY: We searched the Cochrane Pregnancy and Childbirth Group trials register. SELECTION CRITERIA: Randomised and quasi-randomised trials comparing on demand or frequent breastfeeding (two or three hourly) schedules in hospital
compared with four hourly restricted feeds. DATA COLLECTION AND ANALYSIS: Trial quality was assessed and data were extracted independently by two reviewers. MAIN RESULTS: Three trials involving 400 women were included. There were significant methodological limitations in some of the studies. Compared to two hourly, three hourly or on demand breastfeeding, restricted (less frequent four hourly breastfeeding) was associated with greater discontinuation of breastfeeding by four to six weeks postpartum (relative risk 1.53, 95% confidence interval 1.08 to 2.15). Restricted breastfeeding was associated with increased incidence of sore nipples (relative risk 2.12, 95% confidence interval 1.22 to 3.68), engorgement (relative risk 2.10, 95% confidence interval 1.25 to 3.21) and the need to give additional (formula) feeds (relative risk 3.14, 95% 1.24 to 8.00). REVIEWER’S CONCLUSIONS: There appear to be a number of disadvantages from restricting breastfeeding to a four hourly schedule in the first few days after birth. More frequent or on demand breastfeeding is associated with fewer complications and longer duration of breastfeeding.


Abstract: A rise in the fat concentration of human milk within the syringe was noted towards the end of continuous infusion but not with intermittent bolus gastric feeding. The rise in the former was reduced most simply and effectively by using an eccentric nozzle syringe and tilting the pump up at an angle of between 25 degrees and 40 degrees.


Abstract: OBJECTIVE: To identify determinants of the initiation and duration of breastfeeding amongst Australian women. METHODS: A prospective cohort study of 556 women in Perth, Western Australia and 503 women from the Darling Downs area, Queensland, Australia. RESULTS: Breastfeeding at discharge was most strongly associated with perceived paternal support of breastfeeding with an adjusted odds ratio of 9.13 (95% CI 4.83–17.26), using multivariate logistic regression analysis. Duration of breastfeeding was most strongly associated with the length of time a mother intended to breastfeed with an adjusted relative risk of 4.18 (95% CI 2.81–6.22) for > or = 4 months relative to <4 months. CONCLUSIONS: Interventions which aim to increase the length of time a woman intends to breastfeed, and which highlight the role of the father in successful breastfeeding, are recommended to help achieve recommended targets for breastfeeding initiation and duration.


Abstract: A critical review of evidence for the efficacy of recommendations contained in the Ten Steps to Successful Breastfeeding. The steps, which form the foundation of the WHO/UNICEF Baby Friendly Hospital Initiative, summarize the specific practices in hospitals and maternity wards that foster successful breastfeeding. In view of the continuing need to alter health care practices which interfere with breastfeeding, the review aims to give recommended policies and
practices a firm foundation in research and thus provide a powerful tool for education and advocacy. Over 200 references to the recent literature are included in this comprehensive assessment.

Available at: http://www.who.int/dsa/cat98/mat8.htm#Evidence


Abstract: In a population-based case-control study of infant mortality in two urban areas of southern Brazil, the type of milk in an infant's diet was found to be an important risk factor for deaths from diarrhoeal and respiratory infections. Compared with infants who were breast-fed with no milk supplements, and after adjusting for confounding variables, those completely weaned had 14.2 and 3.6 times the risk of death from diarrhoea and respiratory infections, respectively. Part-weaning was associated with corresponding relative risks (RR) of 4.2 and 1.6. The risk of death from infections other than diarrhoea or respiratory infection was less clearly associated with breast-feeding (completely weaned, RR=2.5; partly weaned, RR=0.4). Cow’s and formula milk seemed to be equally hazardous. For deaths due to diarrhoea the increased risk associated with not breast-feeding was greatest in the first two months of life (RR for completely weaned vs breast-fed without supplementary milk=23.3).


Abstract: BACKGROUND: Exclusive breastfeeding is recommended worldwide but not commonly practised. We undertook a randomised controlled study of the efficacy of home-based peer counselling to increase the proportion of exclusive breastfeeding among mothers and infants residing in periurban Mexico City. METHODS: Two intervention groups with different counselling frequencies, six visits (44) and three visits (52), were compared with a control group (34) that had no intervention. From March, 1995, to September, 1996, 170 pregnant women were identified by census and invited to participate in the study. Home visits were made during pregnancy and early post partum by peer counsellors recruited from the same community and trained by La Leche League. Data were collected by independent interview. Exclusive breastfeeding was defined by WHO criteria. FINDINGS: 130 women participated in the study. Only 12 women refused participation. Study groups did not differ in baseline factors. At 3 months post partum, exclusive breastfeeding was practised by 67% of six-visit, 50% of three-visit, and 12% of control mothers (intervention groups vs controls, p<0.001; six-visit vs three-visit, p=0.02). Duration of breastfeeding was significantly (p=0.02) longer in intervention groups than in controls, and fewer intervention than control infants had an episode of diarrhoea (12% vs 26%, p=0.03). INTERPRETATION: This is the first reported community-based randomised trial of
breastfeeding promotion. Early and repeated contact with peer counsellors was associated with a significant increase in breastfeeding exclusivity and duration. The two-fold decrease in diarrhoea demonstrates the importance of breastfeeding promotion to infant health.


Abstract: OBJECT: To evaluate the effects of psychosocial support during labour, delivery and the immediate postpartum period provided by a female companion (doula). DESIGN: The effects of the intervention were assessed by means of a randomised clinical trial. Social support by a doula was provided to women in the intervention group, while women in the control arm received routine care. SETTING: A large social security hospital in Mexico City. PARTICIPANTS: Seven hundred and twenty-four women with a single fetus, no previous vaginal delivery, <6cm of cervical dilatation, and no indications for an elective caesarean section were randomly assigned to be accompanied by a doula, or to receive routine care. OUTCOME MEASURES: Breastfeeding practices, duration of labour, medical interventions, mother’s emotional conditions, and newborn’s health. METHODS: Blinded interviewers obtained data from the clinical records, during encounters with women in the immediate postpartum period, and at their homes 40 days after birth. Relative risks and confidence intervals were estimated for all relevant outcomes. RESULTS: The frequency of exclusive breastfeeding one month after birth was significantly higher in the intervention group (RR 1.64; I–C: 1.01–2.64), as were the behaviours that promote breastfeeding. However, the programme did not achieve a significant effect on full breastfeeding. More women in the intervention group perceived a high degree of control over the delivery experience, and the duration of labour was shorter than in the control group (4.56 hours vs 5.58 hours; RR 1.07 CI (95%) = 1.52 to –0.51). There were no effects either on medical interventions, mothers’ anxiety, self-esteem, perception of pain and satisfaction, or in newborns’ conditions. CONCLUSIONS: Psychosocial support by doulas had a positive effect on breastfeeding and duration of labour. It had a more limited impact on medical interventions, perhaps because of the strict routine in hospital procedures, the cultural background of the women, the short duration of the intervention, and the profile of the doulas. It is important to include psychosocial support as a component of breastfeeding promotion strategies.


Abstract: BACKGROUND: We studied the effect of functional health literacy on the initiation and continuance of breast-feeding in women at a public health clinic. METHODS: Subjects were 61 first-time mothers aged 18 years or older who spoke English as their first language. They were divided into two groups, one who exclusively breast-fed for at least the first 2 months and one who never initiated breast-feeding or did not exclusively breast-feed for at least 2 months. The Rapid Estimate of Adult Literacy in Medicine (REALM) was administered, providing reading grade-level estimates for each subject. RESULTS: An association between functional health
literacy and breast-feeding was seen, with only 23% of the women in the lower literacy group exclusively breast-feeding during the first 2 months compared with 54% of women in the higher literacy group. CONCLUSION: Many patients need simpler health education materials encouraging breastfeeding. These materials are needed both before and during pregnancy.


Abstract: AIM: To study the influence on breastfeeding of skin-to-skin contact after birth. METHODS: Using a prospective cohort study design, a group of 1250 Polish children was investigated with 3 y follow-up. RESULTS: The implementation of the practice significantly increased mean duration of exclusive breastfeeding by 0.39 mo and overall breastfeeding duration by 1.43 mo. The infants kept with the mothers for at least 20 min were exclusively breastfed for 1.35 mo longer and weaned 2.10 mo later than those who had no skin-to-skin contact after delivery. The skin-to-skin contact after birth significantly coexisted with the other hospital practices supportive to breastfeeding, especially rooming-in without separation longer than 1 h per 24 h [relative risk (RR) = 3.18, 95% confidence interval (95% CI): 2.34–4.31] and first breastfeeding within 2 h after birth (RR = 2.94, 95% CI: 2.36–3.67. Multivariate analysis performed by a general linear model with duration of exclusive breastfeeding as the dependent variable indicated skin-to-skin contact and mother education as two independent variables influencing the duration of exclusive breastfeeding, CONCLUSION: The results indicate that extensive mother-infant skin-to-skin contact lasting for longer than 20 min after birth increases the duration of exclusive breastfeeding.


Abstract: BACKGROUND: Most mothers breastfeed in Bangladesh, but they rarely practise exclusive breastfeeding. Hospital-based strategies for breastfeeding promotion cannot reach them because about 95% have home deliveries. We postulated that with the intervention of trained peer counsellors, mothers could be enabled to breastfeed exclusively for the recommended duration of 5 months. METHODS: 40 adjacent zones in Dhaka were randomised to intervention or control groups. Women were enrolled during the last trimester of pregnancy between February and December, 1996. In the intervention group, 15 home-based counselling visits were scheduled, with two visits in the last trimester, three early postpartum (within 48 h, on day 5, between days 10 and 14), and fortnightly thereafter until the infant was 5 months old. Peer counsellors were local mothers who received 10 days’ training. FINDINGS: 363 women were enrolled in each group. Peer counselling significantly improved breastfeeding practices. For the primary outcome, the prevalence of exclusive breastfeeding at 5 months was 202/228 (70%) for the intervention group and 17/285 (6%) for the control group (difference=64%; 95% CI 57%–71%, p>0.0001). For the secondary outcomes, mothers in the intervention group initiated breastfeeding earlier than control mothers and were less likely to give prelacteal and postlacteal foods. At day 4, significantly more mothers in the intervention group breastfed exclusively than
controls. INTERPRETATION: Peer counsellors can effectively increase the initiation and duration of exclusive breastfeeding. We recommend incorporation of peer counsellors in mother and child health programmes in developing countries.


**Abstract:** Low birthweight (LBW) occurs in 17% of births in developing countries and many of them are full term. The subsequent development of LBW term infants is poorer than higher birthweight children and more likely to be affected by poor social circumstances. We investigated the effects of morbidity and breastfeeding on the development of these LBW term infants. Two parallel cohorts (n=131 + 131) of LBW term (1,500–2,499g) and higher birthweight (3,000–3,499g) infants were recruited from six maternity centers in northeast Brazil. The longitudinal prevalence of morbidity and the frequency of breastfeeding over the first 6 mo of life were assessed. The infants’ development was assessed on the Bayley Scales at 6 and 12 mo, and we previously reported that the low birthweight group had lower scores than the higher birthweight group. Hospitalizations in the first 6 mo were negatively associated with 6-mo and 12-mo Bayley scores in both groups. Among LBW infants, but not higher birthweight infants, there were significant associations between the prevalence of diarrhea and mental and motor development at 6 mo and mental development at 12 mo. Breastfeeding frequency in the first 4 wk of life was positively associated with mental development in both birthweight groups at 6 mo but not at 12 mo. Breastfeeding beyond 4 wk was not associated with the children’s development. We conclude that low birthweight infants are especially vulnerable to the effects of diarrhea, and the greater frequency and differential effect of diarrhea partly explains their poorer development.


**Abstract:** BACKGROUND: The debate on breastfeeding in areas of high HIV prevalence has led to the development of simulation models that attempt to assess the risks and benefits associated with breastfeeding. An essential element of these simulations is the extent to which breastfeeding protects against infant and child mortality; however, few studies are available on this topic. We did a pooled analysis of studies that assessed the effect of not breastfeeding on the risk of death due to infectious diseases. METHODS: Studies were identified through consultations with experts in international health, and from a MEDLINE search for 1980–98. Using meta-analytical techniques, we assessed the protective effect of breastfeeding according to the age and sex of the infant, the cause of death, and the educational status of the mother. FINDINGS: We identified eight studies, data from six of which were available (from Brazil, The Gambia, Ghana, Pakistan, the Philippines, and Senegal). These studies provided information on 1,223 deaths of children under two years of age. In the African studies, virtually all babies were breastfed well into the second year of life, making it impossible to include them in the analyses.
of infant mortality. On the basis of the other three studies, protection provided by breastmilk declined steadily with age during infancy (pooled odds ratios: 5.8 [95% CI 3.4–9.8] for infants <2 months of age, 4.1 [2.7–6.4] for 2–3-month-olds, 2.6 [1.6–3.9] for 4–5-month-olds, 1.8 [1.2–2.8] for 6–8-month-olds, and 1.4 [0.8–2.6] for 9–11-month-olds). In the first 6 months of life, protection against diarrhoea was substantially greater (odds ratio 6.1 [4.1–9.0]) than against deaths due to acute respiratory infections (2.4 [1.6–3.5]). However, for infants aged 6–11 months, similar levels of protection were observed (1.9 [1.2–3.1] and 2.5 [1.4–4.6], respectively). For second-year deaths, the pooled odds ratios from five studies ranged between 1.6 and 2.1. Protection was highest when maternal education was low. INTERPRETATION: These results may help shape policy decisions about feeding choices in the face of the HIV epidemic. Of particular relevance is the need to account for declining levels of protection with age in infancy, the continued protection afforded during the second year of life, and the question of the safety of breastmilk substitutes in families of low socioeconomic status.


Abstract: Breastfeeding during infancy appears to result in enhanced cognitive development during childhood, but it is not known whether breastfeeding should be encouraged for infants born small for gestational age (SGA) whose growth might otherwise benefit from nutritional supplementation. To address this issue, duration of exclusive breastfeeding and cognitive development were evaluated prospectively for 220 term children born SGA and 299 term children born appropriate for gestational age (AGA). Cognitive development was assessed using the Bayley Scale of Infant Development at 13 mo and Wechsler Preschool and Primary Scales of Intelligence at 5 y of age. Infants born SGA were given supplemental foods significantly earlier than those born AGA. Growth of infants born SGA was not related to early nutritional supplementation. The salutary effect of exclusive breastfeeding on cognitive development was greater for children born SGA than for those born AGA. Based on a linear association between duration of exclusive breastfeeding and intelligence quotient (IQ), children born SGA and exclusively breastfed for 24 wk were predicted to have an 11-point IQ advantage over those breastfed for 12 wk, as opposed to a 3-point advantage for children born AGA with similar durations of breastfeeding. The IQ distribution of children born SGA and exclusively breastfed for more than 12 wk was not different from that of all children born AGA. CONCLUSION: Duration of exclusive breastfeeding has a significant impact on cognitive development without compromising growth among children born SGA. These data suggest that mothers should breastfeed exclusively for 24 wk to enhance cognitive development.


Abstract: OBJECTIVE: To estimate the effect of exclusive breast feeding and partial breast feeding on infant mortality from diarrhoeal disease and acute respiratory infections in Latin America. DESIGN: Attributable fraction analysis of national data on infant mortality and breast
feeding. SETTING: Latin America and the Caribbean. MAIN OUTCOME MEASURES: Mortality from diarrhoeal disease and acute respiratory infections and nationally representative breastfeeding rates. RESULTS: 55% of infant deaths from diarrhoeal disease and acute respiratory infections in Latin America are preventable by exclusive breast feeding among infants aged 0–3 months and partial breast feeding throughout the remainder of infancy. Among infants aged 0–3 months, 66% of deaths from these causes are preventable by exclusive breast feeding; among infants aged 4–11 months, 32% of such deaths are preventable by partial breast feeding. 13.9% of infant deaths from all causes are preventable by these breastfeeding patterns. The annual number of preventable deaths is about 52 000 for the region. CONCLUSIONS: Exclusive breast feeding of infants aged 0–3 months and partial breast feeding throughout the remainder of infancy could substantially reduce infant mortality in Latin America. Interventions to promote breast feeding should target younger infants.


Abstract: BACKGROUND: Despite data relating body size in early life to later cardiovascular outcomes, the hypothesis that nutrition affects such outcomes has not been established. Breastfeeding has been associated with lower blood pressure in later life, but previous studies have not controlled for possible confounding factors by using a randomised design with prospective follow-up. We undertook such a study to test the hypothesis that early diet programmes blood pressure in later life in children randomly assigned different diets at birth. METHODS: Blood pressure was measured at age 13–16 years in 216 (23%) of a cohort of 926 children who were born prematurely and had participated at birth in two parallel randomised trials in five neonatal units in the UK. Dietary interventions were: donated banked breastmilk versus preterm formula and standard term formula versus preterm formula. FINDINGS: Children followed up at age 13–16 years were similar to those not followed up in terms of social class and anthropometry at birth. Mean arterial blood pressure at age 13–16 years was lower in the 66 children assigned banked breastmilk (alone or in addition to mother’s milk) than in the 64 assigned preterm formula (mean 81.9 [SD 7.8] vs 86.1 [6.5] mm Hg; 95% CI for difference –6.6 to –1.6; p=0.001). In non-randomised analyses, the proportion of enteral intake as human milk in the neonatal period was inversely related to later mean arterial pressure (beta=–0.3 mm Hg per 10% increase [95% CI –0.5 to –0.1]; p=0.006). No differences were found in the term formula (n=44) versus preterm formula (n=42) comparison. INTERPRETATION: Breastmilk consumption was associated with lower later blood pressure in children born prematurely. Our data provide experimental evidence of programming of a cardiovascular risk factor by early diet and further support the long-term beneficial effects of breastmilk.


Abstract: OBJECTIVE: To study the effect of early diet on the development of allergic reactions in infants born preterm. DESIGN: Two randomised prospective trails. In trail A infants were
randomly allocated banked donor milk or preterm formula as their sole diet or (separately randomised) as a supplement to their mother’s expressed breast milk. In trial B infants were allocated term or preterm formula. A blind follow up examination was done 18 months after the expected date of birth. SETTING: Neonatal units of hospitals in Cambridge, Ipswich, King’s Lynn, Norwich, and Sheffield. Outpatient follow up. PARTICIPANTS: 777 Infants with a birth weight less than 1850 g born during 1982 to 1984. MAIN OUTCOME MEASURES: Development of eczema, allergic reactions to food or drugs, and asthma or wheezing by nine and 18 months after term. Whenever possible the observations were confirmed by rechallenge or clinical examination. RESULTS: At 18 months after term there was no difference in the incidence of allergic reactions between dietary groups in either trial. In the subgroup of infants with a family history of atopy, however, those in trial A who received preterm formula rather than human milk had a significantly greater risk of developing one or more allergic reactions (notably eczema) by 18 months (odds ratio 3.6; 95% confidence interval 1.4 to 9.1). CONCLUSIONS: Feeding neonates on formulas based on cows’ milk, including those with a high protein content, did not increase the overall risk of allergy. Nevertheless, in the subgroup with a family history of atopy early exposure to cows’ milk increased the risk of a wide range of allergic reactions, especially eczema.


Abstract: This investigation was carried out to comparatively assess the duration of breast milk feeding and to analyze risk factors for early cessation of breast milk feeding in term and very preterm infants. A cohort study was performed in 89 consecutive very low birthweight (VLBW) infants (<1500g) who survived for at least for one week, and 177 term infants with birthweights >2500g born in the same hospital matched for gender and multiplicity. Median duration of breast milk feeding, as determined from charts and questionnaires mailed to the mothers at 6 and 12 months corrected age, was 36 days in VLBW infants, compared to 112 days in control infants (P<0.0001). In both VLBW and control infants, smoking during pregnancy, low maternal and low paternal school education were each significantly associated with short duration of breast milk feeding. In VLBW infants, multiple pregnancy and gestational age <29 weeks were each associated with prolonged breast milk feeding, as were maternal age >35 years and spontaneous pregnancy (as opposed to pregnancy following infertility treatment) in term infants. Multivariate analysis revealed that VLBW, smoking and low parental school education were independent negative predictors of breast milk feeding. While these results emphasize the need for special support of VLBW infant mothers promoting lactation, the relationships between smoking, school education and breast milk feeding in both strata show that efforts to increase breast milk feeding require a public health perspective.


Abstract: Table 2 shows that human milk will not meet the DRI for all vitamins in breastfeeding infants. The most glaring discrepancy between intake and the RDA is for vitamin D, although, as
discussed, infants may synthesize this from sunlight exposure. Vitamin K must be given in the newborn period. Deficiencies of other vitamins are rare, especially if mothers are nourished adequately. If breastfeeding infants are to be supplemented with vitamin D or any other vitamins, the standard liquid preparations available all contain large amounts of the water-soluble and fat-soluble vitamins (except for vitamin K), which more than meets the RDA. The milk content of thiamin, pyridoxine, and niacin is correlated highly with maternal intake, and these vitamins are all present in relatively large amounts in standard multivitamin tablets given to lactating mothers. In conclusion, in healthy, breastfed infants of well-nourished mothers, there is little risk for vitamin deficiencies and the need for vitamin supplementation is rare. The exceptions to this are a need for vitamin K in the immediate newborn period and vitamin D in breastfed infants with dark skin or inadequate sunlight exposure.


Abstract: Cup feeding has been suggested as an alternative to bottle feeding to help promote breastfeeding by avoiding nipple confusion. To demonstrate the possibility and utility of cup feeding, records of 59 preterm and low birthweight babies (born before 37 weeks’ gestation) admitted to a neonatal intensive care unit (NICU) from May 1995 to April 1996 were analyzed. Feeding was initiated on cup if swallowing was present and cup feeding was possible as early as 29 weeks’ gestational age with a birthweight of 900 g. In the case of five infants (38 per cent) in the gestational age group 28–30 weeks, 19 infants (52 per cent) in the 31–34 weeks’ gestation group, and six (56 per cent) in the 35–37 weeks’ gestation group, feeding could be commenced directly with a cup. Out of 59 infants, 33 infants (56 per cent) could be discharged on exclusive breastfeeding. It was concluded that cup feeding is a useful alternative to bottle feeding and an effective method of feeding preterm and small infants in NICU. Cup feeding allows successful breastfeeding without causing ‘nipple confusion’.


Abstract: OBJECTIVE: We sought to determine the correlates of intent to breastfeed and of successful lactation and nursing at the breast in mothers of very low birth weight (VLBW; <1.5kg) infants. METHODS: We conducted a prospective observational study of 119 mothers of singleton VLBW infants (mean birth weight: 1056g; mean gestational age: 28 weeks), 87 (73%) of whom intended to breastfeed. Mothers completed questionnaires at 3 weeks’ postnatal age and at 35 and 40 weeks’ (term) and 4 months’ corrected ages (CA). RESULTS: Of the 87 mothers who intended to breastfeed, 30 mothers (34%) continued lactation beyond 40 weeks’ CA (postmenstrual plus postnatal age). Compared with mothers who discontinued lactation before this time, those who continued were older (31 vs 26 years), more were married (80% vs 39%), they had more than a high school education (70% vs 42%), and they were white (63% vs 35%). There were no significant differences in their infants’ birth data or rates of neonatal morbidity. Significant correlates of lactation beyond 40 weeks’ CA included beginning milk expression before 6 hours postdelivery, expressing milk > or = 5 times per day, and kangaroo care. These correlates remained significant after controlling for maternal age, race, marital
status, and education beyond high school. At 4 months’ CA, 14 mothers (16%) were still lactating, 12 of whom were nursing at the breast. CONCLUSIONS: Increased maternal support specifically directed toward behavioral factors, including early and more frequent milk expression and kangaroo care, may improve the rates of successful lactation among mothers of VLBW infants who choose to breastfeed.


Abstract: OBJECTIVE: To provide information on the potential contribution to vitamin A nutrition in infants of strategies for improving maternal vitamin A status and increasing the consumption of breast milk. METHODS: The contribution of breastfeeding to the vitamin A nutrition of children in eight age groups between 0 and 24 months was simulated under four sets of conditions involving two levels of breast milk consumption with or without maternal vitamin A supplementation. FINDINGS: During the first 6 months, optimal breastfeeding on its own (compared with withholding colostrum and then partially breastfeeding after the first week) was as effective as postpartum maternal supplementation alone, retinol intakes being increased by 59 micrograms per day and 68 micrograms per day, respectively. Combined in synergy, these strategies increase retinol intake by 144 micrograms per day, or 36% of the recommended intake. After 6 months, partial breastfeeding continued to provide a significant proportion of the recommended intakes: 42% from 6–12 months and 61% during the second year. CONCLUSION: Maternal supplementation with a high dose of vitamin A at the time of delivery and the promotion of optimal breastfeeding practices are highly effective strategies for improving vitamin A nutrition in infants and should be strengthened as key components of comprehensive child survival programmes.


Abstract: BACKGROUND: Exclusive breastfeeding until around six months of age, followed by the introduction of solids with continued breastfeeding, is considered to be the optimal nutritional start for newborn infants. OBJECTIVES: To determine whether the exclusivity and duration of breastfeeding is affected by giving mothers commercial discharge packs in hospital which contain artificial formula or promotional material for artificial formula. These packs are those which are commonly given to mothers on leaving hospital after giving birth (thus discharge packs). SEARCH STRATEGY: Comprehensive electronic search of the register of clinical trials maintained and updated by the Cochrane Pregnancy and Childbirth Group and CINAHL and MEDLINE. SELECTION CRITERIA: All randomised controlled trials with or without blinding to examine the effects of commercial discharge packs on breastfeeding. Participants: Consenting postpartum women who initiate breastfeeding while in hospital or immediately upon discharge. Interventions: Commercial discharge packs which contain free samples of infant formula or promotional material versus non commercial discharge packs (specifically those from which free samples of infant formula have been removed or have been replaced with e.g. breast pads) or no pack. Main outcome measures: The proportion of women breastfeeding at six weeks and 3
months (13 weeks) postpartum. Other outcomes: Rates of breastfeeding at other fixed time points between 0 and 6 months postpartum. DATA COLLECTION AND ANALYSIS: Data were extracted by one reviewer and checked by a second reviewer. MAIN RESULTS: Nine randomised controlled trials involving a total of 3730 women were analysed. The studies only included women from North America. The meta-analysis showed that when comparing commercial discharge packs with any of the controls (no intervention, non-commercial pack and combinations of these), exclusive breastfeeding was reduced at all time points in the presence of commercial hospital discharge packs. There was no evidence to support the conjecture that use of hospital discharge packs causes the early termination of non-exclusive breastfeeding. Where the introduction of solid food was measured, giving a commercial pack (with or without formula) reduced the time before solid food was introduced. REVIEWER’S CONCLUSIONS: The giving of commercial hospital discharge packs (with or without formula) appears to reduce the number of women exclusively breastfeeding at all times but has no significant effect upon the earlier termination of non-exclusive breastfeeding.


Abstract: Human breast milk is primarily colostrum immediately following birth. Colostrum gradually changes to mature milk over the next several days. The role of colostrum in fighting infections and promoting growth and development of the newborn is widely acknowledged. This role is mediated by differences across cultures in the acceptability of colostrum and the prevalence of colostrum feeding. This study examined the prevalence of colostrum feeding and time to initiation of breast-feeding in 143 rural Bangladeshi women in Matlab thana. Structured interviews were collected during a 9-month prospective study conducted in 1993. Women were usually interviewed within 4 days of giving birth and were asked about whether or not they fed their child colostrum and the number of hours until they began breast-feeding the baby. Ninety per cent of the mothers reported feeding their newborn colostrum. A logistic regression found no effect on the prevalence of colostrum feeding from the following covariates: mother’s age, parity, history of pregnancy loss, child’s sex, mother’s self-report of delivery complications, and the time from birth to interview. Fifty-nine per cent of mothers initiated breast-feeding within 4 h, and 88% within 12 h of parturition. Survival analysis was used to estimate the effects of covariates on the time from delivery to initial breast-feeding. Time to initial breast-feeding was delayed slightly, but significantly, for older mothers, for male infants, and by mothers who did not report delivery complications. The percentage of mothers who fed their child colostrum was higher, and times to initial breast-feeding were shorter, than almost all previous reports from South Asia. These findings might be explained, in part, by methodological differences among studies, but it is suggested that recent changes towards earlier initiation of breast-feeding have taken place in rural Bangladesh.


Abstract: The study aims to explore ideas about bad milk found among women in Guinea-Bissau. Interviews were held with 20 elderly knowledgeable rural women. Interinformant
agreement was high within each ethnic group studied. All the informants recognized colostrum but disliked its consistency. Depending on ethnical background, it was considered good, of no special value or harmful to the newborn baby. Further, all the informants held that mature breast milk could turn bad, e.g. in case of mother’s sickness or adultery. Suspected bad milk can be diagnosed by putting an ant into it to observe if it dies. The condition of bad milk can be treated by various procedures. The findings are discussed in relation to similar ideas existing in other societies and to views on the quality of maternal milk held in the industrialized countries. It is proposed that the idea of producing bad milk may be an important determinant of breastfeeding performance generally. Restrictions imposed on the breastfeeding woman, with the intention of producing healthier breast milk, may actually contribute to a decline in breastfeeding.


Abstract: OBJECTIVE: To estimate child mortality associated with reasons for the non-initiation of breastfeeding and weaning caused by preceding morbidity, compared with voluntary weaning as a result of maternal choice. METHODS: Demographic and Health Surveys were analysed from 14 developing countries. Women reported whether they initiated lactation or weaned, and if so, their reasons for non-initiation or stopping breastfeeding were classified as voluntary choice or as a result of preceding maternal/infant illness. Rates of child mortality and survival analyses were estimated, by reasons for non-breastfeeding or weaning. RESULTS: Mortality was highest among never-breastfed children. Child mortality among women who never initiated breastfeeding was significantly higher than among women who weaned. Preceding maternal/infant morbidity was the most common reason for not breastfeeding (63.9%), and the mortality of children never breastfed because of preceding morbidity was higher than in children not breastfed as a result of maternal choice; 326.8 per 1,000 versus 34.8 per 1,000, respectively. Mortality among breastfed children who were weaned because of preceding morbidity was higher than among those weaned voluntarily; 19.2 per 1000 versus 9.3 per 1,000, respectively. Failure to initiate lactation was significantly more frequent among women reporting complications of delivery and with low birthweight infants. CONCLUSION: Child mortality as a result of the voluntary non-initiation of breastfeeding or voluntary weaning was lower than previously estimated, and this should be used as a benchmark when counselling HIV-positive mothers on the risks of non-breastfeeding or weaning to prevent mother-to-child transmission of HIV.


Abstract: OBJECTIVE: to review the literature on the relationship between breast-feeding practices in the first month of life and neonatal mortality. METHODS: Medline and Cochrane databases were searched using the keywords breast-feeding, and neonatal mortality, supplemented with additional searches using the keywords developing countries, colostrum, infant feeding and infant mortality, hypoglaecemia, hypothermia, breastfeeding practices, and suckling. FINDINGS: breast feeding helps prevent hypothermia and hypoglycaemia in newborn
babies, which are contributory causes of early neonatal deaths especially among low birth weight and premature babies. During the late neonatal period, most deaths in developing countries are due to infections such as sepsis, acute respiratory tract infection, meningitis, omphalitis and diarrhoea. Feeding colostrum and breast feeding, especially exclusive breast feeding, protects against such deaths. KEY CONCLUSIONS AND IMPLICATIONS FOR PRACTICE: in most developing countries, nearly all women breast feed in the first month of life, but often breast feeding is delayed beyond the first hour after birth, and exclusive breast feeding is not usually practised. Policies and training of staff of maternity centres and hospitals can encourage early initiation of breast feeding and exclusive breast feeding. Midwives can support community-based efforts to support exclusive breast feeding. Breast feeding plays an important role in reducing neonatal mortality and should be strongly emphasised by programmes attempting to reduce neonatal mortality.


Abstract: Breastfeeding is the natural and safe way of feeding small infants, providing nutritional, immunological, psychological and economic recognized and unquestionable advantages. These qualities are especially important in premature infants, because of their vulnerability. Despite highly desirable, there is, in general, little success in breastfeeding preterm infants, especially in special care neonatal units. There are evidences that a high supportive hospital environment, with an interdisciplinary team, makes possible to these infants to be breastfed. In this article, the authors present an up-to-date review about the components of human milk and its unique characteristics, as well as describes aspects that make the breast milk particularly suitable for feeding the premature newborn.


Abstract: Mothers who experience breastfeeding difficulties with their first babies and give up breastfeeding are less likely to breastfeed subsequent babies than mothers who do not experience such difficulties. We carried out a longitudinal study of 22 mothers in which milk output was measured at 1 week and 4 weeks after giving birth to their first and second babies. Significantly more breast milk was produced at 1 week for the second lactation (an increase of 31% [95% CI 11–51%]) and the net increase was greatest for those with the lowest milk output on the first occasion (90% [30–149%]). They spent less time feeding their second baby (a decrease of 20% [−34 to −5%]). This increased efficiency of milk transfer was also evident at 4 weeks. Health professionals should encourage women to breastfeed all their children, whatever their experience with their first child.

Abstract: OBJECTIVE: To evaluate the Community Breastfeeding Center’s (CBC) impact on clients' breastfeeding experiences. DESIGN: Retrospective survey; participants were mailed a questionnaire. SETTING: A hospital-based drop-in center operated jointly by the Wellington-Dufferin-Guelph Health Unit and Headwaters Health Care Center and offering professional breastfeeding support and peer interaction. PARTICIPANTS: The 164 mothers of singleton births, both inpatients and community clients, who attended the CBC during a 10-month period in 1996–1997 and completed a survey. MAIN OUTCOME MEASURES: A mailed survey with forced-choice and open-ended questions. RESULTS: Of the respondents, 90.9% rated their overall CBC experience as excellent or good. Seventy-three percent of respondents breastfed for 4 months or longer. Primiparae and mothers of preterm infants tended to visit the CBC more frequently, while achieving duration rates similar to other subgroups. Returning to work was the reason most frequently cited for stopping breastfeeding (35%). CONCLUSION: The CBC is an effective community support strategy to lengthen breastfeeding duration and enhance clients’ satisfaction with their breastfeeding experience.


Abstract: Nutrition is essential to the health and development of infants and children. Breastfeeding is superior to infant formula feeding because in addition to breastmilk's nutritional advantages, it protects against infections through specific and non-specific immune factors and has long-term consequences for metabolism and disease later in life. The objectives of this paper are to summarise the epidemiological and other scientific evidence in support of breastfeeding, to clarify why breastmilk is a better food for infants than infant formula and to demonstrate support for further breastfeeding initiatives in Australia. There is much epidemiological evidence for the benefits of breastfeeding to the human infant against a wide range of illnesses and infections. Other scientific evidence for breastfeeding has demonstrated specific nutritional components that provide immunologic protection and beneficial effects on intestinal flora. Human milk enhances the immature immunologic system of the neonate and strengthens host defence mechanisms against infective and other foreign agents. Mechanisms to explain active stimulation of the infant’s immune system by breastfeeding are through bioactive factors in human milk. Following breastfeeding termination there may be prolonged protection against infections due to influences on the infant immune system mediated via human milk. World-wide initiatives have been established to promote breastfeeding and curb the use of infant formula. Primarily the Baby Friendly Hospital Initiative promotes the Ten Steps to Successful Breastfeeding and should be implemented in all maternity services in Australia. There is enough evidence to support further breastfeeding health promotion initiatives in Australia to ensure that all hospitals become ‘baby friendly’, that all mothers are encouraged and supported to commence breastfeeding and that there is adequate community support for mothers to continue exclusive breastfeeding for at least the first six months of life.

Abstract: The effectiveness of breastfeeding promotion is supported by scientific research and is a likely explanation for global changes in behavior. Because in the developing world the vast majority of women initiate breastfeeding and continue to breastfeed, future efforts to promote breastfeeding should focus on the behavior of exclusive breastfeeding for maximum health impact. To extend the duration of exclusive breastfeeding, the timing of the intervention is critical. Women must be reached early during the prenatal period, supported at birth, and within the first month post-partum when breastfeeding problems and the shift from exclusive to partial breastfeeding are most likely to occur. The challenge ahead is to implement infant feeding counseling and support in health services and community-based programs. Research is needed to answer questions such as what is the most cost-effective method of training and the number and timing of visits? What are the most important messages for a mother to have and how are they best delivered to her? It is also necessary to start thinking and acting on the concept of infant feeding promotion activities. Research must emphasize not only the efficacy and effectiveness of the promotion of optimal infant feeding behaviors on infant health, but also its cost-effectiveness. It is necessary to involve health economists in future research. Lastly, to ensure that the numerous benefits of human milk and breastfeeding on infant survival, health, and development are achieved, the potential synergies between research and the implementation and evaluation of interventions based on this research must be realized. To do this not only requires sound scientific research, but also the linking of this research to the science of public health intervention and the development of creative methodologies to evaluate multi-faceted interventions. This requires that the same level of scientific rigor, creativity, and investment that has been brought to the science of human milk and breastfeeding also be brought to the science and art of promoting optimal infant feeding behaviors.


Abstract: Thirty-one physicians, 108 nurses, 105 medical students, and 126 student nurses practicing in the same medical center received a questionnaire to evaluate their knowledge and attitudes about breastfeeding. The mean knowledge score of the 139 staff members was 49.4 +/- 10.8 (The highest possible score was 73); that of the medical students was 31.2 +/- 8.9, and that of the nurse students was 39.5 +/- 7.6. Thirteen percent of the medical students vs. 68.6% of the student nurses reported that they had received breastfeeding education in school. All of the respondents had a positive attitude toward breastfeeding. Occupation and in-service education for breastfeeding could increase the knowledge score. Having been breastfed during infancy could increase both the knowledge score and positive attitude score. We suggest that breastfeeding be integrated into the curricula of both medical and nursing schools. Health professionals should receive in-service education. The mechanism of lactation, management of breast problems and infant problems, contraindications for breastfeeding, the properties of human milk and the benefits of breastfeeding for the infant should all be included.

Abstract: OBJECTIVE: To explore relationships among breastfeeding knowledge, breastfeeding confidence, and infant feeding plans and their effects on feeding practices in first-time breastfeeding mothers. DESIGN: Prospective descriptive design. SETTING: Telephone interviews were conducted prenatally and at 6 weeks, 3 months, and 6 months postpartum. PARTICIPANTS: Seventy-four of 83 first-time mothers with prenatal intentions to breastfeed completed all study requirements. The majority were White (95%), between the ages of 21 and 30 years (73%), with a post-high school education (85%), and household incomes of more than 200% of the federal poverty guideline (88%). MAIN OUTCOME MEASURES: Breastfeeding knowledge, breastfeeding confidence, planned infant feeding method, planned breastfeeding duration, weeks of daily human milk substitute feeding, breastfeeding duration, achievement of breastfeeding goals. RESULTS: Breastfeeding knowledge was strongly correlated with breastfeeding confidence (r=.262; p=.025) and actual lactation duration (r=.455; p=.0001). Compared with women planning to exclusively breastfeed their infants, those planning to combination feed planned shorter breastfeeding duration (p=.022), reported shorter actual duration (p=.004), and were less likely to meet their breastfeeding goal (p=.034). The variables maternal education, breastfeeding knowledge, and weeks of daily human milk substitute feeding were used to develop a prediction equation that correctly categorized 93% of participants who met their breastfeeding goal and 90% of those who did not. CONCLUSIONS: Expectations and the actual breastfeeding experience differed among women planning to combination feed and those planning to exclusively breastfeed. Whether a cause or consequence, daily human milk substitute feeding was associated with negative breastfeeding outcomes.


Abstract: OBJECTIVE: To assess current breastfeeding practices in hospital in South Africa. DESIGN: Survey conducted by means of a postal questionnaire for hospitals and a questionnaire based on the baby-friendly initiative action folder for mothers. SETTING: All private and provincial hospitals according to the 1992 address list supplied by the Department of National Health: Readers of “Living and Loving” and breastfeeding liaison groups. MAIN OUTCOME MEASURE: The level of implementation of the “Ten Steps to Successful Breastfeeding” RESULTS: Less than half of the responding hospitals reported having a written breastfeeding policy. Most hospitals have a shortage of specialized training in the support of breastfeeding. This is consistent with the outcome of the maternal questionnaire indicating that the average hospital is not baby friendly. CONCLUSIONS: A concerted effort should be made by hospitals to implement the “Ten Steps to Successful Breastfeeding” and attention should be given to building breastfeeding skills into the curriculum for medical students, nurses and allied disciplines as well as in-service training for current health care workers.

Abstract: In Africa, more than 95% of infants are currently breastfed, but feeding practices are often inadequate: feeding water, and other liquids, to breastfed infants is a widespread practice. Consequently, the rate of exclusive breast-feeding is low, particularly in West Africa. The rate of bottle-feeding is high in some countries (exceeding 30% in Tunisia, Nigeria, Namibia and Sudan). Nevertheless prolonged breastfeeding is common, and the median duration of breastfeeding ranges between 16 and 28 months. Urbanization and mothers' education are the major factors that tend to shorten breastfeeding. Nevertheless recent trends show an increase in early initiation and in duration of breastfeeding as a result of promotion efforts deployed by WHO and Unicef, local governments, and non-governmental organizations. The importance of breastmilk as a food resource of African countries is generally not recognized. In 31 countries where data on prevalence of breastfeeding are available, consumption of breastmilk by children under three years is estimated at 3.5 million tons per year. The AIDS epidemic could threaten breastfeeding because the virus can be transmitted through breastmilk, as demonstrated by numerous studies. A study suggests that feeding breastmilk and other liquids to infants could be the feeding mode associated with the highest rate of transmission. To prevent mother-to-child transmission of HIV, WHO recommends replacement feeding if it is feasible and safe. Otherwise, mothers are encouraged to practice exclusive breastfeeding for the first months of life followed by early and rapid weaning. The feasibility of replacement feeding with breastmilk substitutes, however, is very uncertain. In a study where free substitutes were given to HIV-positive mothers, the mortality of the formula-fed infants was the same as that of the breastfed infants. HIV-positive mothers may find it difficult to cope with the constraints of replacement feeding, in terms of cost, workload and time, and with the additional health care needs of non-breastfed infants. Exclusive breastfeeding for a few months could carry a lower risk of death than replacement feeding. But success in promoting exclusive breastfeeding has been limited in Africa, and new promotion methods are needed. Infants of all mothers, whether HIV-positive or not, will benefit from improving the rate of exclusive breastfeeding. The major problem is to ensure that early and rapid weaning, between 4 and 6 months, does not have a negative impact on the child's health. Early weaning is known to increase susceptibility to infections and can cause malnutrition. The feasibility and safety of this recommendation will have to be monitored carefully. A strong determination of African governments to promote exclusive breastfeeding among all mothers and to protect prolonged breastfeeding among non-infected mothers will limit the mother-to-child transmission of HIV while preserving the benefits of breastfeeding.


Abstract: Although biochemical evidence seems to support the fact that more DHA is incorporated into the brain of breastfed infants compared with formula-fed infants, whether the levels of DHA in the brain are clinically significant is unclear. Because randomized trials cannot be done, this issue is difficult to study. The effects of breastfeeding on developmental outcome in term infants seems to be small or insignificant. For otherwise healthy children the potential differences are not clinically relevant; however, these small differences distributed over an entire
population might have a significant effect on society. Although significant methodologic concerns exist, the effects of breastfeeding on preterm infants may be greater than those for term infants. Extremely low birth weight, premature infants (<750–1000g) have been found to have IQs that are 13 points lower than term controls and a 50% to 60% risk for requiring special-education services when they are in school. In these infants, small improvements in IQ and neurologic function could have a much greater effect. Further study of neurodevelopmental outcome in premature infants fed breast milk compared with those fed preterm formula are indicated. This information should not change the practice of encouraging breastfeeding of term and preterm infants because other advantages to breastfeeding exist.


**Abstract:** OBJECTIVE: To examine the association between duration of breast milk feeding and cognitive ability at 7–8 years in a birth cohort of very low birthweight infants. DESIGN: 280 survivors from a national birth cohort of 413 New Zealand very low birthweight infants born in 1986 were assessed at age 7–8 years on measures of verbal and performance intelligence quotient (IQ) using the WISC-R. At the same time mothers were questioned as to whether they had elected to provide expressed breast milk at birth and the total duration of breast milk feeding. RESULTS: Some 73% of mothers provided expressed breast milk and 37% breast fed for four months or longer. Increasing duration of breast milk feeding was associated with increases in both verbal IQ (p<0.001) and performance IQ (p<0.05): children breast fed for eight months or longer had mean (SD) verbal IQ scores that were 10.2 (0.56) points higher and performance IQ scores that were 6.2 (0.35) points higher than children who did not receive breast milk. These differences were substantially reduced after control for selection factors associated with receipt of breast milk. Nevertheless, even after control for confounding, there remained a significant (p<0.05) association between duration of breast milk feeding and verbal IQ: children breast fed for eight months or longer had adjusted mean (SD) verbal IQ scores that were 6 (0.36) points higher than the scores of those who did not receive breast milk. CONCLUSIONS: These findings add to a growing body of evidence to suggest that breast milk feeding may have small long term benefits for child cognitive development.


**Abstract:** Protection against neonatal sepsis by breast feeding was investigated in a developing community. A case-control study was carried out with 42 cases from a hospital and 270 controls, matched for age and socioeconomic conditions from the community. Exclusive breast feeding was extremely rare, most babies being partially breast fed and a few being given formula feed or animal milk. A highly significant odds ratio of 18 was obtained, showing that even partial breast feeding protects against neonatal sepsis in such a population.

Abstract: AIM: To examine whether duration of breast feeding has any effect on a child’s cognitive or motor development in a population with favourable environmental conditions and a high prevalence of breast feeding. METHODS: In 345 Scandinavian children, data on breast feeding were prospectively recorded during the first year of life, and neuromotor development was assessed at 1 and 5 years of age. Main outcome measures were Bayley’s Scales of Infant Development at age 13 months (Mental Index, MDI; Psychomotor Index, PDI), Wechsler Preschool and Primary Scales of Intelligence (WPPSI-R), and Peabody Developmental Scales at age 5. RESULTS: Children breast fed for less than 3 months had an increased risk, compared to children breast fed for at least 6 months, of a test score below the median value of MDI at 13 months and of WPPSI-R at 5 years. Maternal age, maternal intelligence (Raven score), maternal education, and smoking in pregnancy were significant confounders, but the increased risk of lower MDI and total IQ scores persisted after adjustment for each of these factors. We found no clear association between duration of breast feeding and motor development at 13 months or 5 years of age. CONCLUSION: Our data suggest that a longer duration of breast feeding benefits cognitive development.


Abstract: BACKGROUND: Despite the numerous studies on the possible protective effect of breast-feeding against the onset of atopic dermatitis during childhood, this issue remains controversial. OBJECTIVE: We conducted a systematic review with meta-analysis of prospective studies that evaluated the association between exclusive breast-feeding during the first 3 months after birth and atopic dermatitis. METHODS: A comprehensive search of the 1966–2000 MEDLINE database and review of the reference lists of relevant articles identified 18 prospective studies that met the predefined inclusion criteria. By means of a standardized approach, 2 of the investigators independently assessed the methodologic quality of the studies, duration and exclusivity of breast-feeding, outcome measures, and control for potential confounding factors. The same approach was applied during data abstraction and evaluation of the estimates of association. Summary measures of association were then calculated. RESULTS: The summary odds ratio (OR) for the protective effect of breast-feeding in the studies analyzed was 0.68 (95% confidence interval [CI], 0.52–0.88). This effect estimate was higher in the group of studies wherein children with a family history of atopy were investigated separately (OR=0.58; CI, 0.41–0.92) than in those of combined populations (OR=0.84; CI, 0.59–1.19). A small subset of studies of children without a history of atopy in first-degree relatives showed no association between breast-feeding and the onset of atopic dermatitis (OR=1.43; CI, 0.72–2.86). CONCLUSION: Exclusive breast-feeding during the first 3 months of life is associated with lower incidence rates of atopic dermatitis during childhood in children with a family history of atopy. This effect is lessened in the general population and negligible in children without first-order atopic relatives. Breast-feeding should be strongly recommended to mothers of infants with a family history of atopy, as a possible means of preventing atopic eczema.

Abstract: BACKGROUND: The protective effect of breast-feeding on the development of childhood asthma remains a matter of controversy. We conducted a systematic review of prospective studies that evaluated the association between exclusive breast-feeding during the first 3 months after birth and asthma. STUDY DESIGN: We searched the 1966–1999 MEDLINE database and reviewed reference lists of relevant articles to identify 12 prospective studies that met pre-stated inclusion criteria. Methodological aspects of the studies, duration and exclusivity of breast-feeding, and outcomes were assessed. Effect estimates were abstracted by the investigators, using a standardized approach. RESULTS: The summary odds ratio (OR) for the protective effect of breast-feeding was 0.70 (95% CI 0.60 to 0.81). The effect estimate was greater in studies of children with a family history of atopy (OR=0.52) than in studies of a combined population (OR=0.73). CONCLUSIONS: Exclusive breast-feeding during the first months after birth is associated with lower asthma rates during childhood. The effect, caused by immunomodulatory qualities of breast milk, avoidance of allergens, or a combination of these and other factors, strengthens the advantage of breast-feeding, especially if a family history of atopy is present.


Abstract: The BFHI is a global UNICEF/WHO-sponsored effort to promote breastfeeding by ensuring that all women are provided with sound information regarding their infant feeding choices and that those who elect to breastfeed their infants are given physiologically sound, evidence-based advice and skilled assistance prenatally and as they begin nursing their infants during their postpartum hospital or birth center stay. The initiative is based on ten policy or procedure statements, The Ten Steps, which were jointly developed and published in 1989 by the sponsoring agencies in consultation with international experts. In 1990, the Ten Steps were accepted as the central theme of the Innocenti Declaration and, later that year, endorsed at the World Summit on Children. In 1992, UNICEF and WHO launched a major international campaign to encourage all hospitals with maternity services to accept the Ten Steps as basic maternity and newborn infant care policies and procedures. These Ten Steps were reviewed briefly in this article. Official designation as Baby Friendly requires a careful assessment completed by a trained external team to confirm that the institution is truly carrying out all Ten Steps and conforming to the International Code of Marketing of Breastmilk Substitutes. During the 8 years since the initiative began, more than 15,000 hospitals in 136 countries have been designated as Baby Friendly. Twenty-seven of these officially designated institutions are in the United States, where the campaign has been active only since 1996. The BFHI is considered
one of the most successful international efforts ever performed to protect, promote, and support breastfeeding. Although it does not ensure that mothers will aspire to or achieve the widely accepted goal of approximately 6 months of exclusive breastfeeding, it helps mothers to initiate exclusive nursing, an essential step in the right direction.


Abstract: An analysis of the role of social support in influencing breastfeeding in a low socioeconomic area in South Australia was undertaken by examining infant feeding attitudes and experiences of mothers, fathers and grandmothers as well as the general community. A random telephone survey of over 3,400 adults (including a more extensive survey of 373 mothers, fathers and grandmothers in the sample) in this area indicated that there was little support for breastfeeding compared to bottle-feeding with similar barriers to breastfeeding found in all target groups as well as the general community. These included breastfeeding in public, the convenience of bottle-feeding, maternal discomfort of breastfeeding, the support required for breastfeeding, fathers’ involvement with feeding, and a mother’s previous experience of breastfeeding. Strategies promoting and supporting breastfeeding should address these issues and should be directed at the community in general rather than specific groups within the community.


Abstract: The efficacy of limited volumes of colostrum (10mL) administered three times a day in the prevention of infection was evaluated in 33 high risk low birth weight infants (group I) who were compared with 33 matched controls (group II). Infections were found to be significantly less (p<0.01) in group I.


Abstract: OBJECTIVES: To explore the extent to which acculturation indicators predict both breast-feeding history and intentions among Mexican-American mothers having their first births, and among those having subsequent births. DESIGN: Cross-sectional survey in a hospital postpartum unit. METHODS: 3,036 Hispanic women were interviewed post-partum in their hospital room. A survey was administered in English or Spanish, and included questions about prenatal care, diet, work exposures, contraceptive use, and breast-feeding history and intentions. For the purposes of this study, acculturation was measured using a series of indicators including language spoken at home, language ability, country of birth, and country in which last schooling was received. RESULTS: Previous breast-feeding was significantly associated with educational
attainment, speaking both English and Spanish at home, having had prenatal care during the previous pregnancy, and with both country variables (country of birth and country where finished school). Women with less education, women who were single, and women who did not receive any prenatal care were less likely to intend to breast-feed than were women with a college education, women with a partner, and women who received any prenatal care. Women born in Mexico (for multiparous women), or having finished school in Mexico (for primiparous women), were more likely to intend to breast-feed. CONCLUSIONS: Acculturation is associated with breast-feeding history and intention to breast-feed. Acculturation is a complex construct and traditional measures of acculturation based on language preference may not be as useful on the US-Mexico border. It is recommended that further study be conducted to determine what factors prevent women from breast-feeding, even though they intend to do so, especially in multi-cultural communities like those around the US-Mexico border.


Abstract: This paper comprises 261 low birth weight infants who were divided into four groups with different feeding schedules. Group I: expressed human milk for all the feeds; Group II: human milk for half the feeds and the nursery formula for the rest; Group III: colostrum, 20 ml three times a day along with the nursery formula; and Group IV: control—only the nursery formula. The groups were matched by means of a randomized block design for identifiable factors which could predispose to the occurrence of infection. Infections were found to be significantly less in the groups which received human milk (p less than 0.001).


Abstract: Some neonatal units are introducing use of cup and traditional feeding devices for feeding young infants although they have not been evaluated objectively. Hence this controlled trial of the use of the bottle, cup and a traditional feeding device (‘paladai’) was undertaken in neonates. Method: The study comprised of 100 infants including full-term normal weight infants (n=66), term growth retarded infants (n=20), and preterm infants (n=14). All three methods were tried on every infant by the same nurse for a particular baby, so that each infant served as his/her control in order to avoid the effect of major influencing factors. Parameters evaluated were the volume ingested, duration of the feed, degree of spilling and satiety. Results: The infants took the maximum volume in the least time and kept quiet longest with the paladai. The findings were particularly significant in the group including all the categories of infants. Spilling was the highest with the cup, especially with preterm infants.

Abstract: OBJECTIVE: To compare the safety of cupfeeding, an alternative feeding method, to bottlefeeding, the current standard of artificial feeding in the United States, in preterm infants whose mothers intend to breastfeed. STUDY DESIGN: In a prospective, randomized crossover study, 56 infants \(<\text{or}=34\) weeks at birth, whose mothers indicated a desire to breastfeed, were studied. Skin-to-skin care and attempts at breast were encouraged frequently when babies were physiologically stable. When infants were \(>\text{or}=34\) weeks’ corrected gestational age, the order of the first two non-breast oral feedings was randomized by coin toss to one cupfeeding and one bottlefeeding. Trained Neonatal Intensive Care Unit nurses provided the feedings. Heart rate, respiratory rate, and oxygen saturation were recorded at 1-minute intervals for 10 minutes before and during the feeding. Volume taken, time required to complete the feed, and any apnea, bradycardia, choking, or spitting episodes were recorded. RESULTS: Heart rate \((p<0.0001)\) and respiratory rate \((p<0.0001)\) increased and oxygen saturation decreased \((p=0.0002)\) during both cup and bottlefeedings compared to pre-feeding baselines. The amount of change in these three parameters from baseline to feeding period was similar for both feeding methods. The fraction of \(O(2)\) saturation \(<90\%\) during baseline compared to the study period was different between these two feeding methods \((p=0.02)\). There was a 10-fold increase in desaturations \(<90\%\) during bottlefeeds compared to no change during cupfeeds. When comparing cupfeeding periods to bottlefeeding periods, heart rates were higher \((p=0.009)\) and oxygen saturations lower \((p=0.02)\) during bottlefeeds. There were no differences between methods in respiratory rate, choking, spitting or apnea, and bradycardia. Volumes taken were lower \((p=0.001)\) and duration of feeds longer \((p=0.002)\) during cupfeedings. CONCLUSION: During cupfeedings, premature infants are more physiologically stable, with lower heart rates, higher oxygen saturations, and less desaturations, than during bottlefeedings. However, cupfed infants took less volume, over more time, than bottlefed for these initial feedings. Based on better physiologic stability and no difference in untoward effects, cupfeeding is at least as safe, if not safer, than bottlefeeding in this population. This study supports the use of cupfeeding as a safe alternative feeding method for premature infants learning to breastfeed.
Low Birth Weight and Prematurity


Abstract: OBJECTIVE: To ascertain whether adjuvant ampicillin and metronidazole given to women in preterm labour with intact membranes would prolong pregnancy and decrease the perinatal mortality and morbidity. DESIGN: A multicentre, prospective, randomised controlled trial. SETTING: Three perinatal centres serving an indigent population. SUBJECTS: Eighty-one women in active preterm labour with otherwise uncomplicated singleton pregnancies between 26 and 34 weeks gestation or an ultrasound fetal weight estimate of 800 g to 1,500g. INTERVENTIONS: The study group received ampicillin and metronidazole for five days. The control group received no antibiotics. In all women contractions were suppressed with hexoprenaline and indomethacin for 24 h, and betamethasone was given for fetal lung maturity. MAIN OUTCOME MEASURES: Days gained and perinatal mortality and morbidity. RESULTS: The study (n=43) and control groups (n=38) were comparable at entry. In those receiving ampicillin and metronidazole the pregnancy was significantly prolonged (median 15 days versus 2.5 days, P=0.04) with significantly more women still pregnant after seven days (63% versus 37%, P=0.03, OR 0.34 95% CI 0.13–0.94). Significantly more infants in the control group developed necrotising enterocolitis than in the study group (5 versus 0, P=0.02). CONCLUSION: Adjuvant ampicillin and metronidazole in the management of women in preterm labour with intact membranes significantly prolonged the pregnancy and decreased neonatal morbidity.


Abstract: This paper describes a simple method of assessing maturity that can be use in peripheral facilities and by community health workers who see the newborn baby in the first 2–3 days after birth. At these sites, it is really necessary to identify only two cut of points, namely <37 weeks of gestation prior to which risks are higher and about 34 weeks of gestation below which morbidity and mortality are still greater.

Method: Note the size of the breast nodule (not the nipple). Evaluate the nodule by picking it up between the thumb and index finger. The size can be noted against a small scale or ruler. Mature infants with normal growth have nodules above 0.5 cm.

If the nodule is 0.5 cm or less, the baby is premature (less than 37 weeks) and / or growth retarded as intrauterine growth retardation also reduces the breast nodule. This itself will identify a high risk category. However, further information on maturity can be had by noting the sole creases. If the sole creases cover more than 1/3–1/2 the sole, the baby is mature. If the creases are only in the front portion within 1/3 of the sole the baby is premature—less than 37 weeks.

If the breast nodule is absent the baby is preterm—less than 34 weeks and / or growth retarded. Where the breast nodule is absent both the categories of preterm and growth retarded babies are very high risk and need referral for special care.
This method is also useful for junior medical and nursing staff and new recruits in hospitals for identifying such babies needing a more in-depth evaluation by a more trained person.


**Abstract:** Considerable controversy exists over the definition of low birthweight (LBW). In 1976 the World Health Organization changed the definition from “2500g or less” to “less than 2,500g” (1). This, while having some advantages, has resulted in inconsistency in the documentation of results in different surveys. Most studies have followed the older definition (2).

Low birthweight constitutes a significant problem in the Third World but the priority it is accorded and the effort and resources expended on different weight and gestational age groups varies with circumstances. In underprivileged areas there is a need to concentrate efforts on the larger and more mature of the LBW infants who stand some chance of survival.


**Abstract:** BACKGROUND: Small-for-gestational-age (SGA) term infants are at risk of long-term growth deficits. OBJECTIVE: The objectives were to test the hypothesis that postnatal growth in SGA term infants can be altered by dietary intervention and to examine whether there is a critical window for nutritional programming of the growth trajectory during the first 9 mo postnatally. DESIGN: Healthy term (gestation > or =37 wk) infants with birth weights below the 10th centile were randomly assigned to receive standard term formula (TF; n=147) or nutrient-enriched formula (EF; n=152) for the first 9 mo; 175 breast-fed SGA term infants formed a reference group. The main outcome measures were weight, length, and occipitofrontal head circumference (OFC) at 9 and 18 mo. RESULTS: The infants fed the EF showed greater gains in length by 9 (1.1cm; 95% CI: 0.38, 1.79) and 18 (1.0cm; 0.25, 1.83) mo and in OFC by 9 (0.5 cm; 0.1, 0.9) and 18 (0.6cm; 0.2, 1.1) mo than did infants fed the TF; the differences were larger in females. The dietary effects were independent of the pattern of growth retardation. Breast-fed infants showed greater gains in weight and OFC by 18 mo than did infants fed the TF; however, these differences disappeared after adjustment for age, parental size, and birth order. CONCLUSIONS: Linear growth and OFC gains in SGA term infants improve after nutritional intervention during the first 9 mo of life and the effects persist for > or =9 mo beyond the intervention period. Further information on whether catch-up growth is beneficial or detrimental to long-term outcomes is required before public health interventions can be recommended.


**Abstract:** This study examines the value of head-, chest- and mid-upper arm circumference (MUAC), and crown-to-coccyx length as a screening method for low birth weight. Results are presented of 2,710 consecutive live births, excluding infants with severe congenital
abnormalities. Chest circumference \((r=0.84)\) and MUAC \((r=0.79)\) correlated best with birth weight. Variance in birth weight was explained by chest circumference in 70\%, while a model including all variables accounted for 79\%. At a cut-off level of 30.0 cm for chest circumference, detection rate for birth weight below 2,500g and 2,000g was 67\% and 96\%, respectively, while false-positive rate was 3 and 10\%. At a cut-off level of 9.0 cm for MUAC, detection rate for birth weight below 2,500 and 2,000g was 72\% and 95\%, respectively, while false-positive rate was 8\% and 15\%. Chest circumference is recommended as the first stage screening method of choice for LBW, when no weighing scale is available.


**Abstract:** In an earlier study usefulness and validity of calf circumference in the identification of low birth weight (LBW) infants was reported. To evolve a simple indicator in identifying LBW in community, comparative evaluation of three simple measurements, i.e., circumferences of calf (CC), thigh (TC) and arm (AC) was done with respect to their sensitivity and specificity. Though all the three measurements showed a high degree of correlation with the birth weight, calf circumference tended to be most sensitive in identifying almost 95\% of LBW infants. Having established the superiority of CC, a two color tape demarcating LBW zone from normal birth weight using 10 cm CC as cut off point was tested by two independent investigators and two ANMs. It was observed that only 5\% of cases were misclassified either as LBW or normal weight by the tape with hardly any inter individual variation. Measurement of calf circumference being simple and easy even in the hands of paramedics, it would be used as indicator of LBW and neonatal mortality in the community.


**Abstract:** A cohort of 5,914 liveborns (99\% of the city births) was followed up to the age of 4 years in Pelotas, southern Brazil. Besides the perinatal evaluation, the cohort children were examined again at mean ages of 11, 23, and 47 months. During each visit the children were weighed and measured and information on morbidity was collected. Also, multiple sources of information were used for monitoring mortality throughout the study. Of the babies with known gestational age, 9.0\% were classified as intrauterine growth-retarded and 6.3\% as preterm. Excluding those of unknown gestational age, 62\% of low birth weight babies were intrauterine growth-retarded and 36\% were preterm. Intrauterine growth retardation was statistically associated with maternal height, pre-pregnancy weight, birth interval, and smoking, whereas preterm births were associated with maternal pre-pregnancy weight and maternal age. Preterm babies had a perinatal mortality rate 13 times higher than that of babies of appropriate birth weight and gestational age and 2 times higher than that of intrauterine growth-retarded babies. Infant mortality rates presented a similar pattern, with the differentials being more pronounced during the neonatal than in the postneonatal period. In the first 2 years of life intrauterine growth-
retarded children were at almost twice the risk of being hospitalized for diarrhea compared with appropriate birth weight, term children, while preterm children experienced only a slightly greater risk. For pneumonia, however, both groups of children were hospitalized significantly more than appropriate birth weight, term children. In terms of growth, despite their earlier disadvantage, preterm children gradually caught up with their appropriate birth weight, term counterparts. (ABSTRACT TRUNCATED AT 250 WORDS).


Abstract: To introduce an unfamiliar procedure into a neonatal unit is undoubtably a challenge, particularly if it is seen as time consuming. Our experience, however, suggests that the time taken in cup feeding can vary as widely as the time taken for the bottle or tube feeding, and by teaching the skill to parents, health professionals are free to attend to other tasks. Helping a mother and infant to establish breastfeeding in a neonatal unit is also not a quick or easy task and any safe measure that will contribute to a successful outcome should be used. Cup feeding is one such measure, which in addition allows the introduction of a ‘no-bottle’ policy where appropriate. Cup feeding is an alternative method of feeding that broadens the options available to both parents and health professionals, who may require unconventional solutions to difficult feeding situations. Cup feeding should be seriously considered for use in neonatal and transitional care units.


Abstract: Preterm, low-birthweight (LBW) newborn infants are at high risk of neonatal mortality and morbidity and need early referral for special paediatric care. In developing countries, birthweight and gestational age often cannot be measured and a practical screening tool based on surrogate neonatal body measurements to identify high-risk infants would be very useful. We studied a consecutive series of 843 singleton infants born at a referral hospital in Addis Ababa, Ethiopia. Gestational age, birthweight, and four body measurements (chest, head, and mid-arm circumferences and length) were accurately recorded. We randomly divided the series into equal-sized training and validation groups. In the training group, we used a recursive partitioning technique to develop a simple predictive algorithm—infants were classified as high risk if head circumference was 31 cm or less or if chest circumference was 30 cm or less, and were classified as low risk otherwise. When tested in the validation group, this algorithm had sensitivity, specificity, and negative predictive value for prediction of preterm and LBW births above 90%. Thus, neonatal body measurements can be combined into a pragmatic, accurate screening tool suitable for clinical use in developing countries.

**Abstract:** OBJECTIVE: To determine whether the link suggested between growth in utero and during infancy and death from cardiovascular disease in men is also present in women.

DESIGN: Follow up study of women and men whose birth weight and weight at 1 year of age had been recorded. SETTING: Hertfordshire, England. SUBJECTS: 5,585 women and 10,141 men born during 1911–30. MAIN OUTCOME MEASURES: Standardised mortality ratios for cardiovascular disease. RESULTS: Among women and men death rates from cardiovascular disease fell progressively between the low and high birth weight groups (chi 2 = 4.3, p = 0.04 for women, chi 2 = 8.5, p < 0.005 for men). Cardiovascular deaths in men but not women were also strongly related to weight at 1 year, falling progressively between the low and high weight groups (chi 2 = 27.5, p < 0.0001). The highest cardiovascular death rates in women were among those with below average birth weight but above average weight at 1 year. In men the highest rates were among those with below average birth weight and below average weight at 1 year. CONCLUSION: Relations between cardiovascular disease and birth weight are similar in men and women. In men cardiovascular disease is also related to weight gain in infancy.


**Abstract:** This review aims to quantify the risks of mortality and morbidity associated with intrauterine growth retardation (IUGR). Twenty-nine data sets with birth-weight-specific mortalities are examined to determine whether consistent patterns of risk emerge when data from different populations are compared. Measures of mortality risk are also made with birth weight as a dichotomous variable. Twelve data sets are presented. From the data available, it is estimated that for term infants weighing 2,000–2,499g at birth, the risk of neonatal death is 4 times higher than for infants weighing 2,500–2,999g, and 10 times higher than for infants weighing 3,000–3,499g. The risk of postneonatal death in term infants weighing 2,000–2,499g is estimated to be 2 times higher than for infants 2,500–2,999g, and 4 times that of infants weighing 3,000–3,499g. Estimates of risk for IUGR infants are less consistent than for preterm infants. This could be due to methodological differences, particularly smaller sample sizes in the studies in developing countries, or may reflect real variation in risk. The latter may be associated with the heterogeneity of IUGR across populations, or to varying risks depending, for example, on which infections predominate or infant age at peak prevalence. IUGR is most prevalent in developing countries and the review therefore focuses on morbidity from diarrhoeal and respiratory infections. Data from nine studies are presented. There is an increased risk of diarrhoea in term infants <2500g and an increased risk of pneumonia. The risks of morbidity and mortality appear to differ depending on whether infants are wasted or stunted at birth. Stunted infants of low birth weight have higher neonatal mortality than wasted newborns, but this could be due to inclusion of infants with congenital anomalies who are often stunted. Wasted infants are more prone than stunted infants to neonatal morbidity. No comparative postneonatal data were located.

Abstract: Studies of the long-term effects of intrauterine growth retardation on mental performance and behavior are reviewed. The results of the majority of studies suggest that, if effects of prematurity and of other associated complicating factors are controlled for, effects of IUGR per se, that can sometimes be demonstrated at an earlier age, become diluted by socio-environmental conditions at later stages in life and no longer appear to have a detrimental effect on mental and behavioral outcomes in adolescence and adulthood.


Abstract: Breast milk intake, urine volume and urine-specific gravity (USG) of exclusively breastfed, low birthweight (LBW) term male infants in Honduras were measured during 8-h periods at 2 (n=59) and 8 (n=68) wk of age. Ambient temperature was 22–36 degrees C and relative humidity was 37–86%. Maximum USG ranged from 1.001 to 1.012, all within normal limits. CONCLUSIONS: We conclude that supplemental water is not required for exclusively breastfed, LBW term infants, even in hot conditions.


Abstract: OBJECTIVE: To discover whether reduced fetal and infant growth is associated with non-insulin dependent diabetes and impaired glucose tolerance in adult life. DESIGN: Follow up study of men born during 1920–30 whose birth weights and weights at 1 year were known. SETTING: Hertfordshire, England. SUBJECTS: 468 men born in east Hertfordshire and still living there. MAIN OUTCOME MEASURES: Fasting plasma glucose, insulin, proinsulin, and 32–33 split pro-insulin concentrations and plasma glucose and insulin concentrations 30 and 120 minutes after a 75g glucose drink. RESULTS: 93 men had impaired glucose tolerance or hitherto undiagnosed diabetes. They had had a lower mean birth weight and a lower weight at 1 year. The proportion of men with impaired glucose tolerance fell progressively from 26% (6/23) among those who had weighted 18lb (8.16kg) or less at 1 year to 13% (3/24) among those who had weighed 27lb (12.25kg) or more. Corresponding figures for diabetes were 17% (4/23) and nil (0/24). Plasma glucose concentrations at 30 and 120 minutes fell with increasing birth weight and weight at 1 year. Plasma 32–33 split proinsulin concentration fell with increasing weight at 1 year. All these trends were significant and independent of current body mass. Blood pressure was inversely related to birth weight and strongly related to plasma glucose and 32–33 split proinsulin concentrations. CONCLUSIONS: Reduced growth in early life is strongly linked with impaired glucose tolerance and non-insulin dependent diabetes. Reduced early growth is also related to a raised plasma concentration of 32–33 split proinsulin, which is interpreted as a sign of beta cell dysfunction. Reduced intrauterine growth is linked with high blood pressure, which may explain the association between hypertension and impaired glucose tolerance.

Abstract: Current knowledge on associations between variations in fetal growth on the one hand and blood pressure, noninsulin dependent diabetes, coronary heart disease and cancer in adulthood on the other is reviewed and related to more conventional preoccupations of perinatal epidemiology. Commonly used definitions and indicators of impaired fetal growth, possible explanations and mechanisms of the association between fetal growth impairment and later disease, and the concept and operational definitions of programming are discussed. Implications and research priorities that can be derived from this information are presented.


Abstract: The primary observations on the relations between size in early life and adult disease are of great interest and clearly require explanation. Although the fetal origins hypothesis is plausible, and is likely to be pertinent to some epidemiological observations, evidence cited for it is often flawed because of misinterpretation and inappropriate analysis of growth data. Previous flaws in interpretation may have deflected attention from potentially important areas of postnatal development that could prove influential for adult health. The most robust test of either the fetal or postnatal origins hypotheses is the randomised intervention study, which has proved, at least in some areas, to be feasible. Until such studies are performed, the problem of proving causation using correlative analyses of early size and later outcome will remain. These issues have never been clearly stated before, and published studies have not generally taken them into account. We recommend that each of the models we discuss above is clearly shown in future publications and that the interpretation of results takes account of the arguments we raise.


Abstract: The aim of this study was to evaluate postnatal examination of the newborn by nurses in a developing country, using a modified Ballard method, scoring for the six external criteria only (Ballard-ext). Applicability of gestational age estimates with the Ballard-ext. was assessed by calculating its agreement with gestational age derived from the last menstrual period (LMP), fundal height and the Dubowitz method. The smallest difference in gestational age and the most narrow limits of agreement were found between the Ballard-ext. and the Dubowitz method. No reliable gestational age could be obtained from LMP or fundal height. At low gestational ages, Ballard-ext. tended to give lower gestational ages compared with the Dubowitz method. At an average gestational age of more than 251 days, Ballard-ext. gave higher values compared with Dubowitz. Both Ballard-ext. and the Dubowitz method identified 48% of low birthweight babies as growth-retarded (gestational age > or = 37 weeks). No significant difference in gestational age assessment of newborns between nurses was observed. The Ballard method, scoring for external criteria alone, compared favourably with the Dubowitz method. The test is simple to perform and can be reliably used routinely by nurses.

Abstract: OBJECTIVE: To see whether reduced rates of fetal growth are related to raised serum cholesterol concentrations in adult life. DESIGN: Follow up study of men and women whose size at birth had been recorded. SETTING: Jessop and Northern General Hospitals, Sheffield. SUBJECTS: 219 men and women born in the Jessop Hospital during 1939–40. MAIN OUTCOME MEASURES: Serum concentrations of total cholesterol, low density lipoprotein cholesterol, and apolipoprotein B. RESULTS: Men and women who had had a small abdominal circumference at birth had raised serum concentrations of total and low density lipoprotein cholesterol and apolipoprotein B. This was independent of the duration of gestation. Serum concentrations of total cholesterol fell by 0.25 mmol/l (95% confidence interval 0.09 to 0.42) with each 1 in (2.54 cm) increase in abdominal circumference. The corresponding figure for serum low density lipoprotein cholesterol was 0.26 mmol/l (0.11 to 0.42) and for serum apolipoprotein B 0.04 g/l (0.02 to 0.07). Small head and chest circumferences at birth and short length were each associated with raised serum low density lipoprotein cholesterol concentrations but the trends disappeared in a simultaneous regression with abdominal circumference at birth. The association between abdominal circumference at birth and low density lipoprotein cholesterol concentration was independent of social class, current body weight, cigarette smoking, and alcohol consumption. CONCLUSION: Raised serum cholesterol concentrations in adult life are associated with impaired growth during late gestation, when fetal undernutrition has a disproportionate effect on liver growth. Impaired liver growth may permanently alter low density lipoprotein cholesterol metabolism.


Abstract: The association between birth weight and infant mortality from infectious diseases was investigated in a population-based case-control study in two urban areas in southern Brazil. All deaths of children, seven to 364 days of age, occurring in a year were studied and the parents of the 357 infants dying of an infectious cause were interviewed, as were the parents of two neighborhood control infants for each case. Low birth weight infants (less than 2,500 g) were found, after allowing for confounding factors, to be 2.3 (90% confidence interval = 1.6 to 3.4) times more likely to die of an infection than those of higher birth weight. The odds ratios were 2.0 (1.1 to 3.6) for deaths due to diarrhea, 1.9 (1.0 to 3.6) for respiratory infections, and 5.0 (1.3 to 18.6) for other infections. These estimates of the risks associated with low birth weight are considerably lower than those from studies in developed countries.

**Abstract:** OBJECTIVE: To examine factors that predict the initiation of expressed milk feedings and the transition to direct breastfeeding among mothers of very low birth weight (VLBW) infants. METHODS: The sample consists of 361 mother-infant pairs enrolled in a follow-up study of children aged 6 to 8 years who were born weighing <1501 g in 1 of 5 hospitals between 1991–1993. Chart review at birth provided data on neonatal characteristics and demographic factors at delivery were obtained by postpartum maternal interview. Information regarding infant feeding practices was obtained at follow-up. RESULTS: In this study, 60% of mothers initiated expressed milk feedings for their VLBW infants. However, the duration of these feedings was brief with 52% of infants receiving 1 to 3 months or less of human milk feedings. Greater educational attainment, private insurance, and breastfeeding experience were each independently associated with the decision to provide expressed milk feedings. Only 27% of mothers reported directly breastfeeding their VLBW infants. The transition from expressed milk feedings to direct breastfeeding was positively associated with sociodemographic factors including maternal age, insurance status, and breastfeeding experience as well as the length of hospitalization, an indicator of infant health. CONCLUSIONS: Sociodemographic factors were associated with both the decision to initiate expressed milk feedings and the transition to direct breastfeeding. However, factors relating to infant health only influenced the transition to direct breastfeeding. Intervention programs need to consider the sociodemographic factors that influence infant feeding decisions as well as specific challenges encountered by mothers of VLBW infants.


**Abstract:** Over the past 30 years, a variety of intervention programs for the enhancement of the neurodevelopmental status of premature infants have been implemented with confusing outcomes. In addition, diametrically different forms of therapy that rest on contrasting theories have led, paradoxically, to similar results. This article systematically examines and analyses the various modes of therapy and their underlying theoretical mechanisms. Skin-to-skin contact (kangaroo care) is suggested as the intervention that most logically meshes the premature infant’s need to develop state regulation while facilitating sequential sensory development and promoting mother-infant attachment.


**Abstract:** Studies about effects of IUGR on growth in childhood as well as on body size, body composition and physical performance in adolescence and adulthood are reviewed. The review is based on 12 studies that distinguished IUGR from other types of low birthweight and compared outcomes of IUGR cases with those of non-IUGR controls. This information is complemented by results of a follow-up study of IUGR cases and controls carried out in...
Guatemalan adolescents and young adults. In Guatemala as well as in other countries, IUGR newborns showed partial catch-up growth during the first one or two years of life, and then maintained their achieved place in the growth distribution. Guatemalan IUGR cases were shorter, lighter and weaker than non-IUGR controls as adolescents and young adults. The differences in adult body size observed in Guatemala between cases and controls are similar to those found in more affluent countries (i.e. about 5cm in height and 5kg in weight).


Abstract: We have become accustomed to the idea that the major disorders of adult life, including coronary heart disease, stroke and diabetes, arise from an interaction between influences in our adult lifestyle and a genetically determined susceptibility. Recent research, however, suggests that growth in utero may also play an important role.


Abstract: The aim of this paper is to quantify the magnitude and describe the geographical distribution of intrauterine growth retardation (IUGR) in developing countries. We estimate that at least 13.7 million infants are born every year at term with low birth weight (LBW), representing 11% of all newborns in developing countries. This rate is approximately 6 times higher than in developed countries. LBW, defined as <2,500g, affects 16.4% of all newborns, or about 20.5 million infants each year. IUGR defined as birth weight below the 10th percentile of the birth-weight-for-gestational-age reference curve, represents 23.8%, or approximately 30 million newborns per year. Overall, nearly 75% of all affected newborns are born in Asia—mainly in South-central Asia—20% in Africa, and about 5% in Latin America. Although some of these are healthy, small infants who merely represent the lower tail of a fetal growth distribution, in most developing countries a large proportion of newborns suffer from some degree of intrauterine growth retardation. These data demonstrate that many developing countries currently exceed the internationally recommended IUGR (>20%) and LBW (>15%) cut-off levels for triggering public health action, and that population-wide interventions aimed at preventing fetal growth retardation are urgently required.


Abstract: Severe nursing shortage adds to the high mortality of low birthweight babies in developing countries. To study the efficacy of maternal nursing care we conducted a prospective matched case-control study. Outcome was compared in low birthweight babies nursed by mothers (mothers’ group, n=151, cases), versus professional nurses (nurses’ group, n=211, controls). Irrespective of condition on admission, weight gain was significantly higher (p<0.001) and overall mortality rate significantly lower (p<0.001) in the mothers’ group. Mortality was also lower in the mothers’ group for babies with pathological jaundice, skin/umbilical sepsis, and no disease except low birthweight (p<0.001). Intercurrent diarrhoea, aspiration pneumonia, and
septicaemia did not differ. Training mothers to nurse their low birthweight babies can significantly reduce mortality rates and decrease workload on nurses. Policy formulation using this approach can save costs in developing countries.


Abstract: This Policy Nutrition Paper summarizes the proceedings of the Low Birth weight (LBW) Symposium and Workshop held in Dhaka, Bangladesh, in June 1999 with a view of improving the Bangladesh Integrated Nutrition Program. Sessions focused on four themes: 1) epidemiology, causes, and consequences of LBW; 2) interventions to reduce LBW; 3) critical issues surrounding nutritional interventions to reduce LBW; and 4) improving outcomes with regard to LBW. LBW infants (<2500g) are at high risk for morbidity and mortality from infectious disease. LBW has multiple etiologies; however, prematurity and intrauterine growth retardation are the two main causes. In developing countries, the major determinants for LBW are poor maternal status at conception, low gestational weight gain due to inadequate dietary intake and short maternal stature. Data revealed that at least 17 million infants are born with LBW annually in developing countries. The workshop highlighted an urgent need to find answers on sustainable practices to improve women’s status prior to pregnancy, and their weight gain during pregnancy. It was concluded that LBW solutions require packages of interventions, and that these need to be incorporated into all antenatal health care programs and are to be expanded both in number in coverage. The identification of effective and practical interventions to prevent LBW and to improve the outcome of infants with LBW, including those with a strong behavioral change component, would have an enormous impact on the health and productivity of individuals and society.


Abstract: In developing countries, where about three quarters of births occur at home or in the community, logistic problems prevent the weighing of every newborn child. A study was performed to see whether other simpler measurements could be substituted for weight to identify neonates of low birth weight and those at risk. A study of 520 hospital births showed a strong correlation (p less than 0.001) between other anthropometric variables and birth weight, but the correlation was maximum for chest circumference (r=0.8696) and mid-arm circumference (r=0.8110). A mid-arm circumference of less than or equal to 8.7 cm and a chest circumference of less than or equal to 30 cm had the best sensitivity and specificity for identifying neonates with a birth weight of 2500 g or less. Measurements on 501 consecutive live births in the community were recorded and the infants followed up at specified ages. Mid-arm circumference was again significantly correlated to birth weight (r=0.6918). Neonatal mortality showed an inverse relation but postneonatal mortality an inconsistent relation with mid-arm circumference. A mid-arm circumference of less than or equal to 8.7 cm and a birth weight of less than or equal
to 2500 g were equally useful in predicting neonatal outcome. Mid-arm and chest circumferences are simple, practicable, quick, and reliable indicators for predicting low birth weight and neonatal outcome in the community and can be easily measured by paramedical workers in developing nations.


Abstract: In Bangladesh, like other developing countries, most births occur at home or in the community, so logistic problems and taboos prevent the weighing of every newborn child. This study was performed to see whether other simpler measurements could be substituted for weight to identify neonates of low birth weight. A total of 1,676 live births at the Chittagong Medical College Hospital constituted the study sample, and this showed a high correlation between mid-arm circumference and birth weight (r=0.792, p<0.000). A mid-arm circumference of <9.0cm had the best sensitivity and specificity for identifying newborns with a birth weight of less than 2500 g. These neonates were followed up to record neonatal deaths. Neonatal mortality showed an inverse relation with mid-arm circumference. A mid-arm circumference of <9.0cm and a birth weight of <2500g were equally useful in predicting neonatal outcome. Mid-arm circumference is a simple, quick and reliable indicator for predicting low birth weight and neonatal outcome, and can be easily measured by medical practitioners and traditional birth attendants (TBAs) in the community of developing countries like Bangladesh.


Abstract: Describes the design and findings of a multicentre study conducted to investigate the determinants and consequences of low birth weight in rural communities of three South Asian countries. India, Nepal and Sri Lanka were selected for the study in view of both their high levels of low birth weight and their wide differences in the availability and utilization of maternal and child health services. A simultaneous urban, hospital-based study was conducted in Nepal to obtain data on factors associated with low birth weight in a hospital setting.

Available at: http://www.who.int/dsa/cat98/mat8.htm#Multicentre Study


Abstract: OBJECTIVE: To ascertain the role of low birth weight (LBW) in neonatal mortality in a periurban setting in Bangladesh. METHODS: LBW neonates were recruited prospectively and followed up at one month of age. The cohort of neonates were recruited after delivery in a hospital in Dhaka, Bangladesh, and 776 were successfully followed up either at home or, in the event of early death, in hospital. FINDINGS: The neonatal mortality rate (NMR) for these infants was 133 per 1,000 live births (95% confidence interval: 110–159). The corresponding NMRs (and confidence intervals) for early and late neonates were 112 (91–136) and 21 (12–33) per thousand live births, respectively. The NMR for infants born after fewer than 32 weeks of
gestation was 769 (563–910); and was 780 (640–885) for infants whose birth weights were under 1500 g. Eighty-four per cent of neonatal deaths occurred in the first seven days; half within 48 hours. Preterm delivery was implicated in three-quarters of neonatal deaths, but was associated with only one-third of LBW neonates. CONCLUSION: Policy-relevant findings were: that LBW approximately doubles the NMR in a periurban setting in Bangladesh; that neonatal mortality tends to occur early; and that preterm delivery is the most important contributor to the NMR. The group of infants most likely to benefit from improvements in low-cost essential care for the newborn accounted for almost 61% of neonatal mortalities in the cohort.


Abstract: To overcome the logistic problems associated with weighing the newborn in the field, a study was undertaken to assess the usefulness of neonatal thigh circumference (TC) as an alternative to weight in identifying low birth weight infants. A strong correlation (P<0.001) between thigh circumference (r=0.9180), mid-arm circumference (MAC, r=0.8292) and birth weight was found in 216 hospital births. A TC of 14.7cm had a better sensitivity and specificity than a MAC of 8.4cm in identifying infants weighing <2500g. Similarly, a TC of 13.9cm has a better predictive value than a MAC of 8.0 cm in detecting infants < 2000g. TC appears to be a reliable and cost effective indicator for the identification of low birth weight babies in the field.


Abstract: The study was designed to detect early clinical predictors of developmental outcome in children with intrauterine growth retardation. Eighty-five children with intrauterine growth retardation were followed up prospectively to 3 years of age, using biometric parameters, perinatal risk questionnaires, and neurodevelopmental evaluations. Forty-two children served as controls. A significant difference in neurodevelopmental score at 3 years of age was noted between the intrauterine growth retardation and control groups (P<.001). In the intrauterine growth retardation group, the clinical parameters that most significantly correlated with outcome were cephalization index (head circumference:birthweight ratio), neonatal risk score, and birthweight. The best predictor of 3-year outcome was the cephalization index (P<.01). The children with intrauterine growth retardation with neonatal complications had significantly lower IQ scores (P<.05) and a poorer neurodevelopmental outcome (P<.01) than those without complications. Children with intrauterine growth retardation are at higher risk for developmental disabilities than are controls, especially in the presence of neonatal complications and a high cephalization index.

Abstract: To determine the extent to which newborn’s mid-upper-arm circumference (MUAC) could be used as a screening tool for low birth weight (LBW), we examined a total of 601 full-term singleton babies delivered at Temeke District Hospital in Dar es Salaam, Tanzania, between January and April 1992. The mean birth weight and standard deviation (SD) was 2826 (+/- 436) g and the MUAC (SD) 9.9 (+/- 0.8) cm with a correlation coefficient of 0.88 between MUAC and birth weight (p=0.0001). The percentage of LBW (<2500g) and an arm circumference below 9.5 cm were 18.8% and 11.8%, respectively. Use of 9.5 cm measurement as a cut-off point in MUAC was found to be a significant predictor of low birth weight. The sensitivity, specificity and positive predictive value were 57.5%, 98.8% and 91.6%, respectively. Newborns with a mid-upper-arm circumference <9.5cm were 10 times more likely to have a LBW compared with an arm circumference > or = 9.5cm (p=0.0001). In places where the conventional scales are not readily available MUAC of 9.5 cm could be used as a method to screen LBW babies in Tanzania. Significant maternal factors associated with LBW at the first antenatal clinic (ANC) booking included: weight <43.5kg, height <150cm, age of 14 to 19 years, positive malaria parasitemia and previous history of LBW. It is recommended that subjects with the above risk factors at ANC booking should be advised to deliver in hospital.


Abstract: This paper addresses two questions: 1) What is the relation of hemoglobin in the second gestational month to preterm birth and low birth weight? 2) How does the relation differ when hemoglobin in the fifth or eighth month or the lowest pregnancy hemoglobin are examined in place of first trimester values? These relations were examined prospectively in 829 women from Shanghai, China in 1991–1992. The population was nearly homogeneous by race, parity, antenatal care, and smoking. Rates of birth outcomes were compared between hemoglobin categories based on 10 g/liter groupings, with 110–119 g/liter as the reference group. Rates of low birth weight and preterm birth (but not small-for-gestational age) were related to early pregnancy hemoglobin concentration in a U-shaped manner. The relative risks (95% confidence intervals) for preterm birth in women by g/liter of hemoglobin were 2.52 (0.95–6.64) for > or = 130 g/liter, 1.11 (0.41–2.99) for 120–129 g/liter, 1.64 (0.77–3.47) for 100–109 g/liter, 2.63 (1.17–5.90) for 90–99 g/liter, and 3.73 (1.36–10.23) for 60–89 g/liter. Use of hemoglobin values in the fifth or eighth month attenuated the association with preterm birth. When lowest pregnancy hemoglobin values were used, the association of anemia with both outcomes was obscured, and risk of preterm birth at high hemoglobin values increased dramatically.

Abstract: This prospective study was designed to characterize the neurodevelopmental and cognitive difficulties specific to children with intrauterine growth retardation and to detect early clinical predictors of these difficulties. Eighty-one children with intrauterine growth retardation were monitored up to 6 to 7 years of age using biometric parameters, perinatal risk questionnaires, and detailed neurodevelopmental and cognitive assessments. Forty-one children served as age-matched, appropriate for gestational age controls. A significant difference in growth parameters (P<.001), neurodevelopmental score (P<.05), and IQ (P<.05) was found between the children with intrauterine growth retardation and controls. A specific profile of difficulties in coordination, lateralization, spatial and graphomotor skills, and abundance of associated movements is typical of the children with intrauterine growth retardation and hints at possible later learning disabilities. The clinical parameters best predicting neurodevelopmental outcome were the neonatal risk score (P<.05) and the weight and height at 6 years of age (P<.05). The children with intrauterine growth retardation with neonatal complications had lower neurodevelopmental scores than the controls but no difference in IQ. Intrauterine growth retardation children diagnosed prenatally had the same neurodevelopmental and IQ scores as those diagnosed at birth, probably due to the careful perinatal and obstetric care provided. Children with intrauterine growth retardation demonstrate a specific profile of neurodevelopmental disabilities at preschool age. Early diagnosis and intervention could probably reduce these difficulties to a minimum.


Abstract: OBJECTIVES: To describe sleep positions among low birth weight infants, variations in sleep position according to birth weight, and changes in sleep position over time. To analyze risk factors and influences associated with prone sleep. DESIGN: Prospective cohort study. SETTING: Massachusetts and Ohio, 1995–1998. STUDY PARTICIPANTS: Mothers of 907 low birth weight infants. RESULTS: At 1, 3, and 6 months after hospital discharge, the prevalence of prone sleeping was 15.5%, 26.8%, and 28.3%, respectively. The corresponding rates for supine sleeping were 23.8%, 37.9%, and 50.2% and for side sleeping were 57.3%, 32.4%, and 20.6%. Very low birth weight (VLBW) infants (<1500g) were most likely to be placed in the prone position. From 1995 through 1998, prone sleeping 1 month after hospital discharge declined among all low birth weight infants from 19.9% to 11.4%; among VLBW infants, the decline in prone sleeping was replaced almost entirely by an increase in side sleeping, whereas in larger low birth weight infants, it was replaced primarily by supine sleeping. Among mothers who placed their infants to sleep in nonprone positions, professional medical advice was cited most frequently as the most influential reason, whereas among mothers of prone-sleeping infants, the infant’s preference was cited most frequently. However, mothers of prone-sleeping VLBW infants also frequently cited the influence of medical professionals and nursery practices as most important in the choice of sleeping position. The factors most strongly associated with prone
sleeping were single marital status (odds ratio [OR]: 3.0; 95% confidence interval [CI]: 1.5–6.2), black race (OR: 2.6; 95% CI: 1.5–4.5), birth weight <1500 g (OR: 2.4; 95% CI: 1.3–4.3), and multiparity (OR: 2.1, 95% CI: 1.2–3.5). CONCLUSIONS: Prone sleep decreased among low birth weight infants from 1995 to 1998. However, VLBW infants, who are at very high risk for sudden infant death syndrome, are more likely to sleep prone than larger low birth weight infants.


Abstract: The birthweight and mortality in hospital was recorded of 567 low birth weight (LBW, < or = 2000g) infants born/admitted during a 7 years period in Agogo Hospital situated in the rainforest area of Ghana. One hundred and fifty-two (26.8%) of these children died in hospital; 87 (57%) of them in the first 48 hours. The average length of stay in hospital of the surviving children was 11.6 days. The death rate varied from 8.4% in the 1,751 to 2,000g group to 83.3% in infants with a birth weight < or = 1000g. The proportion LBW children to the total newborn population was 5.5%; the proportion of extreme LBW (< or = 1000g) to the total number LBW infants was 7.3%. The results are compared with figures from other countries, many of them with a more westernized infrastructure. In our setting, no sophisticated equipment and expensive intensive care provisions were available. This descriptive study was carried out to establish the survival rate in the neonatal period during the primary stay in hospital with low-cost conservative care. Dedicated staff members, who underwent only a simple training programme, and mothers participating in the care for their children contributed to the relatively favourable outcome.


Abstract: Evaluation of a simple technique, using a bangle to measure the midarm circumference at birth, which has a strong correlation with both birth weight as well as neonatal outcome was undertaken. Appropriatel sized bangles (8.5 and 7.5 cm) were passed up to the midarms of 1,412 newborns to determine their efficacy in detecting low birth weight. High sensitivity and specificity were observed with the use of the bangles, both by trained and untrained personnel.


Abstract: CONTEXT: The World Health Organization defines preterm birth as birth at less than 37 completed gestational weeks, but most studies have focused on very preterm infants (birth at <32 weeks) because of their high risk of mortality and serious morbidity. However, infants born at 32 through 36 weeks are more common and their public health impact has not been well studied. OBJECTIVE: To assess the quantitative contribution of mild (birth at 34–36 gestational weeks) and moderate (birth at 32–33 gestational weeks) preterm birth to infant mortality.

RESULTS: Relative risks for infant death from all causes among singletons born at 32 through 33 gestational weeks were 6.6 (95% confidence interval [CI], 6.1–7.0) in the United States in 1995 and 15.2 (95% CI, 13.2–17.5) in Canada in 1992–1994; among singletons born at 34 through 36 gestational weeks, the RRs were 2.9 (95% CI, 2.8–3.0) and 4.5 (95% CI, 4.0–5.0), respectively. Corresponding EFs were 3.2% and 4.8%, respectively, at 32 through 33 gestational weeks and 6.3% and 8.0%, respectively, at 34 through 36 gestational weeks; the sum of the EFs for births at 32 through 33 and 34 through 36 gestational weeks exceeded those for births at 28 through 31 gestational weeks. Substantial RRs were observed overall for the neonatal (eg, for early neonatal deaths, 14.6 and 33.0 for US and Canadian infants, respectively, born at 32–33 gestational weeks; EFs, 3.6% and 6.2% for US and Canadian infants, respectively) and postneonatal (RRs, 2.1–3.8 and 3.0–7.0 for US and Canadian infants, respectively, born at 32–36 gestational weeks; EFs, 2.7%–5.8% and 3.0%–7.0% for the same groups, respectively) periods and for death due to asphyxia, infection, sudden infant death syndrome, and external causes. Except for a reduction in the RR and EF for neonatal mortality due to infection, the patterns have changed little since 1985 in either country. CONCLUSIONS: Mild- and moderate-preterm birth infants are at high RR for death during infancy and are responsible for an important fraction of infant deaths.


Abstract: OBJECTIVES: (1) To compare the mental and psychomotor development of low birth weight term (LBW-T) infants with that of appropriate birth weight (ABW) infants at 6 and 12 months of age. (2) To examine the relationship between developmental levels and social background. METHODS: A cohort of 131 LBW-T infants (1500 to 2499gm) and 131 ABW infants (3000 to 3499gm) matched for sex and time of birth, recruited from six maternity centers in Northeast Brazil were followed for 1 year. Their development was assessed with the Bayley Scales at 6 and 12 months of age, and at 12 months their behavior during the test was rated on five scales. Details of their families’ socioeconomic status were recorded and the degree of stimulation in their homes was assessed. RESULTS: At 6 months of age the LBW-T infants had significantly lower scores than the ABW infants on the mental development index (MDI; 4.2 points lower, p<0.001) and on the psychomotor development index (PDI; 7.3 points lower, p<0.001). The difference had increased by 12 months of age (MDI 7.0 points lower, p<0.001; PDI 9.9 points lower, p<0.001). Socioeconomic variables were related to development at both ages in both groups. Maternal literacy was significantly related to the PDI in LBW-T infants at 12 months but not in ABW infants. Similarly, stimulation in the home was related to the MDI in LBW-T infants at 6 and 12 months but not in ABW infants. LBW-T infants were less active,
cooperative, vocal, and happy, and were more inhibited than ABW infants. CONCLUSIONS: LBW-T infants had poorer development than ABW infants and differed in their behavior. There was an interaction between birth weight and the environment. LBW-T infants, but not ABW infants, were affected by the quality of stimulation in the home and maternal illiteracy.


Abstract: Previous reports have shown that birth weight is associated with mortality rate during the neonatal and postnatal periods and that low arm circumference at birth (LACB: = or < 9.0cm) is closely correlated with birth weight. This paper explores the relationship between arm circumference at birth and early mortality. 823 newborns in Guatemala were studied, of which 416 had a normal arm circumference and 407 were LACB. In addition to arm circumference, weight, height, chest and head circumferences were measured during the 1st 24 hours after birth. Both groups were followed-up during 14 days. All of the 27 deaths observed in the study infants occurred in the LACB group (p>0.001). Relative risk of death during this period was 10 to 17 times higher in the LACB group than in the low risk group. Estimated sensitivity and specificity of LACB were 100% and 84% respectively. These results indicate that LACB is a useful indicator to predict risk of death during the 1st 14 days of life in areas where birth weight assessment is not feasible. (author’s modified).


Abstract: Low-birth-weight babies are most at risk of infant mortality. Unfortunately, in many developing countries it is not possible to weigh babies accurately because of the lack of robust scales. This article describes the results of a WHO Collaborative Study to investigate whether birth weight can be predicted accurately using chest circumference and/or arm circumference. The implications of the results for paediatric practice in developing countries are discussed.


Abstract: OBJECTIVE: To test whether zinc supplementation reduces the deficits in mental development and behaviour that are found in term infants of low birth weight in the study population. DESIGN: A prospective double-blind, part-randomised efficacy trial. SETTING: A low-income population in Pernambuco, northeast Brazil, where the economy is largely dependent on sugar-cane production, and where over 90% of deliveries occur in health facilities. SUBJECTS: During a 20-month period, all singleton, term infants weighing 1500–2499 g born to families of low income (<US $280/month) were enrolled at birth (n=205). At 6 and 12-months, the numbers tested were 163 and 138 respectively. INTERVENTION: Infants born from January 1993–January 1994 were randomly assigned to receive daily, except Sundays, a placebo (n=66)
or 1 mg zinc (n=68). Those born February–August 1994 were given 5 mg zinc (n=71). Supplementation was for eight weeks, starting at birth. Field workers visited each infant at home to administer the supplement. RESULTS: At 6 and 12-months, mental and psychomotor development was assessed with the Bayley Scales of Infant Development and no significant differences in the scores of the three groups were found. At 12-months, behaviour was also assessed on 5 ratings. Ratings were highest in infants given 5 mg zinc (P=0.042).

CONCLUSIONS: Zinc supplementation (5 mg/d) for eight weeks may reverse some of the poor behaviours, particularly responsiveness, exhibited by low birth weight infants. No amelioration of their mental and psychomotor deficits was found.
Kangaroo Mother Care


**Abstract:** Usually Kangaroo Care (KC) or skin-to-skin holding care is done with preterm infants. This article, however, documents clinical experiences with three mothers and their fullterm infants who were having latching/breastfeeding difficulties. In each case the nurse placed the fullterm infant in KC for approximately 1 hour prior to and continuing into the next breastfeeding session. Although no recommendations can be made based on case studies, these clinical experiences suggest that KC is a worthwhile intervention to try when a mother and her fullterm infant are struggling to achieve successful breastfeeding.


**Abstract:** Implementation of a kangaroo mother care programme requires coordinated action by national and provincial health authorities and health care facilities at various levels. A kangaroo mother care programme begun under precarious conditions might be counterproductive, and the minimum facilities for safe management must be provided. Although recent data are available on the savings achieved with kangaroo mother care, better data are needed on the cost-effectiveness of the method, particularly for the ambulatory care. More effective networking among researchers and healthcare providers will be pursued. Kangaroo mother care not only humanizes neonatology, it also makes better use of human and technological resources available in developing countries. Nevertheless, resistance to change is one the obstacles that any new care modality must overcome. The task developed by kangaroo mother care researchers and providers continues to be addressed, and even greater interest is expected at the third workshop to be held in Yogyacarta, Indonesia, in Novemeber 2000.


**Abstract:** The “kangaroo-mother” method, that is nursing babies by continuously keeping them wrapped at the mother’s breasts, has been proposed as an “appropriate technology” for the care of low birth weight (LBW) newborns in developing countries. We evaluated the effectiveness of this method as an alternative hospital care model in the Special Care nursery of the Central Hospital of Mapto, Mozambique. One hundred LBW newborns (mean birth weight 1329g, SD +/− 208g) were consecutively admitted to the “kangaroo-mother” section of the unit at the mean postnatal age of 11.6 days. Ninety-five of them were discharged alive after a mean period of
16.3 days of “kangaroo” nursing. During this period they were exclusively breast fed and their mean weight gain was 12.8g/day. Besides being very effective in improving survival, this method favored the development of early mother-infant relations, which are certainly very important for the long term well-being of the child.


Abstract: The results of introducing the ‘kangaroo method’ (constant nursing of the baby skin to skin on the mother’s chest), as the exclusive means of treating low birth weight (LBW) babies is reported, in the context of a mission hospital in a developing country without incubators and standard equipment for care of LBW neonates. Details of the method developed are described. The survival of babies born under 1500 g improved from 10% to 50%, whereas that of babies 1,500–1,999g improved from 70% to 90%. The method is well accepted by the community, and easily grasped by all hospital staff. Staff expectations concerning survival have dramatically improved, and a considerable saving in workload is experienced. The kangaroo method as described is strongly recommended to all units in developing countries treating LBW babies without modern equipment.


Abstract: The provision of maternal-infant body contact during a period of maternal separation was examined for its effects on parent-infant and triadic interactions. Participants were 146 three-month-old preterm infants and their parents, half of whom received skin-to-skin contact, or kangaroo care (KC), in the neonatal nursery. Global relational style and micro-patterns of proximity and touch were coded. Following KC, mothers and fathers were more sensitive and less intrusive, infants showed less negative affect, and family style was more cohesive. Among KC families, maternal and paternal affectionate touch of infant and spouse was more frequent, spouses remained in closer proximity, and infant proximity position was conducive to mutual gaze and touch during triadic play. The role of touch as a constituent of the co-regulatory parent-infant and triadic systems and the effects of maternal contact on mothering, co-parenting, and family processes are discussed.


Abstract: The effects of mother-infant skin-to-skin contact (Kangaroo Care; KC) on autonomic functioning, state regulation, and neurobehavioural status was examined in 70 preterm infants, half of whom received KC over 24.31 days (SD 7.24) for a total of 29.76 hours (SD 12.86). Infants were matched for sex (19 males and 16 females in each group); birthweight (KC, 1229.95 g [SD 320.21]; controls, 1232.17g [SD 322.15]); gestational age (GA) (KC, 30.28 weeks [SD 2.54]; controls, 30.19 weeks [SD 2.65]); medical risk; and family demographics. Vagal tone
was calculated from 10 minutes of heart rate before KC and again at 37 weeks’ GA. Infant state was observed in 10-second epochs during four consecutive hours before KC and again at 37 weeks’ GA. Neurobehavioural status was assessed at 37 weeks’ GA with the Neonatal Behavioral Assessment Scale (NBAS). Infants receiving KC showed a more rapid maturation of vagal tone between 32 and 37 weeks’ GA (p=0.029). More rapid improvement in state organization was observed in KC infants, in terms of longer periods of quiet sleep (p=0.016) and alert wakefulness (p=0.013) and shorter periods of active sleep (p=0.023). Neurodevelopmental profile was more mature for KC infants, particularly habituation (p=0.032) and orientation (p=0.007). Results underscore the role of early skin-to-skin contact in the maturation of the autonomic and circadian systems in preterm infants.


Abstract: AIM: To demonstrate that skin-to-skin care (SSC) has no detrimental effects on the frequency of episodes of bradycardia and/or hypoxemia. METHODS: Twenty-two spontaneously breathing preterm infants (median gestational age at birth, 29 weeks [range, 24–31 weeks]; age at study, 26 days [range, 7–72 days]; weight at study, 1310 g [range, 725–1,890g]) had three 2-hour recordings of breathing movements, nasal airflow, heart rate, and oxygen saturation as measured by pulse oximetry (SpO(2)) before, during, and after SSC. Rectal temperature was obtained every 2 hours. Recordings were analyzed for baseline heart and respiratory rates, bradycardia (heart rate < two thirds of baseline), and hypoxemia (SpO(2) < or =80%), as well as for breathing pattern (regular vs non-regular). RESULTS: Baseline heart rate and respiratory rate increased during SSC (P<.01), as did the combined frequency of bradycardia and hypoxemia (from 1.5/h [0–8] before to 2.8/h [0–15] during SSC; P<.05). Rectal temperature increased from 36.9 degrees C (36.2 degrees –37.4 degrees C) to 37.3 degrees C (36.6 degrees –38.6 degrees C; P<.01). The proportion of regular breathing pattern decreased from 14% (2%–28%) to 7% (3%–26%) with SSC (P<.01). CONCLUSION: SSC was associated with a significant increase in the combined frequency of bradycardia and hypoxemia and with less regular breathing. These changes were unexpected and may have been related to heat stress. Body temperature, heart rate, and oxygenation should be monitored during SSC.


Abstract: A descriptive study of eleven healthy preterm infants was conducted in which cardiorespiratory (heart and respiratory rates, oxygen saturation), thermal (abdominal, toe and tympanic temperatures) and state behavior responses to two hours of paternal skin-to-skin contact within the first 17 hours of birth in Colombia, South America were evaluated. Infant physiologic and behavioral state measures were recorded each minute as was paternal skin temperature and behavior. Infant heart and respiratory rates increased during paternal contact as did abdominal and core temperatures. Fathers were able to keep their infants sufficiently warm, and five infants became hyperthermic (tympedic temperature greater than 37.5 degrees
C) despite cooling measures while being held in this climate. Infants slept most of the time while being held and fathers seldom gazed at, spoke to, or touched their infants while holding them. When mothers are unavailable, fathers may be an alternate source of warmth and comfort to infants.


**Abstract:** OBJECTIVES: To assess the effectiveness and safety of the Kangaroo mother intervention (KMI). DESIGN: Observational, analytic, prospective (two cohorts) study. SETTING: Two large tertiary care obstetric hospitals, one offering “traditional” care and the other KMI. PATIENTS: Newborn infants with birth weights ≤ 2000g, who survive the neonatal period and are eligible for an in-patient minimal care unit (MCU) (having overcome major adaptation problems to extra uterine life). INTERVENTIONS: “Kangaroo infants” (KI) were discharged as soon as they were eligible for MCU, regardless of weight or gestational age. Infants were kept 24 hours a day in an upright position, in skin-to-skin contact and firmly attached to the mother’s chest until the KMI was not tolerated anymore. Control babies (from the other facility) were kept in incubators at the MCU until they satisfied usual discharge criteria for the control hospital. Both groups were followed periodically up to the age of 1 year. RESULTS: Three hundred thirty-two eligible infants were recruited, 162 at the Kangaroo hospital and 170 at the control hospital. KI came from a much lower socio-economic class and were more ill before eligibility. Relative risk of death was higher for KI (RR 1.9), although this figure was reversed after adjusting for weight at birth and gestational age (RR 0.5). KI grew less in the first 3 months and had a higher proportion of developmental delay at 1 year, and a multivariate analysis failed to control for the large baseline differences in socioeconomic levels and babies’ health status between the two cohorts. CONCLUSIONS: In spite of major baseline differences between studied cohorts, the survival of LBW infants in Bogota is similar between the KMI and the “traditional care”. Questions remain about quality of life, especially regarding weight gain and neurodevelopment, that may be answered by a Randomized Controlled Trial.


**Abstract:** Good quality care of low birthweight infants could reduce neonatal mortality in low-income countries, but the technologies used in rich countries are inappropriate. Kangaroo Mother Care does not need expensive and sophisticated equipment, and for its simplicity it can be applied almost everywhere, including peripheral maternity units of very low-income countries. Kangaroo Mother Care (KMC) can also contribute to the humanization of neonatal care and to better bonding between mother and baby in both poor and rich countries. A group of health professionals with experience in KMC met in a workshop to discuss its effectiveness, safety, applicability and acceptability in different settings: from first and second level maternity units in settings with very limited resources, to second and third level units in settings with limited
resources, to second and third level maternity and neonatal care units in settings with ample resources and infant mortality rates <15/1,000. The paper summarizes the recommendations of this group of health professionals for the implementation of KMC in these various settings, together with suggested research priorities.


**Abstract:** It has been estimated that 95% of low-birthweight infants are born in developing countries. Nevertheless, most of the globally available resources are invested in developed countries, both for sophisticated, expensive technological care and for research focused on solving problems in scenarios in which access to expensive resources is available. Very little research on scientifically sound, economically accessible interventions reaches internationally recognized scientific journals. For instance, one accepted scientific dogma is that all premature infants must receive breast-milk fortifiers. Thus, healthcare workers consider that not offering fortification or supplementation to all preterm infants under 2,000g is unethical, as it denies them the proven benefits of this intervention. This approach oversimplifies the problem by assuming that infants under 2,000g are a homogeneous population, with similar needs and risks. The largest proportion of preterm survivors in developing countries comprises infants weighing >1200g, and their nutritional needs differ from those weighing <1200g, who represent a significantly smaller proportion. In developing countries, fortification of breast milk is seldom a feasible option. Even supplementing breast milk with formula implies an expense that cannot always be covered. In addition, many preterm infants (particularly those weighing >1200g) can grow properly on exclusive breastfeeding. In our experience, about 45% of infants under ambulatory Kangaroo Mother Care (KMC) thrive properly. The choice between giving and withholding supplementation for all preterm infants is not an ethical issue, because there is no choice. This was the justification for conducting the study reported here, which attempts to answer the question of how to identify, as early as possible, those premature infants who survive the early neonatal period and have no obvious risk factors for inadequate growth other than prematurity, but who are less likely to thrive with exclusive breastfeeding. Conclusion: The answer to this question will allow us to use our meagre resources in the most reasonable way, as supplementing breast milk involves not only the direct cost of the formula but also that of training the mothers in techniques for feeding their infants without compromising breastfeeding or increasing the risk of infectious diseases.


**Abstract:** AIM: Both mothers and fathers should achieve early skin to skin holding of their small premature infants, despite the infants’ need for breathing equipment, including respirator. If the mother needs to wait to hold her newborn due to her medical condition, this is not reason enough for the father also to wait. PURPOSE/QUESTION: Do fathers wait significantly longer post delivery to hold their small premature infants skin to skin (kangaroo) than mothers do?
METHODS: Registration-schedule, existing sources of data, and interviews were used.
FINDING/CONCLUSION: The time from birth (hours) until fathers held their small premature infants skin to skin was significantly different (p=0.0004) compared to mothers. Fathers held their infants later than did mothers, despite the fact that fathers saw their infants before the mothers did. Compared to the mothers the average waiting time before fathers first held their infants skin to skin showed a difference of 120.9% (difference of the median).


Abstract: Mortality was high at the Instituto Materno Infantile in Bogota, Colombia, among low birth weight infants when hospital care was attempted, neonatal intensive care was virtually nonexistent, and nosocomial infection was common. The Kangaroo Mother Program was therefore launched by Drs. Rey and Martinez in 1978 to educate and motivate mothers as babies’ main resource, discharge home regardless of weight as early as possible to minimize nosocomial infection, promote exclusive breast feeding, encourage bonding and keeping the baby warm by skin-to-skin contact inside the mother’s clothes, and encourage placing babies in a vertical position between the mother’s breasts to minimize reflux and aspiration. UNICEF provided extra funding and an ambulatory clinic was built to supervise mothers and infants after discharge. Mortality was claimed to be as low for babies below 1,500g birth weight as with conventional neonatal intensive care. There has since been great interest from around the world in this imaginative approach, but amid calls for better documentation before it is widely applied. The authors report on Charpak et al’s exploration of whether the full kangaroo program with very early discharge results in better or worse survival than conventional care, if relying upon the baby’s ability to suck from the breast provides adequate nutrition and growth, and whether the early close contact between mother and baby results in measurably better development later in life. Charpak compared infants with birth weights under 2,000g in the kangaroo mother program with infants who would have been eligible for kangaroo care at a large maternity department in the same city with conventional neonatal care. The data were collected prospectively and simultaneously with complete follow-up on 290 infants. The two populations of infants were nearly identical in gestational age, albeit with a slightly lower birth weight in the kangaroo group. Consistent evidence exists that the infants in the kangaroo mother program had more serious perinatal medical complications and were being discharged early to homes with significantly worse social conditions than infants in the control group. Crude mortality was higher in the kangaroo infant group, but after adjusting for differences in weight and gestational age, the investigators found a lower mortality risk in the kangaroo care group. Although breast feeding was consistently better-maintained in the kangaroo mother group up to twelve months, the kangaroo program babies were retarded in growth up to twelve months, most likely due to their inability to suck adequate volumes of milk from the breast despite its constant availability. The mean difference between the two groups in hospitalization time in the first year was only two days, casting doubt upon the idea that kangaroo care saved substantial amounts of money. The authors note the limitations of the Charpak et al paper, but hail the work as a significant achievement.

**Abstract:** Several hospital-based studies have shown the beneficial effect of kangaroo care on preterm infants. Long-term outcome was studied in 297 preterm infants born at Harare Hospital weighing 500–1,800g, discharged home on kangaroo care and followed up for 12 months. Of these, 79 (26.6%) died, 141 (47.5%) survived to complete follow-up and 77 (25.9%) were lost to follow-up. Of those who died, median birthweight was 1,460g, median age at hospital discharge 7 days, median weight at discharge 1,400g and median age at death 66 days. Of those who completed follow-up, median birthweight was 1,575g, median age at hospital discharge was 6 days and median weight at hospital discharge was 1,500g. Of those who were lost to follow-up, median age at loss to follow-up was 70 days, median birthweight was 1,540g, median age at hospital discharge was 5 days and median weight at hospital discharge was 1,500g. The hospital re-admission rate was 22.9% with 8.8% mortality. Maternal mortality and chronic morbidity rates were 4.7% and 7.4%, respectively. On comparing those who died with those who completed follow-up, mother’s age <20 years, birthweight <1,500g and maternal mortality and chronic morbidity were significant risk factors for infant mortality. Age at discharge and weight at birth and on discharge were not significantly associated with infant mortality.


**Abstract:** BACKGROUND: In 1978, kangaroo mother care (KMC) was proposed as a caring alternative for low birth weight (LBW) infants. We are reporting here early outcomes of a randomized, controlled trial comparing KMC to traditional care. METHOD: An open randomized, controlled trial was conducted in a large tertiary care hospital. All newborn infants </=2,000g, surviving the neonatal period and being eligible for a minimal care unit, were included. A total of 1084 newborns </=2,000g were followed, and 746 were randomized—382 to KMC and 364 to traditional care. KMC infants were discharged after randomization, regardless of weight or gestational age. Infants spent 24 hours per day in an upright position, in skin-to-skin contact, and attached to the mother's chest. After randomization, control infants remained at the minimal care unit until meeting usual discharge criteria. Both groups are being followed up to 12 months of corrected age; 679 (90%) were available for evaluation when they reached term (40 to 41 weeks of postconceptional age). The present paper reports early outcomes (when reaching term) including mortality, infectious episodes, hospital stay after eligibility, and growth and feeding patterns. RESULTS: Both study groups were similar regarding all baseline variables but weight at eligibility. The risk of dying was similar in both groups (relative risk=0.59, 95% confidence interval 0.22–1.6). There were no differences in growth indices. Nosocomial infections were more frequent in control infants. Hospital stay after eligibility was shorter in KMC, primarily for infants </=1,800g. CONCLUSIONS: These results show that KMC is a safe approach to the care of clinically stable LBW infants. Our findings provide the necessary scientific support to a method that is already incorporated in the care of LBW infants at many hospitals around the world and at different levels of care.

**Abstract:** Because resources for care of low-birthweight (LBW) infants in developing countries are scarce, the Kangaroo mother method (KMM) was developed. The infant is kept upright in skin-to-skin contact with the mother’s breast. Previous studies reported several benefits with the KMM but interpretation of their findings is limited by small size and design weaknesses. We have done a longitudinal, randomised, controlled trial at the Isidro Ayora Maternity Hospital in Quito, Ecuador. Infants with LBW (<2,000g) who satisfied out-of-risk criteria of tolerance of food and weight stabilisation were randomly assigned to KMM and control (standard incubator care) groups (n=128 and 147, respectively). During 6 months of follow-up the KMM group had a significantly lower rate than the control group of serious illness (lower-respiratory-tract disorders, apnoea, aspiration, pneumonia, septicemia, general infections; 7 [5%] vs 27 [18%], p<0.002), although differences between the groups in less severe morbidity were not significant. There was no significant difference in growth or in the proportion of women breastfeeding, perhaps because the proportion breastfeeding was high in both groups owing to strong promotion. Mortality was the same in both groups; most deaths occurred during the stabilisation period before randomisation. KMM mothers made more unscheduled clinic visits than control mothers but their infants had fewer re-admissions and so the cost of care was lower with the KMM. Since the eligibility criteria excluded nearly 50% of LBW infants from the study, the KMM is not universally applicable to these infants. The benefits might be greater in populations where breastfeeding is not so common.


**Abstract:** A randomized controlled trial was carried out for 1y in three tertiary and teaching hospitals, in Addis Ababa (Ethiopia), Yogyakarta (Indonesia) and Merida (Mexico), to study the effectiveness, feasibility, acceptability and cost of kangaroo mother care (KMC) when compared to conventional methods of care (CMC). About 29% of 649 low birthweight infants (LBWI; 1,000–1,999g) died before eligibility. Of the survivors, 38% were excluded for various reasons, 149 were randomly assigned to KMC (almost exclusive skin-to-skin care after stabilization), and 136 to CMC (warm room or incubator care). There were three deaths in each group and no difference in the incidence of severe disease. Hypothermia was significantly less common in KMC infants in Merida (13.5 vs 31.5 episodes/100 infants/d) and overall (10.8 vs 14.6). Exclusive breastfeeding at discharge was more common in KMC infants in Merida (13.5 vs 31.5 episodes/100 infants/d) and overall (10.8 vs 14.6). Exclusive breastfeeding at discharge was more common in KMC infants in Merida (13.5 vs 31.5 episodes/100 infants/d) and overall (10.8 vs 14.6). KMC infants had a higher mean daily weight gain (21.3g vs 17.7g) and were discharged earlier (13.4 vs 16.3 d after enrolment). KMC was considered feasible and presented advantages over CMC in terms of maintenance of equipment. Mothers expressed a clear preference for KMC and health workers found it safe and convenient. KMC was cheaper than CMC in terms of salaries (US$11,788 vs US$ 29,888) and other running costs (US$7,501
This study confirms that hospital KMC for stabilized LBWI 1000–1999 g is at least as effective and safe as CMC, and shows that it is feasible in different settings, acceptable to mothers of different cultures, and less expensive. Where exclusive breastfeeding is uncommon among LBWI, KMC may bring about an increase in its prevalence and duration, with consequent benefits for health and growth. For hospitals in low-income countries KMC may represent an appropriate use of scarce resources.


**Abstract:** BACKGROUND: Based on the general bonding hypothesis, it is suggested that kangaroo mother care (KMC) creates a climate in the family whereby parents become prone to sensitive caregiving. The general hypothesis is that skin-to-skin contact in the KMC group will build up a positive perception in the mothers and a state of readiness to detect and respond to infant's cues. METHOD: The randomized controlled trial was conducted on a set of 488 infants weighing <2.00 g, with 246 in the KMC group and 242 in the traditional care (TC) group. The design allows precise observation of the timing and duration of mother-infant contact, and takes into account the infant's health status at birth and the socioeconomic status of the parents. BONDING ASSESSMENT: Two series of outcomes are assessed as manifestations of a mother's attachment behavior. The first is the mother's feelings and perceptions of her premature birth experience, including her sense of competence, feelings of worry and stress, and perception of social support. The second outcome is derived from observations of the mother and child's responsiveness to each other during breastfeeding at 41 weeks of gestational age. INTERVENTIONS: KMC has three components. The first is the kangaroo position. Once the premature infant has adapted to extrauterine life and is able to breastfeed, he is positioned on the mother's chest, in an upright position, with direct skin-to-skin contact. The second component is kangaroo nutrition. Although breastfeeding is the prime source of nutrition, infants also may receive preterm formula whenever necessary and vitamin supplements. The third component is the clinical control; infants are monitored on a regular basis, daily until they are gaining at least 20g per day. Afterward, weekly clinic visits are scheduled until term, which constitutes the ambulatory minimal neonatal care. In the TC group, infants are kept in incubators until they are able to self-regulate their temperature and are thriving (ie, have an appropriate weight gain). Infants are discharged according to current hospital practice, usually not before their weight is approximately 1,700g. Afterward, as with the KMC group, weekly clinic visits are scheduled until term. RESULTS: We observed a change in the mothers' perception of her child, attributable to the skin-to-skin contact in the kangaroo-carrying position. This effect is related to a subjective “bonding effect” that may be understood readily by the empowering nature of the KMC intervention. Moreover, in stressful situations when the infant has to remain in the hospital longer, mothers practicing KMC feel more competent than do mothers in the TC group. This is what we call a resilience effect. In these stressful situations we also found a negative effect on the feelings of received support of mothers practicing KMC. We interpret this as an isolation effect. To thwart this deleterious effect, we would suggest adding social support as an integral component of KMC. The observations of the mothers' sensitive behavior did not show a definite bonding effect, but rather a resilience effect. This is attributable to the KMC intervention; mothers...
practicing KMC were more responsive to an at-risk infant whose development has been threatened by a longer hospital stay. Otherwise, we observed that the mothers (in both the KMC group and the TC group) had behavioral patterns that were adapted to the child’s at-risk health status and to the precarious condition of some premature infants requiring intensive care. We conclude that the infant’s health status may be a more prominent factor in explaining a mother’s more sensitive behavior, which overshadows the kangaroo-carrying effect. CONCLUSION: These results suggest that KMC should be promoted actively and that mothers should be encouraged to use it as soon as possible during the intensive care period up to the 40 weeks of gestational age. Thus, KMC should be viewed as a means of humanizing the process of g.


Abstract: Kangaroo mother care (KMC) for low birthweight infants (LBWI) was introduced in a Mozambican hospital with limited resources and without facilities for intensive care. Six months were needed to change policies, organize the ward, train staff and overcome constraints. Facilitating factors were a KMC national policy, the commitment of health authorities, technical assistance and availability of some funds, and the perception of improved quality of care and survival. The obstacles and constraints were resistance to change by the staff, cultural problems, and managerial difficulties. Out of 32 LBWI (< or = 1.800g) admitted in 3 months, survival was 73 per cent in 22 KMC and 20 per cent in 10 non-KMC infants (p<0.01). KMC is a feasible and appropriate technology in hospitals with very limited resources.


Abstract: BACKGROUND: Kangaroo mother care (KMC), defined as skin-to-skin contact between a mother and her newborn, frequent and exclusive or nearly exclusive breastfeeding, and early discharge from hospital, has been proposed as an alternative to conventional neonatal care for low birthweight (LBW) infants. OBJECTIVES: To determine whether there is evidence to support the use of KMC in LBW infants as an alternative to conventional care after the initial period of stabilization with conventional care. SEARCH STRATEGY: We used the standard search strategy of the Neonatal Review Group of the Cochrane Collaboration. MEDLINE, EMBASE, LILACS, POPLINE and CINAHL databases, and the Cochrane Controlled Trials Register (Cochrane Library) up to Issue 2, 2000, were searched using the key words terms “kangaroo mother care” or “kangaroo mother method” or “skin-to-skin contact” and “infants” or “low birthweight infants”. SELECTION CRITERIA: Randomised trials comparing KMC and conventional neonatal care in LBW infants. DATA COLLECTION AND ANALYSIS: Trial quality was assessed and data were extracted independently by two reviewers. Statistical analysis was conducted using the standard Cochrane Collaboration methods. MAIN RESULTS: Three studies, involving 1,362 infants, were included. All the trials were conducted in developing countries. The studies were of moderate to poor methodological quality. The most common shortcomings were in the areas of blinding procedures for those who collected the outcomes measures, handling of drop outs, and completeness of follow-up. The great majority of results consist of results of a
single trial. KMC was associated with the following reduced risks: nosocomial infection at 41 weeks’ corrected gestational age (relative risk 0.49, 95% confidence interval 0.25 to 0.93), severe illness (relative risk 0.30, 95% confidence interval 0.14 to 0.67), lower respiratory tract disease at 6 months follow-up (relative risk 0.37, 95% confidence interval 0.15 to 0.89), not exclusively breastfeeding at discharge (relative risk 0.41, 95% confidence interval 0.25 to 0.68), and maternal dissatisfaction with method of care (relative risk 0.41, 95% confidence interval 0.22 to 0.75). KMC infants had gained more weight per day by discharge (weighted mean difference 3.6 g/day, 95% confidence interval 0.8 to 6.4). Scores on mother’s sense of competence according to infant stay in hospital and admission to NICU were better in KMC than in control group (weighted mean differences 0.31 [95% confidence interval 0.13 to 0.50] and 0.28 [95% confidence interval 0.11 to 0.46], respectively). Scores on mother’s perception of social support according to infant stay in NICU were worse in KMC group than in control group (weighted mean difference –0.18 (95% confidence interval –0.35 to –0.01). There was no evidence of a difference in infant mortality. However, serious concerns about the methodological quality of the included trials weaken credibility in these findings. REVIEWER’S CONCLUSIONS: Although KMC appears to reduce severe infant morbidity without any serious deleterious effect reported, there is still insufficient evidence to recommend its routine use in LBW infants. Well designed randomized controlled trials of this intervention are needed.


Abstract: OBJECTIVE: This study was conducted (i) to study through a randomized control trial the effect of Kangaroo Mother Care (KMC) on breast feeding rates, weight gain and length of hospitalization of very low birth neonates and (ii) to assess the acceptability of Kangaroo Mother Care by nurses and mothers. METHODS: Babies whose birth weight was less than 1,500 Grams were included in the study once they were stable. The effect of Kangaroo Mother Care on breast feeding rates, weight gain and length of hospitalization of very low birth weight neonates was studied through a randomized control trial in 28 neonates. The Kangaroo group (n=14) was subjected to Kangaroo Mother Care of at least 4 hours per day in not more than 3 sittings. The babies received Kangaroo Care after shifting out from NICU and at home. The control group (n=14) received only standard care (incubator or open care system). Attitude of mothers and nurses towards KMC was assessed on Day 3 +/- 1 and on day 7 +/- 1 after starting Kangaroo Care in a questionnaire using Likert’s scale. RESULTS: The results of the clinical trial reveal that the neonates in the KMC group demonstrated better weight gain after the first week of life (15.9 +/- 4.5 gm/day vs. 10.6 +/- 4.5 gm/day in the KMC group and control group respectively p<0.05) and earlier hospital discharge (27.2 +/- 7 vs. 34.6 +/- 7 days in KMC and control group respectively, p < 0.05). The number of mothers exclusively breastfeeding their babies at 6 week follow-up was double in the KMC group than in the control group (12/14 vs. 6/14) (p<0.05). CONCLUSION: KMC managed babies had better weight gain, earlier hospital discharge and, more impressively, higher exclusive breast-feeding rates. KMC is an excellent adjunct to the routine preterm care in a nursery.

**Abstract:** Kangaroo mother care is becoming an integral part of the care of low birth weight infants worldwide. It provides economic savings to families and health care facilities and many physiologic and psychobehavioral benefits to mothers and infants, the most important of which is the promotion of successful breastfeeding. The benefits of breastfeeding, of human milk over formula, and of feeding from the breast per se, are beyond dispute, and so KMC should be actively promoted. The full impact of KMC on breastfeeding low birth weight infants is yet to be realized.


**Abstract:** BACKGROUND: Kangaroo mother care (KMC), defined as skin-to-skin contact between a mother and her newborn, frequent and exclusive or nearly exclusive breastfeeding, and early discharge from hospital, has been proposed as an alternative to conventional neonatal care for low birthweight (LBW) infants. OBJECTIVES: To determine whether there is evidence to support the use of KMC in LBW infants as an alternative to conventional care after the initial period of stabilization with conventional care. SEARCH STRATEGY: We used the standard search strategy of the Neonatal Review Group of the Cochrane Collaboration. MEDLINE, EMBASE, LILACS, POPLINE and CINAHL databases (to December 2002), and the Cochrane Controlled Trials Register (The Cochrane Library), were searched using the key words terms “kangaroo mother care” or “kangaroo care” or “kangaroo mother method” or “skin-to-skin contact” and “infants” or “low birthweight infants”. SELECTION CRITERIA: Randomized trials comparing KMC and conventional neonatal care in LBW infants. DATA COLLECTION AND ANALYSIS: Trial quality was assessed and data were extracted independently by two reviewers. Statistical analysis was conducted using the standard Cochrane Collaboration methods. MAIN RESULTS: Three studies, involving 1,362 infants, were included. All the trials were conducted in developing countries. The studies were of moderate to poor methodological quality. The most common shortcomings were in the areas of blinding procedures for those who collected the outcomes measures, handling of drop outs, and completeness of follow-up. The great majority of results consist of results of a single trial. KMC was associated with the following reduced risks: nosocomial infection at 41 weeks’ corrected gestational age (relative risk 0.49, 95% confidence interval 0.25 to 0.93), severe illness (relative risk 0.30, 95% confidence interval 0.14 to 0.67), lower respiratory tract disease at 6 months follow-up (relative risk 0.37, 95% confidence interval 0.15 to 0.89), not exclusively breastfeeding at discharge (relative risk 0.41, 95% confidence interval 0.25 to 0.68), and maternal dissatisfaction with method of care (relative risk 0.41, 95% confidence interval 0.22 to 0.75). KMC infants had gained more weight per day by discharge (weighted mean difference 3.6 g/day, 95% confidence interval 0.8 to 6.4). Scores on mother’s sense of competence according to infant stay in hospital and admission to NICU were better in KMC than in control group (weighted mean differences 0.31 [95% confidence interval 0.13 to 0.50] and 0.28 [95% confidence interval 0.11 to 0.46], respectively). Scores on mother’s perception of social support according to infant stay in NICU were worse in KMC group than in
control group (weighted mean difference –0.18 (95% confidence interval –0.35 to –0.01). Psychomotor development at 12 months’ corrected age was similar in the two groups. There was no evidence of a difference in infant mortality. However, serious concerns about the methodological quality of the included trials weaken credibility in these findings. REVIEWER’S CONCLUSIONS: Although KMC appears to reduce severe infant morbidity without any serious deleterious effect reported, there is still insufficient evidence to recommend its routine use in LBW infants. Well designed randomized controlled trials of this intervention are needed.


Abstract: PURPOSE: A national survey was conducted to assess practice, knowledge, barriers, and perceptions regarding Kangaroo Care (KC)—the holding of diaper-clad preterm infants skin-to-skin, chest-to-chest by parents. DESIGN: A descriptive survey was conducted. METHODS: Kangaroo Care Questionnaires (KCQs), developed for the study, were sent to nurse managers in all hospitals in the United States that were identified as providing neonatal intensive care services (N=1,133), and were to be completed by the nurse most familiar with the practice of KC in that unit. A second KCQ was sent to non-respondents. Descriptive statistics were used to summarize the data. RESULTS: A response rate of 59% (N=537) was achieved. Over 82% of the respondents reported practicing KC in their neonatal intensive care units (NICUs). Nurses were knowledgeable about KC. Major barriers to practicing KC for certain types of infants were infant safety concerns, as well as reluctance by nurses, physicians, and families to initiate or participate in KC. Many NICUs do not permit KC for certain types of infants (e.g., those on vasopressors or high-frequency ventilation). Over 60% of respondents agreed that low gestational age or weight were not contraindications. Respondents from NICUs in which KC is practiced were more positive in their perceptions than respondents from NICUs that do not practice KC. CLINICAL IMPLICATIONS: The findings suggest that in order to overcome barriers to the practice of KC, nurses need educational offerings highlighting the knowledge and skills needed to provide KC safely and effectively. These educational offerings should also emphasize the value of KC to infants and parents. In addition, knowledgeable practitioners need to develop evidence-based policies and procedures that will lead to successful KC.


Abstract: This pilot study was conducted to compare the effectiveness of the kangaroo care method with current, mainly incubator-based care in managing well preterm infants in a tertiary level hospital in a developing country. Altogether, 74 infants (37 per group) were consecutively allocated to receive either kangaroo care or incubator care. After adjusting for age and weight on admission to the study, we found that infants in the kangaroo care group gained twice as much weight per day (20.8 vs 10.2g, p=0.0001), had a shorter stay in hospital (16.6 vs 20.7 days, p=0.0457) and had a better survival rate (0% vs 9% deaths). Also, they were ill less frequently,
but after adjusting for age and weight this difference was not significant. This pilot study suggests that the kangaroo care method has major advantages over incubator care of preterm infants in our hospital. Hospitals which cannot use incubators optimally may find kangaroo care to be a better method of improving perinatal and neonatal morbidity and mortality.


Abstract: OBJECTIVE: To describe the experience in a newly established Kangaroo Care Unit (KCU) at a tertiary level hospital and to identify factors associated with poor outcome in this unit. DESIGN: Cross sectional study. SETTING: Kangaroo Care Unit at Harare Central Hospital, Zimbabwe. SUBJECTS: Mothers admitted to the KCU and their well preterm infants. MAIN OUTCOME MEASURES: Discharge home or referral back to the Neonatal Unit (NNU) for conventional care. RESULTS: 613 mother infant pairs were studied from May 1994 to December 1996. The median age for all mothers was 23 years (Q1=15, Q3=26). Fifty four percent of the infants were female. Median age at admission to KCU was 12 days (Q1=1, Q3=25). Seventy two percent of infants were discharged home from the KCU. The rest (28%) were referred back to NNU for conventional care. The odds of being referred back to the NNU were significantly higher if the infant was male OR = 1.82 (95% CI: 1.25 to 2.66); if the birth weight was <1,500grams OR = 1.52 (95% CI: 1.04 to 2.22); if the admission weight to the KCU was <1500grams OR=2.16 (95% CI: 1.42 to 3.29) or if the age on admission to KCU was 14 days or more OR=2.15 (95% CI: 1.44 to 3.29). These factors remained significant after adjusting for confounding. Mother’s age, parity, booking status or whether admission was during the cold months or not had no significant bearing on the outcome in this unit. Reasons for referral back to NNU included apnoea (27%); respiratory distress (27%); aspiration pneumonia (18%); neonatal jaundice (8%); poor feeding (7%); ill mother (5%); sepsis (4%) and diarrhoea (3%). On multivariate analysis birth weight was the strongest predictor for being referred back to the NNU OR=10.753 (95% CI: 6.026–19.186). CONCLUSION: Establishment of a KCU at a tertiary level hospital is feasible. Kangaroo care for well preterm infants is suitable for most mothers and their preterm infants. Infants were more likely to be referred back for conventional care if they were male, very low birth weight and if the age at admission was greater than two weeks. Further studies are needed to determine the long term survival of these infants.


Abstract: Many preterm infants cared for in incubators do not experience Kangaroo Care (KC), skin-to-skin contact with their mothers, due to fear of body heat loss when being held outside the incubator. A randomized clinical trial of 16 KC and 13 control infants using a pretest-test-posttest design of three consecutive interfeeding intervals of 2.5 to 3.0h duration each was conducted over 1 day. Infant abdominal and toe temperatures were measured in and out of the incubator; maternal breast temperature was measured during KC. Repeated measures ANOVA showed no change in abdominal temperature across all periods and between groups. Toe
temperatures were significantly higher during KC than incubator periods, and maternal breast temperature met each infant’s neutral thermal zone requirements within 5 min of onset of KC. Preterm infants similar to those studied here will maintain body warmth with up to 3h of KC.


Abstract: This study aimed to determine the impact of season and weight at discharge on growth rate and complications in low birthweight infants treated with Kangaroo Mother Care (KMC) in Maputo, Mozambique. The study population included 246 infants of birthweight <2,000g. Follow-up until 2,400g was obtained in 64%. There were no seasonal differences in weight gain and the risk of complications of infants treated with KMC in hospital. During the cold season after discharge, the risk of serious complications, including death, was higher (risk ratio 1.96; p=0.02) and more readmissions occurred (risk ratio 2.77; p=0.04). We postulate that after discharge mothers are unable to comply with the kangaroo position at all hours of the day and that exposure to low ambient temperatures may explain the more frequent occurrence of complications in the cold season. The weight at discharge did not affect complications or growth rate. We conclude that the current policy to discharge infants when having gained weight on 3 consecutive days, regardless of the actual weight, or whether the weight at birth has been regained, is adequate. In the cold season particularly, more efforts may be needed to ensure compliance with kangaroo position after discharge and to educate mothers on early signs of complications such as bronchopneumonia to encourage timely care seeking. With this method, low birthweight infants can grow adequately.


Abstract: This descriptive study on kangaroo mother care (KMC) of low-birthweight infants (LBWIs) was carried out in a tertiary care hospital in Recife, Brazil. Of 244 LBWIs weighing less than 1750 g admitted over 14 months, 112 (46%) died before inclusion, 18 (7%) were excluded, and 114 (47%), after stabilization, were cared for by KMC 24 hours a day until discharge. No deaths were recorded in hospital; two twins died of severe pneumonia after discharge and before the age of 3 months. There were no episodes of moderate or severe hypothermia but mild hypothermia (36–36.4 degrees C axillary temperature) occurred at a rate of 30 episodes per 100 infant days, mainly related to occasional separation from the mother. One hundred infants (88%) were discharged on exclusive breastfeeding, eight (7%) were still taking expressed breast-milk from a cup and six (5%) were being fed breast-milk plus formula. The mean daily weight gain during KMC was 15g. At follow-up, 87% were still exclusively breastfed at 1 month and 63% at 3 months. KMC was acceptable to mothers and staff. An important advantage of KMC over previous conventional care is cost—US$20 vs US$66 per bed/day. This study confirms that KMC for stabilized LBWIs in hospital is feasible, acceptable and cheap and in hospitals with limited resources is an appropriate alternative to conventional incubator care.

Abstract: BACKGROUND: Early skin-to-skin contact involves placing the naked baby prone on the mother’s bare chest at birth or soon afterwards (<24 hour). This could represent a ‘sensitive period’ for priming mothers and infants to develop a synchronous, reciprocal, interaction pattern, provided they are together and in intimate contact. Routine separation shortly after hospital birth is a uniquely Western cultural phenomenon that may be associated with harmful effects including discouragement of successful breastfeeding. OBJECTIVES: To assess the effects of early skin-to-skin contact on breastfeeding, behavior, and physiology in mothers and their healthy newborn infants. SEARCH STRATEGY: The Cochrane Pregnancy and Childbirth Group and Neonatal Group trials registers (December 2002), the Cochrane Central Register of Controlled Trials (The Cochrane Library, Issue 4, 2002), MEDLINE (1976 to 2002). SELECTION CRITERIA: Randomized and quasi-randomized clinical trials comparing early skin-to-skin contact with usual hospital care. DATA COLLECTION AND ANALYSIS: Two reviewers independently assessed trial quality and extracted data. We contacted study authors for additional information. We collected adverse effects information from the trials. MAIN RESULTS: Seventeen studies, involving 806 participants, were included. We found statistically significant and positive effects of early skin-to-skin contact on breastfeeding at one to three months postbirth (odds ratio (OR) 2.15, 95% confidence interval (CI) 1.10 to 4.22), breastfeeding duration (weighted mean difference (WMD) 41.99, 95% CI 13.97 to 70.00), maintenance of infant temperature in the neutral thermal range (OR 12.18, 95% CI 2.04 to 72.91), infant blood glucose (WMD 11.07, 95% CI 3.97 to 18.17), infant crying (OR 21.89, 95% CI 5.19 to 92.30) and summary scores of maternal affectionate love/touch (SMD 0.73, 95% CI 0.36 to 1.11) during an observed breastfeeding within the first few days postbirth. We found no statistically significant benefit of early skin-to-skin contact for other major clinical variables: breastmilk maturation, maternal chest circumference, infant heart rate. REVIEWER’S CONCLUSIONS: Limitations included the methodological quality of the studies, variations in the implementation of the intervention and outcome variability. Early skin-to-skin contact appears to have some clinical benefit especially regarding breastfeeding outcomes and infant crying and has no apparent short or long-term negative effects. Further investigation is recommended. To facilitate meta-analysis of the data, future research in this area should involve outcome measures consistent with those used in the studies included here. Published reports should also clearly indicate if the intervention was skin-to-skin contact and include means, standard deviations and exact probability values.


Abstract: Skin-to-skin (“kangaroo”) care for preterm infants is becoming widespread in Western Europe. During this care the mother holds her diaper-clad premature infant against her skin beneath her clothing and allows self-regulatory access to breast-feeding. Fathers hold their infants skin-to-skin also. Research projects in Western Europe and the United States provide data that support the safety and effectiveness of this method. Infants held skin-to-skin are warm
enough and have regular heart rate and respirations, more deep sleep and alert inactivity, less crying, no increase in infections, greater weight gain, and earlier discharge. Lactation is more productive and of greater duration. Parents become attached to their infants and feel confident about caring for them. This research is summarized and annotated in a table, along with descriptive reports and videotapes. These data can be used by health care professionals to make informed decisions about offering kangaroo care opportunities to selected parents and their preterm infants.


**Abstract:** OBJECTIVE: To examine whether the kangaroo care (KC) intervention in premature infants affects parent-child interactions and infant development. METHODS: Seventy-three preterm infants who received KC in the neonatal intensive care unit were matched with 73 control infants who received standard incubator care for birth weight, gestational age (GA), medical severity, and demographics. At 37 weeks’ GA, mother-infant interaction, maternal depression, and mother perceptions were examined. At 3 months’ corrected age, infant temperament, maternal and paternal sensitivity, and the home environment (with the Home Observation for Measurement of the Environment [HOME]) were observed. At 6 months’ corrected age, cognitive development was measured with the Bayley-II and mother-infant interaction was filmed. Seven clusters of outcomes were examined at 3 time periods: at 37 weeks’ GA, mother-infant interaction and maternal perceptions; at 3-month, HOME mothers, HOME fathers, and infant temperament; at 6 months, cognitive development and mother-infant interaction. RESULTS: After KC, interactions were more positive at 37 weeks’ GA: mothers showed more positive affect, touch, and adaptation to infant cues, and infants showed more alertness and less gaze aversion. Mothers reported less depression and perceived infants as less abnormal. At 3 months, mothers and fathers of KC infants were more sensitive and provided a better home environment. At 6 months, KC mothers were more sensitive and infants scored higher on the Bayley Mental Developmental Index (KC: mean: 96.39; controls: mean: 91.81) and the Psychomotor Developmental Index (KC: mean: 85.47; controls: mean: 80.53). CONCLUSIONS: KC had a significant positive impact on the infant’s perceptual-cognitive and motor development and on the parenting process. We speculate that KC has both a direct impact on infant development by contributing to neurophysiological organization and an indirect effect by improving parental mood, perceptions, and interactive behavior.


**Abstract:** OBJECTIVE: To compare the kangaroo and traditional methods of removing an infant from an incubator in terms of four physiologic parameters, mother’s satisfaction, and mother’s preference. DESIGN: Time-series design (quasi-experimental), with infant-mother dyads subjected to both methods. SETTING: Intermediate neonatal care unit in a tertiary hospital in Canada. PARTICIPANTS: A convenience sample of 71 infant-mother dyads. INTERVENTION
AND MEASURES: The intervention was use of the kangaroo or traditional method of maintaining body temperature of preterm infants. The dependent variables were physiologic parameters (skin temperature, heart rate, respiratory rate, and oxygen saturation) measured five times with each method. Mother’s satisfaction was measured at the end of each testing period and mother’s preference at the end of the experiment. RESULTS: The kangaroo method produced less variation in oxygen saturation and longer duration of testing, and it was preferred by most of the mothers. CONCLUSIONS: The kangaroo method is safe for the preterm infant and allows for early contact between parents and infants.


Abstract: The widespread use of ‘kangaroo care’ is yet to be realized despite strong evidence to suggest that this method of preterm care is safe, effective and affordable. We need to understand users’ perception of this method of care. We studied, through focus group discussions, caregivers’ experiences and perceptions of this method in a tertiary level hospital of a developing country. We conclude that, in this hospital, caregivers preferred kangaroo care to conventional methods. Communities’ awareness of this method of care and its advantages must be improved.


Abstract: OBJECTIVE: To test preterm neonates’ physiologic and behavioral responses when placed skin-to-skin on their mother’s chests, called kangaroo care (KC), for the first 6 hours after birth, instead of having the neonates go to an intensive care unit. DESIGN: Convenience sampling was used in this descriptive study to enroll neonates who were given continuous KC beginning soon after birth in the delivery room and continuing for 6 hours. Heart rate, respiratory rate, oxygen saturation, abdominal temperature, and behavioral state were recorded each minute. SETTING: Data were collected in the delivery room and in a private labor room in tropical Cali, Colombia. PARTICIPANTS: Six 34–36-week preterm neonates with 5-minute APGAR scores of 6 or more were enrolled. Two neonates had grunting respirations before KC was begun. RESULTS: Temperature rose rapidly to thermoneutral range. With few exceptions, heart rate, respiratory rate, and oxygen saturation remained within normal limits; grunting respirations in two neonates disappeared with warmed humidified oxygen and continuous KC. Sleep predominated, and neonates were discharged home by 48 hours being fully breastfed, suggesting that KC was an environment conducive to recovery from fatigue. CONCLUSIONS: These data suggest that KC beginning in the delivery room can be given safely and perhaps with benefit to 34–36-week gestation neonates who appear healthy at birth. Kangaroo care was conducive to recovery from birth-related fatigue.
Abstract: OBJECTIVE: To assess the effectiveness and safety of Kangaroo Mother Care (KMC) for infants of low birth weight. METHODS: An open, randomized, controlled trial of a Colombian social security referral hospital was conducted. A total of 1084 consecutive infants who were born at <=2,000g were followed, and 746 newborns were randomized when eligible for minimal care, with 382 to KMC and 364 to “traditional” care. Information on vital status was available for 693 infants (93%) at 12 months of corrected age. KMC consisted of skin-to-skin contact on the mother’s chest 24 hours/day, nearly exclusive breastfeeding, and early discharge, with close ambulatory monitoring. Control infants remained in incubators until the usual discharge criteria were met. Both groups were followed at term and at 3, 6, 9, and 12 months of corrected age. The main outcomes measured were morbidity, mortality, growth, development, breastfeeding, hospital stay, and sequelae. RESULTS: Baseline variables were evenly distributed, except for weight at recruitment (KMC: 1,678g; control participants: 1,713g). The risk for death was lower among infants who were given KMC, although the difference was not significant (KMC: 11 [3.1%] of 339; control participants: 19 [5.5%] of 324; relative risk: 0.57; 95% confidence interval: 0.17–1.18). The growth index of head circumference was statistically significantly greater in the group given KMC, but the developmental indices of the 2 groups were similar. Infants who weighed <=1,500g at birth and were given KMC spent less time in the hospital than those who were given standard care. The number of infections was similar in the 2 groups, but the severity was less among infants who received KMC. More of these infants were breastfed until 3 months of corrected age. CONCLUSION: These results support earlier findings of the beneficial effects of KMC on mortality and growth. Use of this technique would humanize the practice of neonatology, promote breastfeeding, and shorten the neonatal hospital stay without compromising survival, growth, or development.


Abstract: PURPOSE: To compare kangaroo mother care (KMC) and conventional cuddling care (CCC) in premature and small-for-gestational-age infants. DESIGN AND SAMPLE: Thirty mother-infant dyads in two Australian neonatal nurseries were randomly assigned to the KMC group or the CCC group. Both groups of mothers cuddled their babies for a minimum of two hours a day, five days a week while in the study, with the KMC group having skin-to-skin contact while the CCC group had contact through normal clothing. MAIN OUTCOME VARIABLE: The main outcome variables were infant weight gain, temperature maintenance during KMC and CCC, and length of hospital stay. RESULTS: The results showed no difference between groups on the Parental Stress Scale (NICU) or the Parental Expectations Survey. Infants in both groups experienced equivalent maintenance of or rise in temperature while out of the incubators, equal weight gain, equal length of stay in the hospital, and equal duration of breastfeeding.
Birth Asphyxia and Resuscitation


Abstract: In order to test the practicability and safety of whole-body cooling in term neonates with moderate-to-severe hypoxic-ischaemic encephalopathy (HIE) and to report outcomes, a prospective pilot study was carried out in 25 term infants (median postmenstrual age 38 weeks, range 36 to 41 weeks; 20 males, five females). Whole-body cooling, to a target core temperature of 33 to 34 degrees C, started within 6 hours of birth and was maintained for 72 hours. Of the 25 newborn infants (19 Sarnat II and six Sarnat III, 18 outborn), 18 survived, including 13 (72%) with normal cerebral signal by MRI. Temperature instability occurred during cooling in 15 infants, but neither severe haemodynamic instability nor renal failure was seen. Thrombocytopenia developed in 12 infants, including seven with biological disseminated intravascular coagulation. One patient had hypoxaemia with right-to-left shunting through the ductus arteriosus, and seven had limited meningeal or subdural bleeding. Whole-body cooling is feasible in term neonates, with no life-threatening adverse events. Improvements are needed to obtain stable hypothermia for 72 hours.


Abstract: Summary Birth asphyxia is an important cause of preventable neonatal morbidity and mortality in developing countries. Of the 26 million births each year in India, 4–6 per cent of neonates fail to establish spontaneous breathing at birth. These babies can be helped, if healthcare professionals present at the time of birth are skilled in the art of neonatal resuscitation. Since the introduction of the Neonatal Resuscitation Programme (NRP) by the American Academy of Pediatrics and American Heart Association, organized training programmes for instructors and providers have been launched in India, under the aegis of the National Neonatology Forum (NNF) since 1990. The initial goal was to train the trainers and provide them with the necessary equipment. The NNF created a national faculty of 150 pediatricians and nurses for NRP by conducting certification courses in various regions of the country. The certified faculty members in turn trained 12,000 healthcare professionals in various parts of India over the following 2 years. Simultaneously, in several teaching institutions, NRP was introduced into the curricula of medical and nursing students. This programme provides a uniform, systematic and action-oriented approach to the resuscitation of the newborn. Prospective evaluation of the resuscitation programme in teaching hospitals has revealed the use of rational resuscitation practices and a significant decline in asphyxia-related deaths.

**Abstract:** AIM: The neonatal resuscitation program (NRPG) was first introduced in our hospital to replace the traditional resuscitation (TR) program in 1993. TR has been in existence in China for a long time. The implementation of NRPG was timely in reducing the number of infant mortality and also to disseminate to the many hospitals in China which are still practising TR. METHOD: A perspective study of 4,751 newborns with 366 asphyxiated babies in a period of 2 years was carried out. A previous sample of 1,722 live births under the TR program was compared as a controlled group statistically. RESULTS: From August 1993 to August 1995, when NRPG was exclusively implemented in our hospital, only 16 newborns died within 7 days, out of 4,751 births (3.4%) with 2 deaths in the delivery room. Seventeen newborns died within 7 days out of 1,722 births (9.9+) in the TR group, with 10 deaths in the delivery room. From the data shown, it can be clearly seen that the perinatal neonatal mortality rate was reduced almost 3 times after NRPG was implemented (chi^2 = 10.54, p<0.01). The follow-up results of 21 cases of severe asphyxia at 2 months—1 year of age were normal except for one with cerebral palsy. CONCLUSIONS: Our study showed that NRPG was indeed a very effective and feasible technique during the delivery process in the reduction of neonatal mortality. It is important to disseminate widely the knowledge and technique of NRPG in places where TR is still being widely practiced especially in developing countries.


**Abstract:** We describe a prospective cross-sectional survey over a 12-month period in the principal maternity hospital of Kathmandu, Nepal, where over 50% of the local population deliver. The study aim was to estimate the contribution of birth asphyxia to perinatal mortality in this setting. During 1995, there were 14,371 livebirths and 400 stillbirths, a total stillbirth rate of 27 per 1,000 total births. The fresh term (2,000g or more) stillbirth rate was 8.5 per 1000 total births [95% CI 7.1, 10.1]. Ninety-two cases of neonatal encephalopathy (NE) affecting term infants were detected (excluding those due to congenital malformations, hypoglycaemia and early neonatal sepsis). The birth prevalence of NE was 6.4 per 1,000 livebirths [95% CI 5.2, 7.8]. There was evidence of intrapartum compromise in 63 (68%) of the cases of NE and 65 (76%) of the stillbirths, but only in 12 (12%) of controls. The cause-specific early neonatal mortality rate for NE was 2.1 per 1,000 livebirths [95% CI 1.4, 3.0]. Combining the NE deaths and fresh stillbirths gives an upper estimate for term birth asphyxia perinatal mortality rate of 10.8 per 1000 total births [95% CI 9.2, 12.6], 24% of all perinatal deaths before hospital discharge. This study suggests that birth asphyxia remains an important cause of perinatal mortality in developing countries. The paper discusses the pros and cons of different strategies to reduce birth asphyxia in low-income countries.

**Abstract:** INTRODUCTION: Perinatal asphyxia (PA) and its neurologic manifestations are the most important cause of brain injury and neurologic sequelae in full-term infants. The objective of this study is to analyze the perinatal risk factors of neurologic sequelae in asphyctic term newborns. PATIENTS AND METHODS: One hundred and fifty-six consecutive asphyctic term infants were studied prospectively during 40 months. PA was graded in two stages (severe and non-severe), hypoxic-ischemic encephalopathy classification was based on Levene's criteria, and neurologic sequelae was based on Finer and Amiel-Tisson's criteria. The perinatal variables were graded as prenatal (gestational and obstetrics), neonatal (resuscitation, general data of the newborn, and organic manifestations of asphyxia) and postneonatal (neurologic sequelae with at least 24 months of follow-up). The relationships between these variables are studied by univariate and multivariate analysis (Cox's regression). RESULTS: PA was graded as severe in 31 cases and non-severe in 125. Neurologic manifestations (hypoxic-ischemic encephalopathy) during neonatal period were present in 25.6%, and extraneurologic manifestations (hypoxic-ischemic disease) in 41.7% cases. The incidence of neurologic sequelae, in 115 asphyxiated full-term infants follow-up at least 24 months, was 16.5% (19 cases). The perinatal variables associated to risk of neurologic sequelae on univariate analysis are variables of neonatal resuscitation (1 minute Apgar score ≤ 4, 5 minute Apgar score ≤ 6, endotracheal intubation, severity of PA) and variables of systemic manifestations (hypoxic-ischemic encephalopathy, cardiovascular and multi-systemic dysfunction, and mechanical ventilation). But only two variables are independently associated on multivariate analysis: severe PA (RR=2.82; IC=1.07–7.39) and hypoxic-ischemic encephalopathy (RR=4.17; IC=1.48–11.75). CONCLUSIONS: The best predictive risk factors for the neurological prognosis at follow-up are severe PA at birth and/or evidence of encephalopathy in neonatal period.


**Abstract:** In developing countries the need for a risk approach in neonatology is obvious because of a high birth rate, high neonatal mortality rate, and limited availability of resources. Quantification of risk, with selected antepartum, intrapartum factors, clinical, and post-mortem findings was done by calculating odds ratio, attributable risk, and 95 per cent confidence limits in 1,811 babies, 541 of which were asphyxiated. Primigravity, history of perinatal death, pregnancy induced hypertension, and antepartum haemorrhage carried higher risk. Abnormal fetal heart rate and meconium passage in amniotic fluid correctly predicted high risk of birth asphyxia. Decreasing risk in premature/low birth weight babies without increase in abdominal deliveries suggested that caesarean sections were unnecessary in preterm deliveries. Clinical monitoring of asphyxiated newborns was adequate enough.

**Abstract:** BACKGROUND: Traditionally, asphyxiated newborn infants have been ventilated using 100% oxygen. However, a recent multinational trial has shown that the use of room air was just as efficient as pure oxygen in securing the survival of severely asphyxiated newborn infants. Oxidative stress markers in moderately asphyxiated term newborn infants resuscitated with either 100% oxygen or room air have been studied for the first time in this work. METHODS: Eligible term neonates with perinatal asphyxia were randomly resuscitated with either room air or 100% oxygen. The clinical parameters recorded were those of the Apgar score at 1, 5, and 10 minutes, the time of onset of the first cry, and the time of onset of the sustained pattern of respiration. In addition, reduced and oxidized glutathione concentrations and antioxidant enzyme activities (superoxide dismutase, catalase, and glutathione peroxidase) were determined in blood from the umbilical artery during delivery and in peripheral blood at 72 hours and at 4 weeks’ postnatal age. RESULTS: Our results show that the room-air resuscitated (RAR) group needed significantly less time to first cry than the group resuscitated with 100% oxygen (1.2 +/– 0.6 minutes vs 1.7 +/– 0.5). Moreover, the RAR group needed less time undergoing ventilation to achieve a sustained respiratory pattern than the group resuscitated with pure oxygen (4.6 +/– 0.7 vs 7.5 +/– 1.8 minutes). The reduced-to-oxidized-glutathione ratio, which is an accurate index of oxidative stress, of the RAR group (53 +/– 9) at 28 days of postnatal life showed no differences with the control nonasphyxiated group (50 +/– 12). However, the reduced-to-oxidized-glutathione ratio of the 100% oxygen-resuscitated group (OxR) (15 +/– 5) was significantly lower and revealed protracted oxidative stress. Furthermore, the activities of superoxide dismutase and catalase in erythrocytes were 69% and 78% higher, respectively, in the OxR group than in the control group at 28 days of postnatal life. Thus, this shows that these antioxidant enzymes, although higher than in controls, could not cope with the ongoing generation of free radicals in the OxR group. However, there were no differences in antioxidant enzyme activities between the RAR group and the control group at this stage. CONCLUSIONS: There are no apparent clinical disadvantages in using room air for ventilation of asphyxiated neonates rather than 100% oxygen. Furthermore, RAR infants recover more quickly as assessed by Apgar scores, time to the first cry, and the sustained pattern of respiration. In addition, neonates resuscitated with 100% oxygen exhibit biochemical findings reflecting prolonged oxidative stress present even after 4 weeks of postnatal life, which do not appear in the RAR group. Thus, the current accepted recommendations for using 100% oxygen in the resuscitation of asphyxiated newborn infants should be further discussed and investigated.


**Abstract:** The basic mechanisms leading to cell death in birth asphyxia are becoming better known. Some of these are excitotoxicity, inflammation and oxidative stress. In the so-called therapeutic window—between the primary and secondary energy failure—modulation of these processes may be beneficial, reducing apoptosis and perhaps necrosis. In order to reduce oxidative stress, reoxygenation with low oxygen concentrations, even as low as room air, might
be beneficial. Increased oxidative stress might have long-term effects on brain growth and
development and there is evidence indicating that exposure to 100% oxygen after birth for only a
few minutes might have long-term effects. New guidelines for newborn resuscitation have
recently been published but more research is needed in this field, especially regarding
resuscitation of preterm infants, where few data exist.

Neonatol., vol. 6, no. 3, pp. 233–239.

Abstract: Oxygen is a toxic agent and a critical approach regarding its use during resuscitation
at birth is developing. Animal data indicate that room air is efficient for newborn resuscitation.
Three clinical studies have established that normal ventilation is delayed after oxygen
resuscitation. Oxidative stress is augmented for several weeks in infants exposed to oxygen at
birth—the long-term implications of these observations remain unclear. There are limited data
regarding the use of room air during complicated resuscitations, i.e. in meconium aspiration, the
severely asphyxiated infant and in the preterm infant. Thus, it is necessary to continue ongoing
rigorous examination of the long-accepted practice of oxygen administration during neonatal
resuscitation.

Niermeyer, S., P. Van Reempts, J. Kattwinkel, T. Wiswell, D. Burchfield, O. D. Saugstad, A.
Milner, S. Knaebel, J. Perlman, D. Azzopardi, A. Gunn, R. Boyle, S. Toce, and A.
S110–S125.

Abstract: This article summarizes guidelines and newer information on various aspects of
resuscitation of newborns, including meconium-stained amniotic fluid and direct endotracheal
suctioning, use of room air versus 100% oxygen in positive-pressure ventilation for distressed
newborns, acute volume expansion for significant volume loss, cerebral hypothermia after
perinatal asphyxia, and non-initiation and discontinuation of resuscitation in the delivery room.

“Resuscitation of asphyxic newborn infants with room air or 100% oxygen,”

Abstract: To test the hypothesis that room air is superior to 100% oxygen when asphyxiated
newborns are resuscitated, 84 neonates (birth weight >999g) with heart rate <80 and/or apnea
at birth were allocated to be resuscitated with either room air (n=42) or 100% oxygen (n=42).
Serial, unblinded observations of heart rates at 1, 3, 5, and 10 min and Apgar scores at 1 min
revealed no significant differences between the two groups. At 5 min, median (25th and 75th
percentile) Apgar scores were higher in the room air than in the oxygen group [8 (7–9) versus 7
(6–8), p=0.03]. After the initial resuscitation, arterial partial pressure of oxygen, pH, and base
excess were comparable in the two groups. Assisted ventilation was necessary for 2.4 (1.5–3.4)
min in the room air group and 3.0 (2.0–4.0) min in the oxygen group (p=0.14). The median time
to first breath was 1.5 (1.0–2.0) min in both the room air and oxygen groups (p=0.59), and the
time to first cry was 3.0 (2.0–4.0) min and 3.5 (2.5–5.5) min in the room air and oxygen groups,
respectively (p = 0.19). Three neonates in the room air group and four in the oxygen group died in the neonatal period. At 28d, 72 of the 77 surviving neonates were available for follow-up (36 in each group), and none had any neurologic sequelae. (ABSTRACT TRUNCATED AT 250 WORDS).


**Abstract:** OBJECTIVE: Birth asphyxia represents a serious problem worldwide, resulting in approximately 1 million deaths and an equal number of serious sequelae annually. It is therefore important to develop new and better ways to treat asphyxia. Resuscitation after birth asphyxia traditionally has been carried out with 100% oxygen, and most guidelines and textbooks recommend this; however, the scientific background for this has never been established. On the contrary, theoretic considerations indicate that resuscitation with high oxygen concentrations could have detrimental effects. We have performed a series of animal studies as well as one pilot study indicating that resuscitation can be performed with room air just as efficiently as with 100% oxygen. To test this more thoroughly, we organized a multicenter study and hypothesized that room air is superior to 100% oxygen when asphyxiated newborn infants are resuscitated.

**METHODOLOGY:** In a prospective, international, controlled multicenter study including 11 centers from six countries, asphyxiated newborn infants with birth weight >999g were allocated to resuscitation with either room air or 100% oxygen. The study was not blinded, and the patients were allocated to one of the two treatment groups according to date of birth. Those born on even dates were resuscitated with room air and those born on odd dates with 100% oxygen. Informed consent was not obtained until after the initial resuscitation, an arrangement in agreement with the new proposal of the US Food and Drug Administration’s rules governing investigational drugs and medical devices to permit clinical research on emergency care without the consent of subjects. The protocol was approved by the ethical committees at each participating center. Entry criterion was apnea or gasping with heart rate <80 beats per minute at birth necessitating resuscitation. Exclusion criteria were birth weight <1000g, lethal anomalies, hydrops, cyanotic congenital heart defects, and stillbirths. Primary outcome measures were death within 1 week and/or presence of hypoxic-ischemic encephalopathy, grade II or III, according to a modification of Sarnat and Sarnat. Secondary outcome measures were Apgar score at 5 minutes, heart rate at 90 seconds, time to first breath, time to first cry, duration of resuscitation, arterial blood gases and acid base status at 10 and 30 minutes of age, and abnormal neurologic examination at 4 weeks. The existing routines for resuscitation in each participating unit were followed, and the ventilation techniques described by the American Heart Association were used as guidelines aiming at a frequency of manual ventilation of 40 to 60 breaths per minute. RESULTS: Forms for 703 enrolled infants from 11 centers were received by the steering committee. All 94 patients from one of the centers were excluded because of violation of the inclusion criteria in 86 of these. Therefore, the final number of infants enrolled in the study was 609 (from 10 centers), with 288 in the room air group and 321 in the oxygen group. Median (5 to 95 percentile) gestational ages were 38 (32.0 to 42.0) and 38 (31.1 to 41.5) weeks (NS), and birth weights were 2,600 (1,320 to 4,078) g and 2,560 (1,303 to 3,900) g (NS) in the room air and oxygen groups, respectively. There were 46% girls in the room air and 41%
in the oxygen group (NS). Mortality in the first 7 days of life was 12.2% and 15.0% in the room air and oxygen groups, respectively; adjusted odds ratio (OR)=0.82 with 95% confidence intervals (CI)=0.50–1.35. Neonatal mortality was 13.9% and 19.0%; adjusted OR=0.72 with 95% CI=0.45–1.15. Death within 7 days of life and/or moderate or severe hypoxic-ischemic encephalopathy (primary outcome measure) was seen in 21.2% in the room air group and in 23.7% in the oxygen group; OR=0.94 with 95% CI=0.63–1.40. (ABSTRACT TRUNCATED).


Abstract: Perinatal asphyxia is one of the common causes of neonatal mortality. Data from National Neonatal Perinatal database suggest that perinatal asphyxia contributes to almost 20% of neonatal deaths in India. Failure to initiate or sustain respiration after birth has been defined as criteria for the diagnosis of asphyxia by WHO. Perinatal asphyxia results in hypoxic injury to various organs including kidneys, lungs and liver but the most serious effects are seen on the central nervous system. Levene’s classification is a useful clinical tool for grading the severity of hypoxic ischemic encephalopathy. Good supportive care is essential in the first 48 hours after asphyxia to prevent ongoing brain injury in the penumbra region. Strict monitoring and prompt correction is needed for common problems including temperature maintenance, blood sugars, blood pressure and oxygenation. Phenobarbitone is the drug of choice for the treatment of convulsions.


Abstract: OBJECTIVES: The incidence of poor neurologic outcomes was studied in term newborns who had suffered severe asphyxia at birth. METHODS: Subjects were 152 newborns admitted to the NICU with a low Apgar score at 1 or 5 minutes. A 1-year prospective follow-up of neurological outcomes was carried out by a questionnaire survey concluded between April 1, 1996 and March 31, 1998. RESULTS: 1) The incidence of a poor neurologic outcome, including 15 neurologic sequelae and 6 deaths, was 13.8% among the subjects. 2) The risk of a poor outcome was increased by 13-fold in neonates with adverse neurological signs and 31-fold in those with hypoxic ischemic encephalopathy. CONCLUSION: The incidence of poor neurologic outcome was very high among term infants with low Apgar scores. These infants were 10 times to 20 times more likely to die, or to survive with permanent disabilities, than were infants without low Apgar scores.


Abstract: Despite the adoption of evidence-based guidelines for neonatal resuscitation, formulated with international consensus, the process of resuscitating a newly born infant remains a uniquely local activity. Variations in the physical environment, cultural and medical
beliefs, and available resources mediate significant difference in practices worldwide. Yet, the universal nature of the physiology surrounding birth, and its disturbances, provides a common basis for reference. Recognition of the importance of assistance available at the moment of birth, management of the thermal environment, and establishment of adequate ventilation is nearly universal. Differences in specific practices arise from local differences in the risks and challenges to perinatal health, which, in turn, stem from the environment or the available resources. Valuable information can be learned through comparison and evaluation of different techniques. In such a way, the evidence base for neonatal resuscitation can be strengthened and infants around the world can share in the benefits realized.


Abstract: The main methods of oxygen administration to infants are reviewed. Some methods are more economical and therefore more useful in developing countries. All the methods have potential complications and therefore need to be carefully supervised.


Abstract: Per-partum anoxia is a frequent situation facing the pediatrician in the maternity ward. The question is to decide which infants require care in a specialized unit. If transfer is decided, the infant must be referred to an appropriate pediatric unit (intensive care or neonatal unit). Cases of severe anoxia are exceptional. Intermediary situations are however much more frequent and raise difficult evaluation problems due to the lack of any specific test. The pediatrician must rely on a combination of elements from the clinical presentation, the medical history, the clinical course, and laboratory tests. Different elements suggest a prudent approach with referral to a pediatric unit. These elements include: imperfect clinical recovery (5-min Agpar <7), major intensive care at delivery (intubation, ventilation, vasoactive agents), anomalies in the cord blood or first hour blood tests (cord pH<7, base deficit 12, cord or blood lactate 9 mmol/l). Obstetrical circumstances which led to per-partum anoxia must be well identified because those interrupting placental flow (abruptio placenta, uterine rupture) suggest prudence is necessary even if the infant appears to have recovered well. All neonatal disorders (macrosomia, prematurity, infection, respiratory distress) increase the risk of rapid decompensation and may argue for hospitalization. Likewise, if even minimal signs of neurological, respiratory or hemodynamic disorders are present from birth to two hours, surveillance in a specialized unit is required, the level depending on local facilities. Certain situations nevertheless always require referral to a pediatric intensive care unit: use of vasoactive drugs, respiratory distress, abnormal neurological exam, poor recovery (5-min Agpar <4). Finally, it must be remembered that per-partum anoxia is rarely predictable and can occur any at any time of day or night. The pediatrician must also train other delivery room personnel, including the midwives, in intensive care techniques.

**Abstract:** OBJECTIVE: To investigate the long-term neuropsychological consequences of perinatal asphyxia (PA). METHODS: A group of adolescents were assessed with antecedents of mild (n=8) and moderate (n=20) PA, and a matched group of 28 healthy adolescents as a control group. Neuropsychological assessment included tests of memory, perceptual-motor skills, and frontal lobe functions, because these are areas of cognitive functioning susceptible to hypoxic conditions. RESULTS: Subjects with moderate PA showed significant differences from the control group on tests related to delayed recall for both verbal and visual information, perceptual-motor speed, and tests assessing attention and executive functions. Conversely, subjects in the mild PA group exhibited scores which were similar to those of the control group in all the assessed variables. CONCLUSION: The present findings demonstrate that subtle but persistent neuropsychological deficits were observed in adolescents with antecedents of moderate PA, but not in those classified with mild asphyxia.


**Abstract:** Neonatal resuscitation methods vary in developing countries. This study describes the delivery experience at one rural Kenyan mission hospital, retrospectively analysing delivery data and newborn outcomes for a 12-month period, and prospectively characterizing neonatal resuscitation practices. Thirty-six of 878 newborns (4 percent) suffered unfavourable outcomes, significantly associated with caesarean, breech, and vacuum deliveries (nine infants, $P<0.01$) and birthweight of 2000 g or less (10 infants, $P<0.001$). Observed neonatal resuscitation practices were inconsistent and notable for umbilical vein injections given in lieu of bag and mask ventilation. A basic neonatal resuscitation protocol was developed. It is concluded that at one Kenyan hospital, unfavourable newborn outcomes were significantly associated with delivery other than normal vaginal and with birthweights of 2000g or less. Neonatal resuscitation methods could be modified for use in this setting, and might be most useful for term infants delivered by caesarean, breech, or vacuum deliveries.


**Abstract:** There has been a considerable increase in the educational level and awareness of neonatal care in developing countries over last decade. The importance of neonatal resuscitation, however, has been ignored. This report discusses the importance of structured neonatal courses with emphasis on the need for more such courses at regional levels, especially in developing countries. The concept of basic and advanced life support of the newborn is also presented.

**Abstract:** OBJECTIVES: To determine the number of providers and instructors trained by the initial 37 core instructors during the first 2 years following the launch of the Malaysian Neonatal Resuscitation Program (NRP). To identify remediable problems which interfered with the propagation of the NRP in Malaysia. METHODOLOGY: A prospective observational study carried out over a 2-year period between 2 September 1996 to 2 September 1998. For every training course conducted, the instructors completed a NRP course report form (Form A) that documented the instructors involved in the course. For every participant who attended the course and successfully completed it, the instructors submitted a record form (Form B) that contained the name, hospital address, department, profession, place of work, language used for training and the marks obtained by the individual participant. After each course, completed forms A and B were returned to the NRP secretariat for compilation. RESULTS: Of the 37 core instructors, 35 (94.6%) carried out training courses in their respective home states. A further 513 new instructors and 2256 providers were trained subsequently. A total of 2806 health personnel from all 13 states of Malaysia were NRP-certified during the first 2 years. However, 61.2% (n=335) of the 550 instructors were inactive trainers, having trained less than four personnel per instructor a year. Most of the NRP-certified personnel were either doctors (32.0%) or nursing staff (64.4%). More than 60% of these worked either in the labour rooms, neonatal intensive care units or special care nurseries. At least one person from all three university hospitals and all general hospitals, 89.3% (92/103) of the district hospitals, 3.5% (73/2,090) of the maternal and child health services, and 21% (46/219) of the private hospitals and maternity homes, were trained in the NRP. CONCLUSION: Dissemination of the NRP in Malaysia during the first 2 years was very encouraging. Further efforts should be made to spread the program to private hospitals and the maternal and child health services. In view of the large number of inactive instructors, the criteria for future selection of instructors should be more stringent.


**Abstract:** BACKGROUND: As part of a continuous quality assurance process which we instituted in 1999, we review videotapes of selected high-risk deliveries at our hospital. We utilized our reviews to evaluate the occurrence of errors, and to evaluate team and leader functions during neonatal resuscitation. METHODS: We established accepted behavior for members of resuscitation teams and the team leader. The actual conduct of the resuscitation was judged against the standard of the guidelines of the Neonatal Resuscitations Program of the American Heart Association, and the American Academy of Pediatrics. The videotapes of resuscitations were reviewed, and significant deviations from accepted practices were noted, and discussed by a specifically developed quality assurance committee, including, whenever possible, the actual resuscitators. RESULTS: We were able to detect a number of problems, which included inappropriate leader and team member activities, inappropriate preparation, communication, and coordination, and made a number of changes to our practice. CONCLUSIONS: We believe that neonatal resuscitation may be improved by the provision of teaching about team and leader functions, encouraging debriefing following complicated
resuscitations, developing a minimal form to be completed for any patient requiring compressions or epinephrine within the delivery room, and providing more direct observations regarding the actual conduct of resuscitation.


Abstract: Ten million or more newborns worldwide each year need some type of resuscitation assistance. More than 1 million babies die annually from complications of birth asphyxia. Over the past 3 decades, neonatal resuscitation has evolved from disparate, word-of-mouth teaching methods to organized programs. The most widely-used curriculum is the Neonatal Resuscitation Program, which is supported by the American Academy of Pediatrics and the American Heart Association. To date more than 1.5 million individuals have been trained in the Neonatal Resuscitation Program. Resuscitation efforts are geared toward avoiding or mitigating the adverse sequelae of asphyxia neonatorum. Certain characteristics distinguish the preterm infant, including propensity to become hypothermic and higher potential for adverse neurologic and pulmonary complications from resuscitation efforts. In this era of evidence-based medicine the most recent Neonatal Resuscitation Program guidelines were developed to provide recommendations based on the best currently-available science. A number of major proposals received considerable scrutiny during the evaluation process. Many areas of neonatal resuscitation still need to be studied.


Abstract: The incidence, treatment and immediate course in infants with postnatal apnoea were studied. Information on all infants born in Sweden in 1985 with a low Apgar score (3 or less at 1 min or 6 or less at 5 min) was collected from the midwife and from the baby’s chart. Of the 97,648 live births, 1,633 (1.7%) had a low Apgar score. The risk increased with decreasing birthweight and with severe malformations. Before delivery, 19% of the low-Apgar-score infants were not expected to require resuscitation. Eighty percent of the ventilated infants were satisfactorily ventilated by bag and mask; the remainder were intubated. Of the ventilated infants, 78% developed spontaneous breathing within 10 min after birth and 89% within 20 min. Routine intubation or administration of buffer in cases of postnatal asphyxia had no influence on the time to onset of regular spontaneous breathing.


Abstract: Perinatal asphyxia associated with hypoxic-ischemic brain injury remains an important cause of long-term morbidity in both premature and term infants. Early, severe neurologic dysfunction appears to be the most useful indicator that a significant hypoxic-ischemic insult has occurred, and is the best predictor of neurologic sequelae. There are distinct gestational age dependent differences in the vulnerability of specific cerebral structures to hypoxic-ischemic damage, which ultimately determines the type and severity of neurologic sequelae. Both major and minor handicapping conditions are seen, the latter having important consequences on later
academic achievement. Long-term, longitudinal follow-up is required for any asphyxiated infant with early intervention as the goal. As newer imaging modalities are employed and studied, we are learning more about the neuropathology of asphyxia and correlating it to outcome. However, the ability to accurately predict long-term neurodevelopmental outcome in seriously asphyxiated infants remains elusive.


Abstract: Full text available at: http://www.springerlink.com/app/home/content.asp?wasp=12d237n82c4lywm4c750xandreferrer=contributionandformat=2andpage=1


Abstract: The Laerdal prototype device is easy to use, even by those with no previous resuscitation experience. The incorporation of a simple water manometer during training improves performance so that pressures generated are very similar to those recommended for routine endotracheal resuscitation. Finally, a simple bag makes an entirely satisfactory substitute for an expensive resuscitation manikin. In our opinion it is now appropriate for further studies to be carried out using the device in resuscitation of asphyxiated newborn babies.


Abstract: The possibility that temperature may affect the outcome of resuscitation from severe perinatal asphyxia has been a long-standing focus of research. Experimentally it is now well established that even small changes in temperature during severe hypoxia-ischemia critically modulate outcome. Clinical and experimental studies have now shown that hypoxic-ischemic injury continues to evolve after resuscitation. Experimentally, prolonged mild to moderate hypothermia can dramatically reduce this delayed injury, while mild hyperthermia over the same period worsens injury. Indeed there are data indicating that moderate post-ischemic hyperthermia can be deleterious as late as 24h after reperfusion. Hypothermia has significant potential adverse effects, and at present its clinical use is restricted to large randomized controlled trials. The present paper reviews evidence suggesting that both primary prevention of maternal pyrexia during labour, and secondary prevention of hyperthermia after neonatal resuscitation, have the potential to significantly reduce the consequences of perinatal hypoxia-ischemia

Abstract: The International Guidelines 2000 Conference on Cardiopulmonary Resuscitation (CPR) and Emergency Cardiac Care (ECC) formulated new evidenced-based recommendations for neonatal resuscitation. These guidelines comprehensively update the last recommendations, published in 1992 after the Fifth National Conference on CPR and ECC. As a result of the evidence evaluation process, significant changes occurred in the recommended management routines for: * Meconium-stained amniotic fluid: If the newly born infant has absent or depressed respirations, heart rate <100 beats per minute (bpm), or poor muscle tone, direct tracheal suctioning should be performed to remove meconium from the airway. * Preventing heat loss: Hyperthermia should be avoided. * Oxygenation and ventilation: 100% oxygen is recommended for assisted ventilation; however, if supplemental oxygen is unavailable, positive-pressure ventilation should be initiated with room air. The laryngeal mask airway may serve as an effective alternative for establishing an airway if bag-mask ventilation is ineffective or attempts at intubation have failed. Exhaled CO(2) detection can be useful in the secondary confirmation of endotracheal intubation. * Chest compressions: Compressions should be administered if the heart rate is absent or remains <60 bpm despite adequate assisted ventilation for 30 seconds. The 2-thumb, encircling-hands method of chest compression is preferred, with a depth of compression one third the anterior-posterior diameter of the chest and sufficient to generate a palpable pulse. * Medications, volume expansion, and vascular access: Epinephrine in a dose of 0.01–0.03 mg/kg (0.1–0.3 mL/kg of 1:10,000 solution) should be administered if the heart rate remains <60 bpm after a minimum of 30 seconds of adequate ventilation and chest compressions. Emergency volume expansion may be accomplished with an isotonic crystalloid solution or O-negative red blood cells; albumin-containing solutions are no longer the fluid of choice for initial volume expansion. Intraosseous access can serve as an alternative route for medications/volume expansion if umbilical or other direct venous access is not readily available. * Noninitiation and discontinuation of resuscitation: There are circumstances (relating to gestational age, birth weight, known underlying condition, lack of response to interventions) in which noninitiation or discontinuation of resuscitation in the delivery room may be appropriate.


Abstract: The impact of a neonatal resuscitation programme (NRP) on the incidence, management and outcome of birth asphyxia was evaluated in 14 teaching hospitals in India. Two faculty members from each institution attended a neonatal resuscitation certification course and afterwards trained staff in their respective hospitals. Each institution provided 3 months pre-
intervention and 12 months post-intervention data. Introduction of the NRP significantly increased awareness and documentation of birth asphyxia, as judged by an increased incidence of asphyxia based on apnoea or gasping at 1 and 5 minutes (p<0.001 and <0.01, respectively). A significant shift towards more rational resuscitation practices was indicated by a decline in the use of chest compression and medication (p<0.001 for each), and an increase in the use of bag and mask ventilation (p<0.001). Although overall neonatal mortality did not decrease, asphyxia-related deaths declined significantly (p<0.01).


*Abstract:* This article examines the difficulties of defining perinatal asphyxia. Once the central clinical concern is identified, the ethical questions become clearer. A variety of procedural and ethical issues also need to be considered; especially those related to how physicians introduce and dialogue with parents about difficult life and death decisions. Depending on how well this is accomplished, sound medical practice, parental autonomy and the patient’s best interest issues can all be effectively addressed with a minimum of conflict.


*Abstract:* The recent publication of guidelines for ethical decision making for resuscitation of infants has highlighted the problems inherent in using the currently available data to define those situations in which resuscitation should be or might be withheld or withdrawn. Prior selection criteria for resuscitation, criteria for inclusion into the study group, incomplete resuscitation, gestational age determination, intrauterine growth restriction, subjective assessment of ‘poor’ outcome, and other factors make setting specific parameters for acting or not acting difficult, if not dangerous, and possibly impossible. Research in neonatal resuscitation poses some potential ethical obstacles, but national and international regulations and guidelines are available to assist investigators in study design.


*Abstract:* BACKGROUND: Epinephrine is a cardiac stimulant with complex effects on the heart and blood vessels. It has been used for decades in all age groups to treat cardiac arrest and bradycardia. Despite formal guidelines for the use of epinephrine in neonatal resuscitation, the evidence for these recommendations has not yet been rigorously scrutinised. While it is understood that this evidence is in large part derived from animal models and the adult human population, the contribution from work in the neonatal population remains unclear. In particular, it remains to be determined if any randomised studies in neonates have helped to establish if the administration of epinephrine in the context of apparent stillbirth or extreme bradycardia might influence mortality and morbidity. OBJECTIVES: Primary objective: ~bullet~To determine if the administration of epinephrine to apparently stillborn and extremely bradycardic newborns reduces mortality and morbidity Secondary objectives: ~bullet~To determine the effect of
intravenous versus endotracheal administration on mortality and morbidity ~bullet~To determine the effect of high dose versus standard dose epinephrine on mortality and morbidity, where high dose is defined as any dose greater than the current recommended standard dose of 0.1 to 0.3ml/kg of a 1:10,000 solution of epinephrine ~bullet~To determine whether the effect of epinephrine on mortality and morbidity varies with gestational age, i.e. term (greater than or equal to 37 weeks) versus pre-term (less than 37 weeks) SEARCH STRATEGY: Searches were made of Medline from 1966 to December 2002, CINAHL (from 1982), Current Contents (from 1988), EMBASE, and the Cochrane Controlled Trials Register (2002, issue 4). Bibliographies of conference proceedings were reviewed and unpublished studies were sought by hand searching the conference proceedings of the Society for Pediatric Research and the European Society for Pediatric Research from 1993 to 2002. SELECTION CRITERIA: Randomised and quasi-randomised controlled trials of newborns, both pre-term and term, receiving epinephrine for unexpected apparent stillbirth or extreme bradycardia. DATA COLLECTION AND ANALYSIS: No studies were found meeting the criteria for inclusion in this review MAIN RESULTS: No studies were found meeting the criteria for inclusion in this review. REVIEWER’S CONCLUSIONS: We found no randomised, controlled trials evaluating the administration of epinephrine to the apparently stillborn or extremely bradycardic newborn infant. Similarly, we found no randomised, controlled trials which addressed the issues of optimum dosage and route of administration of epinephrine. Current recommendations for the use of epinephrine in newborn infants are based only on evidence derived from animal models and the human adult literature. Randomised trials in neonates are urgently required to determine the role of epinephrine in this population.


Abstract: The incidence of cerebral palsy is 1 per 1,000, whereas the proportion caused by perinatal asphyxia is only 8% to 10%. The purpose of this article is to review the relationship between asphyxia and cerebral palsy. Only a minority of cases, those involving severe pathological fetal academia, are consistently associated with neonatal encephalopathy and an increased risk of cerebral palsy.


Abstract: In a leading article in 1989, the Lancet called for the Apgar score to be ‘pensioned off’. There was no attempt to suggest a replacement, nor how one should record the state of the infant at birth. I suspect that much of the concern about the Apgar score in the literature results from incorrect interpretation of a low Apgar score as being synonymous with asphyxia, which it is not, and the use of this erroneous opinion in medicolegal work. Although we should remain cautious in our interpretation of an individual Apgar score, it has value as a descriptor of the condition of the infant at birth. It is not by itself a useful outcome measure, nor does it predict the further progress of infants reliably. We should maintain vigilance that it is measured as accurately as possible in each delivery suite and continue to search for other measures that may better indicate neonatal condition immediately after birth. Although imperfect, it would seem a little premature to pension the Apgar score off yet.

**Abstract:** The issues of life support in the asphyxiated infant are not only whether cardiopulmonary resuscitation or CPR will be successful, but also whether if successful, the infant will be severely damaged. This is particularly important in the developing countries because the damaged infants may burden the society. The country has to allocate huge financial and human resources to look after them. When it comes to decisions in initiation and withdrawal of life support, there are differences between the East and the West. Physicians are searching for reliable predictors of outcome of term asphyxiated infants to enable early decision-making, initiation and withdrawal life support, as well as counselling and planning appropriate level of treatment including trials of cerebroprotective therapies. Markers commonly used to identify birth asphyxia are not good predictors of brain injury or death. There is a myriad of reports on clinical or laboratory tests, some using single parameter, to help determine neurological outcome of asphyxiated term infants. Much frequently used equipment in developed countries can be expensive and inaccessible to developing countries. There is an urgent need to look for relevant, simple and inexpensive methods. A combination of measurements may look promising in the early selection of at-risk neonates for decision and counselling. Recently measurement of urinary lactate: creatinine ratio to identify early newborn infants at risk for HIE was proposed. Withdrawal of life support is an ethical issue. In withdrawing life support of the severely asphyxiated infants, one must be aware of the differences of approach. There are differences in religion and culture; in beliefs and philosophies, between the East and West. The importance of neonatal resuscitation should be emphasised. Some regions still adhere to obsolete resuscitation methods. Neonatal Resuscitation Program (NRP) should be promulgated and organised resuscitation should be introduced. There is an urgent need to train the trainers in CPR in the developing countries.


**Abstract:** In a follow-up study of 122 full-term infants in whom postasphyxial encephalopathy occurred the incidence of death or severe handicap was 1 in 1000 deliveries. The abilities of two methods of diagnosing intrapartum asphyxia to predict outcome at a median age of 2.5 years were compared. A decision matrix calculation was undertaken to assess the sensitivity and specificity of low Apgar score and postasphyxial encephalopathy. A 10 min Apgar score less than or equal to 5 was the most sensitive of six different Apgar ratings in predicting adverse outcome (sensitivity 43%, specificity 95%) but even this was much less sensitive than the presence of moderate or severe encephalopathy in predicting death or severe handicap (sensitivity 96%).

**Abstract:** A community-based inquiry was conducted in a rural area of north India to estimate the extent of the problem of birth asphyxia. Births and neonatal deaths were recorded in 54 villages. Trained field workers contacted birth attendants/family members within 15 days after the birth, and recorded the symptoms and signs related to birth asphyxia on a pre-coded questionnaire. Detailed descriptive history of birth events in chronological order was recorded in cases suspected to be asphyxiated or stillborn. Two pediatricians reviewed the case histories independently to assign the diagnosis. Out of the 1977 recorded livebirths, field workers suspected 53 babies to be asphyxiated, 39 of these were diagnosed as asphyxiated, four as not asphyxiated by both the experts, and 10 were considered as asphyxiated by one of the experts. Prevalence of birth asphyxia was estimated to be at least 2 per cent (39/1,977). Case fatality in these cases was 74 per cent. The verbal diagnosis method adopted in this study can be used to compare the prevalence of asphyxia in community studies.


**Abstract:** Thirty six neonates with severe birth asphyxia (Apgar score less than or equal to 3 at 1 min), 32 with moderate birth asphyxia (Apgar score 4 to 6 at 1 min) and 35 controls (Apgar score greater than or equal to 7 at 1 min) matched for weight and gestation were followed up prospectively for neurodevelopmental outcome. Fetal distress occurred more frequently in babies with severe birth asphyxia when compared to controls (p less than 0.05). Six neonates with severe birth asphyxia had abnormal neurological signs such as delayed sucking, hypo or hypertonia, apneic spell or seizures. Of these, only two had delayed developmental milestones (Developmental Quotient less than 70) and features of cerebral palsy. Both of these babies developed seizures during first 24 hours, did not suck and required gavage feeding. The study highlights the fact that a vast majority of survivors of birth asphyxia enjoy good quality of life thus emphasizing the need for vigorous management of asphyxiated babies at birth.


**Abstract:** This guide, designed for programme managers and planners at national and local levels, presents a simple method of newborn resuscitation, along with recommendations for introducing the method. Included are an overview of the problem of birth asphyxia in developing countries; a step-by-step illustrated guide to newborn resuscitation; details on selecting equipment; and a model form for recording data on resuscitation and its outcome. The guide also discusses the ethical issues surrounding newborn resuscitation, offers guidance for modifying the resuscitation method, if needed, and suggests policies on newborn resuscitation for specific situations (e.g., for infants born significantly pre-term, or cases where resuscitation fails). A final section outlines a series of actions at national and local levels to help health facilities introduce or improve newborn resuscitation practices.

32 pp. English.

**Abstract:** The aim of the study was to compare the effectiveness of mouth-to-mask ventilation (MM) in neonatal asphyxia with bag-and-mask ventilation (BM). A new mouth-to-mask infant resuscitation system was constructed. The study was performed in two university clinics with different resources. The KEM Hospital in Bombay was well equipped and neonatologists took part in all resuscitations; Muhimbili Medical Centre in Dar es Salaam was understaffed and had no physicians available at resuscitation. Therefore, different protocols had to be used. In Bombay, the study period was limited to 5 minutes. If needed, mask ventilation was then replaced by intubation. In Dar es Salaam, MM ventilation was continued for up to 10 minutes, the inspiratory pressure was adjusted to 30 cmH2O and the ventilation was slow (8–10 breaths/min). In Bombay, 30 babies were allocated to the BM and 24 to the MM groups. In Dar es Salaam 56 were in the BM and 64 in the MM groups. The results for term babies in Bombay and both term and pre-term babies in Dar es Salaam showed no significant differences between the two groups of treatment, as determined by Apgar score ≥ 4 at 5 and 10 minutes, number of babies with their first gasp, heart rate > 130 beats/min or pulse oximeter values above 75%, all at 5 minutes. An Apgar score > or = 4 at 5 minutes was achieved in more than 75% of all infants, irrespective of treatment. The rates of early neonatal mortality and neonatal convulsions did not differ between the two methods of resuscitation. In Dar es Salaam, the low respiratory frequency used in both groups was associated with a slow increase in heart rate above 130 beats per min. This result indicates that further studies will be needed before such slow respiratory frequencies are used. We conclude that, if adequate training is provided and the respiratory frequency is kept within the normal range, MM ventilation is an alternative to assisted ventilation when no bag and mask is available. However, further studies are necessary, since this method has proved to be tiring and uncomfortable for the resuscitating health personnel.


**Abstract:** Very scanty information is available in East, Central and Southern Africa on the incidence and risk factors associated with asphyxia of the newborn. A multicentre prospective study involving 4267 deliveries in eight countries was undertaken over a three month period, in
maternity units of the central hospitals to determine the incidence; maternal, service and logistic risk factors for asphyxia of the newborn as determined by an abnormally low Apgar score. 30% of births were by primigravida mothers, of whom 67% were teenagers. A birth by a teenager had a higher risk for low birth weight. Overall incidence of low birth weight was 13.9%. The overall incidence of asphyxia of the newborn was 22.9% while that associated with low birth weight (i.e. babies weighing less than 2,500 grams) was 29.3% compared with 21.5% among the normal birth weight babies. Low birth weight contributed a large proportion of the high neonatal mortality of 15.9% compared to 1.8% for normal birth weight babies by 24 hours after birth. The mean mortality by 24 hours post delivery was 3.8%. Obstetrical complications are important risk factors for asphyxia of the newborn. Among the important risk factors are those associated with prolonged labour and intra partum accidents. The incidence of risk for asphyxia broadly was 21.3%, which is very close to the actual incidence of asphyxia of 22%. Lack of referral contributed to increased risk of asphyxia. In a significant proportion of infants, resuscitation measures taken were inappropriate. The stillbirth rate was 3.0% while the incidence of externally evident congenital malformations was 1.2%. There is urgent need to institute appropriate measures to prevent and manage asphyxia of the newborn in the region. These should include identification of the at risk mother, proper referral and management while adhering to correct established procedures. There is also need to develop appropriate and relevant technologies for perinatal and neonatal care through research undertaken in the region. It is also concluded that the co-operation and joint effort between the obstetricians, paediatricians and the nursing staff who all contributed to the collection of this data is a cost effective approach to research in perinatal health and consequently in instituting interventions.


Abstract: BACKGROUND: Many perinatal deaths follow birth asphyxia that occurs in newborn babies of women who are referred on developing life-threatening obstetric complications. OBJECTIVE: To determine the antenatal and intrapartum risk factors for severe birth asphyxia among babies delivered by women admitted as emergency obstetric referrals. DESIGN: Case-control study. SETTING: Mulago hospital, the National Referral Hospital, Kampala, Uganda. SUBJECTS: Cases were newborn term babies (and their mothers) with a 5-minute Apgar score 4 or less (birth asphyxia). Controls were term newborn babies with a 5-minute Apgar score more than 4. MAIN OUTCOME MEASURES: Antepartum and intrapartum risk factors among newborn babies (and their mothers) from socio-demographic characteristics, obstetric complications or labour management. The Odds ratios (OR) for various outcomes were calculated using the Statistical Assistance Software (SAS) version 6.2 (Windows), and are presented with their 95% confidence intervals (CI) and p-values. RESULTS: There was no association between socio-demographic factors and birth asphyxia. Antepartum hospitalization, antepartum or intrapartum anaemia, antepartum hemorrhage and severe pre-eclampsia/eclampsia were significantly associated with birth asphyxia; the respective ORs and 95% CI were 1.73 (1.09–2.75), 5.65 (3.36–9.50), 2.12 (1.11–4.05) and 10.62 (2.92–38.47). Augmentation of labour with oxytocin, premature rupture of membranes, meconium staining of liquor amnii, vacuum extraction, caesarean section, low birth weight and mal-presentations were significantly associated with
birth asphyxia with ORs of 5.76 (2.20–15.05), 2.23 (1.31–3.37), 6.40 (2.76–14.82), 2.16 (1.28–3.67), 2.36 (1.07–5.20) and 6.32 (3.57–11.20) respectively. CONCLUSIONS: Early recognition of these complications among emergency obstetric referrals, followed by prompt and appropriate management, may reduce the perinatal deaths from birth asphyxia.


Abstract: Five widely used neonatal face masks were tested on 44 babies for their efficiency in terms of degree of leakage and ease of cleaning. Leakage was measured indirectly. The mean peak pressure of ten breaths when babies were ventilated from a respirator via a mask was recorded; a low pressure was taken to indicate leakage. A triangular moulded rubber mask (‘Rendell-Baker’) leaked most and a circular silicone rubber mask (‘Laerdal’) leaked least. The ease of cleaning the masks was measured as the amount of bacteria removed from contaminated masks by wiping them with 70% ethanol. The Laerdal mask was significantly more effectively cleaned than the others. It is also the only one of the masks tested that can be boiled and autoclaved.


Abstract: Twenty two infants were resuscitated at birth using a face mask connected to an oxygen supply from a conventional resuscitaire. Intermittent finger occlusion provided the positive pressure within the mask. This method was apparently at least as effective as the best bag and mask systems and was convenient to use.
Neonatal Jaundice


Abstract: Out of 6586 live born babies, 736 babies with jaundice were studied from 1st July 1996 to 30th June, 1997, in a city based medical college nursery. Physiological jaundice was present in 8.92% of all live born babies and accounted for 79.89% of babies with jaundice. Breast milk jaundice and prematurity were next common causes responsible for 5.29% each of all cases with neonatal jaundice. Septicaemia caused jaundice in 4.75% cases. Among the babies with jaundice appearing between day 4 and day 7 of life, breast milk jaundice was the commonest cause occurring in 49.25% cases. The last entity surfaced probably due to exclusive breastfeeding recently initiated in the baby friendly hospital nursery.


Abstract: This paper evaluates a simple tool, the icterometer, in assessing jaundice in the newborn. The instrument consists of a perspex scale with yellow stripes of increasing intensity, numbered 1–5, alternating with transparent areas through which the infant's blanched skin colour can be seen and compared with the coloured stripes. The scale was found to be useful for more objective screening of neonatal jaundice, particularly in decreasing the number of blood samples to be taken for serum bilirubin. The present study suggests that serum bilirubin estimation can be avoided when the icterometer readings on the face are 3 or less, unless there is a rapid rise in jaundice within 24–36 h. However, a reading on the sole of even 1 is significant and requires assessment by trained staff for blood sampling and/or phototherapy. The instrument may also be useful to peripheral staff in developing countries when deciding on referral to specialist centres and to staff in specialist centres for screening cases of neonatal jaundice and decreasing the number of blood samples.


Abstract: Despite the many advantages of breast-feeding, there is ample documentation of the strong association between breast-feeding and an increase in the risk of neonatal hyperbilirubinaemia. Breast-fed infants have higher bilirubin levels than formula-fed infants. Suggested mechanisms for these findings include poor fluid and caloric intake, inhibition of hepatic excretion of bilirubin, and intestinal absorption of bilirubin (enterohepatic circulation). On rare occasions, breast-fed infants without evidence of haemolysis have developed extreme hyperbilirubinaemia and kernicterus. Because almost all of the cases of kernicterus reported in the last 15 years have occurred in fully or partially breast-fed newborns, it is important that these
infants be followed closely. Appropriate support and advice must be provided to the lactating mother so that successful breast-feeding can be established and the risk of severe hyperbilirubinaemia reduced.


**Abstract:** Treatment of neonatal hyperbilirubinemia is usually based on the measurements of total serum bilirubin levels. Based on empirical data, it is generally recommended to start phototherapy at lower levels in low birth weight and very low birth weight infants than in term infants, but no general agreement exists on exact limits. Treatment criteria in preterm infants do not, however, have the same empirical backing as in term infants. The very low and extremely low birth weight infants are more susceptible to bilirubin toxicity. However, bilirubin may function as an antioxidant and enzyme inducer in these infants. Several other different approaches to establish treatment criteria have also been suggested, and a summary of these are presented and discussed. With the exception of measurement of unbound bilirubin, very few of these approaches have been validated in routine clinical settings. However, unbound bilirubin is at present mainly used also as a parameter to be evaluated in relation to total bilirubin values. The present treatment criteria result in a considerable overtreatment particularly of term infants. However, with a more relaxed attitude toward neonatal hyperbilirubinemia by health care professionals, kernicterus is again reported in term infants. Because the basic mechanisms of bilirubin toxicity as well as the relative significance of the maximum serum bilirubin level compared to the duration of hyperbilirubinemia are not known, individual assessment of a newborn infant's tolerance for hyperbilirubinemia is difficult. Major changes in the empirically developed criteria for treatment of hyperbilirubinemia in the newborn are therefore not justified in the near future. For term infants, the search for validated criteria for follow-up of jaundiced infants after discharge are therefore more important than revision of existing criteria for phototherapy.


**Abstract:** On the basis of the concentration of unconjugated bilirubin and available albumin for the binding of bilirubin it is possible to calculate the level of unbound bilirubin in a serum sample. The solubility of bilirubin can further be calculated when the pH is known. In cases of threatened kernicterus the free bilirubin concentration in serum samples from newborn infants surpasses the solubility by a factor close to one hundred. It is hypothesized that deposition of bilirubin in tissues takes place as an ongoing event, the deposited pigment being eliminated by bilirubin oxidase in healthy infants. Kernicterus results when the rate of deposition becomes overwhelming as a result of high bilirubin concentration, low albumin reserve, low pH, after administration of a displacing drug, or if the bilirubin oxidase system has been compromised by preceding birth asphyxia or other forms of central nervous system injury.

**Abstract:** Interview and record review data from 12,023 singleton deliveries were analyzed to determine the relationships between neonatal hyperbilirubinemia (10 mg/dL or greater) and maternal characteristics. Confounding variables were controlled by multiple logistic regression analysis. There was a statistically significant positive relationship between hyperbilirubinemia and low birth weight, Oriental race, premature rupture of membranes, breast-feeding, neonatal infection, use of the “pill” at time of conception, instrumental delivery, and history of first trimester bleeding. Maternal smoking and black race were negatively related to hyperbilirubinemia and statistically significant. In this study, other previously suspected etiologic factors such as epidural anesthesia, parity, use of oxytocin in labor, and white race were not associated with hyperbilirubinemia.


**Abstract:** This study reevaluates the clinical ability to accurately identify jaundice in neonates. Three hundred seventy-one term infants were clinically assessed for jaundice, before discharge home on day 2 to 3 of life. Bilirubin levels obtained at the same time were significantly higher in the newborns clinically diagnosed as being jaundiced. Our neonatologists were able to diagnose jaundice at clinically low levels, and not to misdiagnose significant hyperbilirubinemia in the majority of the infants. The trained human eye can still discriminate between the jaundiced and nonjaundiced newborn, and clinical impression of jaundice remains a reliable primary screening tool for significant neonatal hyperbilirubinemia.


**Abstract:** Jaundice is a common clinical problem in newborns. Although the need to diagnose and treat hyperbilirubinemia in the healthy term newborn has been controversial, recent reports of detrimental neurologic effects from elevated serum bilirubin levels in the healthy newborn make such scrutiny prudent. Until 1994, when the American Academy of Pediatrics developed guidelines for managing hyperbilirubinemia in the healthy term newborn, no standard of care was defined.


**Abstract:** Hyperbilirubinemia is one of the most common problems encountered in term newborns. Historically, management guidelines were derived from studies on bilirubin toxicity in infants with hemolytic disease. More recent recommendations support the use of less intensive therapy in healthy term newborns with jaundice. Phototherapy should be instituted when the total serum bilirubin level is at or above 15 mg per dL (257 micromol per L) in infants 25 to 48 hours
old, 18mg per dL (308 micromol per L) in infants 49 to 72 hours old, and 20mg per dL (342 micromol per L) in infants older than 72 hours. Few term newborns with hyperbilirubinemia have serious underlying pathology. Jaundice is considered pathologic if it presents within the first 24 hours after birth, the total serum bilirubin level rises by more than 5mg per dL (86 micromol per L) per day or is higher than 17mg per dL (290 micromol per L), or an infant has signs and symptoms suggestive of serious illness. The management goals are to exclude pathologic causes of hyperbilirubinemia and initiate treatment to prevent bilirubin neurotoxicity.


Abstract: The feeding patterns and third day serum bilirubin levels were evaluated in 30 newborn infants receiving formula feeds in the neonatal special care unit and in 30 breastfed babies. Initiation of milk feeds were delayed in breast-fed babies and the frequency of feeding was significantly lower than in the formula-fed infants. Supplementary water was given only in the breast-fed group. Serum bilirubin levels were significantly higher in breast-fed infants (9.74 +/- 3.17mg/dl) than those on formula (6.59 +/- 3.50mg/dl), t=3.69, p<0.001), but did not reach any critical levels preparing phototherapy.


Abstract: Neonates with hyperbilirubinemia commonly undergo a battery of laboratory tests. We used a computerized database and medical records to study the frequency, cost, and yield of these tests in 2,443 infants born at the University of California, San Francisco, between 1980 and 1982. Four hundred forty-seven (18%) of the infants met standard criteria for “nonphysiologic” hyperbilirubinemia; the incidence varied from 9% in blacks to 31% in Asian infants. About 55% of these 447 infants received a $125 “hyperbilirubinemia workup.” Hospital discharge diagnoses on all 447 hyperbilirubinemic infants were reviewed. In 214 (48%), no cause of the jaundice was identified. An additional 145 (32%) had a possible cause apparent from history, physical examination, or initial hematocrit determination. The only diagnosis made as a result of routine investigations of hyperbilirubinemia was possible ABO or Rh isoimmunization in 75 infants (17%). Nonphysiologic hyperbilirubinemia may be more common than previously reported. The recommended tests are expensive and rarely lead to diagnoses other than ABO or Rh isoimmunization. Their routine use should be reevaluated.


Abstract: The publication of guidelines calling for less aggressive treatment of jaundice in newborns has been followed by a reappearance of case reports of kernicterus. These case reports illustrate important issues for writers and consumers of practice guidelines. One issue is the particular salience of identified patients with bad outcomes, and their potentially...
disproportionate influence on decision-makers. A second issue is whether, when good evidence of treatment benefit is lacking, policymakers should recommend what has traditionally been done, recommend less treatment, or not make recommendations at all. Finally, the cases raise the question of whether treatment guidelines should be more conservative than their authors actually believe is necessary, to take into account the likelihood that they will not be closely followed. We believe that case reports can serve as an important early warning system, but policymakers should be aware of their potentially disproportionate influence. In the long run, patients and clinicians will be best served by guidelines that summarize and acknowledge the limitations of existing evidence, that allow a wide range of treatment options when evidence is weak, and that recommend what the guideline authors actually believe should be done. In the short run a period of readjustment may be required, however, as clinicians become accustomed to guidelines written to be followed, rather than bent.


Abstract: This study comprises of 112 children ranging from 6 months to 7 years of age. They included 56 cases (Group I) who had received phototherapy for indirect hyperbilirubinemia in the early neonatal period. 32 of these had, in addition, undergone exchange transfusion. These were compared with 56 controls (Group II) matched for age, sex, and birth weight. Only full term infants with normal intrauterine growth who had had an uneventful early neonatal period, barring hyperbilirubinemia in group I were taken up for study. There was no difference in the socio-economic and educational status. Detailed ophthalmological evaluation including tests for visual acuity, dyslexia tests, and retinoscopic and funduscopic examination did not reveal any significant differences between the two groups.


Abstract: To estimate the effect of neonatal hyperbilirubinemia on long-term cognitive ability in full-term newborns with a negative Coombs test, we performed a 17-year historical prospective study of 1948 subjects. Intelligence tests and medical examinations performed at the military draft board were stratified according to serum bilirubin concentration. A logistic regression analysis was used to adjust for the confounding effects of gestational age, birth weight, Apgar score, ethnic origin, socioeconomic class, paternal education, birth order, and the administration of phototherapy and exchange transfusion. No direct linear association was shown between neonatal bilirubin levels and intelligence test scores or school achievement at 17 years of age. However, the risk for low intelligence test scores (IQ score less than 85) was found to be significantly higher (P=.014) among full-term male subjects with serum bilirubin levels above 342 mumol/L (20mg/dL) (odds ratio, 2.96; 95% confidence interval, 1.29–6.79). This association was not observed among female subjects. We conclude that severe neonatal hyperbilirubinemia, among full-term male newborns with a negative Coombs test, could be associated with lower IQ scores at 17 years of age.

**Abstract:** OBJECTIVE: To examine the association between neonatal bilirubin levels and subsequent neurodevelopmental outcome. DESIGN: Prospective cohort study. SETTING: 12 US medical centers from 1959 (first births) to 1974 (last follow-up). PARTICIPANTS: 41,324 singleton white or black infants with birth weight > or = 2,500g who had neonatal bilirubin measurements recorded and survived at least 1 year. MAIN OUTCOME MEASURES: Wechsler Intelligence Scale for Children Intelligence Quotient (IQ) at age 7 years, blinded neurologic examination at age 7 years, and sensorineural hearing loss at age 8 years. RESULTS: There was no association between IQ and bilirubin. For example, comparing children who had maximum bilirubin levels > or = 342 mumol/L (20mg/dL) with those who had lower bilirubin levels, adjusted mean IQs were 105.0 and 103.4 in whites (difference +1.6; 95% confidence interval [CI]: –0.4 to +3.5) and 91.0 and 93.3 in blacks (difference –2.3; 95% CI: –4.8 to +0.2). Abnormal neurologic examination results were reported in 12 of 268 children (4.5%) with bilirubin > or = 342mumol/L (20mg/dL) compared with 1,249 of 33,004 children (3.8%) with lower levels (relative risk [RR]=1.2; 95% CI: 0.7 to 2.1). The frequency of abnormal or suspicious neurologic examination results increased in a stepwise fashion with increasing bilirubin level (P<.001), from 4346/29,258 (14.9%) of those with bilirubin levels <171mumol/L (10mg/dL) to 60/268 (22.4%) of those with bilirubin levels > or = 342mumol/L (20mg/dL), apparently due to increasing minor motor abnormalities at higher bilirubin levels. Sensorineural hearing loss was not associated with high bilirubin levels (RR=1.0; 95% CI: 0.3 to 3.0). CONCLUSIONS: Neonatal bilirubin levels seem to have little effect on IQ, definite neurologic abnormalities, or hearing loss. Higher bilirubin levels are associated with minor motor abnormalities, but the clinical importance of this finding is limited by the weakness of the association, the mild nature of the abnormalities, and the lack of evidence that they are prevented by treatment.


**Abstract:** Bilirubin has long been considered a foe. However, recent suggestions indicate that we have been overly aggressive at combating this compound. Nonetheless, there are still many questions regarding its absolute safety—at any level—evenly associated with conditions such as hemolytic disease, sepsis, or prematurity. We therefore must approach high bilirubin levels with continued caution until we have better answers to our questions. Let us remember that treatment for hyperbilirubinemia (i.e. phototherapy) is very safe. Is it not better to be safe than sorry?

Abstract: OBJECTIVE: To determine how well parents, nurses, physicians, and an Ingram icterometer can detect the presence and the severity of jaundice in newborns. SETTING: Normal newborn nursery in a 340-bed teaching hospital. PATIENTS OR OTHER PARTICIPANTS: Nurses and physicians caring for nursery infants and parents of the infants. INTERVENTIONS: Physicians and nurses examining newborns documented whether they detected jaundice in the infants and, if so, the estimated bilirubin level and the extent of cephalocaudal progression of the jaundice. An assistant taught the parents how to examine the infants for jaundice and determine its cephalocaudal progression. The assistant also obtained icterometer readings. Bilirubin testing was performed according to usual clinical practice. OUTCOME MEASURES: Nurse and physician estimates of bilirubin levels; parent, nurse, and physician assessment of the presence of jaundice and its cephalocaudal progression; icterometer readings; bilirubin levels. RESULTS: There was moderate agreement about the presence of jaundice in the infants (pairwise kappa, 0.48) However, all infants with bilirubin levels >12mg/dL were correctly identified as jaundiced by all examiners. The parents’ assessment of cephalocaudal progression and the icterometer readings were most highly correlated with serum bilirubin levels (adjusted Pearson correlations, 0.71 and 0.57, respectively). CONCLUSIONS: Many parents can be taught to accurately assess cephalocaudal progression of jaundice in the hospital. The icterometer is a useful tool for assessing jaundice severity. Both parent assessment and the icterometer were more highly correlated with bilirubin levels than physician and nurse estimates in this study. Additional research is needed to determine how accurate these methods of clinical assessment are at the higher bilirubin levels that typically occur after hospital discharge.
Neonatal Hypoglycemia


Abstract: A discussion of neonatal hypoglycemia was held on 18 November 1995 as a satellite symposium of the 40th Annual Meeting of Japan Society for Premature and Newborn Medicine and continued in closed session of 19 November to address neonatal hypoglycemia in the 21st century. This represented a 30-year follow-up of a discussion of carbohydrate and energy metabolism in the newborn held in Tokyo on 10 November 1965. This follow-up was prompted by the incredible advances in clinical care in perinatal medicine and in basic knowledge in the neurosciences, neonatal physiology and metabolism that have occurred in Japan and around the world throughout these 3 decades.


Abstract: AIMS: To compare two cotside methods of blood glucose measurement (HemoCue and Reflolux II) against a standard laboratory method for the detection of neonatal hypoglycaemia in a developing country maternity hospital where hypoglycaemia is common. METHODS: 94 newborn infants and 75 of their mothers had blood glucose assessed on the same venous sample using three different methods in the Special Care Baby Unit and postnatal wards, Prasuti Griha Maternity Hospital, Kathmandu, Nepal: HemoCue and Reflolux II at the cotside; Roche Ultimate glucose oxidase method (GOM) in the laboratory. RESULTS: The mean (SD) values for blood glucose in newborn infants were GOM 2.5 (1.1)mmol/l; Reflolux II 2.1 (0.9); and HemoCue 4.2 (1.2). For mothers the values were GOM 5.3 (1.2)mmol/l; Reflolux II 3.6 (1.2); and HemoCue 5.6 (1.0). Bland-Altman plots showed that Reflolux II consistently underreads GOM blood glucose in neonates by 0.5 mmol/l (SD 0.7) and that HemoCue overreads glucose by 1.7mmol/l (SD 0.8). For the detection of hypoglycaemia (<2.0mmol/l), Reflolux II achieved a sensitivity of 83%, a specificity of 62%, and a likelihood ratio of 2.2. HemoCue produced a sensitivity of 0% and a specificity of 100% using measured values. If 2.0 mmol were subtracted from all Hemocue values this rose to 81% and 68% and a likelihood ratio of 2.5. CONCLUSION: Although more accurate than Reflolux II for the measurement of blood glucose in mothers, HemoCue overreads glucose concentrations in neonates and is therefore potentially dangerous as a screening method for neonatal hypoglycaemia. Reflolux II is useful as a screening method for high risk infants (low birthweight, post-term) and could achieve a post-test probability of detecting hypoglycaemia in a high risk setting like Nepal of 50–60%.
Abstract: The definition of clinically significant hypoglycemia remains one of the most confused and contentious issues in contemporary neonatology. In this article, some of the reasons for these contentions are discussed. Pragmatic recommendations for operational thresholds, ie, blood glucose levels at which clinical interventions should be considered, are offered in light of current knowledge to aid health care providers in neonatal medicine. Future areas of research to resolve some of these issues are also presented.


Abstract: There has been much controversy and confusion regarding potential damage caused to the neonatal brain by low blood glucose levels. Previous studies of outcome after neonatal hypoglycaemia are flawed by many factors including retrospective data collection and inability to control for co-existing clinical complications. There is no doubt that hypoglycaemic brain damage does occur but the severity and duration of low blood glucose levels required to cause lasting harm varies between subjects and is related to the ability of each baby to mount a protective response such as the production of ketone bodies which are alternative cerebral fuels. Evidence from studies of humans and other animals suggests that cortical damage and long-term sequelae occur after prolonged hypoglycaemia sufficiently severe to cause neurological signs. CONCLUSION: Prolonged hypoglycaemia should be avoided by close clinical observation of vulnerable infants whilst avoiding excessively invasive management in populations of neonates which may jeopardize the successful establishment of breast feeding.


Abstract: It is almost a century since hypoglycaemia (a reduction in the glucose concentration of circulating blood) was first described in children, and over 50 years since the condition was first recognized in infants. Nevertheless, controversy still surrounds the definition, significance, and management of neonatal hypoglycaemia. Technological developments such as bedside glucose monitoring have, paradoxically, exacerbated rather than eased the situation. This article reviews the literature on hypoglycaemia of the newborn, and covers the following: historical aspects; glucose homeostasis and metabolic adaptation at birth; the effect of low blood glucose levels on the central nervous system; the definition of hypoglycaemia; screening; prevention; treatment; research needs; and concludes with recommendations for prevention and management.

Abstract: Among a cross-sectional sample (stratified by weight and age after birth) of 226 uncomplicated term newborns from the delivery and postnatal wards of a busy government maternity hospital in Kathmandu, the period prevalence of hypoglycaemia (corrected blood glucose of <2.6mmol/l) during the first 50 hours after birth was 38 percent. (This compares with a reported prevalence rate of 12 per cent from studies of uncomplicated term newborns in the UK.) Hypothermia, young maternal age, low birth weight and early sampling after birth were independent risk factors for hypoglycaemia. Of 31 infants studied longitudinally during the same period, 27 (87 percent) had at least one blood glucose measurement of <2.6mmol/l and 25 (81 percent) a rectal temperature of <35.5 degrees C. Fourteen infants (44 percent) had three or more episodes of hypoglycaemia and seven infants (22 percent) had three or more episodes of hypothermia. Hypoglycaemia is a common, preventable and neglected problem in many maternity hospitals in developing countries. Simple low-cost measures to reduce the incidence of hypoglycaemia may have a major impact on early infant mortality and neurodevelopmental sequelae of perinatal origin.


Abstract: Healthy, full-term infants are functionally and metabolically programmed to make the transition from their intrauterine dependent environment to their extrauterine existence without the need for metabolic monitoring or interference with the natural breastfeeding process. Full-term infants are equipped with homeostatic mechanisms that preserve adequate energy substrate to the brain and other vital organs. Thermal stability and early, properly guided, frequent, exclusive breastfeeding are the keys to success. Thus, routine screening for blood glucose concentrations or feeding sugar water is not necessary and potentially counterproductive to the establishment of a healthy mother-infant dyad.


Abstract: The main objectives of the study were to find the incidence and risk factors associated with development of hypoglycemia in small for gestational age (SGA) babies, to compare haemoglucotest strips (Boehringer Mannheim) with the standard laboratory method (glucose-hexokinase) for estimation of blood glucose, and to measure the insulin and cortisol responses of SGA babies. This was a prospective longitudinal study. The sample included SGA babies and over a period of six months, 127 consecutively born small for gestational age babies were investigated prospectively for development of hypoglycemia in first 48 hrs of life. Plasma samples were taken during episodes of hypoglycemia for insulin and cortisol estimation and compared with non-hypoglycemic controls. The overall incidence of hypoglycemia was 25.2% in SGA babies and 98% of the episodes occurred within first 24 hrs. Compared to non-hypoglycemics, mothers of hypoglycemic babies had higher incidence of receiving i.v. fluids (5%
dextrose) during labour. The hypoglycemic babies were more likely to be sick and oral feeds had been initiated by one hour of life in only 37% of them compared to 63% of non-hypoglycemic babies. Plasma insulin/glucose ratio was significantly higher in hypoglycemic than non-hypoglycemic babies, whereas the cortisol levels were similar. Small for gestational age babies are highly prone to develop hypoglycemia in first 24 hrs of life.


Abstract: Since a universal definition for hypoglycemia is lacking, an operational threshold for initiating therapy has been defined. Hypoglycemia is encountered in a variety of neonatal conditions including prematurity, growth retardation and maternal diabetes. Since hypoglycemia may be asymptomatic, routine screening for this condition in certain high risk situations is recommended. Supervised breast-feeding may be a treatment option in asymptomatic hypoglycemia. However, symptomatic hypoglycemia should always be treated with a continuous infusion of parenteral dextrose. Neonates needing dextrose infusion rates above 12mg/kg/m should be investigated for refractory causes of hypoglycemia. Hypoglycemia has been linked to poor neuro-developmental outcome and hence aggressive screening and treatment is recommended.


Abstract: AIMS: To measure the prevalence of hypoglycaemia among newborn infants in Nepal, where classic risk factors prevail, and to evaluate their importance. METHODS: A cross sectional study was done of 578 term newborn infants aged 0 to 48 hours on the postnatal wards of a government maternity hospital in Kathmandu, with unmatched case-control analysis of risk factors for moderate hypoglycaemia (less than 2.0mmol /l). RESULTS: Two hundred and thirty eight (41%) newborn infants had mild (less than 2.6 mmol/l) and 66 (11%) moderate hypoglycaemia. Significant independent risk factors for moderate hypoglycaemia included postmaturity (OR 2.62), birthweight under 2.5kg (OR 2.11), small head size (OR 0.59), infant haemoglobin >210g/l (OR 2.77), and raised maternal thyroid stimulating hormone (TSH) (OR 3.08). Feeding delay increased the risk of hypoglycaemia at age 12–24 hours (OR 4.09). Disproportionality affected the risk of moderate hypoglycaemia: lower with increasing ponderal index (OR 0.29), higher as the head circumference to birthweight ratio increased (OR 1.41). Regression expressing blood glucose concentration as a continuous variable revealed associations with infant haemoglobin (negative) and maternal haemoglobin (positive), but no other textbook risk factors. CONCLUSIONS: Neonatal hypoglycaemia is more common in a developing country, but may not be a clinical problem unless all fuel availability is reduced. Some textbook risk factors, such as hypothermia, disappear after controlling for confounding variables. Early feeding could reduce moderate hypoglycaemia in the second 12 hours of life. The clinical significance of raised maternal TSH and maternal anaemia as prenatal risk factors requires further research.

Abstract: OBJECTIVE: To determine whether umbilical cord blood glucose correlates with subsequent hypoglycaemia after birth in infants of well-controlled diabetic mothers. METHODOLOGY: Thirty-eight term infants of well-controlled diabetic mothers were enrolled. Five mothers had pre-existing diabetes. Of the 33 gestational diabetic mothers, 16 were managed on insulin and 17 on diet. Maternal blood glucose was maintained between 4 and 8 mmol/L during labour and delivery. Infants’ plasma glucose levels were measured from venous cord blood and serially, at less than 30 min, 1 h and 2 h of life by glucose hexokinase method. Blood glucose levels were further monitored by bedside Dextrostix for 24 h. RESULTS: Eighteen (47%) infants developed hypoglycaemia (blood glucose level less than 2 mmol/L) during the first 2 h of life. There was no difference in the cord blood glucose levels between infants with or without hypoglycaemia (3.7 +/- 1.1 vs 4.5 +/- 1.1 mmol/L, respectively). Infants of mothers with diabetes diagnosed prior to 28 weeks gestation were at a higher risk of developing hypoglycaemia (8 of 10 vs 10 of 28, OR 7.2, 95%CI 1.3–40.7). Hypoglycaemic infants were of significantly higher birthweight, and were more likely to be born to Caucasian mothers and by Caesarean section. Raised maternal fructosamine blood level, the need for insulin treatment or the infant’s haematocrit were not different between infants with or without hypoglycaemia. CONCLUSIONS: In well-controlled diabetic mothers, the incidence of early hypoglycaemia in infants is still high, particularly in those mothers who had a longer duration of diabetes. Cord blood glucose level did not identify the infants with hypoglycaemia.


Abstract: Neonatal hypoglycemia is a common problem encountered by both term and preterm infants. It can be either symptomatic or asymptomatic. Prolonged hypoglycemia may result in permanent neurologic impairment and death. Definitions of hypoglycemia vary and remain controversial. Underlying causes of hypoglycemia include (a) inadequate glucose production; (b) increased glucose utilization; (c) abnormalities of endocrine regulation; and (d) other causes. Nurse practitioners must be aware of infants at risk for hypoglycemia so they can provide appropriate interventions. In this article the clinical characteristics of hypoglycemia are reviewed, various causes for hypoglycemia are identified, and an infant with prolonged hypoglycemia is described. In addition, the role of the nurse practitioner in the care and management of these infants is addressed.


Abstract: OBJECTIVE: The purpose of this study was to investigate the rate of hypoglycemia in large-for-gestational-age infants of nondiabetic mothers in relation to maternal or neonatal risk factors. STUDY DESIGN: Hospital charts of all term large-for-gestational-age infants born between 1994 and 1998 (n=1136) were analyzed for the rate of neonatal hypoglycemia
(capillary glucose level, $<$ or $\leq30$mg/dL) during the first 24 hours of life. Infants of women with preexisting or gestational diabetes mellitus were excluded ($n=180$). Neonatal glucose testing was performed at 1 or 2 hours of life, with subsequent measurements every 4 to 6 hours. Maternal and neonatal parameters were compared between neonates with and without hypoglycemia, including recent oral glucose tolerance test values in those women who were tested ($n=358$). RESULTS: Of 956 infants, 69 infants (7.2%) were not tested for hypoglycemia. In the remaining 887 infants, hypoglycemia occurred in 142 infants (16%) within the first 24 hours of life. The incidence of hypoglycemia decreased sharply during the first few hours of life, from 9.2% within the first hour of life, to 3.5% between 2 to 5 hours (cumulative) of life, and 2.4% between 6 and 24 hours of life. Gestational age at delivery was the only neonatal parameter that differed significantly between infants with and without hypoglycemia (39.5 vs 39.3 weeks, $P=.01$). The antenatal 1-hour oral glucose tolerance test value was the only predictive maternal parameter (141.5 vs 163.0 mg/dL, $P<.006$). There was an incremental risk of hypoglycemia with increasing 1-hour oral glucose tolerance test values, with hypoglycemia rates of 2.5%, 9.3%, 22.0%, and 50.0% that were associated with maternal 1-hour glucose values of $<120$, 120–179, 180–239, and $>240$ mg/dL, respectively ($P<.05$, for all comparisons). CONCLUSION:

Routine glucose testing is indicated in large-for-gestational-age newborn infants of nondiabetic mothers. The 1-hour glucose value of the maternal oral glucose tolerance test is a fairly good predictor of subsequent neonatal hypoglycemia. A single elevated 1-hour value of $>240$ mg/dL markedly increases the risk of neonatal hypoglycemia.


**Abstract:** Transient hypoglycemia in the early neonatal period is a common adaptive phenomenon as the newborn changes from the fetal state of continuous transplacental glucose consumption to intermittent nutrient supply following cessation of maternal nutrition at birth. Research has demonstrated that in the term, healthy newborn, this dynamic process is self-limiting and is not considered pathologic. The American Academy of Pediatrics and the World Health Organization recommend that neonatal blood glucose screening be reserved for newborns who are at risk or symptomatic and conclude that universal hypoglycemia screening is inappropriate, unnecessary, and potentially harmful. Nevertheless, many hospital nurseries continue the clinical practice of routine early glucose screening on healthy, term newborns. This results in the misidentification of neonates captured while experiencing the normal, self-correcting physiologic blood glucose nadir who are then diagnosed with pathologic neonatal hypoglycemia. Subsequent to this misdiagnosis, further surveillance and unnecessary, aggressive treatment interventions will follow that are potentially harmful to the successful establishment of positive maternal-infant interactions and the breastfeeding experience. Research studies indicate that routine hypoglycemia screens, treatments, and interventions in the healthy infant are not evidence-based and result in a serious disruption of the initiation process and duration patterns of lactation. Using the perspective of the theory of technology dependency, this inquiry explores the potential adverse sequelae of inappropriate glucose screening in the healthy breastfeeding newborn and describes selected outcome variables including: 1) the consequences of early maternal-infant separation, 2) the influence of early
formula supplementation on breastfeeding discontinuance rates, 3) the effect of separation and supplementation on the onset of lactogenesis, and 4) the impact of hospital staff and provider recommendations of formula supplementation on maternal confidence to independently nurture her baby.


Abstract: Although various authors recommend screening for hypoglycemia in large for gestational age (LGA) and small for gestational age (SGA) newborns, the frequency of hypoglycemia in these infants, using a recent definition of hypoglycemia, and the proper duration of screening are not documented. We determined chromogen test strip blood glucose values at ages 1, 2, 3, 6, 12, 24, 36, and 48 hours in full-term LGA and SGA infants whose mothers were not diabetic. Serum glucose determination was immediately done if a test strip reading was less than 40 mg/dl. Hypoglycemia was defined as a serum glucose less than 35 mg/dl at less than 3 hours of age, less than 40 mg/dl at 3 to 24 hours of age, and less than 45 mg/dl at more than 24 hours of age. The frequency of hypoglycemia in LGA infants was 8.1% (95% confidence interval [CI] 5.0 to 11.2%), and in SGA infants, 14.7% (95% CI 9.8 to 19.6%). The mean age at which hypoglycemia occurred was 2.9 hours (range, 0.8 to 8.5) in LGA infants, and 6.1 hours (range, 0.8 to 34.2) in SGA infants. There were no differences in other possible risk factors between the hypoglycemic and euglycemic infants except that in SGA infants meconium-stained amniotic fluid (40% vs 20%, p=.001), maternal preeclampsia (27% vs 8%, p=0.0056), and male sex (29% vs 9%, p=0.029) were more common in hypoglycemic than in euglycemic infants. These data suggest that screening for hypoglycemia in LGA infants whose mothers are not diabetic may be stopped after 12 hours, but should continue for 48 hours in SGA infants.
Neonatal Infections / Sepsis


Abstract: Group B Streptococcus (GBS) is the main etiological agent of neonatal sepsis in developed countries, however there is no detailed information on its incidence in Brazil. We registered the incidence and lethality of GBS infection in a Brazilian private maternity hospital from April 1991 to March 2000. Maternal risk factors contributing to neonatal infections were also scored. The rate of infection was determined by checking for GBS in the blood and liquor of symptomatic neonates within 72 hours of birth. Sepsis and/or early onset meningitis were diagnosed in 43 neonates (32 cases in blood, 1 in liquor and 10 in blood and liquor). The overall incidence was 0.39 per thousand neonates and remained quite constant throughout the period, ranging from 0.25–0.63. Septic shock occurred in 33 neonates within 1 to 36 hours of birth (mean 15 hours). Among those patients, 26 (60%) died between the 5th and the 85th hour after birth. Maternal risk factors, according to CDC criteria, included: gestational age below 37 weeks in 26 cases (60%), amniorrhexis equal or superior to 18 hours in 7 cases (16%), and maternal temperature equal or superior to 38(o)C in 4 cases (9%). None of the mothers had received prophylactic antibiotics during labor nor were urine, rectal or vaginal swabs screened for GBS. Although the incidence of GBS infection in the population in this study was lower than that found in developed countries, its rate of mortality was higher. The death rate could be reduced through recognition of the risk factors and prophylactic antibiotics during labor.


Abstract: Handwashing is very basic and important in controlling nosocomial infection. We researched the effect of handwashing by doctors and nurses at the UOEH Hospital. One hundred and eight doctors and 114 nurses of 19 wards were examined. The number of bacteria was determined by a palm stamp check agar plate for general bacteria before and after handwashing. The difference in the condition of microorganism contamination among the wards was found by the number of bacteria before handwashing, and by comparing the number of bacteria before and after handwashing, the effect of handwashing was determined. Handwashing by water or soap is not effective in killing bacteria. Therefore, we suggest that doctors and nurses use an effective disinfectant when washing their hands before and after contact with patients. We also think that the results noted in this paper will help doctors and nurses to have a better understanding of the importance of infection control.

Abstract: CONTEXT: Intrauterine infection is thought to be one cause of preterm premature rupture of the membranes (PPROM). Antibiotic therapy has been shown to prolong pregnancy, but the effect on infant morbidity has been inconsistent. OBJECTIVE: To determine if antibiotic treatment during expectant management of PPROM will reduce infant morbidity. DESIGN: Randomized, double-blind, placebo-controlled trial. SETTING: University hospitals of the National Institute of Child Health and Human Development Maternal-Fetal Medicine Units Network. PATIENTS: A total of 614 of 804 eligible gravidas with PPROM between 24 weeks’ and 0 days’ and 32 weeks’ and 0 days’ gestation who were considered candidates for pregnancy prolongation and had not received corticosteroids for fetal maturation or antibiotic treatment within 1 week of randomization. INTERVENTIONS: Intravenous ampicillin (2-g dose every 6 hours) and erythromycin (250-mg dose every 6 hours) for 48 hours followed by oral amoxicillin (250-mg dose every 8 hours) and erythromycin base (333-mg dose every 8 hours) for 5 days vs a matching placebo regimen. Group B streptococcus (GBS) carriers were identified and treated. Tocolysis and corticosteroids were prohibited after randomization. MAIN OUTCOME MEASURES: The composite primary outcome included pregnancies complicated by at least one of the following: fetal or infant death, respiratory distress, severe intraventricular hemorrhage, stage 2 or 3 necrotizing enterocolitis, or sepsis within 72 hours of birth. These perinatal morbidities were also evaluated individually and pregnancy prolongation was assessed. RESULTS: In the total study population, the primary outcome (44.1% vs 52.9%; P=.04), respiratory distress (40.5% vs 48.7%; P=.04), and necrotizing enterocolitis (2.3% vs 5.8%; P=.03) were less frequent with antibiotics. In the GBS-negative cohort, the antibiotic group had less frequent primary outcome (44.5% vs 54.5%; P=.03), respiratory distress (40.8% vs 50.6%; P=.03), overall sepsis (8.4% vs 15.6%; P=.01), pneumonia (2.9% vs 7.0%; P=.04), and other morbidities. Among GBS-negative women, significant pregnancy prolongation was seen with antibiotics (P<.001). CONCLUSIONS: We recommend that women with expectantly managed PPROM remote from term receive antibiotics to reduce infant morbidity.


Abstract: BACKGROUND: There may be a link between infection and preterm birth. OBJECTIVES: Since rupture of the membranes is an important factor in the progression of preterm labour, it is important to see if antibiotics are of any benefit prior to membrane rupture. The objective of this review was to assess the effects of antibiotics administered to women in preterm labour with intact membranes, on maternal and neonatal outcomes. SEARCH STRATEGY: We searched the Cochrane Pregnancy and Childbirth Group trials register and reference lists of articles. We contacted experts in the field. SELECTION CRITERIA: Randomised trials which compared antibiotic treatment with placebo or no treatment for women
in preterm labour (between 20 and 36 weeks gestation) with intact membranes. DATA COLLECTION AND ANALYSIS: Trial quality was assessed and data were extracted independently by two reviewers. Study authors were contacted for missing data. MAIN RESULTS: Meta-analysis of the ten included trials demonstrated a statistically significant prolongation of pregnancy associated with the use of antibiotics (5.4 days, 95% confidence interval (CI) 0.9–9.8 days). Antibiotic treatment was also associated with a statistically significant reduction in maternal infection (odds ratio (OR) 0.59, 95% CI 0.36, 0.97) and neonatal necrotising enterocolitis (OR 0.33, 95% CI 0.13, 0.88). No statistically significant effect was detected on the neonatal outcomes of respiratory distress syndrome and neonatal sepsis, although there was a trend towards the latter (OR 0.67, 95% CI 0.42, 1.07). An increase in perinatal mortality was observed in the group receiving antibiotics (OR 3.36, 95% CI 1.21, 9.32).

REVIEWER’S CONCLUSIONS: Although a prolongation in time to delivery and a trend towards a reduction in neonatal sepsis was detected, this review fails to demonstrate a clear overall benefit from antibiotic treatment for preterm labour with intact membranes on neonatal outcomes and raises concerns about increased perinatal mortality for those who received antibiotics. This treatment cannot therefore be currently recommended for routine practice. Further research is required to identify a subgroup of women (and their babies) who are more likely to experience benefit from antibiotic treatment for preterm labour prior to membrane rupture, and to identify which antibiotic or combination of antibiotics is most effective. The results of the ongoing ORACLE trial should help resolve some of the uncertainties revealed by this review.


Abstract: BACKGROUND: The consequences of prematurity continue to result in neonatal morbidity and mortality. One of the causes of prematurity is preterm prelabour rupture of membranes in which there is evidence that subclinical infection plays a role. OBJECTIVES: The aim of the review was to evaluate the effectiveness and the immediate and long-term safety of the effects of administering antibiotics to women with preterm prelabour rupture of membranes on maternal infectious morbidity, fetal and neonatal morbidity and mortality, and longer term childhood development. SEARCH STRATEGY: All randomized trials identified using the search strategy described by the Cochrane Pregnancy and Childbirth Group. Date of last search: 31 May 2001. SELECTION CRITERIA: All trials which reported clinically relevant outcomes (as opposed to laboratory data) were included. DATA COLLECTION AND ANALYSIS: Data were extracted from each report without any blinding of either the results or the treatments which women received. Unpublished data were sought from a number of authors. MAIN RESULTS: There were 13 trials included in the review which randomised over 6,000 women and their babies. The use of antibiotics following preterm prelabour rupture of membranes (pPROM) is associated with a statistically significant reduction in maternal infection after delivery prior to discharge (relative risk (RR) 0.85, 95% confidence interval (CI) 0.76,0.96) and morbidity (including chlorination) (RR 0.62, 95% CI 0.51,0.75) There was a statistically significant reduction in the numbers of babies born within 48 hours (RR 0.77, 95% CI 0.72,0.83) and seven days RR 0.88, 95% CI 0.84,0.92) of randomisation. Neonatal infection (including pneumonia) (RR 0.67, 95% CI 0.52,0.85) and positive blood culture (RR 0.75, 95% CI 0.60,0.93) were statistically significantly reduced in the babies whose mothers received antibiotics as was the
numbers of babies requiring oxygen therapy overall (RR 0.88, 95% CI 0.81,0.96) and at 28 days of age or older (RR 0.81, 95% CI 0.68,0.97). One trial (ORACLE) found a statistically significant reduction in the use of surfactant (RR 0.83, 95% CI 0.72,0.96). There was also a statistically significant reduction in the number of babies diagnosed with abnormal cerebral ultrasound (RR 0.82, 95% CI 0.68,0.99) scans prior to discharge from hospital. Overall, there was no evidence of adverse effect. Intrinsically there are fewer data relating to specific antibiotics. When looking at the effect of beta lactum antibiotics (augmentin) where two trials were included, there was a statistically significant reduction in the number of babies born within 48 hours (RR 0.75, 95% CI 0.67,0.84) and seven days (RR 0.91, 95% CI 0.85,0.97) of randomisation. However, there was a highly significant increase in the numbers of babies with necrotising enterocolitis (RR 4.60, 95% CI 1.98,10.72) in the augmentin treatment group. The effect of macrolide antibiotics (erythromycin), included four trials and found statistically significant reductions in the number of babies born within 48 hours (RR 0.84, 95% CI 0.76,0.93) of randomisation but delivery <7 days did not exclude unity. There was statistically significant reductions in those requiring oxygen therapy (RR 0.87, 95% CI 0.78,0.98) and those with a positive blood culture (RR 0.70, 95% CI 0.52,0.94). REVIEWER’S CONCLUSIONS: There are sufficient data to recommend routine prescription of macrolide antibiotics in this clinical situation. The routine prescription of macrolide antibiotic (erythromycin) is recommended as beta lactum antibiotics (augmentin) is associated with a statistically significant increase in neonatal necrotising enterocolitis.


Abstract: A four-year study of the bacteria isolated from neonatal eye swabs at Royal Women’s Hospital, Brisbane has been carried out. Of infants admitted to nurseries 2.7% (571/21,217) had positive cultures. The incidence of infection in premature non-premature nurseries was 9.7% (221/2,273) and 1.8% (350/18,944) respectively, a highly significant difference. There was a preponderance of Gram-negative organisms in the former (67%) and of Gram-positive organisms in the latter (69%), each a statistically significant difference. Neisseria gonorrhoeae was isolated 8 times (1.4%) during this period.


Abstract: One hundred and fifty five neonates with conjunctivitis admitted into the neonatal unit at the Lagos University Teaching Hospital were microbiologically investigated. This was to determine the bacterial aetiologic agent(s) in neonatal eye infection and highlight some risk factors. Antimicrobial susceptibility testing was done on the pathogens isolated using the diskagar diffusion method. The incidence of conjunctivitis in the newborn was 18 per 1000 live births. Predisposing factor noted were vaginal delivery, asphyxia neonatorum and prolonged rupture of membrane. Pathogens predominantly isolated were Staphylococcus aureus (37.4%), Coagilase negative Staphylococci (12.3%), Klebsiella pneumoniae (12.9%) and Pseudomonas aeruginosa (8.2%). Antimicrobial susceptibility results revealed varied degrees of susceptibility to
ofloxacin (75%), Cloxacillin, erythromycin, Gentamicin and augmentin (30%) by the gram positive bacteria while most of the gram negative were susceptible to colistin and ofloxacin (above 90%). The high incidence of bacterial eye infection should be minimized by the elimination of the risk factors and adoption of stringent aseptic measures in the care of the neonate.


Abstract: BACKGROUND: Preterm birth after spontaneous preterm labour is associated with death, neonatal disease, and long-term disability. Previous small trials of antibiotics for spontaneous preterm labour have reported inconclusive results. We did a randomised multicentre trial to resolve this issue. METHODS: 6,295 women in spontaneous preterm labour with intact membranes and without evidence of clinical infection were randomly assigned 250mg erythromycin (n=1611), 325mg co-amoxiclav (250mg amoxicillin and 125mg clavulanic acid; n=1550), both (n=1565), or placebo (n=1569) four times daily for 10 days or until delivery, whichever occurred earlier. The primary outcome measure was a composite of neonatal death, chronic lung disease, or major cerebral abnormality on ultrasonography before discharge from hospital. Analysis was by intention to treat. FINDINGS: None of the trial antibiotics was associated with a lower rate of the composite primary outcome than placebo (erythromycin 90 [5.6%], co-amoxiclav 76 [5.0%], both antibiotics 91 [5.9%], vs placebo 78 [5.0%]). However, antibiotic prescription was associated with a lower occurrence of maternal infection. INTERPRETATION: This trial provides evidence that antibiotics should not be routinely prescribed for women in spontaneous preterm labour without evidence of clinical infection.


Abstract: Data from 6613 pregnancies that ended before term were analysed to determine whether amniotic-fluid infections are a cause as well as a consequence of premature rupture of the fetal membranes. Amniotic-fluid infections seem to be a cause of such ruptures because the infections were 2–3 fold more common when the fetal membranes ruptured just before labour started than when they ruptured just after the onset of labour. There was no relation between the frequency of premature rupture and the number of coital acts in the month before delivery but at every gestational age the proportion of fetuses and neonates who died with amniotic-fluid infections was greater when coitus had occurred in the month before delivery. This was because the infections associated with coitus were more severe. Low Apgar scores and neonatal hyperbilirubinaemia were 60% more frequent when preterm delivery was due to premature rupture of the membranes than when it was due to other causes. This was mainly the result of the high frequency of amniotic-fluid infections associated with the premature membrane ruptures.

Abstract: BACKGROUND: It is uncertain whether the rates and causes of early-onset sepsis (that occurring within 72 hours after birth) among very-low-birth-weight infants have changed in recent years, since antibiotics have begun to be used more widely during labor and delivery. METHODS: We studied 5,447 very-low-birth-weight infants (those weighing between 401 and 1,500g) born at centers of the Neonatal Research Network of the National Institute of Child Health and Human Development between 1998 and 2000 who had at least one blood culture in the first three days of life and compared them with 7,606 very-low-birth-weight infants born at centers in the network between 1991 and 1993. RESULTS: Early-onset sepsis (as confirmed by positive blood cultures) was present in 84 infants in the more recent birth cohort (1.5 percent). As compared with the earlier birth cohort, there was a marked reduction in group B streptococcal sepsis (from 5.9 to 1.7 per 1,000 live births of infants weighing 401 to 1,500 g, P<0.001) and an increase in Escherichia coli sepsis (from 3.2 to 6.8 per 1,000 live births, P=0.004); the overall rate of early-onset sepsis was not significantly changed. Most E. coli isolates from the recent birth cohort (85 percent) were resistant to ampicillin, and mothers of infants with ampicillin-resistant E. coli infections were more likely to have received intrapartum ampicillin than were those with ampicillin-sensitive strains (26 of 28 with sensitivity data vs. 1 of 5, P=0.01). Infants with early-onset sepsis were more likely to die than uninfected infants (37 percent vs. 13 percent, P<0.001), especially if they were infected with gram-negative organisms. CONCLUSIONS: Early-onset sepsis remains an uncommon but potentially lethal problem among very-low-birth-weight infants. The change in pathogens over time from predominantly gram-positive to predominantly gram-negative requires confirmation by ongoing surveillance.


Abstract: OBJECTIVE: To determine if cleansing the birth canal with an antiseptic at delivery reduces infections in mothers and babies postnatally. DESIGN: Clinical trial; two months of no intervention were followed by three months of intervention and a final month of no intervention. SETTING: Queen Elizabeth Central Hospital (tertiary care urban hospital), Blantyre, Malawi. SUBJECTS: A total of 6965 women giving birth in a six month period and their 7,160 babies. INTERVENTION: Manual wipe of the maternal birth canal with a 0.25% chlorhexidine solution at every vaginal examination before delivery. Babies born during the intervention were also wiped with chlorhexidine. MAIN OUTCOME MEASURES: Effects of the intervention on neonatal and maternal morbidity and mortality. RESULTS: 3,635 women giving birth to 3,743 babies were enrolled in the intervention phase and 33,30 women giving birth to 3,417 babies were enrolled in the non-intervention phase. There were no adverse reactions related to the intervention among the mothers or their children. Among infants born in the intervention phase, overall neonatal
admissions were reduced (634/3,743 (16.9%) v 661/3,417 (19.3%), P<0.01), as were admissions for neonatal sepsis (7.8 v 17.9 per 1000 live births, P<0.0002), overall neonatal mortality (28.6 v 36.9 per 1,000 live births, P<0.06), and mortality due to infectious causes (2.4 v 7.3 per 1,000 live births, P<0.005). Among mothers receiving the intervention, admissions related to delivery were reduced (29.4 v 40.2 per 1,000 deliveries, P<0.02), as were admissions due to postpartum infections (1.7 v 5.1 per 1,000 deliveries, P=0.02) and duration of hospitalisation (Wilcoxon P=0.008).

CONCLUSIONS: Cleansing the birth canal with chlorhexidine reduced early neonatal and maternal postpartum infectious problems. The safety, simplicity, and low cost of the procedure suggest that it should be considered as standard care to lower infant and maternal morbidity and mortality.


Abstract: In the first week of December 1997, an increasing incidence of neonates colonized with multi-drug resistant Enterobacter cloacae (MR-E. cloacae) was observed in the neonatal Intensive care unit of our 950-bed university hospital. Initially, re-enforcement of infection control practices including hand disinfection and cohort isolation seemed to be sufficient to control the outbreak. Nevertheless, an increasing number of newly admitted patients was paralleled by another rise in the incidence of colonized neonates. Since E. cloacae was initially found in urine specimens of the patients, surveillance and environmental cultures were aimed at procedures and instruments that might colonize the gastro-intestinal and/or urinary tract. E. cloacae was isolated from a single cap of an electronic digital thermometer. Despite banning of this possible source, newly admitted neonates still became colonized. The unit was closed for further admissions and a second round of extensive screening was started; this time including all available thermometers and continuous rectal temperature probes. Ready-to-use ‘disinfected thermometers and probes were found to be colonized with MR-E. cloacae. Observation of disinfection procedures and a laboratory investigation revealed that ‘rushed disinfection with alcohol 80% led to a 1 in 10 chance of thermometers still being contaminated. Furthermore, alcoholic hand rub used for convenience disinfection failed to disinfect thermometers in 40% and 20% of the cases when done in a ‘rushed’ or ‘careful’ fashion, respectively. Adequate disinfection of the thermometers led to the control of the outbreak, with no new occurrence of MR-E. cloacae in the following months.


Abstract: From December 1999 to March 2000 a nosocomial outbreak of multiresistant Enterobacter cloacae occurred in the neonatal intensive care unit (NICU) at the VU Medical Center, Amsterdam, the Netherlands. Twenty-six patients were infected or colonized with this strain resistant to third generation cephalosporins and with decreased sensitivity for aminoglycosides. Three neonates experienced sepsis with E. cloacae with serious clinical
symptoms and two of them died. Comparison of the Enterobacter isolates by amplified-fragment length polymorphism indicated that this outbreak was caused by the spread of a single strain. Infection control precautions were initiated in order to stop further spread; barrier precautions, enforcement of hand disinfection and cohorting of colonized patients. A multidisciplinary crisis team coordinated these infection control precautions and informed all persons involved. Analysis of antibiotic usage in 1999 showed an increase in the use of third generation cephalosporins from November onwards. Due to the resistance pattern of the epidemic strain the use of third generation cephalosporins was discontinued in February 2000. At the end of February the NICU was temporarily closed. The epidemic strain of E. cloacae was isolated from one digital rectal thermometer. Patient use of thermometers and disposable coverings for rectal thermometers were introduced to eliminate this possible means of spread. No spread of multiresistant E. cloacae was found following the introduction of these interventions. Once all the neonates had been transferred, the NICU was disinfected and reopened in March.


Abstract: OBJECTIVE: We assessed the epidemiology of neonatal infections coming to medical attention among inpatient and outpatient newborn infants within a defined health care maintenance organization (HMO) population. DESIGN AND METHODS: This was a retrospective cohort study, using automated data from a large health maintenance organization and the hospital where the majority of HMO patients delivered. All infants delivered between October 1, 1990 and March 31, 1998 at the study hospital and receiving postdischarge care at the study HMO for the first 30 days of life were included. The outcomes assessed were 10 neonatal infection syndromes defined according to modified National Nosocomial Infection System criteria. RESULTS: There were 13,224 infants in the study cohort. Of these, 559 infants (4.2%) had 574 infections. Nonpneumonia respiratory infections were most common, accounting for 43% of all infections. Infections diagnosed in the outpatient setting comprised 63% of all infections. More serious infections (bloodstream infection, clinical sepsis and pneumonia) were typically diagnosed in the first few days of life and before nursery discharge. Infants with an infection had a significantly longer length of nursery stay (4.7 excess days among full term infants, P<0.001), more office visits (397.3 vs. 273.3 per 100, P<0.001) and more hospital admissions (16.7 vs. 3.6 per 100, P=0.001) than uninfected infants. CONCLUSION: Infections were common during the first 30 days of life. The majority were noninvasive, were diagnosed in the outpatient setting and were most likely community-acquired. Serious infections were rare, occurred early in the neonatal period and were usually diagnosed before nursery discharge.

**Abstract:** This prospective study reports on screening for neonatal sepsis among 3,372 live births out of 6,060 consecutive deliveries at the University Hospital of Pointe-a-Pitre, Guadeloupe, during a 30-month period. Group B Streptococcus (GBS) was the most common pathogen, representing 46% (89/194) of positive blood cultures and 52% (335/637) of positive gastric aspirates. Although only 3,372 (55%) of all live births were screened, 637 (10%) had gastric bacterial carriage at birth; of those, 335 (5.5%) involved GBS. Similarly, there were 194 (3.2%) positive blood cultures, of which 89 (1.5%) involved GBS. In this report, all newborns who presented with a positive GBS blood culture had at least one of the external tests positive for GBS (gastric, ear canal, rectum and placenta). Thirty-seven per cent (14/38) of positive neonatal blood cultures occurred in newborns with foetid liquor while in deliveries with intrapartum fever 16.5% (32/195) of blood cultures were positive. In our clinical practice, characteristics that were evident in the delivery room (without knowledge of prenatal follow-up) such as foetid liquor, intrapartum fever, prolonged rupture of membranes, foetal tachycardia and meconium staining were associated with the great majority of neonatal sepsis.


**Abstract:** The authors report on an analysis of a chemoprophylaxis protocol at the University Hospital of Guadeloupe in the Caribbean. This study comprised 6,060 consecutive deliveries and was initiated to assess the application of an intrapartum chemoprophylaxis protocol, evaluate its results, and try to identify possible necessary modifications to the existing protocol. Although more than 90% of women had at least one bacterial screening (vaginal or urinary) during the last trimester of pregnancy, approximately 75% of mothers who were heavily colonized group B streptococcus (GBS) at delivery were not detected by this systematic screening. As is also reported in other tropical areas where a great proportion of neonatal sepsis occurs in term babies, low birthweight was not a specific risk factor in this study when controlling for other major risk factors such as fever and premature rupture of membranes. Intrapartum chemoprophylaxis was associated with an approximate threefold decrease in the risk of GBS neonatal bacteraemia among at risk deliveries. The results suggest that, in our tropical context, prolonged rupture of membranes of at least 12 hours’ duration should be considered as a cause for intrapartum chemoprophylaxis as it accounted for the majority of cases of neonatal bacteraemia that escaped the existing protocol.

Abstract: Of the 6,060 consecutive live births delivered at the University Maternity Unit of Guadeloupe (French West Indies) during a 30-month period, 635 newborns (10.4%) presented with meconium stained (MS) amniotic fluid, of which 595 (94%) received bacteriological screening at birth (light MS, n=543; thick MS, n=52). Thirty (5%) of MS newborns had a bacteraemia (n=13, group B streptococcus, GBS), and 128 (21.5%) a bacterial positive gastric aspirate (n=54, GBS). Sixty-six newborns among MS babies needed tracheal suctioning (11%) in the delivery room for meconium inhalation. Among these 595 screened MS newborns, 286 (48%) presented clinical signs of postmaturity at birth, having therefore an explanation for their MS condition. For the other MS newborns without the postmaturity explanation, we experienced twofold increased risk of neonatal sepsis (OR 1.88 for bacteraemia and 2.61 for external carriage p<0.02, Chi square) as compared with their MS postmature counterparts. We conclude that when meconium stained deliveries are associated with postmaturity signs, one may not need to initiate prophylactic antibiotic treatment at birth unless they present with other traditional risk factors for neonatal sepsis such as intrapartum fever and prolonged rupture of membranes.


Abstract: Over a period of 18 months, 100 full-term newborns developed an axillary or a rectal temperature greater than or equal to 37.8 C during the first four days of postnatal life. These febrile term newborns represented 1% of all full-term newborns in the normal nursery. Of the febrile newborns, 10% had culture-proven bacterial disease (BD). Fever developed in 54%, 27%, 13%, and 6% on the first, second, third, and fourth days, respectively. In 17 newborns fever developed within the first hour of life; 13 of these had mothers with fever and two others were under a radiant warmer in the birth room. Fever occurring on the third day of postnatal life had a significantly higher chance of being associated with BD than fever occurring at any other time in the first four days of postnatal life. Newborns with temperature greater than or equal to 39 C had a significantly higher incidence of BD than newborns with temperature less than 39 C. The incidence of fever among breast-fed newborns (0.98%) was similar to that of formula-fed newborns (1.01%). Of the 100 febrile newborns, 45 had other symptoms compatible with BD, and eight of these had proven BD (group B Streptococcus in five, group D Streptococcus in one, Shigella D in one, and Propionibacterium species in one). The two other febrile newborns with proven BD had no other symptoms of infection (group B Streptococcus and Escherichia coli). Mean WBC count of febrile newborns with BD was significantly lower than that of febrile newborns without BD. Only three febrile newborns had WBC count less than 5,000/cu mm and two of them had proven BD. Febrile newborns should be evaluated and treated with antibiotics when they have symptoms of infection other than fever or when the fever persists or recurs.

**Abstract:** The value of hand hygiene for the prevention of cross-infection was first observed in the middle of the 19th century. Since then, which procedure is the most suitable for hand hygiene has been repeatedly discussed and several different guidelines and recommendations have been published. The aim of this review is to compare different recommendations for hand hygiene regarding technique and indication. Medline, the internet and a personal library were searched to obtain as many written recommendations as possible. In addition, a small questionnaire was sent by e-mail to 20 international colleagues. As a result, written recommendations from 10 countries could be compared. Recommended methods of hand hygiene include handwashing (washing hands with plain soap), hygienic handwash (washing hands with medicated soap) and hygienic hand-rub (use of antiseptic rubs). In most countries handwashing and hygienic handwash are the methods of choice and only in central European countries is hygienic hand-rub the preferred technique. Situations in which performance of hand hygiene is recommended are comparable. However, no single indication is recommended in all guidelines. Hand hygiene is most often recommended before performing invasive procedures and after microbial contamination. Guidelines should be clear and easy to follow for them to become standard of care. Thus, guidelines are needed that do not leave to the health care worker a decision as to whether hand hygiene is indicated.


**Abstract:** The handwashing practices and bacterial hand flora of 62 pediatric staff members of a teaching hospital in Lima, Peru, were studied. Handwashing followed patient contact 29.3% of the time (204/697 contacts). Mean duration was 14.5 seconds, and significant differences in practices were found by unit (rehydration or neonatal intensive care), type of staff member (nurses or physicians), and type and duration of patient contact. Mean count of colony-forming units was log10 5.87 +/- 0.41, with significant differences in density of flora found between patient care and kitchen staffs. There was no significant effect of handwashing on counts of colony-forming units. Significant differences were also found by unit and by staff position with regard to species isolated and antimicrobial resistance of isolates. A more efficacious and cost-effective form of hand hygiene and a more prudent use of antimicrobial agents are indicated.


**Abstract:** The importance of hands in the transmission of nosocomial infection has been worldwide admitted. However, it is difficult to induce this behavior in health-care workers. The aim of the present work was to point out the importance of hand bacteria colonization, the influence of hand washing and of patient physical examination. One hundred health-care workers were randomly divided in two groups: Group A without hand washing previous to patient physical examination or handling (PPE); group B with hand washing previous to PPE. Direct fingerprint samples in Columbia agar before and after PPE were obtained. The colonies were counted and identified by conventional techniques, and antibiograms according to NCCLS were performed. Before PPE group A participants showed a high number of bacteria regarding group B participants (73.9 Vs 20.7; p<0.001); 44 out of 50 participants were carriers of potentially pathogen bacteria. No group B participants were carriers of potential pathogen bacteria before PPE. The latter group showed an increase in number of bacteria after PPE (20.7 CFU (before) Vs 115.9 CFU (after); p<0.001). Sixteen group B participants were contaminated after PPE with potential pathogens such as S. aureus (50% of them methicillin resistant); Escherichia coli, Pseudomonas aeruginosa and Enterococcus faecalis, half of them multiresistant. We can conclude on the importance of these results to implement educational programs and to provide the health-care workers with the proper commodities to fulfill this practice.


**Abstract:** Two hundred and twenty-nine infants born consecutively at the maternity ward of the Middelheim Hospital in Antwerp, over a period of 5 months, and an additional 55 randomly selected infants born at the same hospital were clinically and microbiologically investigated before leaving the maternity ward. All infants born at this maternity ward received argyrol eye drops immediately after birth. Twenty-six (11%) of the infants consecutively investigated had neonatal conjunctivitis diagnosed before leaving the maternity ward, where they stayed from 7–10 days. Another 29 infants were reported to have developed sticky eyes and/or red eyes after leaving the maternity hospital and before 1 month of age. The instantaneous risk of developing, a conjunctivitis was equal for each day of the first month of life. Chlamydia trachomatis was isolated from the eyes of 11 of the 229 (4.8%) consecutively born infants but only one had conjunctivitis symptoms before leaving the maternity ward. Overall one or more bacterial species could be isolated from the eyes of 143 (48%) of the infants, but only viridans streptococci and Staphylococcus aureus were cultured significantly more often from the eyes of cases with conjunctivitis than from the eyes of the infants without conjunctivitis (P less than 0.001).

Abstract: Perinatal morbidity and mortality are due to various infective agents, mainly represented by beta-hemolytic group B Streptococcus. The perinatal disease related to this infection is distinguished in Early-onset, characterised by pneumonia and sepsis, and Late-onset which leads to sepsis, meningitis and pneumonia. Various strategies were therefore proposed to prevent transmission including immunisation and chemoprophylaxis. All these methods however present adverse effects and are most of all expensive to carry out. Taha et al. reported an interesting experience regarding the reduction of perinatal infections following the cleansing of the birth canal with a solution of Chlorhexidine 0.25% during labour (1996–1997). It seemed interesting for us to assess the applicability and efficacy of a new strategy of prophylaxis of perinatal infections in a Developing Country based on the association of two of the simple strategies proposed i.e.: cleansing the birth canal with chlorhexidine and chemoprophylaxis in cases with risk factors without culture screening. We studied two groups of patients: one in which cleansing of the birth canal was used and the second (control group) in which the old method already applied in the hospital (i.e. cleansing of the external genitals with Cetrimide 1%+ Chlorhexidine 0.1%) was carried out associated with antibiotic therapy when risk factors arose. We observed a total absence of neonatal mortality due to sepsis resulting from the association of the methods suggested even though the presence of sepsis evaluated through signs and symptoms like fever, poor feeding, apnoea or dyspnoea in newborns was similar in both groups.


Abstract: Hospital acquired infection has a direct effect on the quality of patient care and is therefore, a major issue in the context of clinical governance. The role of hand washing by health care workers in hospital acquired infection is discussed and recommendations made.


Abstract: Records the results of a WHO consultation convened to evaluate the public health significance of maternal and perinatal infections in developing countries, assess the adequacy of tools for their prevention and treatment, and propose realistic strategies for control. The objective is to help health officials identify the most rational and humane approach to the control of these major causes of morbidity and mortality. In view of the meagre resources available for health care, a particular effort is made to determine the feasibility, effectiveness, and average costs of all possible interventions.

Available at: http://www.who.int/dsa/cat98/mat8.htm#Maternal and Perinatal Infections

Abstract: In most Special Care Neonatal Units (SCNUs) in India, mothers are excluded from the care of their sick babies for fear of over-crowding and dislocation. We have attempted to study the feasibility of involving mothers in the care of their babies admitted for neonatal septicemia and to analyse whether this changed the sepsis related case fatality rate. The study material consisted of 158 neonates with blood culture positive neonatal septicemia whose mothers were actively involved in their care during their stay in the SCNU of LNJPN Hospital throughout 1987–88. The mothers lived in with their sick neonates and were extremely useful in feeding, cleaning, and monitoring for some important signs and symptoms. There were no epidemics of infection in the nursery during this period. All the babies discharged were receiving breast feeds, and the mothers were confident in taking care of them before discharge. The mortality in this group was 43%. The onset of septicemia was most often in the first week (36%) being 25.9% in second week, 26.6% in the third, and 11.4% in the fourth. Mortality was maximum (64.5%) when the onset of illness was in the first 3 days. Klebsiella and S. aureus were commonly isolated organisms (38.6 and 21.5%, respectively). Gram negative organisms were isolated in 66.5% cases with higher mortality in this group. Nearly 46% of the babies weighed 2kg or less, with a mortality of 60.2% compared to 28.2% in those more than 2kg. Only 3 to 5% and 40 to 66.7% of Gram negative and 23 and 70% of Gram positive organisms were sensitive to ampicillin and gentamicin, respectively.


Abstract: OBJECTIVE: To investigate the spectrum of organisms causing neonatal sepsis in Peshawar, Pakistan and to assess their sensitivity to various groups of drugs. METHODS: Blood taken from newborn babies admitted to the special care baby unit at the Khyber Teaching Hospital with a clinical diagnosis of neonatal sepsis was cultured. The data obtained from October 1997 to December 2000 were analysed and the results tabulated. RESULTS: A total of 1,598 blood cultures were taken; 1003 were positive (positivity rate 62.8%). Escherichia coli was the most common organism found (36.6%), followed by Staphylococcus aureus (29.5%), Pseudomonas (22.4%), Klebsiella (7.6%), and Proteus (3.8%). No group B streptococcus was grown. Listeria monocytogenes was found in one cerebrospinal fluid culture. E coli and Pseudomonas showed a high degree of resistance to commonly used antibiotics (ampicillin, augmentin, and gentamicin), a moderate degree of resistance to cephalosporin (cefotaxime, ceftriaxone, and ceftrizone), and low resistance to drugs not used for newborn babies (ofloxacin, ciprofloxacin, and enoxabid). S aureus showed a low resistance to all three groups of antibiotics. CONCLUSION: Neonatal sepsis remains one of the leading causes of neonatal admission, morbidity, and mortality in developing countries. Gram negative organisms are the major cause of neonatal sepsis in Peshawar. Such organisms have developed multidrug resistance, and management of patients infected with them is becoming a problem in developing countries.

**Abstract:** Despite major improvements in infant intensive care, neonatal meningitis remains a devastating disease. Survivors of bacterial meningitis are at high-risk for life-long neurological handicaps, and despite a reduction in mortality, the morbidity of neonatal meningitis has not changed substantially over the last thirty years. A substantial improvement in outcome is unlikely to result from further refinements in ICU technology or new antibiotics. However, recent advancements in our understanding of the pathogenesis of meningitis and the pathophysiology of brain injury in meningitis may provide the opportunity to interrupt the mechanisms that allow bacteria to enter the central nervous system and initiate the inflammatory response. Strategies aimed at modulating the inflammatory response must be chosen carefully, so as not to disrupt normal host responses needed for the infant to recover from the infectious episode.


**Abstract:** A 2-year review of neonatal meningitis was undertaken at a referral hospital in Zimbabwe to determine the pattern of bacterial isolates from the cerebrospinal fluid, the clinical presentation and the immediate outcome. During the study period, 94 cases were identified and the overall mortality was 41%. Group B Streptococcus was the predominant organism isolated (61%) and was associated with 42% mortality. Low-birthweight babies and babies with Gram-negative meningitis had mortality rates of 71 and 62%, respectively.


**Abstract:** This study describes the bacteriology, cerebrospinal fluid (CSF) findings, and mortality of neonatal meningitis over an 11-year period. The minimum incidence of neonatal meningitis at Tygerberg Hospital is 0.72/1,000 live births/year. Eighty-eight patients were included in the study. Median birthweight and age at diagnosis were 2,320g and 12 days, respectively. CSF culture was positive in 77 (88 percent), blood culture was positive in 51 (57 percent), and Gram stain was positive in 58 (66 percent). The most frequently cultured organisms were Group B Streptococcus, Klebsiella pneumoniae, and E. coli. Thirty (34 percent) patients died, the majority within 72 h after admission. The death rate was significantly increased in babies with a birthweight of less than 1500 g (59 percent). Increased total CSF protein was associated with an increased risk of death. Normal CSF cell count, total CSF protein and CSF glucose were found in six infants.


**Abstract:** OBJECTIVE: Our goal was to evaluate the relationship between neonatal death caused by sepsis associated with ampicillin-resistant organisms and length of antibiotic
exposure. STUDY DESIGN: All neonatal deaths from culture-positive sepsis over a 3-year period were examined. Infants who were delivered at either the University of Mississippi Medical Center or at St. Barnabas Medical Center at ≥24 weeks’ gestation and died within 7 days of life were included. Information on the organism causing sepsis and its sensitivities was collected, and the number of doses of ampicillin administered to the mother before delivery was determined. RESULTS: Of the 78 neonatal deaths, 35 met the inclusion criteria. There were 8 cases of sepsis from ampicillin-resistant Escherichia coli and 27 cases caused by other organisms. There was a statistically significant difference between the mean number of doses of ampicillin received by the ampicillin-resistant Escherichia coli group (17.6 ± 5.5) compared with the other organisms group (4.9 ± 3.6) (P < .001). CONCLUSION: A relationship exists between neonatal death caused by ampicillin-resistant Escherichia coli and prolonged antepartum exposure to ampicillin.


Abstract: High vaginal swabs (HVS) of 1792 expectant mothers were sent for culture at the time of delivery, prior to first vaginal examination. The newborns were followed-up for development of superficial or deep infections. Appropriate cultures of the babies who developed infections were sent. Bacterial growth of predominantly gram-ve organisms was obtained in 1026 (57%) HVS. Infection developed in 48 (27%) babies in 1st 72 hours of life, of which 28 had deep infection while the rest had superficial infection. Vertical transmission of organisms was documented in 24 (1.3%) mother-baby dyads and the same was 72% in newborns who were at risk of developing sepsis by septicemia scoring, showing a significantly higher incidence of vertical transmission and subsequent sepsis in high risk newborns.


Abstract: A prospective multicenter study was designed to assess the frequency, etiology, and mortality of nosocomial neonatal sepsis diagnosed between 1996 and 1997 in the neonatology services of 27 acute-care hospitals in Spain (“Grupo de Hospitales Castrillo”). Nosocomial sepsis is defined in the literature using chronological criteria (>3–7 days of life at the onset of symptoms); accordingly, there is the possibility of including late-onset maternally acquired sepsis or of excluding early-onset nosocomial sepsis (<3–7 days of life). For these reasons, in this study, cases of nosocomial sepsis that developed at < or = 3–7 days after birth (early onset) were also recorded and maternally acquired sepsis diagnosed beyond 3–7 days of life were excluded. Using these criteria in a total of 30,993 admissions to the neonatal units of the participating hospitals, the nosocomial sepsis rate was 2.1% with an incidence density of 0.89 per 1,000 patient days. Sepsis rate was significantly more frequent among very low birth weight (VLBW) infants (15.6%) than among those weighing > or = 1500g (1.16%) (P < .001). Fifty-eight percent of all isolates were Gram-positive organisms, mainly Staphylococcus epidermidis (42%). Gram-negative organisms were isolated in 29.5% of cases (Escherichia coli and Klebsiella spp. were the most commonly isolated pathogens) and fungal infections in 12%, with absolute
predominance of Candida spp. The overall mortality rate was 11.8% and the following subgroups had significantly higher (P<0.001) mortality rates: sepsis caused by Gram-negative organisms (19% vs. 5.1% in Gram-positive pathogens) and sepsis caused by Pseudomonas aeruginosa (33.3% vs. 9.4% for the total number of sepsis caused by the remaining causative pathogens). Sepsis caused by S. epidermidis showed a significantly lower mortality rate (5.5%) compared with overall sepsis for the remaining etiologies (14.2%) (P<0.001). In VLBW infants, the mortality rate was significantly higher than in infants weighing >1500g (17.3% vs. 6.5%, P<0.001).


Abstract: OBJECTIVE: A periodic review of neonatal sepsis to assess any change in the infecting organism. METHOD: A prospective study was conducted at HMC and ASH, Karachi. The babies suspected to have or developed sepsis any time during hospitalization were investigated to establish the diagnosis and isolate the causative organism. Blood culture was taken at the time of admission or when sepsis was suspected. RESULTS: Out of 109 episodes of blood culture proven sepsis 68 presented as early onset (within 48 hours of birth) and 41 as late onset sepsis (after 48 hours of birth). In early onset group Gram -ve and Gram +ve organisms were almost equal, i.e. 33 and 35 respectively. Among the gram -ve organism most of the cases were due to Klebsiella sp, and Enterococcus was the commonest Gram +ve organism. In late onset group majority of infections were due to gram +ve organisms, i.e. 30 out of 41. Staph. aureus and Staph. epidermidis were commonest. The organisms were least sensitive to Ampicillin (<20%) and highly sensitive to Amikacin (90% to 100%), Cefotaxime was also seen as a good choice of antibiotic with sensitivity of (84%–89%). CONCLUSION: Gram +ve organisms were the main cause of neonatal sepsis. Klebsiella sp. is still the commonest organism causing early onset sepsis. The data must be periodically reviewed and antibiotic policy revised accordingly.


Abstract: Bacterial antigenic challenge presents a difficult fight for the neonatal immune system, and they have a smaller array of weapons to fight bacterial infections than adults and older children. The baby’s own systemic inflammatory response may have detrimental effects on several organs and longer lasting effects on the developing brain. Neurodevelopmental outcomes after maternal chorioamnionitis are worse than neonates without a contaminated intrauterine environment, regardless of gestation age and the baby’s culture results. Successes with intrapartum antibiotic prophylaxis decreasing rates of GBS sepsis and maternal chorioamnionitis, have heartened care providers and parents. These results demonstrate the advances possible when specific diseases are made a national health priority, and good clinical trial work is applied to clinical practice.

**Abstract:** In a survey of 450 consecutive births in Southampton a 12% incidence has been found of ophthalmia neonatorum. Bacterial pathogens were isolated from only one-third of the cases, while nonpathogens were isolated from as many cases as controls. There was an incidence of chlamydial infection of 3.7 per 1000 live births, while Neisseria gonorrhoeae could not be found. Chloramphenicol is recommended for topical antibacterial treatment, but chlamydial infection will not respond; it must be considered in ‘resistant’ cases, when both the neonate and the parents will need treatment with erythromycin or tetracycline.


**Abstract:** Ophthalmia neonatorum is the most common infection in the first month of life and can have serious systemic as well as ophthalmic morbidity. This article discusses the differential diagnosis and treatment of conjunctivitis in the neonate. Controversies in method of prophylaxis are reviewed.


**Abstract:** BACKGROUND: In up to 73% of ophthalmia neonatorum, Chlamydia trachomatis is the causative agents. Untreated sequelae to the eyes and organs may be the result. The aim of this study was to determine the bacterial spectrum of ophthalmia neonatorum with special regard to chlamydia and their diagnostic tests. MATERIALS AND METHODS: We compared the results of 15 newborn with ophthalmia neonatorum. For the diagnosis we used a rapid diagnostic test, Immunofluorescent Antibody Staining and Culture on McCoy cells. Bacteria that were cultured on culture media were also identified. RESULTS: In 66% the newborn showed a positive rapid diagnostic test result that was confirmed by Immunofluorescent Antibody Staining. In 5 patients all tests were negative. CONCLUSIONS: In this study C. trachomatis was the most frequent pathogen. In the culture media we isolated mostly gram-positive cocci but not Neisseria gonorrhoeae. We point out the value of an exact rapid diagnosis and specific treatment to avoid sequelae to the eye and organs.


**Abstract:** The microbiology, epidemiology and pathophysiology of ophthalmia neonatorum are reviewed with special emphasis on its prevention and management in the developing world. Although prophylaxis should be mandatory, no single topical agent is effective to prevent the ocular complications of both Neisseria gonorrhoea and Chlamydia trachomatis. Where levels of resistance to tetracyclines are low, however, tetracycline eye ointment is permissible for ocular prophylaxis. Eye prophylaxis has a relatively low failure rate. Management of ophthalmia neonatorum should be syndromic and systemic. Contact tracing is an integral part of the management.

Abstract: The transmission of infections from the biologic mother to her offspring is popularly known as perinatal infection (PI). It is not synonymous to infections during the perinatal or neonatal period. Physicians should avoid focusing attention only on the TORCH agents in the evaluation of suspected PI. Perinatal period begins from 28 weeks of gestation. Would one consider in utero infections in the first or second trimester of pregnancy as PIs? Developing countries have difficulty in collecting reliable and accurate data of PIs. These data are useful to define the magnitude of the problems, to monitor the trends, to recognise the mode of spread, and to find a solution of PIs. Most PIs are asymptomatic and diagnosis is extremely difficult. Developing countries need rapid, easy-to-operate, simple, and cheap diagnostic tools urgently. Access to health care in the remote city is limited. Newer drugs are too expensive and very few patients can benefit from these. Each developing country should prioritize its PI problems and tackle those that have serious public health problems and socio-economic impact. Most developing countries should focus on HIV (human immunodeficiency virus) and HBV (hepatitis B virus) infections. Other countries where ophthalmia, malaria or tuberculosis are prevalent or endemic, should focus on these. Developing countries are more willing to allocate the budget for prevention of diseases than for treatment. There may be problem of promulgating the information on prevention of diseases because of illiteracy, multi-lingual community. Vaccines where available, should be affordable. Other effective prevention guidelines should be workable in poorer nations. The government should play an important role in enforcing immunisation program by intensive promotion program or by legislation.


Abstract: OBJECTIVE: To build predictive models of severe adverse outcome at various times in the course of neonatal bacterial meningitis. STUDY DESIGN: Retrospective cohort study with follow-up to a minimum age of 1 year of term and near-term infants, admitted between 1979 and 1998 to a regional tertiary care center. Predictors of adverse outcome detectable at 1 year of age (death or moderate or severe neurosensory impairment) were identified by univariate analysis. Independent predictors of adverse outcome were identified by multivariate analysis. Predictive tree models were constructed at 12, 24, 48, and 96 hours after admission and at discharge. RESULTS: Of 101 infants admitted with definitive bacterial meningitis, 13 died and 17 had moderate or severe disability at 1 year of age. Outcomes are known for all patients, to 1 year of age. Twelve hours after admission the important predictors of adverse outcome were presence of seizures, presence of coma, use of inotropes, and leukopenia (sensitivity: 68%; specificity: 100%). At 96 hours the predictors were seizure duration of >72 hours, presence of coma, use of inotropes, and leukopenia (sensitivity: 88%; specificity: 99%). CONCLUSIONS: Most infants at risk for adverse outcome can be identified within 12 hours of admission. Duration of seizures for >72 hours, presence of coma, use of inotropes, and leukopenia were the most important predictors of adverse outcome. Although these models have good predictive accuracy, they need to be validated in a contemporary cohort in large multicenter studies.

**Abstract:** A scoring system for prediction of neonatal sepsis was evolved after determining the interdependence of perinatal risk factors for infection. Records of 100 babies with a history of one or more perinatal risk factors were analysed for incidence of infection within 4 hours of birth and followed for 1 week thereafter for appearance of any clinical or laboratory signs of infection. The incidence of sepsis was compared amongst various risk factors. Since majority of perinatal risk factors occur in combinations interdependence of factors was determined using actuarial analysis and score assignment was done whether the factor was dependent or independent. No definite infection was seen in the control group of 100 babies having no history of high risk factors. The scoring system thus elucidated is recommended as a screening procedure for selecting of neonates for laboratory evaluation.


**Abstract:** Streptococcus agalactiae transmitted to infants from the vagina during birth is an important cause of invasive neonatal infection. We have done a prospective, randomised, double-blind, placebo-controlled, multi-centre study of chlorhexidine prophylaxis to prevent neonatal disease due to vaginal transmission of S agalactiae. On arrival in the delivery room, swabs were taken for culture from the vaginas of 4,483 women who were expecting a full-term single birth. Vaginal flushing was then done with either 60 ml chlorhexidine diacetate (2g/l) (2,238 women) or saline placebo (2,245) and this procedure was repeated every 6 h until delivery. The rate of admission of babies to special-care neonatal units within 48 h of delivery was the primary end point. For babies born to placebo-treated women, maternal carriage of S agalactiae was associated with a significant increase in the rate of admission compared with non-colonised mothers (5.4 vs 2.4%; RR 2.31, 95% CI 1.39–3.86; p=0.002). Chlorhexidine reduced the admission rate for infants born of carrier mothers to 2.8% (RR 1.95, 95% CI 0.94–4.03), and for infants born to all mothers to 2.0% (RR 1.48, 95% CI 1.01–2.16; p=0.04). Maternal S agalactiae colonisation is associated with excess early neonatal morbidity, apparently related to aspiration of the organism, that can be reduced with chlorhexidine disinfection of the vagina during labour.


**Abstract:** OBJECTIVE: To compare the Center for Disease Control consensus guidelines’ screening-based strategy to a risk-based strategy as regards the incidence of early-onset group B streptococcus (GBS) infection among term infants. STUDY DESIGN: A cohort of university
hospital prenatal clinic mother-infant pairs who were screened for GBS at 35 to 37 weeks’
gestation were compared to a matched control group of unscreened mother-infant pairs from the
outreach satellite prenatal clinics who delivered at the same institution during the same time
period. GBS screening was carried out with rectovaginal cultures plated on selective media.
GBS-positive women received antimicrobial prophylaxis in labor whereas women of unknown
GBS status were only treated intrapartum if they had a risk factor for GBS infection. Principal
outcome variables included incidence of cases of neonatal early-onset GBS sepsis (blood, urine,
or cerebrospinal fluid positive for GBS), incidence of cases of strongly suspected GBS sepsis
(culture negative), and incidence of neonatal sepsis with non-GBS organisms. RESULTS: There
were 3,164 screened mother-infant pairs who were compared to 2,684 unscreened pairs. The
incidence of GBS carriage was 13.3%. A random sample of 420 screened women were
compared to a matched sample of 407 women of unknown GBS carrier status for
characterization of demographics and risk factors. No cases of documented GBS sepsis
occurred in the infants of the screened women, but four cases occurred among the infants of the
women who did not undergo screening (incidence 1.5/1000) (p=0.04), only one of whom had a
risk factor for GBS infection. Cases of suspected but culture negative sepsis were not more
common in the screened population when compared to the unscreened. There was one case of
Escherichia coli sepsis in an infant of a mother in the unscreened group. CONCLUSIONS: GBS
screening at 35 to 37 weeks, with intrapartum antimicrobial prophylaxis of carriers, decreased
the incidence of neonatal early-onset GBS sepsis and appears to have advantages over
treatment based on risk factors alone in term infants.

infections by vaginal chlorhexidine disinfection during labour,” Acta Paediatr., vol. 83,
no. 9, pp. 923–926.

Abstract: Comparison of two different methods of vaginal disinfection was made with regard to
prevention of neonatal infections. In method I, an antepartum vaginal douche with a
chlorhexidine solution was used; method II involved the use of chlorhexidine gluconate
obstetrical gel during vaginal exploration. We studied 2,853 normal deliveries from a total
number of 3,236 deliveries: 1,467 deliveries were allocated randomly to receive a vaginal
douche whereas 1,386 underwent vaginal exploration using chlorhexidine gel. A total of 203
neonates were transferred to the neonatal unit (120 males and 83 females): 101 belonged to the
group where the mothers were subjected to method I, whereas in 102 method II had been used.
Within 48 h postpartum 30 neonates from the method I group and 34 neonates from the method
II group received systemic antibiotics. There was a tendency towards a higher proportion of full-
term neonates with verified septicaemia in the method II group (6 versus 2), whereas the
numbers of probable infections were 8 versus 12. The corresponding total numbers in preterm
infants were 3 and 2, respectively. These differences were not statistically significant. We
conclude that the use of chlorhexidine douche compared with vaginal exploration with
chlorhexidine gel provides no additional advantages.

**Abstract:** The neonatal outcomes in 109 pregnancies complicated by prolonged rupture of the fetal membranes were studied over a 3-year period. The overall neonatal mortality was 29 (26.6%). Nineteen of these deaths were from infections, of which 12 were pneumonia. There was also a high morbidity rate of 68.8%. Neonatal sepsis, cardiorespiratory depression at birth and prematurity were the most significant complications. Forty-eight (44%) of the infants in the study group had an infection, in contrast with three (2.9%) in the control group (p<0.0001). No protective effect or benefit from prolonged rupture of fetal membranes in relation to the development of respiratory distress syndrome was demonstrated.


**Abstract:** OBJECTIVE: To achieve rapid identification of neonatal sepsis. SETTING: Neonatal Intensive care unit (NICU) of a teaching hospital. METHOD: We evaluated fifty neonates who were admitted with clinical features suggesting sepsis or who had principal risk factors, e.g. Prematurity (<36 weeks), Low birth weight (<2.5kg), H/o maternal pyrexia or prolonged rupture of membranes, birth asphyxia, unbooked cases or instrumentation. Five tests, i.e., Total Leukocyte Count (T.L.C.), Absolute Neutrophil Count, Immature/Total Neutrophil ratio (I.T. ratio), Platelet count and C-Reactive protein were used for rapid diagnosis of neonatal sepsis. RESULTS: C-reactive protein (C.R.P.) and absolute Neutrophil count had a sensitivity of over 60% with a specificity of 50%. White blood cell count had a specificity of 93% but a sensitivity of 14%. CONCLUSION: None of the tests used alone were reliable, but when in combination these five tests may help to diagnose sepsis within a few hours. Also, if the tests show a high negative predictive value, the neonate can be discharged early from the hospital, stopping the antibiotics, thereby reducing the cost of treatment and anxiety of the family.


**Abstract:** Systemic infection in the newborn is the commonest cause of neonatal mortality. Data from National Neonatal Perinatal Database 2000 suggest that Klebsiella pneumoniae and Staphylococcus aureus are the commonest causes of neonatal sepsis in India. Two forms of clinical presentations have been identified. Early onset sepsis, probably related to perinatal risk factors, usually presents with respiratory distress and pneumonia within 72 hours of age. Late onset sepsis, related to hospital acquired infections, usually presents with septicemia and pneumonia after 72 hours of age. Clinical features of sepsis are non-specific in neonates and a high index of suspicion is required for the timely diagnosis of sepsis. Although blood culture is
the gold standard for the diagnosis of sepsis, reports are available after 48–72 hours. A practical septic screen for the diagnosis of sepsis has been described and some suggestions for antibiotic use have been included in the protocols.


Abstract: Body temperatures of 99 term and 44 preterm infants were measured at four sites: core (5cm beyond the anus, with an electronic telethermometer), rectum (2cm, with a mercury-in-glass thermometer), axilla, and between the skin and mattress. Temperatures measured at the four sites agreed closely in this group of largely normothermic infants. However, five of seven term infants with abnormal core temperature (greater than 1.5 SD below or above the mean) would have been judged to be normothermic by each of the three other measurements. The temperatures in preterm infants were lower and varied less with the site of measurement, indicating a smaller core-surface temperature gradient because of their relative lack of thermal insulation by body fat. Axillary temperature was as reliable as rectal temperature measured in the usual way with a mercury-in-glass thermometer. Measurement of the temperature between the skin and mattress was nearly as accurate as the other more frequently used methods. Ninety percent of temperatures were within 0.1 degree C of their final stabilization readings by 5 minutes for each type of thermometer and measurement site.


Abstract: The 1996 World Health Report highlights the global importance of infectious diseases, especially among young children, and stresses the impact of new or emerging diseases. Neonatal infections are old diseases. What is needed is a new recognition that they are important causes of morbidity and mortality and that simple interventions are available that can make a significant impact on the incidences of infection and death related to infection.


Abstract: We sought to assess the antimicrobial capacity of human colostrum against Chlamydia trachomatis, a common agent of ophthalmia neonatorum. Colostrum was collected from 13 post-partum females and tested in an in vitro assay of chlamydial growth inhibition using HeLa 229 cells as the host cell line. All samples significantly inhibited chlamydial growth in a dose-response manner. The percent inhibition ranged from 45.3 to 99.0 (mean=88.1+/-4.1). The chlamydial growth inhibition activity of colostrum was found to be: heat- and freezing-resistant; more concentrated in colostrum than breast milk; was not attributable to interferon or antibody activity; and, could not be attributed to host cell cytotoxicity. Additionally, chlamydial growth inhibition occurred in < or = 15 min and was effective only when colostrum was incubated with chlamydiae prior to addition to HeLa 229 monolayers. Lastly, centrifugal fractionation of the
colostrum yielded similar activity in the lipid pellicle and in the lipid-free supernatant. These results indicate that topically applied colostrum may have efficacy in the prophylaxis of ophthalmia neonatorum of chlamydial etiology in the absence of conventional modalities.


Abstract: BACKGROUND: Ophthalmia neonatorum still blinds approximately 10,000 babies annually worldwide. Identification of contributory maternal perinatal factors could possibly predict which babies are at greater risk for this disease. METHODS: In a randomized prospective study of ophthalmia neonatorum in Kenya, we studied the effect of prophylaxis with povidone-iodine, silver nitrate, and erythromycin in 3117 neonates. Four perinatal factors that may promote ophthalmia neonatorum were investigated: maternal vaginitis, birth in a nonsterile environment, presence of meconium at birth, and postnatal development of endometritis. RESULTS: No significant difference in the general ophthalmia neonatorum rate was found for any of the four factors (P>.14 by Fisher exact test). However, with regard to venereal ophthalmia neonatorum, the 26 infants born to mothers with vaginitis had a relative risk 5.1 times that of the rest of the infants (P=0.0013). Their relative risk to develop gonococcal ophthalmia neonatorum in particular was 24.9 times the rest of the neonates (P=0.0000031). Prophylaxis was with povidone-iodine in 12 infants, silver nitrate in two, and erythromycin in 12. The frequency of ophthalmia neonatorum was 25%, 100%, and 33%, respectively (differences not significant). CONCLUSION: Neonates born to mothers with vaginitis should be carefully observed for the first postnatal month for the development of ophthalmia neonatorum, even though a prophylactic agent has been used.


Abstract: To evaluate the core-peripheral temperature alterations as a marker for sepsis in normothermic premature newborns, 50 normal term neonates and 11 preterms with sepsis and 11 normal preterms (controls) were studied. Axillary, rectal and sole temperatures were recorded in all babies using a single mercury-in-glass thermometer by a single observer. There was significant widening of the rectal-sole and axillary-sole temperatures in the preterms with sepsis (p less than 0.001). There was no significant difference (p greater than 0.05) between the axillary and rectal temperatures in the term, normal preterms or those with sepsis. With an overall accuracy of 90.9%, a rectal-sole temperature difference of greater than or equal to 2.3 degrees C (100% sensitivity) or greater than or equal to 3.2 degrees C (100% specificity) is a useful marker to differentiate normothermic preterms with or without sepsis. Using the axillary-sole temperature difference, the respective values were greater than or equal to 2.2 degrees C and greater than or equal to 3.0 degrees C.

**Abstract:** An outbreak of Salmonella worthington infection in a neonatal unit occurred in a pediatric ward of Holy Family Hospital, Rawalpindi, Pakistan. The index case was a prematurely born male child from whose clinical specimens S. worthington was recovered. After this finding 40 infants kept in that nursery were included in an investigation. Major symptoms were diarrhea, septicemia and jaundice. Three developed meningitis. Disease morbidity rate was 45% and mortality occurred in 16.6% of the total positive cases. The source of infection was traced to a contaminated rubber tubing of a suction apparatus which was used for oropharyngeal suction of the babies. S. worthington was recovered from the clinical specimens of all 18 babies who received suction. Multiple drug resistance of these S. worthington strains was found.


**Abstract:** PURPOSE: To compare the clinical and bacteriological effects of fucidic acid (Fucithalmic: 1.0%) and chloramphenicol (Minims(R): 0.5%) eye drops in neonates with a clinical diagnosis of acute conjunctivitis of suspected bacterial origin. METHODS: A TOTAL OF 456 NEWBORNs with gestational age > 32 weeks with acute conjunctivitis of suspected bacterial origin acquired within the first 28 days of life were included in the study. They were randomly assigned to a 7-day treatment with eye drops using either fucidic acid (1.0%) (Fucithalmic) applied twice per day, or chloramphenicol (0.5%) (Minims Chloramphenicol) applied six times per day. The subjects were followed up with two visits (on days 1 and 8) and by telephone 2 weeks after the end of treatment. RESULTS: Eighty-nine per cent of the neonates treated with Fucithalmic were cured, compared to 87.9% of those treated with Minims Chloramphenicol (n.s). The drug was used as instructed in 90.7% of patients treated with Fucithalmic and in 78.0% of those treated with Minims Chloramphenicol (P < 0.001). CONCLUSION: Treating neonatal conjunctivitis with fucidic acid is easier than with chloramphenicol and is equally effective.
Mother to Child Transmission of HIV-AIDS


Abstract: We were pleased to see the article by Newell report “the ultimate goal of public health programmes for the prevention of mother-to-child-transmission (MTCT) is to save the lives of large numbers of children born to HIV-infected mothers”. Much of the current research uses the reduction of detectable blood viral levels and the prevention of transmission of the virus as the standard by which positive outcomes of programmes should be judged. We question the assumption that reducing transmission is the only effective way to improve health in children of HIV-positive mothers.


Abstract: The greatest burden of HIV infection in women and their children is disproportionately borne by the poorest countries, especially in sub-Saharan Africa. Breastfeeding is a major health-promoting factor for infants and children in developing countries but the risk of mother-to-child transmission (MTCT) of HIV by this route is challenging traditional practices and health policies in low-resource countries. Maternal and infant factors contributing to the risk of MTCT through breastfeeding are still poorly understood and not well researched. Factors identified include: advanced clinical stages of infection in the mother; high maternal plasma HIV-1 load; presence of mastitis; and infant oral thrush. In many developing countries, international agencies are providing support and recommendations for preventing MTCT of HIV-1 by breastfeeding. Preventive strategies supported by WHO/UNICEF and charitable agencies in some sentinel centres in sub-Saharan Africa include routine antenatal voluntary counselling and testing (VCT), PCR testing of infants of seropositive mothers at 6 weeks of age, various combinations of a shortened period (3–6 mths) of exclusive breastfeeding, perinatal administration of antiretrovirals (ARV) such as nevirapine and provision of affordable and safe infant replacement feeds (presently given free by UNICEF in some centres). Many problems, however, have hindered effective implementation of these interventions. In many poor communities, even where VCT facilities are available, acceptance of HIV testing is low because there is fear of stigmatisation by the spouse, family or community and compliance with complex drug regimens is therefore poor. Other problems include the exorbitant cost of antiretroviral drugs, inadequately resourced health care systems and unavailability or poor acceptance of safe breast-milk alternatives. The rate of mixed feeding is high and so the risk of MTCT is increased. Continued promotion of exclusive breastfeeding for at least 6 months, irrespective of HIV status, followed by a properly prepared, high energy, nutritious complementary diet, with the possibility of early weaning to an animal milk formula, still appears to be the most appropriate option for the poor in countries with high levels of MTCT not deriving any benefit from the above strategies. While a longer period of breastfeeding would probably increase the risk of MTCT in vulnerable communities, a shorter
duration would certainly increase infant morbidity and mortality. Results of investigations of the
efficacy of ARV for protecting the infants of HIV-infected mothers during the breastfeeding period
are awaited.

Desclaux, A. 2002. “What if the HIV/AIDS pandemic were an opportunity to improve the
73–75.

Abstract: In the 1990s, many programs and actions were set up for promoting breastfeeding in
Africa, more or less successfully in different countries. The main achievements of these
programs were the training of health professionals and the apparent ending of the distribution of
formula in Health services. The impact of these programs on breastfeeding practices in countries
with prevalent prolonged mixed feeding is less obvious, as many programs did not emphasize
“best practices”. Health messages delivered on this topic have been poor, because they were
often conceived at the international level rather than adapted to African contexts, and because
the consensus about the promotion of breastfeeding is so strong that the programs have rarely
undergone a critical evaluation. The HIV/AIDS pandemic could be an opportunity to rethink
these programs. “Baby friendly” Health services are now considered as the most knowledgeable
to deal with breastfeeding in the context of HIV, through the reinforcement of the promotion of
“best feeding practices” and through the follow-up of formula-feeding for some HIV-positive
mothers. To prevent HIV transmission, health messages will have to promote some practices
that are useful for HIV-negative, as well as HIV-positive, mothers, such as exclusive
breastfeeding, the prevention, early diagnosis and treatment of abscesses and mastitis, and the
management of weaning—all strategies that were undervalued until now. For children of HIV-
positive mothers and for orphans, Health services will have to set up a medical follow-up of
artificial feeding. These new goals mean that breastfeeding promotion programs will have to
develop complementary strategies with an emphasis on care, coordinated with other vertical
programs such as AIDS and malnutrition programs.

Mandelbrot, L., P. Msellati, N. Meda, V. Leroy, R. Likikouet, P. P. van de, L. Dequae-
Merchadoux, F. Sylla-Koko, A. Ouangre, T. Ouassa, R. Ramon, L. Gautier-Charpentier, M.
children following vaginal cleansing with benzalkonium chloride of their HIV infected
267–270.

Abstract: OBJECTIVES: To study mother to child HIV-1 transmission (MTCT) and infant
mortality following benzalkonium chloride (BC) disinfection. METHODS: A randomised, double
blind phase II placebo controlled trial. Women testing positive for HIV-1 infection in prenatal care
units in Abidjan, Cote d’Ivoire, and Bobo-Dioulasso, Burkina Faso, from November 1996 to April
1997 were eligible, with their informed consent. Women self administered daily a vaginal
suppository of 1% BC (53) or matched placebo (54) from 36 weeks of pregnancy, plus a single
dose during labour. The neonate was bathed with 1% BC solution or placebo within 30 minutes
after birth. MTCT rate was assessed based on repeated polymerase chain reaction (PCR) and
serology results. For the present analysis, children were followed up to 15 months. RESULTS: A
total of 107 women were enrolled. Of 103 eligible liveborn children, 23 were HIV infected, 75 uninfected, and five of indeterminate status. MTCT transmission rate was 24.2% overall (95% confidence interval (CI): 14.3% to 30.4%). On an intent to treat basis, the transmission rate did not differ between the two groups (23.5%, CI 13.8 to 38.5, in the BC group and 24.8%, CI 15.0 to 39.6, in the placebo group at 15 months). Similarly, there was no difference in mortality at 15 months (22.9%, CI 13.7 to 36.9, in the BC group and 16.5%, CI 9.0 to 29.4, in the placebo group). CONCLUSION: This analysis failed to suggest any benefit of BC disinfection on mother to child HIV transmission or perinatal and infant mortality.

**Moore, M. 2003. A Behavior Change Perspective on Integrating PMTCT and Safe Motherhood Programs, The Change Project.**

**Abstract:** In the context of an increase in AIDS-related maternal deaths and high prevalence of obstetric-related maternal mortality in most African nations, this paper argues the needs for programs that simultaneously address both problems.

It outlines barriers to the widespread implementation of effective prevention of mother to child transmission (PMTCT) and Safe Motherhood (SM) programmes and the ways in which behaviour change interventions can break these down. The paper reviews research results and field experience from a behaviour change perspective to see what can be applied to develop and strengthen the essential behavior change component of PMTCT programs. It briefly discusses some of the operational challenges faced by PMTCT programs documented in the literature, and how a behavior change approach could help to address them.

Barriers that can be addressed with behavior change interventions include:

- missed opportunities to offer, or low uptake of, voluntary counselling and testing during routine antenatal care (ANC)
- low levels of acceptance of HIV testing where it is available, by both pregnant women and partners
- failure to return for HIV test results where rapid testing is not available
- inadequate acceptance of anti retroviral treatment (ART) offered to HIV+ women at ANC
- insufficient use of facility-based delivery where improved obstetric practices can be used, and ART for mother and newborn can be supervised
- poor adherence to ‘take-home’ ART for mother and newborn when given to HIV+ women at ANC
- low coverage to newborns with ART even when delivered in facility
- low uptake of recommended infant feeding behaviors to minimize MTCT cause

The paper states that of all of the interventions necessary for reducing MTCT, improving obstetric care is the one receiving least attention, and that behavior change can play an important part in doing that through a focus on reducing delays in obstetric careseeking and educating birth attendants. It outlines the BCC method that can be used for these purposes and recommends next steps to be taken by planners and policy makers.


Abstract: To determine the efficacy and safety of 2 inexpensive and easily deliverable antiretroviral (ARV) regimens for the prevention of mother-to-child transmission (MTCT) of human immunodeficiency virus (HIV) type 1 during labor and delivery, HIV-infected pregnant women were screened at 11 maternity health institutions in South Africa and were enrolled in an open-label short course ARV regimen of either nevirapine (Nvp) or multiple-dose zidovudine and lamivudine (Zdv/3TC). The overall estimated HIV-1 infection rates in 1,307 infants by 8 weeks were 12.3% (95% confidence interval [CI], 9.7–15.0) for Nvp and 9.3% (95% CI, 7.0–11.6) for Zdv/3TC (P=.11). Excluding infections detected within 72 h (intrauterine), new HIV-1 infections were detected in 5.7% (95% CI, 3.7–7.8) and 3.6% (95% CI, 2.0–5.3) of infants in the Nvp and Zdv/3TC groups, respectively, in the 8 weeks after birth. There were no drug-related maternal or pediatric serious adverse events. Common complications were obstetrical for mothers (Nvp group, 24.3%; Zdv/3TC group, 26.3%) and respiratory for infants (Nvp group, 16.1%; Zdv/3TC group, 17.0%). This study further confirms the efficacy and safety of short-course ARV regimens in reducing MTCT rates in developing countries.


Abstract: The gap between rich and resource-poor countries has continued to grow as reproductive care providers integrate interventions to limit mother-to-child transmission (MTCT) of HIV in a manner consistent with existing information. There are two major reasons for this difference: access to prophylactic antiretroviral therapy (ARV) for HIV-infected pregnant mothers and availability of alternative feeding for babies. In resource-poor settings, these options are beyond reach for the majority of the women. Infant and under-five mortality rates from other infections are high in these settings and breastfeeding remains the norm. Answering the question, What is an achievable standard of care in resource-poor settings? still remains a major challenge today. Dialogue has begun in most resource-poor settings to address the key elements in the package of interventions to reduce MTCT of HIV. These elements include the following: (1) overall prevention of HIV in mothers and fathers; (2) provision of good-quality voluntary testing and counseling (VCT) in antenatal clinics; (3) a comprehensive package of interventions during pregnancy, during labor, and after delivery, including screening for sexually transmitted diseases (STDs), family planning, and—where possible—ARVs; (4) provision of infant and maternal nutrition within the socioeconomic realities; (5) advocacy and program communication; and (6) other supportive measures, including community mobilization to address issues such as stigmatization of and violence against HIV-infected women. This paper discusses the challenges faced by most resource-poor settings in integrating some of these activities into reproductive care services.

**Abstract:** Although substantial progress has been made in preventing mother-to-child HIV-1 transmission in the past decade, critical research questions remain. Two perinatal epidemics now exist. In more-developed countries, integration of prenatal HIV-1 counselling and testing programmes into an existing antenatal infrastructure, availability of effective antiretroviral prophylaxis, and access to infant formula have resulted in new perinatal infections becoming rare. However, identification of missed prevention opportunities, the causes of prophylaxis failure, and the potential effects of in-utero antiretroviral exposure have become a priority. In less-developed countries, antenatal care is limited, testing programmes are almost non-existent, effective interventions remain unimplemented, and prevention of postnatal transmission through breastmilk while maintaining adequate infant nutrition is a major dilemma. The challenge for the next decade is to simultaneously address questions relevant to both epidemics while bridging the gap in prevention of perinatal transmission between more-developed and less-developed countries.


**Abstract:** PDF available at: http://www.unaids.org/publications/documents/mtct/Gaberone_meeting_MTCT.doc


**Abstract:** OBJECTIVE: To investigate zidovudine prophylaxis with caesarean section to reduce mother-to-infant HIV transmission. INTERVENTIONS: Elective caesarean section before labour, usually at 36–38 weeks of gestation, plus a short oral course of zidovudine, normally starting at week 32, intravenous zidovudine before caesarean section and for 10 days for the neonate (the reduced Berlin regimen). RESULTS: Of 179 mother-infant pairs 104 received no antiretroviral prophylaxis or therapy (control group), 48 received the reduced Berlin prophylaxis regimen, 18 received combination therapy and nine received only part of the prophylaxis regimen. Of the antiretroviral group, 68 were delivered by elective caesarean section. The HIV transmission rate was zero in the antiretroviral group [95% confidence interval (CI) 0–4.7] and 12.6% (6.4–19.0) in the control group. The reduction in vertical transmission was 90% for the Berlin regimen, with an 80 and 70% reduction in risk associated with antiretroviral treatment and caesarean section, respectively. Maternal CD4 cell count but not viral load had some confounding effect on the reduction in risk attributed to caesarean section and the prophylactic regimen. Neonatal haematological abnormalities associated with antiretroviral intervention lasted for up to 7 weeks. Weight and length, although significantly lower at birth, were normal by 6–8 weeks.
CONCLUSION: A much reduced three-arm regimen of zidovudine prophylaxis in combination with caesarean section before labour is highly effective in reducing the risk of vertical HIV transmission and is safe for the infant.


Abstract: This tool provides guidance for researchers who seek to establish the nature of the association and levels of risk of transmission between patterns of infant feeding and mother-to-child transmission of HIV (MTCT). Such a tool has not yet been developed for MTCT although comparable tools have been used in other contexts, such as childhood diarrhoea. Many indicators, including those in Demographic and Health Studies, already exist. By drawing on these existing instruments and involving many investigators in the design of this tool, it is hoped that the data may be more consistently collected from study to study, allowing improved comparison across sites and meta/joint analyses of data sets.

This tool is designed to assess infant feeding patterns and their relation with MTCT. It is not intended to collect information on nutritional adequacy of infant feeding.

Available at: http://www.who.int/reproductive-health/publications/RHR_01_12/RHR_01_12.en.abstract.html


Abstract: BACKGROUND: Women in developing countries have the difficult choice of balancing the risk of transmitting HIV through breast milk against the substantial benefits of breastfeeding. It is not known, however, whether the benefits of breastfeeding are the same when the mother is HIV-infected. Therefore, we examined the impact of breastfeeding on infections, growth and mortality in the infants of HIV-1-infected women. METHODS: Infants of HIV-1-positive women were followed from birth and at each visit they were examined, growth parameters were recorded and notes were made of feeding method, and of current and interim illnesses. RESULTS: Of the 43 HIV-infected and 90 non-infected infants for whom feeding data were available, 36 infants (27%) were exclusively breastfed, 76 (57%) received mixed feeding, and 21 (16%) received formula only. The HIV transmission rate was 39% in those exclusively breastfed, 24% in those fed exclusively on formula and 32% in those receiving mixed feeding [relative risk (RR), 7.39; 95% confidence interval (CI), 1.67–32.6 between the exclusive breast and formula only groups]. There was a stepwise increase in the transmission rate with duration of exclusive breastfeeding of 1, 2 and 3 months (45%, 64%, and 75%, respectively). Of the infected infants, seven (50%) exclusively breastfed, 13 (51%) of those on mixed feeds and none on formula only developed AIDS; exclusively breastfed infants had a slower rate of progression to AIDS (mean
age, 7.5 months versus 5.0 months, P=0.2242) than those on mixed feeds. Mortality (which occurred in the infected infants only) was 19% in the exclusively breastfed infants; 13% in those on mixed feeds and 0% in those exclusively formula-fed. The frequency of failure to thrive and episodes of diarrhoea and pneumonia were not significantly different between the three groups in both the infected and non-infected infants. CONCLUSIONS: Exclusive breastfeeding by HIV-infected women does not appear to protect their infants against common childhood illnesses and failure to thrive, nor does it significantly delay progression to AIDS. The implication of the trend towards differential mortality rates according to feeding groups is uncertain and requires further investigation.


Abstract: Complete avoidance of breast-feeding is the surest way to avoid mother-to-child transmission (MTCT) of HIV through breast-feeding, but replacement feeding exposes infants, especially those born in developing countries, to the risk of other infectious diseases with consequent increase in morbidity and mortality. One study has suggested that exclusive breast-feeding during the first months of life carries a lower risk of HIV transmission than when other foods are given in addition to breast milk. Other studies have provided limited data on the risks of HIV transmission according to different patterns of breast-feeding, but studies have used different definitions of breast-feeding patterns and have analysed their data with adjustment on different risk factors. This hampers our ability to understand the mechanisms underlying HIV transmission through breast milk and the risks associated with different infant feeding practices. Consequently it is difficult to determine the best interventions to reduce the risk of transmission and the development of optimal policies. In collaboration with research teams involved with infant feeding research, the World Health Organization has developed a tool to assist studies on MTCT to collect information in a standardized manner, using common definitions and terms. The purpose is to facilitate comparisons between studies and the quantification of the risks of transmission according to various feeding patterns, after adjusting for potential confounding variables. The tool includes a core questionnaire to record infant feeding practices and other key information on the mother’s and the infant’s health. It also provides guidance on methods of analysis and presentation of the complex data on infant feeding. The tool can be used in prospective research studies on MTCT prevention, as well as providing the framework to assess infant feeding patterns in intervention programmes, such as those providing intensive counselling to mothers on infant feeding. The tool will facilitate the compilation of information from these studies which will ultimately provide scientific basis for updating guidelines and policies on infant feeding by mothers infected with HIV.


Abstract: By supporting community involvement, we can enhance prevention of mother-to-child transmission of HIV. Our recommendations are for the benefit of program managers, policymakers, and donors and apply to preventing vertical transmission of HIV in a number of
settings, including prevention services for women who are likely to become pregnant and their partners. The recommendations acknowledge the right of people to know their serostatus and to access the information, services, and support they need to make decisions based on this knowledge. We hope that our recommendations will encourage program planners to include community participation, education, and mobilization as critical program elements.

Available at: http://www.popcouncil.org/pubasps/PublicationDetails.asp?PublicationID=1677


Abstract: OBJECTIVE: To assess the cost-effectiveness of alternative strategies of nevirapine (NVP) administration to prevent vertical HIV transmission in sub-Saharan Africa. DESIGN: A decision-analysis model was constructed to estimate the costs and effects of NVP-based prevention strategies for two separate groups of women: those who qualify for standard therapy by attending a 36-week prenatal visit, and those who do not qualify, owing to preterm delivery or lack of prenatal care. RESULTS: For women in prenatal care, mass provision of NVP without maternal serodiagnosis was found to yield greater health gains at an acceptable cost, compared with providing targeted therapy to only those women identified as seropositive. However, this conclusion was strongly contingent on several uncertain assumptions, most importantly the probability that a woman who does not know her serostatus will nonetheless adhere to therapy. Among those women who present for delivery without prior enrollment in a prenatal strategy, either late provision of maternal-infant NVP or treatment of only the infant would likely be a cost-effective alternative to the current practice of offering no preventive therapy. CONCLUSIONS: NVP intervention offers a cost-effective avenue for preventing vertical HIV transmission in sub-Saharan Africa. The optimal choice between mass therapy and targeted therapy cannot be confidently identified without information regarding adherence among women who do not know their serostatus. For women who do not receive NVP prenatally, treatment on presentation for delivery would be cost-effective even in the face of modest clinical efficacy. Clinical assessment of adherence to therapy among women who do not know their status and the field effectiveness of alternative approaches to NVP administration is urgently needed to allow identification of optimal prevention strategies.


Abstract: OBJECTIVES: To determine the vertical transmission rate of HIV-1 infection and to assess the influence of maternal risk factors on transmission in infants born to HIV-1-infected black women in Durban. DESIGN: A prospective, hospital-based cohort study conducted at King Edward VIII hospital, Durban. HIV-1-seropositive women were enrolled into the study, and their infants were followed up at regular intervals from birth to early childhood. The infection status of the children was classified and the transmission rate was computed according to the recommendations of the workshop held in Ghent, Belgium (1992). RESULTS: The final cohort of 181 infants were classified as 48 infected, 93 not infected and 40 indeterminate. Clearance of
maternal antibodies was achieved by 12 months of age in virtually all infants who became seronegative. The intermediate transmission rate was 34% (95% confidence interval, 26 to 42). Deliveries by cesarean section had significantly lower transmission (relative risk, 0.46; 95% confidence interval 0.23 to 0.91). Women with lower hemoglobin concentrations during pregnancy (<10g/dl) had an increased risk of transmission (relative risk, 1.99; 95% confidence interval, 1.18 to 3.34). Advanced maternal age, multiparity, positive syphilis serology, duration of ruptured membranes, preterm delivery and breast-feeding were not associated with an increased risk of transmission. CONCLUSIONS: This study, the first from South Africa, has confirmed that the rate of vertical transmission of HIV-1 is as high as that reported from most African cohorts. Cesarean sections were protective against transmission, whereas low hemoglobin values were associated with an increased risk of transmission. Twelve months could be used as the cutoff age for the diagnosis of vertical infection using antibody tests.


Abstract: BACKGROUND: The relationship between duration of ruptured membranes (DROM) and vertical transmission (VT) of HIV-1 was evaluated in a meta-analysis using individual patient data from prospective cohort studies. METHODS: Studies including at least 100 mother-child pairs, from regions where women with HIV-1 are counseled not to breastfeed, were eligible for inclusion. The primary analysis included deliveries with DROM <24 hours, either vaginal deliveries (VagD) or cesarean sections performed after rupture of membranes and/or after onset of labor (NECS). Multi-variate logistic regression analysis was used to assess the strength of the relationship, adjusting for other factors associated with VT. RESULTS: Data for 4721 mother-child pairs from 5 European and 10 North American studies were analyzed. After adjusting for mode of delivery, receipt of antiretroviral therapy, maternal disease stage, and infant birth weight, the likelihood of VT increased linearly with increasing DROM [adjusted odds ratio = 1.02 (95 percent confidence interval: 1.01, 1.04) for each one hour increment]. There were no significant interactions of DROM with study cohort or with any of the covariates, except maternal AIDS. Of note, mode of delivery (VagD or NECS) did not modify the relationship between DROM and VT. With AIDS, the probability of VT increased in a curvilinear fashion from 8% to 31% with DROM of two hours and 24 hours, respectively (p<0.01). CONCLUSIONS: These results confirm that DROM affects the risk of VT of HIV-1, and suggest a diagnosis of AIDS in the mother at the time of delivery may potentiate the effect of DROM.

Available at: http://www.retroconference.org/2000/abstracts/659.html


Abstract: This document examines the recent WHO recommendations for modifying breastfeeding to reduce postnatal transmission of HIV in Africa. Specifically, it reviews the three-stage strategy for “modified breastfeeding” for HIV-positive mothers that involves exclusive breastfeeding followed by an early transition to exclusive replacement feeding. Organized into six chapters, this document also describes a step-by-step process for making the transition from
exclusive breastfeeding to exclusive replacement feeding. However, many of the behaviors discussed in this review represent a major change in traditional infant care practices in Africa, and their feasibility and impact on child survival have yet to be determined. It is recommended, therefore, that these guidelines be subjected to additional research and testing before being implemented.


Abstract: OBJECTIVES: To conduct a rapid assessment of the impact of the Khayelitsha Prevention of Mother-to-Child Transmission (MTCT) programme on infant care practices among programme participants and the local population. STUDY DESIGN: Cross-sectional survey and qualitative in-depth interviews. SETTING. Khayelitsha, a large formal and informal settlement of about 300,000 people on the outskirts of Cape Town. At the time of the study the HIV seroprevalence rate among antenatal women was about 15% and the MTCT programme had enrolled nearly 800 infected women. SUBJECTS: Seventy randomly selected caregivers with young children in the survey; in-depth structured interviews with 11 nutrition counsellors and 11 mothers enrolled in the programme. RESULTS: Caregivers have good knowledge of the spread and prevention of HIV. A majority knew that breast-feeding can transmit HIV but 90% stated that this did not affect their feeding decisions. Over 80% had stopped exclusively breast-feeding by the time their infants were 3 months of age. All of the respondents felt that being diagnosed HIV-positive would result in serious social and domestic consequences. None of the health workers could correctly estimate the risk of spreading HIV through breast-feeding and many reported feeling confused about what they should counsel mothers. All the mothers on the programme reported exclusive formula-feeding. Some had serious problems with preparation and feeding of formula milk. Nearly all reported running out of feeds before being able to fetch new supplies. None reported any negative social effects of not breast-feeding. Most of the mothers endorsed the programme and felt that it had given them strength to face up to and plan for the consequences of their diagnosis. CONCLUSION: This rapid appraisal of the infant feeding and care component of the MTCT programme has raised a number of important challenges which health managers and policymakers need to address. Similar assessments in the new pilot sites will be important.


Abstract: CONTEXT: Transmission of human immunodeficiency virus type 1 (HIV-1) is known to occur through breastfeeding, but the magnitude of risk has not been precisely defined. Whether breast milk HIV-1 transmission risk exceeds the potential risk of formula-associated diarrheal mortality in developing countries is unknown. OBJECTIVES: To determine the frequency of breast milk transmission of HIV-1 and to compare mortality rates and HIV-1-free survival in breastfed and formula-fed infants. DESIGN AND SETTING: Randomized clinical trial conducted
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from November 1992 to July 1998 in antenatal clinics in Nairobi, Kenya, with a median follow-up period of 24 months. PARTICIPANTS: Of 425 HIV-1-seropositive, antiretroviral-naive pregnant women enrolled, 401 mother-infant pairs were included in the analysis of trial end points. INTERVENTIONS: Mother-infant pairs were randomized to breastfeeding (n=212) vs formula feeding arms (n=213). MAIN OUTCOME MEASURES: Infant HIV-1 infection and death during the first 2 years of life, compared between the 2 intervention groups. RESULTS: Compliance with the assigned feeding modality was 96% in the breastfeeding arm and 70% in the formula arm (P<.001). Median duration of breastfeeding was 17 months. Of the 401 infants included in the analysis, 94% were followed up to HIV-1 infection or mortality end points: 83% for the HIV-1 infection end point and 93% to the mortality end point. The cumulative probability of HIV-1 infection at 24 months was 36.7% (95% confidence interval [CI], 29.4%–44.0%) in the breastfeeding arm and 20.5% (95% CI, 14.0%–27.0%) in the formula arm (P=.001). The estimated rate of breast milk transmission was 16.2% (95% CI, 6.5%–25.9%). Forty-four percent of HIV-1 infection in the breastfeeding arm was attributable to breast milk. Most breast milk transmission occurred early, with 75% of the risk difference between the 2 arms occurring by 6 months, although transmission continued throughout the duration of exposure. The 2-year mortality rates in both arms were similar (breastfeeding arm, 24.4% [95% CI, 18.2%–30.7%] vs formula feeding arm, 20.0% [95% CI, 14.4%–25.6%]; P=.30). The rate of HIV-1-free survival at 2 years was significantly lower in the breastfeeding arm than in the formula feeding arm (58.0% vs 70.0%, respectively; P=.02). CONCLUSIONS: The frequency of breast milk transmission of HIV-1 was 16.2% in this randomized clinical trial, and the majority of infections occurred early during breastfeeding. The use of breast milk substitutes prevented 44% of infant infections and was associated with significantly improved HIV-1-free survival.


Abstract: BACKGROUND: The debate on breastfeeding in areas of high HIV prevalence has led to the development of simulation models that attempt to assess the risks and benefits associated with breastfeeding. An essential element of these simulations is the extent to which breastfeeding protects against infant and child mortality; however, few studies are available on this topic. We did a pooled analysis of studies that assessed the effect of not breastfeeding on the risk of death due to infectious diseases. METHODS: Studies were identified through consultations with experts in international health, and from a MEDLINE search for 1980–98. Using meta-analytical techniques, we assessed the protective effect of breastfeeding according to the age and sex of the infant, the cause of death, and the educational status of the mother. FINDINGS: We identified eight studies, data from six of which were available (from Brazil, The Gambia, Ghana, Pakistan, the Philippines, and Senegal). These studies provided information on 1223 deaths of children under two years of age. In the African studies, virtually all babies were breastfed well into the second year of life, making it impossible to include them in the analyses of infant mortality. On the basis of the other three studies, protection provided by breastmilk declined steadily with age during infancy (pooled odds ratios: 5.8 [95% CI 3.4–9.8] for infants <2 months of age, 4.1 [2.7–6.4] for 2–3-month-olds, 2.6 [1.6–3.9] for 4–5-month-old infants, 1.8 [1.2–2.8]
for 6–8-month-olds, and 1.4 [0.8–2.6] for 9–11-month-olds). In the first 6 months of life, protection against diarrhoea was substantially greater (odds ratio 6.1 [4.1–9.0]) than against deaths due to acute respiratory infections (2.4 [1.6–3.5]). However, for infants aged 6–11 months, similar levels of protection were observed (1.9 [1.2–3.1] and 2.5 [1.4–4.6], respectively). For second-year deaths, the pooled odds ratios from five studies ranged between 1.6 and 2.1. Protection was highest when maternal education was low. INTERPRETATION: These results may help shape policy decisions about feeding choices in the face of the HIV epidemic. Of particular relevance is the need to account for declining levels of protection with age in infancy, the continued protection afforded during the second year of life, and the question of the safety of breastmilk substitutes in families of low socioeconomic status.


Abstract: OBJECTIVE: To describe the effects of various short zidovudine (ZDV) prophylactic regimens on vertical transmission of human immunodeficiency virus type 1 (HIV-I) infection, especially the effect of immediate neonatal ZDV prophylaxis. MATERIALS AND METHODS: The study included children of HIV-1-infected mothers who were born at a teaching hospital in Bangkok. The ZDV prophylaxis regimens varied by time periods that included: (1) no ZDV (1991–1996); (2) antenatal oral ZDV, 250 mg given twice a day starting at 34 to 36 weeks gestation and continued until labor (1995–1998); (3) antenatal oral ZDV plus immediate neonatal oral ZDV, 6 mg/0.6 mL/dose started within the first 2 hours after birth and continued at 6-hour intervals for 4 to 6 weeks (1997–1998); and (4) intrapartum intravenous ZDV given in addition to regimen 3 (1998-1999). Neonatal ZDV was administered within 2 hours after birth in 95% of the neonates. RESULTS: In a cohort of 136 children born at least 9 months before the analysis date, the HIV-1 vertical infection rates were: (1) no ZDV, 11 of 48 (22.9%, 95% confidence interval [CI]=12.0–37.3); (2) late antenatal ZDV, 10 of 47 (21.3%, 95% CI=10.7–35.7); (3) late antenatal ZDV plus immediate neonatal oral ZDV, 0 of 28 (0%, 95% CI=0–12.3); (4) late antenatal, intrapartum intravenous ZDV, plus immediate neonatal ZDV, 0 of 13 (0%, 95% CI=0–24.7). An estimated 0% (95% CI=0–8.6) of the infants who received immediate neonatal ZDV with or without intrapartum ZDV were infected, as compared with 22.1% (95% CI=14.2–31.8 ) of those who received no ZDV or only late antenatal ZDV (P<0.001). CONCLUSIONS: The results of this study suggests high protective effect of immediate administration of neonatal ZDV. Perinatal components of antiretroviral prophylaxis provided the best results for protecting against vertical HIV-1 transmission.


Abstract: This study evaluated the success of a national program for the prevention of mother-to-child transmission (MTCT) of HIV-1 in 874 mother-infant pairs from Buenos Aires and
surroundings. This population was referred to the National Reference Center for AIDS for diagnosis of neonatal infection during 1993–2000. The data revealed an increase in the use of antiretroviral therapy during pregnancy from 3.2% in 1993–1994 to 73.1% in 1999–2000 and in the use of cesarean delivery (reaching 54.8% in 1999–2000). However, the proportion of HIV-infected women who continued to breast-feed their children remained steady (around 12%). General improvement of the conditions for decreasing MTCT resulted in a significant decrease in the proportion of infected infants from 37.3% before 1995 to 10.7% in 1999–2000 and even 6.5% during 2001. Data on the time of diagnosis indicated that only 42.7% of the women knew about their HIV status before pregnancy, 44.8 knew during pregnancy, and 12.3% knew after the birth of their child. The main risk factor for HIV infection in the mothers was heterosexual contact (73%), and in the fathers, it was injection drug use (67%). These results point out the urgent need to develop additional strategies for prevention of MTCT of HIV-1 to generalize education, counseling, and testing of young women.


Abstract: Vertical transmission of HIV infection can take place in utero, during delivery and postnatally through breastfeeding, with about three-quarters of infections occurring around the time of delivery in non-breastfeeding populations. In Europe, in the absence of specific interventions, the vertical transmission rate was 15–20%. High maternal load is the major risk factor for both intra-uterine and intra-partum mother-to-child transmission. Prematurity is the most common adverse neonatal outcome associated with maternal HIV infection. Earlier diagnosis of paediatric HIV infection than previously available is now possible with virological tests, particularly HIV DNA polymerase chain reaction. An estimated one fifth of infected children will have been diagnosed with AIDS or have died by 12 months of age, rising to a third by 6 years of age. Surgical and therapeutic interventions are effective in reducing vertical transmission risk, in addition to the avoidance of breastfeeding. Caesarean section delivery before labour and before rupture of membranes approximately halves the risk of transmission, while prophylactic zidovudine therapy according to the ACTG076 regimen reduces transmission by up to two-thirds, transmission is reduced even further with both interventions. Trials of short-course zidovudine regimens show their effectiveness in reducing vertical transmission, in breastfeeding and non-breastfeeding populations. Nevirapine has been shown to be significantly more effective than short course zidovudine regimens in breastfeeding populations, but is still under evaluation in non-breastfeeding populations additionally receiving routine anti-retroviral prophylaxis. Reports of a small number of serious adverse events in uninfected children exposed in utero or neonatally to antiretroviral therapy need further investigation. Trials of vitamin A supplementation to reduce vertical transmission have had negative results, while the effectiveness of vaginal lavage and passive immune therapy in reducing vertical transmission remains uncertain.

**Abstract:** Exclusive breast-feeding is unambiguously the optimal infant feeding practice and is universally promoted in the absence of human immunodeficiency virus (HIV-1). It is associated with reduced morbidity and mortality from diarrheal and respiratory diseases. Recent findings suggest that exclusive breast-feeding may pose less risk of HIV-1 transmission than the more common practice of mixed feeding (i.e., breast-feeding concurrent with the feeding of water, other fluids, and foods), which has important infant feeding policy implications for low-resource settings. This paper reviews the biologic mechanisms associated with exclusive breast-feeding that provide protection against gastrointestinal, respiratory, and atopic diseases, and evaluates the relevance of these mechanisms for HIV-1 transmission. Potential mechanisms include reduction in dietary antigens and enteric pathogens that may maintain integrity of the intestinal mucosal barrier and limit inflammatory responses of the gut mucosa; promotion of beneficial intestinal microflora that may increase resistance to infection and modulate the infant’s immune response; alteration in specific antiviral or anti-inflammatory factors in human milk that may modulate maternal hormonal or immunologic status; and maintenance of mammary epithelial integrity that may reduce viral load in breast milk.


**Abstract:** The aim of this study was to describe breastfeeding practices, as well as what pregnant women know about breastfeeding and mother-to-child transmission (MTCT) of HIV, and explore factors associated with exclusive breastfeeding, especially in the presence of HIV/AIDS. A cross-sectional interview survey of 500 pregnant women was conducted in the Kilimanjaro region, supplemented by focus group discussions with pregnant women. Among the 309 mothers having previously breastfed, 85% had initiated breastfeeding within the first few hours postpartum, and 18% of newborns received some prelacteal food. Mean duration of breast-feeding was 23.7 months, but 46% of mothers had introduced other fluids early. Knowledge of HIV-transmission through breastfeeding was not associated with breastfeeding practices. Married women (odds ratio [OR]=.09, 95% confidence interval [CI]=.04–.24) and those having knowledge of exclusive breastfeeding (OR=.08, 95% CI=.02–.31) were the least likely to end exclusive breastfeeding early. Exclusive breastfeeding is a rare practice, and MTCT of HIV may further complicate recommendations with regard to this practice.


**Abstract:** BACKGROUND: The correlation between the presence of HIV-1 in maternal cervicovaginal secretions and in the infant’s oro-pharyngeal secretions at birth, and mother-to-child HIV transmission (MTCT) were examined to obtain a better understanding of its mechanism. METHODS: Women without medical and obstetrical complications, living within a reasonable distance of the government hospital in Mombasa, Kenya, were recruited after informed consent. Maternal and infant characteristics were collected. Polymerase chain reaction
was used to detect HIV-1 in cervico-vaginal and oro-pharyngal secretions. Infants were tested for HIV-1 by polymerase chain reaction within 48 h and at 6 weeks after delivery. RESULTS: Between April 1998 and April 1999, 228 woman-infant pairs were included in the study. HIV-1 DNA in cervico-vaginal secretions was independently associated with HIV-1 maternal viral load and with infant birth-weight, whereas HIV-1 RNA was associated with maternal viral load and maternal age. HIV-1 DNA in the oropharyngal secretions was also independently associated with maternal viral load. MTCT rate at the age of 6 weeks was 23.6%. Intrapartum and early postpartum HIV transmission was independently associated with maternal viral load [adjusted odds ratio (OR), 1.6; 95% confidence interval (CI), 1.0–2.7], detection of HIV-1 RNA in cervico-vaginal secretions (adjusted OR, 3.2; 95% CI, 1.5–7.3) and of HIV-1 DNA in oro-pharyngeal secretions (adjusted OR, 3.2; 95% CI, 1.1–9.0). DISCUSSION: As far as is known, this is the first study showing that infant exposure to HIV-1 in the birth canal and the presence of HIV-infected cells in the infant’s oropharyngeal cavity are independently associated with intrapartum and early postpartum MTCT. It supports the hypothesis that MTCT could occur through the oral route.


Abstract: There is vigorous controversy around whether HIV-infected women in developing countries should choose formula or breastfeeding for their infants. Formula eliminates HIV transmission but incurs risk of increased mortality, whereas breastfeeding has multiple benefits but entails risk of HIV transmission. International guidelines are available but need to be strengthened. This commentary summarizes data on the scale and rate of mother-to-child transmission (MTCT) of HIV through breastfeeding, and the hazards and benefits of breast- and formula-feeding. The case against providing free or subsidized formula to HIV-infected mothers is based on the following: it exacerbates disadvantages of formula feeding; compromises free choice; targets beneficiaries erroneously; creates a false perception of endorsement by health workers; compromises breastfeeding; results in disclosure of HIV status; ignores hidden costs of preparation of formula; increases mixed breastfeeding, which is an unsatisfactory method for all women; requires organization and management of programmes that are complicated and costly; and finally increases the ‘spill-over’ effect into the normal breastfeeding population. Recommendations to minimize these drawbacks include use of affordable antiretrovirals to reduce MTCT; investments in high-quality, widely available HIV counselling; support for choice of feeding; and exclusive breastfeeding for those who choose to breastfeed.


Abstract: In areas of the world where genital tract infections (GTIs) are common, the prevalence of HIV and the rate of mother-to-child transmission (MTCT) of HIV are also high. Although observational studies suggested that GTIs are associated with MTCT of HIV, no controlled clinical trial has confirmed this finding. It is likely that GTIs that cause either discharges or ulcers during pregnancy increase perinatal transmission of HIV. Several potential
biological mechanisms might facilitate perinatal transmission. For example, chorioamnionitis, increased viral shedding in cervicovaginal secretions, increased HIV acquisition during pregnancy, inflammatory cytokine production, preterm labor, prolonged rupture of membranes, ascending infection, and increased intrapartum infectious secretions are factors that can be associated with GTIs. Several studies have shown that treating clinical conditions associated with inflammation might alter HIV shedding. It is conceivable that preventing ascending infection or reducing exposure of the infant to infectious material during birth could reduce MTCT. This can possibly be achieved by antimicrobial therapy during pregnancy and intrapartum. Such an approach is practical, is less expensive, and has secondary benefits related to prevention of adverse pregnancy outcomes associated with GTIs. Antibiotics might also complement reductions in MTCT of HIV obtained by antiretrovirals given to the mother around the time of delivery. In addition, antibiotics could reduce infectious causes of morbidity and mortality in infant and mother.


Abstract:
Guidelines for Decision Makers
A Guide for Health Care Managers and Supervisors
A Review of HIV Transmission Through Breastfeeding

This set of three manuals offers the latest expert advice, from WHO, UNICEF, and UNAIDS, on recommended safe practices for infant feeding when the mother is infected with HIV. Citing firm evidence that HIV can be transmitted through breast milk, the manuals respond to the urgent need for guidance when advising infected mothers as well as formulating sound public health policies. With this need in mind, the manuals identify the wide range of precautions and policy options needed to reduce the risk of HIV transmission through breast milk while ensuring that the nutritional requirements of infants born to HIV-infected mothers are adequately met.

Although recommendations and advice have universal relevance, particular attention is given to options for infant feeding in resource-poor settings where infectious diseases and malnutrition are the leading causes of infant mortality and where artificial feeding may be hazardous as well as prohibitively expensive. The manuals also offer abundant advice on ways of ensuring that breast-milk substitutes reach only those infants who are at risk of HIV infection and thus do not undermine the unique advantages of breastfeeding for the majority of women and infants. Other key messages include the vital importance of confidential counselling, the right of every mother to decide how she wishes to feed her child, and the need to protect infected mothers from stigmatization and discrimination.

Available at: http://www.who.int/dsa/cat98/aids8.htm#HIV and Infant Feeding

1998, available as a set of three manuals [E]
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**Abstract:** The discovery of the human immunodeficiency virus (HIV) in breastmilk in 1985, and subsequent research, supports the hypothesis that breastfeeding provides a route of transmission to the nursing baby. Various routes of infection and relative rates of transmission have been studied in many parts of the world, leading to the blanket guideline that babies of HIV-infected mothers should not be breastfed, if a safe alternative can be provided. However, due to the limits inherent in various studies and various testing methods, the exact frequency of breastmilk transmission of HIV during the course of lactation remains unknown, and the conclusions drawn are thus conflicting and confusing. Replacement feeding of young babies with non-human milks and other foods may be hazardous in poverty-stricken populations in Africa and elsewhere, and still more research suggests that there are several properties in human milk that may provide specific protection to the baby of an infected mother. The possibility of providing the mother’s own treated expressed breastmilk to the baby at risk of HIV infection via breastfeeding is an alternative which has yet to be fully explored and ways that this could be accomplished are examined. Those of us working with mothers and babies need more information before we can assist mothers living with HIV to make truly informed decisions about the safest way to feed their babies. Topics requiring urgent further attention are outlined.


**Abstract:** It is estimated that approximately 6000 women of childbearing age, mostly living in the developing world, acquire HIV infection every day. Taking into account that approximately 98% of HIV infected children have acquired HIV from the mother, during pregnancy, at delivery or through breastfeeding, therefore, prevention of mother-to-child transmission (MTCT) is a major health priority. Several studies have showed how MTCT of HIV may be prevented using antiretrovirals. Results from a study conducted in Thailand have also recently showed how a short oral zidovudine course during pregnancy and labor may reduce the risk of HIV transmission by approximately 50%. These findings represent a major challenge for the International Health Agencies and Organizations that will have the major obligation to provide HIV tests, counseling and antiviral drugs in settings with high HIV prevalence.


**Abstract:** BACKGROUND: Between 25 and 44% of mother-to-child transmission (MTCT) of the human immunodeficiency virus (HIV) occurs through breastfeeding. As a result, feeding guidelines for infants of HIV-infected mothers are being formulated in many resource-poor countries. The impact of introducing these guidelines on mothers’ actual feeding practices has not previously been examined. Infant-feeding practices of mothers of known HIV status who should have received advice during pre- and post-test HIV counselling were assessed and compared with those of uninfected mothers. METHODS: Mothers of infants aged 2–12 months,
55 HIV-infected and 85 HIV-uninfected, were recruited from the HIV Family Support Unit in Lusaka, Zambia. HIV status was known to 121 of these mothers, who had all received pre- and post-test HIV counselling. Feeding practices were determined by verbal questionnaire.

RESULTS: All mothers breastfed but only 35% of infants below 4 months were exclusively breastfed (received breast milk only). HIV-infected mothers introduced fluids and weaned their infants significantly earlier than HIV-uninfected mothers (p=0.03 and p=0.002, respectively). Infants of HIV-infected mothers had significantly lower weight for age Z (WAZ) scores indicating poorer nutritional or health status (p=0.004). Commercial formula milk and cow’s milk were used by 36 mothers as breast milk substitutes, and were introduced at a median age of 2.5 months. Thirteen mothers gave cow’s milk, and no mother added water to cow’s milk (as recommended), with two adding sugar and four adding salt. CONCLUSION: Infant-feeding practices of HIV-infected mothers differed significantly from HIV-uninfected mothers, and this may contribute to their poorer growth. Paradoxically these mothers feeding practice could be putting these infants at greater risk of both non-HIV-related morbidity and HIV transmission, as early introduction of foods other than breast milk may increase MTCT.


Abstract: Although vertical transmission of HIV-1 can occur through breast-feeding, little is known about the effect of colostrum, duration of breast-feeding, mixing feeding, and nipple pathology. We used retrospective cohort data to examine the association between breast-feeding-related factors and transmission of HIV-1 from mother to child in Sao Paulo State, Brazil. Information on maternal and postnatal factors was collected by medical record review and interview. Infection status was determined for 434 children by anti-HIV-1 tests performed beyond 18 months of age or diagnosis of AIDS at any age. Among 168 breast-fed children, the risk of transmission of HIV-1 was 21%, compared with 13% (p=.01) among 264 children artificially fed. Breast-feeding was independently and significantly associated with mother-to-child transmission of HIV-1 after controlling for stage of maternal HIV-1 disease (odds ratio [OR]=2.2; 95% confidence interval [CI], 1.3–3.8). A trend was shown toward an increased risk of transmission with longer duration of breast-feeding, a history of bleeding nipples, and introduction of other liquid food before weaning, but these associations were not statistically significant. History of colostrum intake or cracked nipples without bleeding were not associated with transmission. Most of the women who breast-fed were unaware of their HIV-1 infection status at the time of delivery. Avoidance of mixed feeding and withholding of breast-feeding in the presence of bleeding nipples should be considered in further research as strategies to reduce postnatal transmission of HIV-1 in settings in which safe and sustainable alternatives for breast-feeding are not yet available.

Abstract: BACKGROUND: The observation that mother-to-child transmission of HIV-1 can occur through breastfeeding has resulted in policies that recommend avoidance of breastfeeding by HIV-1-infected women in the developed world and under specific circumstances in developing countries. We compared transmission rates in exclusively breastfed, mixed-fed, and formula-fed (never breastfed) infants to assess whether the pattern of breastfeeding is a critical determinant of early mother-to-child transmission of HIV-1. METHODS: We prospectively assessed infant-feeding practices of 549 HIV-1-infected women who were part of a vitamin A intervention trial in Durban, South Africa. The proportions of HIV-1-infected infants at 3 months (estimated by use of Kaplan-Meier life tables) were compared in the three different feeding groups. HIV-1 infection was defined by a positive RNA-PCR test. FINDINGS: At 3 months, 18.8% (95% CI 12.6–24.9) of 156 never-breastfed children were estimated to be HIV-1 infected compared with 21.3% (17.2–25.5) of 393 breastfed children (p=0.5). The estimated proportion (Kaplan-Meier) of infants HIV-1 infected by 3 months was significantly lower for those exclusively breastfed to 3 months than in those who received mixed feeding before 3 months (14.6% [7.7–21.4] vs 24.1% [19.0–29.2], p=0.03). After adjustment for potential confounders (maternal CD4-cell/CD8-cell ratio, syphilis screening test results, and preterm delivery), exclusive breastfeeding carried a significantly lower risk of HIV-1 transmission than mixed feeding (hazard ratio 0.52 [0.28–0.98]) and a similar risk to no breastfeeding (0.85 [0.51–1.42]). INTERPRETATIONS: Our findings have important implications for prevention of HIV-1 infection and infant-feeding policies in developing countries and further research is essential. In the meantime, breastfeeding policies for HIV-1-infected women require urgent review. If our findings are confirmed, exclusive breastfeeding may offer HIV-1-infected women in developing countries an affordable, culturally acceptable, and effective means of reducing mother-to-child transmission of HIV-1 while maintaining the overwhelming benefits of breastfeeding.

Brocklehurst, P. 2002. Interventions aimed at decreasing the risk of mother-to-child transmission of HIV infection.

Abstract: At the end of 1998 over 33 million people were infected with the human immunodeficiency virus (HIV) and over one million children had been infected from their mothers. The objective of this review was to assess what interventions may be effective in decreasing the risk of mother-to-child transmission of HIV infection as well as their effect on neonatal and maternal mortality and morbidity. The Cochrane Pregnancy and Childbirth Group trials register and the Cochrane Controlled Trials Register were searched. Randomised trials comparing any intervention aimed at decreasing the risk of mother-to-child transmission of HIV infection compared with placebo or no treatment, or any two or more interventions aimed at decreasing the risk of mother-to-child transmission of HIV infection. Trial quality assessments and data extraction were undertaken by the reviewer.
Main results:

**Zidovudine**—Four trials comparing zidovudine with placebo involving 1585 participants were included. Compared with placebo, there was a significant reduction in the risk of mother-to-child transmission with any zidovudine (relative risk (RR) 0.54, 95% confidence interval (CI) 0.42–0.69). There is no evidence that ‘long course therapy’ is superior to ‘short course therapy’.

**Nevirapine**—One trial compared intrapartum and postnatal nevirapine with intrapartum and postnatal zidovudine in 626 women, the majority of whom breast fed their infants. Compared with zidovudine, there was a significant reduction in the risk of mother-to-child transmission of HIV with nevirapine (RR 0.58, 95% CI 0.40–0.83). No trials are available comparing nevirapine with placebo.

**Caesarean section**—One trial comparing elective caesarean section with anticipation of vaginal delivery involving 436 participants was included. Compared with vaginal delivery, there was a significant reduction in the risk of mother-to-child transmission of HIV infection with caesarean section (RR 0.17, 95% CI 0.05–0.55).

**Immunoglobulin**—One trial comparing hyperimmune immunoglobulin plus zidovudine with non-specific immunoglobulin plus zidovudine involving 501 participants was included. The addition of hyperimmune immunoglobulin to zidovudine does not appear to have any additional effect on the risk of mother-to-child transmission (RR 0.67, 95% CI 0.29–1.55).

Reviewers’ conclusions: Zidovudine, nevirapine and delivery by elective caesarean section appear to be very effective in decreasing the risk of mother-to-child transmission of HIV infection.


**Abstract:** BACKGROUND: The AIDS Clinical Trials Group protocol 076 zidovudine prophylaxis regimen for HIV-1-infected pregnant women and their babies has been associated with a significant decrease in vertical HIV-1 transmission in non-breastfeeding women in developed countries. We compared the safety and efficacy of short-course nevirapine or zidovudine during labour and the first week of life. METHODS: From November, 1997, to April, 1999, we enrolled 626 HIV-1-infected pregnant women at Mulago Hospital in Kampala, Uganda. We randomly assigned mothers nevirapine 200 mg orally at onset of labour and 2 mg/kg to babies within 72 h of birth, or zidovudine 600 mg orally to the mother at onset of labour and 300 mg every 3 h until delivery, and 4 mg/kg orally twice daily to babies for 7 days after birth. We tested babies for HIV-1 infection at birth, 6–8 weeks, and 14–16 weeks by HIV-1 RNA PCR. We assessed HIV-1 transmission and HIV-1-free survival with Kaplan-Meier analysis. FINDINGS: Nearly all babies (98.8%) were breastfed, and 95.6% were still breastfeeding at age 14–16 weeks. The estimated risks of HIV-1 transmission in the zidovudine and nevirapine groups were: 10.4% and 8.2% at birth (p=0.354); 21.3% and 11.9% by age 6–8 weeks (p=0.0027); and 25.1% and 13.1% by age...
14–16 weeks (p=0.0006). The efficacy of nevirapine compared with zidovudine was 47% (95% CI 20–64) up to age 14–16 weeks. The two regimens were well tolerated and adverse events were similar in the two groups. INTERPRETATION: Nevirapine lowered the risk of HIV-1 transmission during the first 14–16 weeks of life by nearly 50% in a breastfeeding population. This simple and inexpensive regimen could decrease mother-to-child HIV-1 transmission in less-developed countries.


Abstract: A pilot clinical trial to assess the efficacy of intrapartum zidovudine (ZDV) infusion alone in the reduction of maternal viral load and its potential role in preventing vertical transmission of HIV-1. Twenty six, asymptomatic antiretroviral naive HIV-1 infected pregnant women who had no prior antenatal care and were in labor were enrolled. Each patient received ZDV infusion at the rate of 2 mg/kg within the first hour. ZDV was then continuously infused at 1 mg/kg/h until delivery. Maternal plasma HIV-1 RNA prior to the commencement of ZDV infusion and within an hour after delivery were measured. HIV-1 transmission was documented by nested polymerase chain reaction in infants at six months of age. Median maternal plasma HIV-1 RNA prior to the ZDV infusion and after delivery was 29,401 and 32,555 copies/ml respectively, (p>0.05). The estimated HIV-1 transmission rate was 19.2 per cent (95% CI=4–34). This result suggested that in asymptomatic HIV-1 infected pregnant women who were antiretroviral naive and had no prior antenatal care, intrapartum ZDV infusion alone failed to reduce maternal HIV-1 viremia and the transmission rate of HIV-1.


Abstract: Mastitis, an inflammation in the breast, has recently been linked with higher human immunodeficiency virus (HIV) load in breast milk and higher risk of mother-to-child transmission of HIV. Among 334 HIV-infected women in Malawi who were breastfeeding, the prevalence of mastitis, as indicated by elevated breast milk sodium, was 16.4% at six weeks and 2.8% at six
months postpartum. Mastitis is associated with significantly higher concentrations of immunological and inflammatory mediators in breast milk, including lactoferrin, lysozyme, secretory leukocyte protease inhibitor, interleukin-8, and RANTES. Mastitis is potentially preventable by improving micronutrient status of breastfeeding women and can be treated with antibiotics and clinical management. These studies in Malawi suggest that mastitis may contribute to transmission of HIV through breast milk.


Abstract: As part of a continuing strategy to prevent and contain the spread of HIV infection, the Ministry of Honduras (MOH) has been working to develop an integrated package of interventions to reduce mother-to-child transmission. This package includes the promotion and availability of voluntary HIV testing and counseling (VCT) for all pregnant women, anti retroviral therapy (ARV) during pregnancy, and the provision of infant formula post-partum. This package will be field tested as a pilot project in the cities of Tegucigalpa and San Pedro Sula beginning at the end of this year.

*Honduras, June 8–12, 1998*


Abstract: OBJECTIVE: To determine the risk of HIV transmission by infant feeding modality. DESIGN AND SETTING: A prospective study in two hospitals in Durban, South Africa. PARTICIPANTS: A total of 551 HIV-infected pregnant women enrolled in a randomized trial of vitamin A. INTERVENTIONS: Women self-selected to breastfeed or formula feed after being counselled. Breastfeeders were encouraged to practice exclusive breastfeeding for 3–6 months. MAIN OUTCOME MEASURES: Cumulative probabilities of detecting HIV over time were estimated using Kaplan-Meier methods and were compared in three groups: 157 formula-fed (never breastfed); 118 exclusively breastfed for 3 months or more; and 276 mixed breastfed. RESULTS: The three feeding groups did not differ in any risk factors for transmission, and the probability of detecting HIV at birth was similar. Cumulative probabilities of HIV detection remained similar among never and exclusive breastfeeders up to 6 months: 0.194 (95% CI 0.136–0.260) and 0.194 (95% CI 0.125–0.274), respectively, whereas the probabilities among mixed breastfeeders soon surpassed both groups reaching 0.261 (95% CI 0.205–0.319) by 6 months. By 15 months, the cumulative probability of HIV infection remained lower among those who exclusively breastfed for 3 months or more than among other breastfeeders (0.247 versus 0.359). CONCLUSION: Infants exclusively breastfed for 3 months or more had no excess risk of HIV infection over 6 months than those never breastfed. These findings, if confirmed elsewhere, can influence public health policies on feeding choices available to HIV-infected mothers in developing countries.

Abstract: CONTEXT: Breastfeeding among women infected with human immunodeficiency virus type 1 (HIV-1) is associated with substantial risk of HIV-1 transmission, but little is known about the morbidity risks associated with formula feeding in infants of HIV-1-infected women in resource-poor settings. OBJECTIVE: To compare morbidity, nutritional status, mortality adjusted for HIV-1 status, and cause of death among formula-fed and breastfed infants of HIV-1-infected women. DESIGN: Randomized clinical trial conducted between 1992 and 1998. SETTING: Four antenatal clinics in Nairobi, Kenya. PARTICIPANTS: Of 401 live-born, singleton, or first-born twin infants of randomized HIV-1-seropositive mothers, 371 were included in the analysis of morbidity and mortality. INTERVENTIONS: Mothers were randomly assigned either to use formula (n=186) or to breastfeed (n=185) their infants. MAIN OUTCOME MEASURES: Mortality rates, adjusted for HIV-1 infection status; morbidity; and nutritional status during the first 2 years of life. RESULTS: Two-year estimated mortality rates among infants were similar in the formula-feeding and breastfeeding arms (20.0% vs 24.4%; hazard ratio [HR], 0.8; 95% confidence interval [CI], 0.5–1.3), even after adjusting for HIV-1 infection status (HR, 1.1; 95% CI, 0.7–1.7). Infection with HIV-1 was associated with a 9.0-fold increased mortality risk (95% CI, 5.3–15.3). The incidence of diarrhea during the 2 years of follow-up was similar in formula and breastfeeding arms (155 vs 149 per 100 person-years, respectively). The incidence of pneumonia was identical in the 2 groups (62 per 100 person-years), and there were no significant differences in incidence of other recorded illnesses. Infants in the breastfeeding arm tended to have better nutritional status, significantly so during the first 6 months of life. CONCLUSIONS: In this randomized clinical trial, infants assigned to be formula fed or breastfed had similar mortality rates and incidence of diarrhea and pneumonia during the first 2 years of life. However, HIV-1-free survival at 2 years was significantly higher in the formula arm. With appropriate education and access to clean water, formula feeding can be a safe alternative to breastfeeding for infants of HIV-1-infected mothers in a resource-poor setting.


2001. “MTCT programs work in a variety of ways. UNAIDS, others working to help pregnant women,” Aids Alert., vol. 16, no. 11, pp. 144–5, 137.

Abstract: While mother-to-child transmission (MTCT) of HIV has been reduced to very small numbers in the United States and Europe, there still are more than 1,600 children infected with HIV each day, mostly in sub-Saharan Africa. Besides free drug programs to prevent MTCT, there have been efforts made by UNAIDS of Geneva, Switzerland, the Elizabeth Glaser Pediatric AIDS Foundation in Washington, DC, and others to combat this problem.

**Abstract:** OBJECTIVE: To estimate the cost and cost effectiveness nationally and for each province of a programme to reduce mother-to-child transmission (MTCT) of HIV in South Africa. METHODS: A model developed to estimate cost and cost effectiveness of interventions in Hlabisa, KwaZulu-Natal, was modified and applied to each province. This model predicts a 37% reduction in paediatric HIV infections if short-course oral zidovudine (ZDV) plus infant formula feed for 4 months is provided within a strengthened health system. Estimates of the number of pregnancies and HIV prevalence among pregnant women per province in 1997 were combined with an estimated 30% MTCT rate. Costs were calculated from a health system perspective, and effectiveness was estimated as cost per infection averted and cost per disability-adjusted life year (DALY) gained. RESULTS: In 1997, 63,397 paediatric HIV infections were estimated to have occurred in South Africa, mainly in KwaZulu-Natal (18,513, 29%) and Gauteng (10,417, 16%). The cost of a national programme is estimated at R155.9 million (1997 rand costs, 0.94% of the national health budget). Major cost items are drugs (R46.4m, 30%), staff salaries (R45.8m, 29%), and formula feed (R37.1m, 24%). Most money would need to be spent in KwaZulu-Natal (R37.6m, 24% of national cost), Gauteng (R25.2m, 16%) and the Eastern Cape (R24m, 15%). National cost per infection averted is R6,724, and R213 per DALY gained. Provincial DALY costs range from R176 to R369. CONCLUSIONS: A national programme preventing 37% of expected paediatric HIV infections would cost a small fraction of the national health budget, at a cost equivalent to R3.89 per capita total population. The cost per DALY gained compares well with established public health and clinical interventions in middle-income countries, even without factoring in the care costs that would be saved through a successful programme. Cost effectiveness is greatest where HIV prevalence is highest.
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UNAIDS. 2002. Nevirapine donation for prevention of mother-to-child transmission of HIV.


Abstract: On behalf of the Inter-Agency Task Team on MTCT, WHO’s Department of Reproductive Health and Research, in collaboration with the HIV/STI Initiative and the Department of Child and Adolescent Health, convened a Technical Consultation on new data on the prevention of MTCT and their policy implications. The objective was to review recent scientific data and update current recommendations on the provision of ARVs and infant feeding counseling. The Technical Consultation focused on these two components, although it was recognized that many other components are important for a comprehensive package for MTCT-prevention.


Abstract: Mother-to-child transmission (MTCT) of HIV is the most significant source of HIV infection in children below the age of 10 years. The strategy recommended by the United Nations agencies to prevent mother-to-child transmission of HIV includes: (1) the primary prevention of HIV infection among parents to be, (2) the prevention of unwanted pregnancies in HIV-infected women, and (3) the prevention of HIV transmission from HIV-infected women to their infants. While the best ways to prevent HIV infection in infants remain primary prevention of HIV infection and reduction of unwanted pregnancies among women who are infected with HIV, many HIV-infected women become pregnant. In 1994 a long and complex regimen of the antiretroviral drug Zidovudine (ZDV) taken 5 times daily from the 14th week of pregnancy and intravenously during labour was shown to reduce the risk of transmission from mother to child by two-thirds, from 26% to 8%. This regimen had little practical value in developing countries and more appropriate short course ZDV regimens starting later in pregnancy were evaluated and also shown to be effective. Other interventions shown to prevent transmission of HIV include
elective caesarean section and the avoidance of breastfeeding. While these interventions have become standard practice in developed countries, they are not always practical or safe in resource-limited settings.


Abstract: BACKGROUND: As HIV spreads through many countries in Asia and the Pacific, women of reproductive age are becoming infected and we can expect increasing numbers of infants to be infected. Rapid advances in knowledge about mother to child transmission (MTCT), new findings from intervention studies, recognition of complex ethical implications, and changing attitudes and behaviours combine to create uncertainty for policy makers. OBJECTIVE: Policy makers need sound advice but MTCT and its prevention are complicated topics. We aim to provide an overview of MTCT of HIV and suggest some key points to consider in the allocation of resources. STUDY DESIGN: This is a policy analysis based on review of the literature, consultation with policy makers and researchers, and observations in the context of projects in developing countries. RESULTS: The risk of MTCT is between 15 and 40%, but the use of antiretroviral prophylaxis, elective caesarean section, and replacement of breastfeeding can reduce this to less than 4%. But most infected women in developing countries are unaware that they are HIV-infected and do not yet have access to these 'test-dependent' interventions (interventions based on testing for HIV infection). Population-based strategies that address known influences on the risk of MTCT can be implemented with benefits for the health of both men and women. The test-dependent interventions can have adverse effects as well as benefits, careful preparation is necessary before they are introduced in resource poor settings. The public health impact of test-dependent interventions is limited by difficulties in achieving wide coverage and because they miss women who become infected late in pregnancy or during lactation who have the highest risk of MTCT. CONCLUSIONS: We argue for a broad response to the problems raised by MTCT of HIV that includes gathering information to inform the introduction of strategies that do not depend on testing for HIV infection as well as the test-dependent interventions, community education that reaches men as well as women; strengthening of reproductive health services; and mobilising communities to care for infected women, their families, and orphans.

**Abstract:** It is estimated that each HIV-positive child in South Africa costs the government more in terms of health and welfare expenses than it does to reduce mother-to-child transmission (MTCT) of HIV through the use of antiretroviral regimens (where the mother continues to breastfeed). Programmes to reduce MTCT of HIV/AIDS are, thus, clearly affordable. Using Nevirapine (according to the HIVNET 012 Protocol) saves fewer lives, but is more cost-effective than using Zidovudine (CDC 2 weeks regime).


**Abstract:** HIV-1 infection is one of the leading causes of childhood morbidity and mortality globally and mother-to-child transmission (MTCT) is the major mode of infection. Over the past decade, natural history and interventional studies have improved our understanding of the pathogenesis of MTCT and pediatric HIV-1 infection. This has resulted in the development of effective preventive strategies to reduce new infections and therapeutic strategies to improve outcome following infection. However, successful implementation of these preventive and therapeutic strategies has been limited in resource-poor settings, where the majority of new pediatric infections occur. In addition, toxicities and antiretroviral resistance may limit the long-term utility of currently available strategies. Continued efforts to understand MTCT and pediatric HIV-1 pathogenesis and to refine preventive and therapeutic strategies are of high priority.


**Abstract:** BACKGROUND: Perinatal transmission of human immunodeficiency virus (HIV) type 1 contributes significantly to infant mortality. Exposure in the birth canal may account for some transmission. We examined the efficacy of a birth canal washing procedure in reducing perinatal transmission in Malawi. METHODS: The infection status of infants of 3327 control women (conventional delivery procedures) was compared with that of 3637 infants of intervention-delivered women. The infants’ HIV status was determined by polymerase chain reaction on dried blood spots collected at 6 and 12 weeks of age. The intervention consisted of manual cleansing of the birth canal with a cotton pad soaked in 0.25% chlorhexidine, which was done on admission in labour and every 4 h until delivery. FINDINGS: No adverse reactions to the intervention procedure were seen. 2094 (30%) of the enrolled women were HIV-infected, and 59% of their infants were seen in follow-up. Among 982 vaginal vertex singleton deliveries to HIV-infected women, 269 (27%) infants were infected. The intervention had no significant impact on HIV transmission rates (27% in 505 intervention women compared with 28% in 477 control women), except when membranes were ruptured more than 4 h before delivery (transmission
25% in the intervention group vs 39% in the control group). INTERPRETATION: If birth canal exposure is an important risk factor, different or additional methods to reduce the risk of perinatal HIV transmission should be tested. Alternatively, perhaps birth canal exposure is not a major contributor to perinatal infection risk.


Abstract: The effect of placental membrane inflammation on mother-to-child transmission (MTCT) of HIV-1 is reported. Placentas from HIV-1-infected women were examined as part of a perinatal HIV-1 project in Mombasa, Kenya. Polymerase chain reaction analysis was used to test for HIV-1 in the infants at birth and at 6 weeks. The maternal HIV-1 seroprevalence was 13.3% (298 of 2,235). The overall rate of MTCT of HIV-1 was 25.4%; polymerase chain reaction analysis revealed that of the 201 infants 6.0% (12) were already HIV-1-positive at birth (intrauterine transmission) and 19.4% (39) were infected during the peripartum period or in early neonatal life (perinatal transmission). The prevalence of acute chorioamnionitis was 8.8%, that of deciduitis was 10.8%, and that of villitis was 1.6%. Acute chorioamnionitis was independently associated with peripartum HIV-1 transmission but not with in utero MTCT (17.9% vs. 6.7%, respectively; adjusted odds ratio, 3.9; 95% confidence interval, 1.2–12.5; p=.025). Other correlates of perinatal MTCT were presence of HIV in the genital tract and in the baby’s oral cavity and a high maternal viral load in peripheral blood. The adjusted population attributable fraction of 12.8% (95% confidence interval, 1.5%–22.8%) indicated that approximately 3% of MTCT could be prevented if acute chorioamnionitis was eliminated. We suggest that further research on the role of antimicrobial treatment in the prevention of chorioamnionitis and the reduction of peripartum MTCT needs to be performed.


Abstract: OBJECTIVES: Various approaches to preventing mother-to-child transmission (MTCT) of HIV have recently been, or are being, evaluated in developing countries, especially in Africa. New findings from these trials are now becoming available, the implications of which, for population-based intervention programmes, need urgent consideration. METHOD: A critical review of 18 randomized trials and other relevant studies from developing and industrialized countries. RESULTS: Most African results relate to trials of antiretroviral agents (ARV). They demonstrate efficacy in reducing transmission in the first 6 months of life with short regimens of zidovudine (ZDV), with or without lamivudine (3TC), and nevirapine (NVP) alone. Preliminary results suggest the long-term efficacy of zidovudine. Antiseptic and nutritional interventions have been shown to reduce maternal and infant mortality and morbidity but not MTCT of HIV. HIV
confidential voluntary counselling and testing for pregnant women, a short regimen of peripartum ARV with alternatives to breastfeeding such as early weaning or breast milk substitutes from birth currently represent the best option to reduce MTCT of HIV in Africa. However, the prevention of postnatal transmission requires further research, particularly in view of the consequences of different feeding options and the possibility of post-perinatal exposure prophylaxis of newborns with ARV. Issues relating to the implementation of currently validated strategies are discussed.


Abstract: The HIV pandemic has greatly affected women of childbearing age in developing countries and, thus, their offspring, through mother-to-child transmission (MTCT) of the virus. Scientific advances, most of them established by randomized clinical trials, have recently led to the development of practical strategies aiming to reduce the public health burden of MTCT of HIV. These advances came first in non-breast-feeding populations, for example, in Thailand and, more recently, in African populations, where breast-feeding remains the predominant mode of infant feeding. This article reviews major accomplishments in this area, outlines practical issues for program implementation, and suggests future research needs. Short-course zidovudine and short-course nevirapine in the peripartum period currently represent 2 valid options to reduce MTCT of HIV in developing countries if appropriate prenatal, obstetrical, and postnatal care is provided and if alternatives to breast-feeding are considered according to the local situation and the mother’s individual decision.


Abstract: African women of childbearing age are particularly vulnerable to HIV infection, and this has led to an increase in the number of pediatric HIV infections reported due to the risk of mother-to-child transmission (MTCT) of HIV during pregnancy, delivery and breastfeeding. Various approaches to preventing MTCT have been, or are being, evaluated in developing countries, especially in Africa. New data from these trials are becoming available and have implications for population-based intervention programs that require urgent consideration. We performed a critical review of 18 randomized trials and other relevant studies from developing and industrialized countries, to assess public health perspectives and to identify new research issues. Most African results relate to trials of antiretroviral drugs (ARVs) given to mothers during the last month of pregnancy, and for up to one week after delivery, and to the neonate during the first week of life, or simpler and shorter regimens. They indicate that zidovudine treatment, with or without lamivudine, and nevirapine treatment given alone, reduce transmission during the first six months of life by 30% to 50%. Preliminary results suggest that zidovudine treatment is effective in the long term. One randomized study showed that the replacement of breast feeding with breast milk substitutes was effective at reducing the overall risk of MTCT. Antiseptic disinfection and micronutrient supplementation have been shown to reduce maternal and infant mortality and morbidity, but not the MTCT of HIV. Voluntary, confidential HIV counseling and testing for pregnant women, a short course of peripartum ARVs and alternatives to breast
feeding such as early weaning and breast milk substitutes from birth, are currently the best means of reducing the MTCT of HIV in Africa. Pilot programs based on these findings are currently being implemented in several African countries. Prevention of the MTCT of HIV should also be considered as part of the wider management of maternal and infant health during prenatal, delivery and postnatal care. Several complementary issues require further investigation. Some results, such as the long-term efficacy of a short course of ARVs once the mother has finished breast feeding, and the long-term safety of these treatments, require confirmation. Further studies are required into the prevention of postnatal transmission, particularly in light of the unknown consequences of different feeding options and the possibility of post-perinatal prophylaxis with ARVs. The reduction of MTCT of HIV in Africa is a true challenge in efforts to control the HIV pandemic, but recent progress in the identification of effective treatments provides some hope. Large-scale implementation of these new treatments is required, and should provide practical information and perhaps identify more potent, and possibly cheaper, strategies.


Abstract: OBJECTIVES: Different approaches to prevent mother-to-child transmission of HIV are being evaluated in developing countries. The first trials using a short regimen of zidovudine have been successful in Thailand, Cote d’Ivoire and Burkina Faso. International and local strategies are now being considered. The Ghent International Working Group on Mother-to-Child Transmission of HIV developed public health policy options to integrate these interventions into basic and maternal and child health (MCH) services. METHODS: The following tasks were undertaken: a critical review of randomized trials; an international pooled analysis of late postnatal transmission of HIV through breastfeeding; a review of the cost-effectiveness and cost-benefit of antiretroviral prophylaxis; a feasibility assessment of preventive strategies, including a postal survey on HIV voluntary counselling and testing (VCT) of pregnant women; the identification of requirements and research priorities for prenatal, obstetric and paediatric care. These projects provided the background for a three-day workshop in Ghent, Belgium, in November 1997. Conclusions were further refined, based on 1998 research findings. RESULTS: A summary of relevant evidence and ten public health recommendations are reported. VCT for pregnant women, a short regimen of zidovudine together with alternatives to breastfeeding currently represent the best option to reduce vertical transmission in most developing countries. The primary goal of the integrated package supporting these interventions is to alleviate overall maternal and infant morbidity and mortality. CONCLUSION: Prevention of mother-to-child transmission of HIV should now be considered for integration into basic health and MCH services of selected countries, with the involvement of governments and donor agencies.

Abstract: Each year, an estimated 590,000 infants acquire human immunodeficiency virus type 1 (HIV) infection from their mothers, mostly in developing countries that are unable to implement interventions now standard in the industrialized world. In resource-poor settings, the HIV pandemic has eroded hard-won gains in infant and child survival. Recent clinical trial results from international settings suggest that short-course antiretroviral regimens could significantly reduce perinatal HIV transmission worldwide if research findings could be translated into practice. This article reviews current knowledge of mother-to-child HIV transmission in developing countries, summarizes key findings from the trials, outlines future research requirements, and describes public health challenges of implementing perinatal HIV prevention interventions in resource-poor settings. Public health efforts must also emphasize primary prevention strategies to reduce incident HIV infections among adolescents and women of childbearing age. Successful implementation of available perinatal HIV interventions could substantially improve global child survival.


Abstract: In June 2001 the United Nations Special Assembly on HIV/AIDS set reduction targets of 20% and 50% for the numbers of children newly infected with HIV by 2005 and 2010 respectively. Are these targets achievable? Antiretroviral monotherapy during pregnancy, delivery, and the neonatal period can reduce the rate of mother-to-child transmission of HIV-1 by two-thirds in non-breastfeeding populations. Shorter and simpler regimens of monotherapy have been associated with a reduction of 50% in such transmission among non-breastfeeding populations and of up to 40% in breastfeeding populations. Delivery by elective caesarean section is associated with a halving of the risk of mother-to-child transmission. However, breastfeeding poses a substantial additional risk of acquisition of HIV, and if prolonged it more than doubles the overall rate of transmission. Rates below 2% are being reported from settings where combination therapy is applied during pregnancy and delivery, delivery is by elective caesarean section, and breastfeeding does not take place. In breastfeeding populations where elective caesarean delivery is not an option but peripartum antiretroviral therapy is used, rates at six weeks are about 10% but can be 25% or more after 18 months of breastfeeding. More widely applicable interventions are being developed, such as cleansing of the birth canal and antiretroviral therapy during the breastfeeding period.


Abstract: Prevention of mother-to-child transmission (MTCT) of human immunodeficiency virus (HIV), also known as vertical, perinatal, or parent-to-child transmission, has become an important priority for many developing country governments and agencies in Africa. It is consistent not only with the broader goals of HIV/AIDS prevention, but also with commitments to improving child health and survival.

This paper summarizes current knowledge about MTCT and provides practical guidance for introducing interventions to prevent MTCT in Africa that are safe, affordable, feasible, culturally acceptable, sustainable, and effective in a variety of African settings. Further, this paper may also be used for policy dialogue and coordination of efforts among other partner agencies and NGOs at international, regional, and national levels.


Abstract: Abstract taken from Conclusion:

There are at least 6 million people living with HIV/AIDS in the Asia Pacific region. The numbers of HIV-infected women and children are increasing at an alarming rate. Important components that need to be addressed in order to successfully prevent and reduce perinatal HIV transmission include VCCT, family planning, obstetric care, ARV use and infant feeding.

There are many services that can aid in the PMTCT of HIV and the care of HIV-infected mothers and their children. Each country needs to take into account its HIV/AIDS epidemiology, its infrastructure and the available resources. Providing services in a stepwise manner can aid in the achievement of PMTCT.


Abstract: OBJECTIVE: To assess the cost effectiveness of vertical transmission prevention strategies by using a mathematical simulation model. DESIGN: A Markov chain model was used to simulate the cost effectiveness of four formula feeding strategies, three antiretroviral interventions, and combined formula feeding and antiretroviral interventions on a cohort of 20 000 pregnancies. All children born to HIV positive mothers were followed up until age of likely death given current life expectancy and a cost per life year gained calculated for each strategy.

SETTING: Model of working class, urban South African population. RESULTS: Low cost antiretroviral regimens were almost as effective as high cost ones and more cost effective when formula feeding interventions were added. With or without formula feeding, low cost antiretroviral interventions were likely to save lives and money. Interventions that allowed breast feeding early on, to be replaced by formula feeding at 4 or 7 months, seemed likely to save fewer lives and
offered poorer value for money. CONCLUSIONS: Antiretroviral interventions are probably cost effective across a wide range of settings, with or without formula feeding interventions. The appropriateness of formula feeding was highly cost effective only in settings with high seroprevalence and reasonable levels of child survival and dangerous where infant mortality was high or the protective effect of breast feeding substantial. Pilot projects are now needed to ensure the feasibility of implementation.


Abstract: This paper is a commentary on the issue of promoting exclusive breast-feeding in the face of the HIV-1 pandemic. It notes that in the randomized study by Rukhsana Haider and colleagues showing the impact of using peer counselors to promote exclusive breast-feeding in Dhaka, Bangladesh, a significant improvement in the percentage of women in the intervention group, who were exclusively breast-feeding at 5 months, was indicated. This implies that it is possible to bring about change in breast-feeding practice that is important for HIV-1-infected women who breast-feed. Hence, although many would argue that breast-feeding might increase HIV transmission, it can be promoted, provided that counselors inform mothers that if they have or are at risk of HIV-1 infection, they should seek advice on infant-feeding from an HIV counselor; they should use condoms during the lactation period; and they should seek prompt treatment for any breast abnormality or for oral thrush in the infant.


Abstract: Although short-course antiretroviral therapy is efficient in reducing mother-to-child transmission (MTCT) of HIV-1, it does not prevent transmission during the breastfeeding period. There is therefore an urgent need to test various approaches, including HIV-1 vaccination, to try to prevent postnatal transmission of HIV-1 in breastfeeding populations in developing countries.


Abstract: BACKGROUND: In HIV-1-infected women, poor micronutrient status has been associated with faster progression of HIV-1 disease and adverse birth outcomes. We assessed the effects of vitamin A and multivitamins on birth outcomes in such women. METHODS: In Tanzania, 1075 HIV-1-infected pregnant women at between 12 and 27 weeks’ gestation received placebo (n=267), vitamin A (n=269), multivitamins excluding vitamin A (n=269), or multivitamins including vitamin A (n=270) in a randomised, double-blind, placebo-controlled trial with a 2x2 factorial design. We measured the effects of multivitamins and vitamin A on birth outcomes and counts of T lymphocyte subsets. We did analyses by intention to treat. RESULTS: 30 fetal deaths
occurred among women assigned multivitamins compared with 49 among those not on multivitamins (relative risk 0.61 [95% CI 0.39–0.94] p=0.02). Multivitamin supplementation decreased the risk of low birthweight (<2500 g) by 44% (0.56 [0.38–0.82] p=0.003), severe preterm birth (<34 weeks of gestation) by 39% (0.61 [0.38–0.96] p=0.03), and small size for gestational age at birth by 43% (0.57 [0.39–0.82] p=0.002). Vitamin A supplementation had no significant effect on these variables. Multivitamins, but not vitamin A, resulted in a significant increase in CD4, CD8, and CD3 counts. INTERPRETATION: Multivitamin supplementation is a low-cost way of substantially decreasing adverse pregnancy outcomes and increasing T-cell counts in HIV-1-infected women. The clinical relevance of our findings for vertical transmission and clinical progression of HIV-1 disease is yet to be ascertained.


Abstract: OBJECTIVE: Poor vitamin A status has been associated with a higher risk for mother-to-child transmission of HIV-1 and there is contradictory evidence on the impact of vitamin A on perinatal outcome. We therefore assessed the effect of vitamin A supplementation to mothers on birth outcome and mother-to-child transmission of HIV-1. DESIGN AND METHODS: In Durban, South Africa 728 pregnant HIV infected women received either vitamin A (368) or placebo (360) in a randomized, double-blind trial. The vitamin A treatment consisted of a daily dose of 5000 IU retinyl palmitate and 30 mg beta-carotene during the third trimester of pregnancy and 200000 IU retinyl palmitate at delivery. HIV infection results were available on 632 children who were included in the Kaplan-Meier transmission analysis. Results are reported on mother-to-child transmission rates up to 3 months of age. RESULTS: There was no difference in the risk of HIV infection by 3 months of age between the vitamin A [20.3%; 95% confidence interval (CI), 15.7–24.9] and placebo groups (22.3%; 95% CI, 17.5–27.1), nor were there differences in foetal or infant mortality rates between the two groups. Women receiving vitamin A supplement were, however, less likely to have a preterm delivery (11.4% in the vitamin A and 17.4% in the placebo group; P=0.03) and among the 80 preterm deliveries, those assigned to the vitamin A group were less likely to be infected (17.9%; 95% CI, 3.5–32.2) than those assigned to the placebo group (33.8%; 95% CI, 19.8–47.8). CONCLUSION: Vitamin A supplementation, a low-cost intervention, does not appear to be effective in reducing overall mother-to-child transmission of HIV; however, its potential for reducing the incidence of preterm births, and the risk of mother-to-child transmission of HIV in these infants needs further investigation.

**Abstract:** Strategies drawing from current scientific knowledge and collective international experience that can be implemented as part of a comprehensive program to reduce mother-to-child transmission of HIV.


**Abstract:** BACKGROUND: Antiviral prophylaxis is recommended for HIV positive mothers to prevent mother-to-child transmission of HIV. To date UNAIDS and WHO policy has been based on a study in Thailand which showed a reduction in transmission by half with short course AZT (Zidovudine) treatment together with artificial feeding. We modelled the possible positive and negative effects on child deaths in low and middle resource developing country settings of two interventions to reduce mother to child transmission (MTCT) of HIV: antenatal testing, short-course antivirals (zidovudine or nevirapine), firstly with and then without artificial feeding.

**MATERIAL AND METHODS:** Estimates are made of child lives likely to be saved by the programme by age ten years, balanced against increases in deaths due to more uninfected mothers choosing to use artificial feeds where these are part of the intervention. Mid-point values for variables affecting the balance of mortality gains and losses are taken from recent published data for low and middle income developing countries and a sensitivity analysis is undertaken. **RESULTS:** In low income settings the use of antivirals alone would result in an estimated gain in child survival of around 0.36%, representing 360 deaths avoided from a birth cohort of 100,000 by age 10 years. Adding artificial feeding could reduce the gain to 0.03% (30 deaths avoided). In middle income settings the gain from antivirals alone would be 0.26% but as ‘spill-over’ of artificial feeding to uninfected women was more likely it could result in a net increase of child deaths of up to 1.08% (1,080 additional deaths). A sensitivity analysis emphasised this potential for regimens using artificial feeding if programme participation was low, and under most circumstances in middle income settings. **CONCLUSIONS:** HIV testing and use of antivirals by infected mothers, if well implemented, will be effective at a population level in reducing MTCT. However the addition of artificial feeding is potentially be a high risk strategy, especially in middle income countries.

UNAIDS. 2002. *Summary of new recommendations on the use of ARV in preventing MTCT of HIV.*

**Abstract:** Full text available at www.unaids.org/publications/documents/mtct/index.html

**Abstract:** The association between maternal HIV infection and perinatal outcome was evaluated through a systematic literature review and a meta-analysis of the studies located. The review of the literature for the period 1983–96 identified 31 prospective studies with an appropriate control group (21 conducted in developing countries) on this topic. The summary odds ratios (ORs) of the risk of adverse perinatal outcomes related to maternal HIV infection were as follows: spontaneous abortion, 4.05 (95% confidence interval (CI), 2.75–5.96); stillbirth, 3.91 (95% CI, 2.65–5.77); fetal abnormality, 1.08 (95% CI, 0.7–1.66); perinatal mortality, 1.79 (95% CI, 1.14–2.81); neonatal mortality, 1.10 (95% CI, 0.63–1.93); infant mortality, 3.69 (95% CI, 3.03–4.49); intrauterine growth retardation, 1.7 (95% CI, 1.43–2.02); low birth weight, 2.09 (95% CI, 1.86–2.35); and preterm delivery, 1.83 (95% CI, 1.63–2.06). Sensitivity analyses indicated the association between maternal HIV infection and adverse perinatal outcome. Most solid is evidence of an association between maternal HIV infection and the risk of infant death in developing countries. Needed, however, are large prospective cohort studies of HIV-positive and HIV-negative pregnant women that attempt to control for confounding. Ideally, these studies would collect data on immune function and HIV disease stage before and during pregnancy, enroll women in the early antenatal stages, and follow-up for at least a year after delivery.


**Abstract:** The promotion of nearly universal breastfeeding has played an important role in improving child health by providing optimum nutrition and protection against common childhood infections, and by promoting child spacing. Unfortunately, it has become clear that breastfeeding is responsible also for much of the increasing burden of worldwide pediatric human immunodeficiency virus (HIV) infection, especially in the developing nations (12–14% additional risk of HIV infection transmitted by breastfeeding; 35% total proportion of all HIV-infected children in an area infected through breastfeeding). Several factors influence the transmission of HIV by breastfeeding, including whether a woman acquires her infection during breastfeeding (29% risk of transmission) or before pregnancy (7–10% risk of breastfeeding transmission), the degree of maternal plasma and breastmilk viral load, and the presence of mastitis. In areas of the world where adequate sanitary replacement feeding is not available, the decision to withhold breastfeeding so as to decrease HIV transmission may lead to increased rates of child morbidity and mortality from diarrheal and respiratory diseases, and malnutrition. This review summarizes current data on the pathophysiology of breastfeeding transmission of HIV infection, the risk
factors for and incidence rates of transmission, and the feasibility of possible alternatives to exclusive breastfeeding in the setting of maternal HIV infection. Clearly, women must be fully informed about the risks of breastfeeding transmission of HIV, the risks of morbidity and mortality among nonbreastfed infants, and the expense and availability of procuring adequate replacement formula. If an uninterrupted access to a nutritionally adequate breastmilk substitute that can be safely prepared is ensured (as is possible in industrialized countries), HIV-infected women should be counseled not to breastfeed their infants.


Abstract: How best to advise mothers infected with human immunodeficiency virus type 1 (HIV-1) in developing countries regarding breastfeeding is an important issue that has generated considerable debate. Previous studies have addressed this problem by means of mathematical models, but without considering the issue of the duration of breastfeeding. A mathematical model was developed to compare the age-specific risks of mother-to-child HIV transmission versus the excess mortality due to not breastfeeding. In this model it is assumed that both the risk of mother-to-child transmission of HIV through breast milk and the relative risk of not breastfeeding do not vary with age. The model indicates that, in HIV-1-seropositive mothers, the decrease in child mortality afforded by breastfeeding may exceed the risk of mother-to-child HIV-1 transmission only during the first 3–7 months of life. Thereafter the risk of HIV-1 transmission probably exceeds the mortality benefit of breastfeeding. Experimental studies of counselling HIV-1-infected mothers to limit their duration of breastfeeding should be considered in the setting of developing countries.


Abstract: This article focuses on the effects of the worldwide human immunodeficiency virus (HIV) epidemic on the lives of pregnant women and their infants in the developing world. It discusses the natural history of mother-to-child transmission (MTCT) in HIV, including the role of breastfeeding and the effectiveness of various treatment/prevention schemes in resource-poor communities. Although the treatment schemes are not the same as those used in North America, the underlying principles of transmission are the same. Understanding the mechanisms of MTCT and recognizing the benefits of even short-term therapies can promote appropriate interventions when complete perinatal antiretroviral therapy is impossible.

**Abstract:** BACKGROUND: To evaluate the relation between elective cesarean section and vertical transmission of human immunodeficiency virus type 1 (HIV-1), we performed a meta-analysis using data on individual patients from 15 prospective cohort studies. METHODS: North American and European studies of at least 100 mother-child pairs were included in the meta-analysis. Uniform definitions of modes of delivery were used. Elective cesarean sections were defined as those performed before onset of labor and rupture of membranes. Multivariate logistic-regression analysis was used to adjust for other factors known to be associated with vertical transmission. RESULTS: The primary analysis included data on 8533 mother-child pairs. After adjustment for receipt of antiretroviral therapy, maternal stage of disease, and infant birth weight, the likelihood of vertical transmission of HIV-1 was decreased by approximately 50 percent with elective cesarean section, as compared with other modes of delivery (adjusted odds ratio, 0.43; 95 percent confidence interval, 0.33 to 0.56). The results were similar when the study population was limited to those with rupture of membranes shortly before delivery. The likelihood of transmission was reduced by approximately 87 percent with both elective cesarean section and receipt of antiretroviral therapy during the prenatal, intrapartum, and neonatal periods, as compared with other modes of delivery and the absence of therapy (adjusted odds ratio, 0.13; 95 percent confidence interval, 0.09 to 0.19). Among mother-child pairs receiving antiretroviral therapy during the prenatal, intrapartum, and neonatal periods, rates of vertical transmission were 2.0 percent among the 196 mothers who underwent elective cesarean section and 7.3 percent among the 1255 mothers with other modes of delivery. CONCLUSIONS: The results of this meta-analysis suggest that elective cesarean section reduces the risk of transmission of HIV-1 from mother to child independently of the effects of treatment with zidovudine.


**Abstract:** Mother to child transmission (MCT) of Human Immunodeficiency Virus (HIV) is the main cause of the spread of the HIV epidemic in the pediatric population. It is estimated that to date, three million children worldwide have been infected by HIV. The epidemic burden in developing countries is dramatic. Ninety-five percent of the world's HIV-infected women are living in developing countries. In industrialized countries, antiretroviral treatment of pregnant women and newborns with azidothymidine (AZT, ACTG 076 regimen) and discouraging breast feeding by HIV-infected mothers are effectively reducing MCT of HIV. However, there are three major obstacles to the systematic application of these strategies in developing countries: (a) difficulties in implementing the complex AZT administration and its corollary the avoidance of breast feeding; (b) the complexity of the logistics of the ACTG 076 regimen; (c) cost. Indeed, in
developing countries the socioeconomic situation of the populations are precarious and health structures and services are underdeveloped. In addition, the anxiety and the reluctance of general population in the face of the HIV problem and the high prevalence of maternal anemia reduce the acceptability and safety of AZT treatment for pregnant women in developing regions. Only interventions that are applicable, acceptable, safe, affordable, of low cost and integrated into health system will be able to reduce HIV MCT. We now know that MCT occurs mostly during the perinatal period and the maternal viral load in blood, in cervical secretions and in breast milk appears to be the main determinant of transmission. Maternal vitamin A deficiency may also favor MCT of HIV. It is however possible that this association is confounded by the relationship between advanced maternal HIV disease (a known risk factor for transmission) and vitamin A deficiency. In spite of these uncertainties concerning determinants of MCT of HIV, several interventions have been designed. The first involves treating the mother with antiretroviral drugs for the perinatal period. The second is vaginal disinfection by application of virucidal antiseptics during the perinatal period. The third is to give vitamin A supplements to pregnant women and children. Finally, passive immunotherapy with anti-HIV antibodies applied to pregnant women and/or new born, may be beneficial. The feasibility, safety and efficacy of these potential interventions have not yet been demonstrated in developing countries. In view of the dramatic spread of HIV infection in these countries, the evaluation of these interventions is of utmost priority. These trials are necessary because of the public health emergency but should be performed in strict respect of human rights and medical ethics.


Abstract: OBJECTIVE: To define the frequency and timing of breast milk transmission of HIV-1. DESIGN: Meta-analysis of data abstracted from published literature. SUBJECTS: Participants in prospective cohort studies of MTCT of HIV-1. Cohorts were separated on the basis of breast feeding duration. INTERVENTIONS: None. MAIN OUTCOME MEASURES: HIV-1 transmission rates. RESULTS: Two thousand three hundred and seventy five HIV-1 infected women and their infants, 499 of whom breast fed, the estimated risk of breast milk HIV-1 transmission was 16% (95% CI: 9, 22%). Among breastfeeding infants, forty seven per cent of HIV-1 infections were attributable to breast feeding. Breast milk transmission risk was 21% (95% CI: 10, 33%) in cohorts with mean/median duration of breast feeding > or = 3 months and 13% (95% CI: 4, 21%) in cohorts with median duration of breast feeding <2 months. In a separate analysis of 702 infants with prolonged duration of breast feeding, the risk of late postnatal transmission (infection occurring later than three to six months of age) was four per cent (95% CI 2, 5%). CONCLUSIONS: This analysis suggests that breast milk transmission of HIV-1 is substantial and continues throughout the postnatal period. Early cessation of breast feeding at six months would avert some but not most infant HIV-1 infections due to breast feeding. While recently published studies showing some effectiveness of antiretrovirals early during the breast feeding period are encouraging, prevention of breast milk HIV-1 transmission needs to remain a high research priority.

Abstract: CONTEXT: A 2-dose intrapartum/newborn nevirapine regimen reduced perinatal human immunodeficiency virus (HIV) transmission in Ugandan women not receiving antenatal antiretroviral therapy (ART). However, it is unknown whether the addition of the 2-dose nevirapine regimen to standard ART would further reduce perinatal HIV transmission. OBJECTIVE: To determine whether a 2-dose nevirapine regimen can decrease perinatal transmission of HIV in nonbreastfeeding women receiving standard ART. DESIGN AND SETTING: International, blinded, placebo-controlled, phase 3 trial enrolling women between May 1997 and June 2000 at clinical sites providing care for HIV infection throughout the United States, Europe, Brazil, and the Bahamas. PARTICIPANTS: A total of 1270 women received nevirapine (n=642) or placebo (n=628). Infants were followed up for 6 months to determine HIV-infection status, which was available for 1248 deliveries. INTERVENTION: A 200-mg dose of oral nevirapine to women after onset of labor and a 2-mg/kg dose of oral nevirapine to newborns between 48 and 72 hours after birth. MAIN OUTCOME MEASURES: Detection of HIV infection in infants and grade 3 and 4 toxic effects in women and newborns. RESULTS: After review by the data and safety monitoring board, the trial was stopped early because the overall transmission rates were significantly lower than assumed for the study design. Antenatal ART included zidovudine alone in 23%; combinations without protease inhibitors in 36%; and combinations with protease inhibitors in 41%. Thirty-four percent of women had elective cesarean delivery. No significant safety concerns were identified for women or infants. Detection of HIV infection occurred in 9 (1.4%; 95% confidence interval [CI], 0.6%–2.7%) of 631 nevirapine group deliveries and 10 (1.6%; 95% CI, 0.8%–2.9%) of 617 placebo group deliveries. The 95% CI for the difference in transmission rate (–0.2) between the 2 study arms ranged from –1.5% in favor of nevirapine to 1.2% in favor of placebo (P=.82, Fisher exact test). The transmission rate was higher in women with lower baseline CD4 cell counts and higher delivery HIV RNA levels, but there was no significant difference between treatment arms in any subgroup. CONCLUSION: Risk of perinatal HIV transmission was low and no benefit from additional intrapartum/newborn nevirapine was demonstrated when women received prenatal care and antenatal ART, and elective cesarean section was made available.

UNAIDS. 2002. UNAIDS Technical Update mother-to-child transmission of HIV.


The Synergy Project. 2002. USAID Efforts to Prevent Mother-to-Child Transmission of HIV/AIDS.

Abstract: Since 1998, USAID has made real advances in determining the best methods to approach the complex problem of preventing MTCT in the developing world. The Agency has invested in operations research by establishing comprehensive MTCT pilot projects in Kenya
and Zambia, and in so doing has partnered with African governments, the United Nations Children’s Fund (UNICEF), the Joint United Nations Programme on HIV/AIDS (UNAIDS), African researchers, and other USAID-funded projects. These pilot projects are producing critically needed “best practices” for the prevention of MTCT, while teaching policymakers what pitfalls they must avoid. Advances from these and other projects include feasibility studies on breastfeeding counseling; assessments of costs, acceptability, and operational barriers of MTCT programs; a new computer model to analyze various components of MTCT programs; new program guidance for USAID Missions on how to approach MTCT; MTCT research and service delivery support at antenatal care hospitals, such as the Chris Hani Baragwanath Hospital in South Africa; MTCT information sharing among donors and developing country partners; and much more.

As the HIV/AIDS epidemic continued to escalate, increased USAID investments in prevention of MTCT will be critical in saving the lives of children made vulnerable to HIV/AIDS around the world.


Abstract: BACKGROUND: Mother-to-child transmission (MTCT) of HIV infection is one of the most tragic consequences of the HIV epidemic, especially in resource-limited countries, resulting in about 650 000 new paediatric HIV infections each year world-wide. The paediatric HIV epidemic threatens to seriously undermine decade-old child survival programmes. This is one of several reviews assessing the available evidence for preventing HIV transmission from an HIV-infected woman to her child. The other reviews assess the effects of antiretroviral therapy, Caesarean section delivery, breast feeding, and vitamin A supplementation. OBJECTIVES: To estimate the effect of vaginal lavage on the risk of MTCT of HIV and infant and maternal mortality and morbidity, as well as tolerability of vaginal lavage in HIV infected women. SEARCH STRATEGY: We searched the Cochrane Controlled Trials Register, Cochrane Pregnancy and Childbirth Register, PubMed, EMBASE, AIDSLINE, LILACS, AIDSTRIALS, and AIDSDRUGS, using standardised methodological filters for identifying trials. We also searched reference lists of identified articles, relevant editorials, expert opinions and letters to journal editors, and abstracts and proceedings of relevant conferences, and contacted subject experts and pharmaceutical companies. There were no language restrictions. SELECTION CRITERIA: Randomised trials or clinical trials comparing vaginal disinfection during labour with placebo or no treatment, in known HIV infected pregnant women. Trials had to include an estimate of the effect of vaginal disinfection on MTCT of HIV and/or any other pre-specified adverse pregnancy outcome to be included. DATA COLLECTION AND ANALYSIS: Two reviewers independently assessed trial eligibility and quality, and extracted data. MAIN RESULTS: Only one low quality trial included an estimate of the effect of vaginal disinfection on at least one pre-specified outcome. There was no evidence of an effect of vaginal disinfection on MTCT of HIV (odds ratio 0.93, 95% confidence interval 0.63 to 1.38), and no information was available on the other pre-specified outcomes. REVIEWER’S CONCLUSIONS: There is a need for well-designed randomised controlled trials to estimate the effects of vaginal disinfection on MTCT of HIV.

Abstract: BACKGROUND: Mother-to-child transmission (MTCT) of HIV infection is one of the most tragic consequences of the HIV epidemic, especially in resource-limited countries, resulting in about 650 000 new paediatric HIV infections each year world-wide. The paediatric HIV epidemic threatens to seriously undermine decade-old child survival programmes. This is one of several reviews assessing the available evidence for preventing HIV transmission from an HIV-infected woman to her child. The other reviews assess the effects of antiretroviral therapy, Caesarean section delivery, breast feeding, and vitamin A supplementation. OBJECTIVES: To estimate the effect of vaginal lavage on the risk of MTCT of HIV and infant and maternal mortality and morbidity, as well as tolerability of vaginal lavage in HIV infected women. SEARCH STRATEGY: We searched the Cochrane Controlled Trials Register, Cochrane Pregnancy and Childbirth Register, PubMed, EMBASE, AIDSLINE, LILACS, AIDS TRIALS, and AIDS DRUGS, using standardised methodological filters for identifying trials. We also searched reference lists of identified articles, relevant editorials, expert opinions and letters to journal editors, and abstracts and proceedings of relevant conferences, and contacted subject experts and pharmaceutical companies. There were no language restrictions. SELECTION CRITERIA: Randomised trials or clinical trials comparing vaginal disinfection during labour with placebo or no treatment, in known HIV infected pregnant women. Trials had to include an estimate of the effect of vaginal disinfection on at least one pre-specified outcome. DATA COLLECTION AND ANALYSIS: Two reviewers independently assessed trial eligibility and quality, and extracted data. MAIN RESULTS: Only one low quality trial included an estimate of the effect of vaginal disinfection on MTCT of HIV and/or any other pre-specified adverse pregnancy outcome to be included. DATA COLLECTION AND ANALYSIS: Two reviewers independently assessed trial eligibility and quality, and extracted data. MAIN RESULTS: Only one low quality trial included an estimate of the effect of vaginal disinfection on at least one pre-specified outcome. There was no evidence of an effect of vaginal disinfection on MTCT of HIV (odds ratio 0.93, 95% confidence interval 0.63 to 1.38), and no information was available on the other pre-specified outcomes. REVIEWER’S CONCLUSIONS: There is a need for well-designed randomised controlled trials to estimate the effects of vaginal disinfection on MTCT of HIV.


Abstract: OBJECTIVES: To evaluate the effect of vaginal lavage with diluted chlorhexidine on mother-to-child transmission of HIV (MTCT) in a breastfeeding population. METHODS: This prospective clinical trial was conducted in a governmental hospital in Mombasa, Kenya. On alternating weeks, women were allocated to non-intervention or to intervention consisting of vaginal lavage with 120 ml 0.2% chlorhexidine, later increased to 0.4%, repeated every 3 h from admission to delivery. Infants were tested for HIV by DNA polymerase chain reaction within 48 h and at 6 and 14 weeks of life. RESULTS: Enrolment and follow-up data were available for 297 and 309 HIV-positive women, respectively, in the non-lavage and the lavage groups. There was no evidence of a difference in intrapartum MTCT (17.2 versus 15.9%, OR 0.9, 95% CI 0.6–1.4)
between the groups. Lavage solely before rupture of the membranes tended towards lower MTCT with chlorhexidine 0.2% (OR 0.6, 95% CI 0.3–1.1), and even more with chlorhexidine 0.4% (OR 0.1, 95% CI 0.0–0.9). CONCLUSION: The need remains for interventions reducing MTCT without HIV testing, often unavailable in countries with a high prevalence of HIV. Vaginal lavage with diluted chlorhexidine during delivery did not show a global effect on MTCT in our study. However, the data suggest that lavage before the membranes are ruptured might be associated with a reduction of MTCT, especially with higher concentrations of chlorhexidine.


Abstract: Infectious agents which are sexually transmitted determine considerable morbidity in women during the gestational period. Connatal and perinatal infection of the newborn, miscarriage, and low birthweight have all been described. Vertical transmission of HIV and other STD may occur via the placenta during gestation (the major mechanism for syphilis) or at birth during the passage through the cervico-vaginal channel (the major mechanism for HIV, HBV, HSV, gonorrhoea and chlamydia). High serum viral loads of HIV significantly increase the likelihood of newborn infection, while the presence of lesions in the genital tract at birth increases the odd for transmission for HSV. Breast feeding is a well described route of transmission for HIV infection, but it is irrelevant to the transmission of HBV. Cutaneous lesions of the breast and nipples carry a risk of transmission of syphilis and HSV through breast-feeding. Treatment of the etiologic agent is considered an effective means for the prevention of vertical transmission and is recommended for all STI agents except for HBV. HIV infected women on antiretroviral therapy should continue the same treatment regimen if they become pregnant (with the exception of indinavir and efavirenz, which should be replaced as soon as possible); women who did not assume antiretroviral drugs at the time they became pregnant, should start treatment as soon as they reach the second trimester of gestation. Delivery should be performed by elective cesarian section in all HIV infected women. Delivery should also be performed by cesarian section in women who develop a primary HSV infection and have cervico-vaginal lesions. Recurrent episodes of genital herpes are associated to a much lower risk of vertical transmission and do not represent a criterium for cesarian section. Women with documented cervical chlamydia infection should receive a full treatment regimen at the 36th week of gestation. Women with chronic HBV infection do not require etiologic treatment; however, their newborns should receive concomitant doses of HBV immunoglobulins and HBV vaccine soon after birth. Standard practices of prevention of vertical transmission of STI agents applies to women regardless their native country. However, the feasibility of implementation of the guidelines in poor resource countries is a matter of great concern: an unresolved debate is ongoing on optimal strategies for the prevention of vertical transmission of HIV in such countries.

Abstract: BACKGROUND: Mother-to-child transmission (MTCT) of HIV is the dominant mode of acquisition of HIV infection for children, currently resulting in about 1800 new paediatric HIV infections each day world-wide. This is one of several reviews assessing the available evidence for preventing HIV transmission from an HIV-infected woman to her child. The other reviews assess the effects of antiretroviral therapy, Caesarean section delivery, breast feeding, and vaginal lavage. OBJECTIVES: To assess the effects of antenatal and intrapartum vitamin A supplementation, compared to an appropriate control group, on the risk of MTCT of HIV infection and infant and maternal mortality and morbidity, and the tolerability of vitamin A supplementation. SEARCH STRATEGY: We searched the Cochrane Controlled Trials Register, Cochrane Pregnancy and Childbirth Register, PubMed, EMBASE, AIDSLINE, LILACS, AIDSTRIALS, and AIDS DRUGS, using standardised methodological filters for identifying trials. We also searched reference lists of identified articles, relevant editorials, expert opinions and letters to journal editors, and abstracts or proceedings of relevant conferences; and contacted subject experts, agencies, organisations, academic centres, and pharmaceutical companies. There were no language restrictions. SELECTION CRITERIA: Randomised trials comparing vitamin A supplementation with no vitamin A supplementation in known HIV infected pregnant women. Trials had to include an estimate of the effect of vitamin A supplementation on MTCT of HIV and/or any other pre-specified adverse pregnancy outcome to be included. DATA COLLECTION AND ANALYSIS: Two reviewers independently assessed trial eligibility and quality and extracted data. Odds ratios (OR) and 95% confidence intervals (CI) were estimated for binary data and pooled using a fixed effect (Mantel-Haenszel) method. Heterogeneity between studies was examined by graphical inspection of results followed by a chi-square test of homogeneity. MAIN RESULTS: We identified five eligible trials, only two of which included an estimated of the effect of vitamin A supplementation on at least one of the pre-specified outcomes. Based on the two trials, with a total of 1813 participants, there is no evidence that vitamin A supplementation has an effect on MTCT of HIV (OR 1.09, 95% confidence interval (CI) 0.81 to 1.45). There is no evidence of heterogeneity between the trials (p = 0.37), and no evidence of an effect of vitamin A supplementation in HIV-infected pregnant women on stillbirths (OR 1.07, 95% CI 0.63 to 1.80), very preterm births, i.e. born less than 34 weeks gestation (OR 0.86, 95% CI 0.57 to 1.31), all preterm births, i.e born less than 37 weeks gestation (OR 0.88, 95% CI 0.68 to 1.13), low birth weight, i.e. weighing less than 2500g (OR 0.86, 95% CI 0.64 to 1.17), very low birthweight, i.e. weighing less than 2000g (OR 0.71, 95% CI 0.4 to 1.28), and postpartum CD4 levels (weighted mean difference –4.00, 95% CI –51.06 to 43.06). The effect of vitamin A on maternal mortality could not be assessed, as there were only three maternal deaths. REVIEWER’S CONCLUSIONS: Implications for practice: At the present time there is no conclusive evidence that the antenatal and intrapartum use of vitamin A supplementation to reduce MTCT of HIV and adverse pregnancy outcomes among HIV-infected pregnant women should be recommended. Implications for research: The current review will be updated as soon as data from ongoing studies become available. This review and the review in progress on vitamin A supplementation in pregnant women of seronegative/unknown HIV status (Kulier 2002~) should be considered together in order to shed more light on the effect of vitamin A supplementation on non-HIV related adverse pregnancy outcomes.

**Abstract:** BACKGROUND: Mother-to-child transmission (MTCT) of HIV is the dominant mode of acquisition of HIV infection for children, currently resulting in about 1800 new paediatric HIV infections each day world-wide. This is one of several reviews assessing the available evidence for preventing HIV transmission from an HIV-infected woman to her child. The other reviews assess the effects of antiretroviral therapy, Caesarean section delivery, breast feeding, and vaginal lavage. OBJECTIVES: To assess the effects of antenatal and intrapartum vitamin A supplementation, compared to an appropriate control group, on the risk of MTCT of HIV infection and infant and maternal mortality and morbidity, and the tolerability of vitamin A supplementation. SEARCH STRATEGY: We searched the Cochrane Controlled Trials Register, Cochrane Pregnancy and Childbirth Register, PubMed, EMBASE, AIDSLINE, LILACS, AIDSTRIALS, and AIDSDRUGS, using standardised methodological filters for identifying trials. We also searched reference lists of identified articles, relevant editorials, expert opinions and letters to journal editors, and abstracts or proceedings of relevant conferences; and contacted subject experts, agencies, organisations, academic centres, and pharmaceutical companies. There were no language restrictions. SELECTION CRITERIA: Randomised trials comparing vitamin A supplementation with no vitamin A supplementation in known HIV infected pregnant women. Trials had to include an estimate of the effect of vitamin A supplementation on MTCT of HIV and/or any other pre-specified adverse pregnancy outcome to be included. DATA COLLECTION AND ANALYSIS: Two reviewers independently assessed trial eligibility and quality and extracted data. Odds ratios (OR) and 95% confidence intervals (CI) were estimated for binary data and pooled using a fixed effect (Mantel-Haenszel) method. Heterogeneity between studies was examined by graphical inspection of results followed by a chi-square test of homogeneity. MAIN RESULTS: We identified five eligible trials, only two of which included an estimated of the effect of vitamin A supplementation on at least one of the pre-specified outcomes. Based on the two trials, with a total of 1813 participants, there is no evidence that vitamin A supplementation has an effect on MTCT of HIV (OR 1.09, 95% confidence interval (CI) 0.81 to 1.45). There is no evidence of heterogeneity between the trials (p=0.37), and no evidence of an effect of vitamin A supplementation in HIV-infected pregnant women on stillbirths (OR 1.07, 95% CI 0.63 to 1.80), very preterm births, i.e. born less than 34 weeks gestation (OR 0.86, 95% CI 0.57 to 1.31), all preterm births, i.e. born less than 37 weeks gestation (OR 0.88, 95% CI 0.68 to 1.13), low birth weight, i.e. weighing less than 2500g (OR 0.86, 95% CI 0.64 to 1.17), very low birthweight, i.e. weighing less than 2000g (OR 0.71, 95% CI 0.40 to 1.28), and postpartum CD4 levels (weighted mean difference –4.00, 95% CI –51.06 to 43.06). The effect of vitamin A on maternal mortality could not be assessed, as there were only three maternal deaths. REVIEWER’S CONCLUSIONS: Implications for practice: At the present time there is no conclusive evidence that the antenatal and intrapartum use of vitamin A supplementation to reduce MTCT of HIV and adverse pregnancy outcomes among HIV-infected pregnant women should be recommended. Implications for research: The current review will be updated as soon as data from ongoing studies become available. This review and the review in progress on vitamin A supplementation in pregnant women of seronegative/unknown HIV status (Kulier 2002) should be considered together in order to shed more light on the effect of vitamin A supplementation on non-HIV related adverse pregnancy outcomes.
WHO and UNAIDS. 2002. **WHO and UNAIDS continue to support use of nevirapine for prevention of mother-to-child HIV transmission.**

**Abstract:** Geneva, 22 March 2002. The statement released today by the United States National Institutes of Health (NIH), concerning some reporting and documentation irregularities in clinical trial HIVNET012, does not warrant any change in the recommendations issued following a WHO technical consultation on mother-to-child HIV transmission in October 2000.

This expert group, convened by WHO on behalf of UNICEF, UNFPA, and the UNAIDS Secretariat, concluded that the safety and effectiveness of antiretroviral regimens, including nevirapine, in preventing mother-to-child HIV transmission has been clearly documented and that the use of these regimens is thus warranted for preventing mother-to-child HIV transmission. The simplest regimen requires a single dose of nevirapine to the mother at delivery and a single dose to the newborn within 72 hours of birth.

Newborn Immunization


Abstract: The rational design of a successful vaccination strategy against tuberculosis requires certain kinds of information and must take account of several considerations: (i) the nature of the immune response that protects the large majority of individuals infected by Mycobacterium tuberculosis, designated as healthy contacts, must be defined and distinguished from that in tuberculosis patients, whose immune system must have failed; (ii) the vaccination strategy must incorporate a way of priming the immune system to guarantee in all individuals this protective response, normally generated in healthy contacts, upon natural infection by M. tuberculosis; (iii) the strategy must incorporate a mechanism for ensuring that the effectiveness of this priming is not abrogated by exposure to environmental mycobacteria; and (iv) the strategy must take account of the fact that the vaccinated population is genetically heterogeneous, and that individuals will therefore respond variably to most standard vaccination protocols. We describe a tentative proposal for how these interrelated problems might be solved and discuss predictions of this tentative vaccination strategy. Critical testing of the neonatal, low-dose BCG vaccination strategy can only be achieved by a field trial and we outline the considerations underlying this proposal.


Abstract: A total of 2273 normal babies born in the Government Maternity Hospital, Egmore, from 6th February, 1975 to 8th October, 1975 were vaccinated with full or half dose of freeze-dried BCG vaccine or placebo. The vaccines as well as the placebo were obtained from BCG Laboratory, Madras. In order to assess the post-vaccination allergy at various intervals after vaccination the babies were tested with 5 IU of PPD-S from 5th January, 1976 to 25th March, 1976 by home visits. About 80 percent of babies were available for testing after 3 to 5 months but only 50 percent after 12–13 months. There was considerable waning of post-vaccination allergy during a period of 12 months. The mean size of scar did not differ significantly for the two doses at the three intervals. The difference in size of mean post-vaccination allergy between full dose and half dose of the freeze-dried vaccine, though statistically significant, was small (0.5mm). There were not many complications like BCG adenitis either with the full or the half dose. It would appear desirable to vaccinate babies with 0.1mg/0.1ml dose of vaccine, in contrast to the present general practice of vaccinating them with half the dose.

Abstract: OBJECTIVES: To explore practices and attitudes of pediatricians toward administration of the first dose of hepatitis B vaccine to infants, and to identify factors influencing the decision of pediatricians to initiate immunization at birth versus at 1 to 2 months of age. METHODS: A random sample of 600 pediatricians obtained from the American Academy of Pediatrics membership database was surveyed by mail. RESULTS: Three hundred eighty (68%) of the 563 pediatricians who were located responded to the survey. Of these 380 pediatricians, 279 provided routine immunizations to children. Of the 270 pediatricians who vaccinated children with hepatitis B vaccine and indicated their practice regarding the birth dose, 50% offered the first dose of hepatitis B vaccine at birth to all infants; the rest either offered the vaccine at birth only to infants of hepatitis B surface antigen-positive mothers and mothers whose serostatus is unknown, or did not offer the birth dose to any infants at all. Practicing in the inner city, working for a medical school or government hospital, and living in a state with universal immunization supply policies were associated with the respondent giving the birth dose. The strongest perceived barriers to giving the birth dose in the hospital were the difficulty tracking these vaccines (39%), the increased cost (27%), and the lack of reimbursement from insurance companies (26%). If a combination vaccine that includes hepatitis B; diphtheria, tetanus, pertussis (diphtheria and tetanus toxoids and acellular pertussis vaccine); and polio (inactivated poliovirus vaccine) antigens become available in the near future, then 38% of physicians who currently give the birth dose to all infants would prefer to wait until 2 months of age to initiate hepatitis B immunization. CONCLUSIONS: Efforts to achieve high implementation of hepatitis B birth dose administration may falter once a hepatitis B-containing pentavalent combination vaccine becomes available. Programmatic efforts should ensure prevention of perinatal hepatitis B virus transmission through universal prenatal hepatitis B surface antigen screening and immunoprophylaxis of high-risk newborn infants.


Abstract: BACKGROUND: Hepatitis B virus (HBV) infection and its complications are among the most common diseases in Iran. National mass vaccination of neonates against hepatitis B was started in 1991, but was considered a costly venture. AIM: To compare the efficacy of low-dose intradermal HBV recombinant vaccine with standard intramuscular dose in neonates. METHOD: 165 apparently healthy neonates born in Shiraz were randomized to receive either 10 microg [corrected] of recombinant vaccine intramuscularly (IM; n=82) or 2 microg [corrected] vaccine intradermally (ID; n=83) at months 0, 1, 6. Anti-HBs titers were measured at 6 and 18 months after the first dose. RESULTS: 53 and 51 neonates in the IM and ID groups, respectively, completed the study. Protective anti-HBs titers (>10 IU/L) at 18 months after the first dose were achieved in 98.1% and 96.2% of neonates in IM and ID groups, respectively (p=ns). The only
side effect in the ID group was local hyperpigmentation, which was seen in 55%; no significant side effect was reported in the IM group. CONCLUSION: Intradermal vaccination with 20% of standard dose is as effective as IM vaccination when evaluated at 18 months after the first dose.


Abstract: This study examines the parameters crucial to cost-effectiveness of universal hepatitis B immunization in India. An incremental cost-effectiveness analysis was done using a decision tree (Markov model) to follow up a hypothetical cohort of 100,000 newborns for the effects of hepatitis B acquired vertically at birth. The measure of effectiveness was disability-adjusted life-years gained. Uncertainty analysis and Scenario analysis were done using Latin hypercube sampling. Hepatitis B endemicity is the most important factor, followed by the cost of vaccine. Other factors of some influence are vaccination coverage, vaccine efficacy, HBeAg positivity, and vaccine wastage.


Abstract: BACKGROUND: The efficacy of Bacillus of Calmette and Guerin (BCG) vaccination given at birth is still controversial. We therefore conducted a study in Bangui (Central African Republic) to estimate the protection afforded over the first seven years of life by BCG administered at birth. METHODS: One thousand children who had lived in contact with a recently diagnosed case of contagious tuberculosis were followed up for a period of 6 months in order to detect the occurrence of tuberculosis. Diagnosis of tuberculosis was made through a scoring system. Vaccine efficacy (VE) was calculated on the basis of the relative risk of contracting tuberculosis according to vaccination status. RESULTS: The efficacy of BCG was estimated to be 71% (95% confidence interval: 56–81%). This result remained practically the same after changing the definition used for tuberculosis cases (VE=75% for a threshold with a score of 15 instead of 6, VE=74% when only confirmed cases were considered). There was no difference between the two groups in the variables measuring intensity of contact with the source of contamination, but there was a difference in age distribution. Vaccine efficacy adjusted for this factor was the same as the crude VE. CONCLUSION: This study, based on a methodology that controls for most of the risks of bias inherent to field efficacy measurement, confirms the protective capacity of neonatal BCG against childhood tuberculosis. Therefore BCG vaccination at birth must remain a public health priority especially in countries with high incidence of the disease.

Abstract: OBJECTIVE: To evaluate the epidemiological effect of hepatitis B immunization among newborn babies in Beijing. METHODS: A multistage sampling method was used for the collection of immunization cards, field epidemiological survey on hepatitis B virus (HBV) immunization of children, analysis of infectious disease reports. HBsAg, anti-HBs and anti-HBc levels were detected by solid phase radioimmunoassays (SPRIA). RESULTS: The incidence of hepatitis B in children of 0 to 14 years at the beginning of HBV immunization was 18.59 to 20.52/100,000, and declined to 0.39 to 2.38/100,000 in 2000 (chi2=58.26, P<0.01). The HBsAg carrying rate of the children decreased from 2.82% to 0.60%, about 80.00% after vaccination (chi2=10.75, P<0.01). CONCLUSION: Hepatitis B vaccination of newborn babies is an effective measure for prevention and control of hepatitis B virus infection.


Abstract: A double-blind randomized placebo-controlled study to prevent hepatitis B infection in 235 babies born to chronic hepatitis B, HBeAg carriers was carried out. Babies in three treatment groups all received heat-inactivated hepatitis B vaccine. In addition multiple doses of HBIG and a single dose of HBIG were given in groups I and II respectively. After three years of follow-up, 4/60 (Group I), 3/64 (Group II), and 1/64 (Group III) developed chronic infection. For those who escaped chronic infection, other hepatitis events also occurred. They were transient HBs-antigenaemia, anti-HBc conversion and significant rise in anti-HBs titre without seroconversion for anti-HBc. It was deduced that 30% of babies born to hepatitis carriers are naturally protected from chronic infection. Immunization, with vaccine only, protects another 46%. The addition of single and multiple doses of HBIG protects another 10% and 5%, respectively. 2% acquired intrauterine infection and 7% failed to respond to the most intensive immunization schedule.


Abstract: BACKGROUND: Routine use of hepatitis B vaccine for low-risk newborns was suspended on July 7, 1999, because of concern about the potential risk of thimerosal, a mercury-containing vaccine preservative. Reinstatement of the birth dose was recommended when a thimerosal-free vaccine became available. OBJECTIVE: To explore changes in hepatitis B vaccination practices for newborns related to the revised recommendations for low-risk infants (in this study, the terms newborn and infant are used interchangeably). DESIGN: A telephone survey of a random sample of 1000 US hospitals. PARTICIPANTS: Nurse managers, nursery directors, and staff nurses of the newborn nurseries. MAIN OUTCOME MEASURES: Nursery vaccination practices before and after July 7, 1999, and the availability and use of thimerosal-free vaccine. RESULTS: Interviews were conducted with 773 (87%) of 886 eligible hospitals.
Before July 7, 1999, 78% of the hospitals reported vaccination practices that were consistent with recommendations at that time, although only 47% vaccinated all low-risk infants at birth. After July 7, 1999, almost all hospitals discontinued vaccination of low-risk infants, in accordance with the recommendation change; however, there was a 6-fold increase in the number of hospitals that were not vaccinating all high-risk infants. After the introduction of thimerosal-free vaccine, only 39% of the hospitals reported vaccinating all low-risk infants. CONCLUSIONS: Most hospital nurseries altered their newborn hepatitis B vaccination practices consistent with changes in national recommendations. However, unintended consequences included the failure of some hospitals to continue vaccinating all high-risk infants and the delay in reintroducing vaccination for low-risk newborns after the introduction of a thimerosal-free vaccine. Assessments of the appropriateness of this country’s response to the threat of thimerosal in vaccines should consider these findings.


Abstract: Global eradication of hepatitis B, which has infected over 2000 million people worldwide, is an achievable goal. Hepatitis B vaccine is effective and safe, and is recommended in Australia as a four-dose childhood schedule commencing with a neonatal dose. A neonatal dose has a greater impact on carriage, the main reservoir of transmission, due to the inverse relationship of age and risk of chronic carriage. Universal vaccination is clearly cost-effective in countries of high hepatitis B endemicity but less so in countries of low endemicity. Other factors affecting the perceived benefits of universal vaccination in low-risk countries include the use of the preservative thiomersal in hepatitis B vaccines, and case reports of multiple sclerosis (MS) and unexplained fever in recipients. Careful epidemiological studies have failed to confirm any risk of MS or fever with the hepatitis B vaccine, which is now thiomersal-free. Other arguments against universal vaccination include ‘unnecessary’ vaccination of low-risk neonates. However, selective vaccination programmes targeting at-risk neonates are often poorly implemented and do not protect against horizontal transmission in early childhood. Universal vaccination, which is safe and effective, is the only practical means of achieving global eradication of hepatitis B.


Abstract: OBJECTIVE: To evaluate the long-term efficacy of infant hepatitis B (HB) immunization program on preventing hepatitis B virus (HBV) infection, and to assess its impact on the incidence of HB in children. METHODS: Since 1986, the universal HB vaccination for newborn babies with standard, pediatric dose had been launched without serologic prescreening of pregnant women for HBsAg, in a high endemic county of Long-An. A hepatitis surveillance system was set up to evaluate the possible impact on the incidence of hepatitis B. To serologically evaluate the effectiveness of the program, a stratified random sampling of 1,000
children in 1987 birth cohorts, who received plasma-derived HB vaccine, was recruited for long-term follow up at the age of 1 to 13 years. A cross-sectional seroepidemiological survey was conducted in the county in 1985, before the program, and in 2001, for 1,551 children born in 1996–2000 who were administered yeast recombinant HB vaccine. RESULTS: During the 1 to 13 years after the program, the rates of HBsAg-positive were 0.7% to 2.9% with an average of 1.7% and the protective rates were 83.5% to 96.6%. HBV infection rates were 1.1% to 5.1% with an average of 2.4% and the protective rates were 93.5% to 98.4%. For the population aged 1 to 4 years who were immunized with recombinant HB vaccine, HBsAg positive rates were 1.8% to 2.4% with an average of 2.0% and the protective rates were 78.4 to 85.2%. 14 years after the program, the cumulative incidence of acute hepatitis B in the children aged 1 to 14 years fell to 1.5 cases per 100000 children, down 91.8% as compared with that in 1985 to 1987. However, the cumulative incidence of 14.4 cases per 100000 population in unvaccinated children was not significantly different from that in the history controls. Acute hepatitis B children had not been reported, showing that the vaccination program was 100% protective in children. CONCLUSION: The universal infant HB vaccination program in a hyperendemic area has proved to be effective in controlling HBV infection and decreasing the incidence of acute hepatitis B in children. Booster dose is unnecessary in 13 years after the immunization. The protective efficacy of yeast recombinant HB vaccine is similar to that of plasma-derived HB vaccine.


Abstract: In Tari, Southern Highlands Province (SHP), Papua New Guinea (PNG), pneumococcal polysaccharide (Pnc PS) vaccine was offered to women at 28–38 weeks gestation. Blood samples were collected for measurement of pneumococcal antibody titres prior to immunization, from mother and cord at delivery and from their children at ages 1–3 and 4–6 months; samples were also collected in a subset of children before and 1 month after Pnc PS vaccine was given at age 8–9 months. Serum was collected from unimmunized women and their children at delivery and from children of unimmunized women at the same ages in infancy. There were no differences in neonatal or post-neonatal mortality rates or congenital abnormalities in the children of 235 immunized and 202 unimmunized women. There was a significant increase in antibody titres to pneumococcal serotypes 5, 14 and 23F in immunized women but not for serotype 7F. Geometric mean titres (GMTs) of antibodies for serotypes 5 and 23F were significantly higher in children of immunized women than in the unimmunized group up to age 2 months and for serotype 14 significantly higher to age 4 months. Maternal immunization did not significantly affect the children’s capacity to make antibody responses to immunization with Pnc PS vaccine in infancy. The findings of this study and those in several other developing countries provide support for the concept of Pnc PS maternal immunization and justify the planning of large-scale efficacy trials.

**Abstract:** Neonatal supplementary immunization with monovalent type 1 vaccine appears to offer considerable advantages over trivalent oral polio vaccine supplementation in providing solid, early immunity to type 1 polio, the major cause of epidemic polio and the major threat to developing countries with moderate-to-good immunization coverage but with suboptimal standards of environmental sanitation. Monovalent type 1 vaccine has a considerably better chance of achieving early, solid type 1 immunity because of the lack of interference from the more dominantly immunogenic type 2 vaccine. In addition to significantly reducing an important source of susceptibles from the community, early immunity would be a major factor in removing a significant pool of wild type 1 virus.


**Abstract:** Hepatitis B virus (HBV) infection is a worldwide problem of public health. Mother/child transmission of the virus represents a major factor in maintaining the infection, which is often transmitted during delivery, the risk of transmission of the HBV depending on the degree of maternal infectiosity, the genomic type of the virus, and the rate of maternal antibodies. Evolution towards chronicity of the infected newborn is frequent. The available means to prevent the mother/child transmission of the virus are efficient. Once HBV maternal infection is diagnosed during pregnancy, joint administration of vaccine and specific immunoglobulins to the baby in the early neonatal period efficiently prevent the mother/child transmission of the virus.


**Abstract:** The objective of this study is to test a four-dose Hepatitis B vaccine schedule in premature infants (PI) and assess the immunogenicity of the vaccine with this schedule. We studied 29 PI who received the vaccine against Hepatitis B at birth, 1, 5, and 9 months of age. Antibodies against surface antigen (Anti-HBs) were measured before the third and fourth doses and 12 weeks after the fourth dose. Levels higher than 10 mIU/mL were considered protective, whereas more than 100 mIU/mL was an excellent response. Twenty-nine PI were studied. The average weight at the time of the initial dose was 1,398g, gestational age of 32.5 weeks, and a postnatal age of 9 days. Since the initial measurement, protective levels were achieved in all patients. The response was excellent in 24.1, 75.9, and 89.7%, after the second, third, and fourth doses, respectively. No correlation was found between the type of response and the infants' weight or the postnatal age. The Anti-HBs geometrical levels were 51.9, 133, and 133 mIU/mL after the second, third, and fourth doses, respectively. The favorable results obtained might be due to: the four-dose schedule itself, the dose we used (10 microg), the time interval between the doses, and even a race factor. Our schedule seems to be useful for PI infants and probably is no longer necessary to delay the vaccination, although this should be confirmed by further studies.

**Abstract:** INTRODUCTION: A well-accepted vaccination schedule for preterm babies is not available. We therefore studied the response to hepatitis B vaccine in preterm babies.

METHODS: 60 babies born to HBsAg-negative mothers were studied. Group I (n=20) consisted of term babies with birth weight >2.5 Kg, group II (n=20) included preterm babies with birth weight between 1.8 and 2.49 Kg, and group III (n=20) included preterm babies with birth weight between 1.2 and 1.79 Kg. Mean gestational age in the three groups was 38.5 (1.1), 33.5 (1.4) and 32.7 (2.1) weeks, respectively. All babies received 3 doses (10 microg/0.5 mL) of a recombinant HBV vaccine within 3 days of birth, and at 6 weeks and 6 months of life. Anti-HBs levels were measured one month after the 2nd and 3rd doses each; the immune response was categorized as good responders (anti-HBs >100 mIU/mL), low responders (anti-HBs 10–100 mIU/mL) and non-responders (anti-HBs <10 mIU/mL). RESULTS: Good antibody response after the second dose was seen in 95% of babies in group I, 60% of those in group II and 10% of those in group III. This increased to 100%, 90% and 45%, respectively after the third dose. The response was influenced by gestational age (r=0.73); 94% of babies with gestational age 34–36 weeks attained good antibody response compared to only 55% of babies with gestational age of 31–33 weeks. Birth weight had no independent influence on the antibody response.

CONCLUSION: The response to hepatitis B vaccine is influenced by gestational age. Hence, in preterm babies, it is advisable to check antibody titers one month after the third dose to assess the need for a booster dose.


**Abstract:** According to our data, delaying the first dose of HBV vaccine for weeks after a birth carries a "cost": a non-negligible proportion of chronic carriers among every birth cohort. A policy that starts vaccination later than birth is incompatible with the goal of reducing the incidence of chronic liver complications. This is true in sub-Saharan Africa, as well as Asia. At a time when access to treatments and vaccines in developing countries constitutes a priority for health and development policies, HBV vaccine strategies must be implemented respecting the recommendation that universal immunization must be started at birth.


**Abstract:** The latest controlled trial of BCG vaccination in southern India showed that two vaccines failed to confer protection against pulmonary tuberculosis. This result cast serious doubt on the effectiveness of BCG vaccination of the newborn, which is widely applied in developing countries. Therefore, WHO initiated a global research study to evaluate current programmes in developing countries. Part of this study was carried out in Lome, Togo, in which child contacts of newly detected patients were followed up with clinical and radiological examinations. All observations were recorded according to a scoring system. Concomitant observations were made to verify the comparability of the vaccinated and unvaccinated children.
Of the child contacts of 352 index cases, 1,421 completed the examinations. The distribution of the final score made it possible to distinguish 175 children likely to suffer from tuberculosis: 113 among the 546 unvaccinated and 62 among the 875 vaccinated children. Significant incomparability was observed in respect of intensity of exposure: the vaccination coverage was relatively low, and the risk of disease relatively high, if a parent was the index case or the child shared the bedroom of the index case (which very often coincided). The other variables studied, including age and sex, turned out to be practically irrelevant as regards comparability. The estimate of the protective effect against all types of tuberculosis combined is 61.5%, which is slightly lower than suggested by the raw data (66%). The protective effect, however, appeared to increase considerably with severity of disease. In children of 5 years and older it was lower than in the younger children. Tuberculin testing failed to reveal any sensitivity induced by BCG in the vaccinated children. The distribution of the tuberculin reactions correlated poorly with the other diagnostic findings. Small reactions were only slightly more frequent in healthy than in sick children; only the very large reactions were associated with a higher risk of disease. This confirms that the tuberculin test is of very limited diagnostic value in young children.
Miscellaneous Issues


**Abstract:** A new portable, cheap and indigenous incubator made of polystyrene has been devised for delivery of primary health care services to the newborn babies in the community. Twenty six babies with a mean weight of 1726 g (range 1388–1981g) and gestational age of 35.3 weeks (range 34–38 wks) were continuously evaluated for 2 hours observation period, in naked and clothed conditions. Rectal, abdominal skin, foot, ambient air and nursery temperatures were recorded. The baseline core temperature of the babies was 36.58 (+/– 0.21) degrees C; after incubator care it was recorded s 36.80 (+/– 0.10) degrees C in naked infants. The baseline core temperature of the clothed babies was 36.63 (+/– 0.21) while it was 37.01 (+/– 0.18) after 2 hours of incubator care. An ambient air temperature of 33–34 degrees C in the incubator (thermoreutral temperature range for these babies being 31.0–33.8 degrees C) was achieved within 30–60 minutes of incubator stay (nursery temperature being 28 +/– 0.6 degrees C). No evidence of carbon dioxide narcosis, hypoxia, acidosis, or adverse thermoregulatory behavior was observed. One baby had hypoglycemia (blood sugar less than 35 mg/dl) and another had sweating. There is a scope for providing additional facilities like administration of oxygen, phototherapy, X-rays through the incubator without disturbing the baby.


**Abstract:** Thirty-two high-risk newborns requiring continuing special care were transported to one hospital or another. They were transported in styrofoam boxes in order to maintain temperature. Oxygen was bubbled through the ventilatory hole of the box. The babies receiving inotrope infusion continued to receive it during transportation. Babies getting intragastric feed received their feeds 30–45 min. before transportation. No baby became hypothermic or failed to maintain colour or required resuscitation during transportation. Heart rate and respiratory rate remained in an acceptable range.


**Abstract:** The outcome of two hundred and twelve infants transferred in utero and delivered in the regional neonatal intensive care center is compared with one hundred and sixty-six infants born elsewhere and transferred neonatally to the same unit, during the same period of time. The mean birthweight (+/– 1 S.D.) was 1391 g (+/– 415g) for the infants transferred in utero, and 1,398g (+/– 415g) for the infants transferred neonatally. The mean gestational age of the two groups was 29.9 completed weeks for both groups. Survival was defined as discharge from the
neonatal unit and intraventricular hemorrhage was diagnosed ultrasonically. The survival rate was 83% for the group transferred in utero and 70% for the group transferred postnatally (p<less than 0.01). The incidence of intraventricular hemorrhage was 30% and 45% respectively (p<less than 0.01). Using birthweight specific perinatal mortality rates and intraventricular hemorrhage rates of the neonatally transferred group for standardisation, it can be calculated that 27 infants survived and 31 were protected from intraventricular hemorrhage because of in utero transfer. It is concluded that infants likely to require neonatal intensive care have decreased mortality and morbidity if transferred in utero to a center with these facilities rather than being transferred neonatally.


Abstract: The importance of early mother-infant interaction has been recognized all over the world. This article reviews some of the reported influences on the bonding phenomenon and attendant controversies in affluent societies. It also highlights the variation in developing countries in the practices and impact related to this interaction, and presents practical guidelines for the involvement of the mothers with the high risk neonates.


Abstract: The relationship between cesarean delivery and neonatal mortality is presented with information from 292 early neonatal deaths (cases) and 3098 survivors (controls) born in 25 hospitals in Mexico City during the summer of 1984. The overall rate of cesarean delivery was 27%. Variations between health agencies and different social groups were not related to obstetric risk, suggesting that a sizable proportion of the operations were probably unjustified. Babies of normal birth weight (greater than or equal to 2,500gm) delivered by cesarean section were 2.5 times more likely to die in the early neonatal period compared with vaginally delivered babies of the same weight. The excess of mortality could not be explained by the effect of maternal characteristics or complications or by differences in birth weight or gestational age. It is suggested that the conditions under which the operation was performed probably explain the increased risk of early neonatal death. It is likely that poor quality of resuscitation and respiratory care are implicated in the link between “unnecessary” cesarean section and early neonatal mortality.


Abstract: The effects of using the mother or a female attendant to look after the infant in the neonatal special care unit were studied. There was a fall in mortality and a decreased occurrence of aspiration of feeds. The babies also appeared to be more contented as evidenced by their being quieter. There was no increase in the incidence of infections.

**Abstract:** OBJECTIVE: To determine whether vitamin A supplementation at birth could reduce infant morbidity and mortality. STUDY DESIGN: We conducted a placebo-controlled trial among 2067 Indonesian neonates who received either 52 micromol (50,000 IU) orally administered vitamin A or placebo on the first day of life. Infants were followed up at 1 year to determine the impact of this intervention on infant mortality. A subgroup (n=, 470) was also examined at 4 and 6 months of age to examine the impact on morbidity. RESULTS: Vital status was confirmed in 89% of infants in both groups at 1 year. There were 19 deaths in the control group and 7 in the vitamin A group (relative risk=0.36; 95% confidence interval=0.16, 0.87). The impact was stronger among boys, infants of normal compared with low birth weight, and those of greater ponderal index. Among infants examined at 4 months of age, the 1-week period prevalence of common morbidities was similar for vitamin A and control infants. However, during this same 4-month period, 73% and 51% more control infants were brought for medical treatment for cough (p=0.008) and fever (p=0.063), respectively. CONCLUSIONS: Neonatal vitamin A supplementation may reduce the infant mortality rate and the prevalence of severe respiratory infection among young infants.


**Abstract:** Topical therapy to enhance skin barrier function may be a simple, low-cost, effective strategy to improve outcome of preterm infants with a developmentally compromised epidermal barrier, as lipid constituents of topical products may act as a mechanical barrier and augment synthesis of barrier lipids. Natural oils are applied topically as part of a traditional oil massage to neonates in many developing countries. We sought to identify inexpensive, safe, vegetable oils available in developing countries that improved epidermal barrier function. The impact of oils on mouse epidermal barrier function (rate of transepidermal water loss over time following acute barrier disruption by tape-stripping) and ultrastructure was determined. A single application of sunflower seed oil significantly accelerated skin barrier recovery within 1 h; the effect was sustained 5 h after application. In contrast, the other vegetable oils tested (mustard, olive and soybean oils) all significantly delayed recovery of barrier function compared with control- or Aquaphor-treated skin. Twice-daily applications of mustard oil for 7 d resulted in sustained delay of barrier recovery. Moreover, adverse ultrastructural changes were seen under transmission electron microscopy in keratin intermediate filament, mitochondrial, nuclear, and nuclear envelope structure following a single application of mustard oil. Conclusion: Our data suggest that topical application of linoleate-enriched oil such as sunflower seed oil might enhance skin barrier function and improve outcome in neonates with compromised barrier function. Mustard oil, used routinely in newborn care throughout South Asia, has toxic effects on the epidermal barrier that warrant further investigation.

**Abstract:** Neonatal transport in the Third World remains hazardous because of a shortage of human and material resources. An audit of the transportation of 126 surgically ill neonates was undertaken to identify areas where improvement is possible. Failure to maintain simple interventions such as intravenous fluid replacement and nasogastric drainage were found to be more important than inadequate technology in defining the status of the patient on arrival. Investment in education is likely to pay greater dividends than further technological advances.


**Abstract:** This report summarizes the deliberations of a technical working group on the care of sick newborns convened by the World Health Organization in Ankara, Turkey, in June 1995. Emphasis was placed on the clinical management of the most common and severe early neonatal diseases that can be treated with limited resources in the community, health center, or referral hospital. For the purposes of management at the health center, diseases were grouped into four categories based on urgency and similarity of signs and management: severe bacterial infection, local bacterial infection, severe jaundice, and inability to feed. The most important element of newborn care at the health center level is the identification of signs that suggest severe disease and referral of the newborn to the hospital. Workshop proceedings are summarized in four tables: 1) the most common newborn diseases in the first week of life, the presenting signs, diagnostic category, and possible associated maternal complications; 2) danger signs in the first week of life that can be recognized by mothers, families, and health workers; 3) assessment (ask, look, listen, feel) of the newborn at the health center; and 4) classification and identification of treatment at the health center.


**Abstract:** Fifty mothers of high risk infants admitted to the Neonatal Special Care Unit were followed up to the postnatal age of 2.5 mo +/- 15 days. Twenty five mothers (Group I) had stayed in the nursery with the infant for a period of 4.8 +/- 4.6 days until the discharge of the infant, providing expressed milk and participating in the non-specialised care of the infant. The other 25 mothers (Group II) remained separate from their babies for the duration of the latter's stay in the hospital although some of the mothers did come off and on to give expressed human milk and at times handle their infants. Family features such as parental age, educational and occupational status, and presence of residential elder women, were similar in the two groups. Infant characteristics too, such as sex, birth weight, and early neonatal morbidity were also comparable. Operative deliveries and maternal problems were as expected more in the separated group. The duration of the infants' hospital stay was also more in the latter (9.5 +/- 3.5
Subsequent to their discharge, mothers who had stayed with the infant identified the following benefits of their stay—acquiring of knowledge relevant to infant care especially hygiene (19) and their personal involvement in the care of their infant (12), both of which they said increased their self confidence in looking after the babies after discharge, and provision of breast milk round the clock (17).


Abstract: BACKGROUND: As the incidence of tuberculosis (TB) has increased worldwide, it is expected that pregnant women will acquire this infection more frequently. Mycobacterium tuberculosis infection during pregnancy may represent a risk for maternal and neonatal complications. METHODS: We studied the perinatal events of 35 consecutive pregnancies complicated by TB from March 1990 to June 1998; 105 apparently healthy pregnant women were included as controls, matched in age, gestational age upon arrival at the Institute, and socioeconomic status. Frequency and type of neonatal complications were recorded. Relative risk (RR) with 95% confidence interval (CI) was calculated. To control potentially confounding variables, a stratified analysis was performed. RESULTS: Seventeen (48.5%) tuberculous mothers had a pulmonary infection and 18 (51.5%), an extrapulmonar localization of the TB. The neonatal morbidity rate in children born to women with TB was 23% against 3.8% of the children of the control cohort (p<0.05). Average weight of newborn infants of tuberculous mothers was 2,859 +/- 78.5 g, while average weight at birth of control neonates was 3,099 +/- 484 g (p = 0.03). Newborns of women with TB had a higher risk of prematurity (RR 2.1; 95% CI 1–4.3), perinatal death (RR 3.1; 95% CI 1.6–6), and weight at birth less than 2,500 g (RR 2.2; 95% CI 1.1–4.9). Pulmonary localization of the TB and late start of the treatment in the mothers increase the risk of perinatal death and neonatal morbidity. CONCLUSIONS: Children born to women with TB have an increased risk of morbidity and mortality in the neonatal period.


Abstract: In a controlled study on 50 preterms, corn oil was applied every four hours to the entire body in 25 babies and an equal number matched for weight and gestational age served as controls. Rectal temperatures were monitored and maintained when necessary with a warmer. Both groups were fed with breast milk and nursed in the same nursery. Fasting serum triglycerides were estimated in both groups prior to starting the study and at the end of the 72 hours. The study group required use of the warmer for significantly lesser number of hours (P<0.001) as compared to the controls. The serum triglyceride levels also rose significantly (P<0.01) in the study group.

Abstract: Certified nurse-midwives, whose responsibility includes care of the newborn in the first days of life, should be well versed in the commonly used pharmaceutical preparations in the neonatal period. This article reviews therapeutic uses and the pharmacodynamics of vitamin K, as well as the neonatal eye preparations for prophylaxis of infections (silver nitrate, tetracycline, and erythromycin ophthalmic ointments). Preparations used in caring for the umbilical cord, as well as the commonly prescribed antibiotics ampicillin and gentamicin, are discussed. The narcotic antagonist naloxone is also reviewed, along with commonly used medications for colic and thrush. The etiology and clinical conditions that require the application of these medications are considered.


Abstract: The waterproofing effect of a number of creams, oils, and greases was examined by measuring water loss from adult skin before and after topical application. Creams had a high water content and were ineffective, oils produced a modest fall in water loss, but paraffin in grease form had a pronounced, sustained waterproofing effect. A paraffin mixture (80% soft, 20% hard paraffin (BP) was then applied to the skin of 3 preterm babies nursed naked in incubators. Overall skin water loss fell by 40 to 60% after application and was still lower than pretreatment levels 6 hours later. The topical application of paraffin offers a new approach to reduction of the high evaporative water and heat losses of preterm babies.


Abstract: Abdominal sonography of four infants with pyrexia and hepatomegaly demonstrated multiple hypoechoic hepatic and splenic foci, guided biopsies of which showed caseating granulomas with acid-fast bacilli. Evidence of tuberculosis in maternal endometrium and its exclusion in the contacts further confirmed a diagnosis of congenital tuberculosis. Clinical suspicion supplemented by careful sonography facilitated early detection and antemortem diagnosis of this potentially fatal disease.


Abstract: Regular weighing of babies and children is an important aspect of growth monitoring. Teaching Aids at Low Cost (TALC), a charity producing and distributing books, slide sets and growth monitoring equipment for health workers in developing countries, has recently launched a new type of simple spring balance. This uses a spring of comparable accuracy to those in more complex weight scales, whose pointer can directly indicate a child’s weight on its growth chart.
mounted on the scale frame. It is available in 0–5 and 0–17kg versions. The scale is designed for home use by parents and health workers and may help to promote community understanding of growth monitoring. The original field testing of the ‘baby’ (0–5kg) version of the scale was carried out by parents and health workers in Ayrshire. The results have been used in the basic criticism of the scale for use in developing countries. It is suggested that the TALC baby scale may also be useful in community child care in the UK. The use of the scale in developing countries and its possible advantages there are discussed.


Abstract: BACKGROUND: Conservation of energy assumes an important role in the care of infants requiring assisted ventilation, yet little research has been conducted on this group of infants in terms of thermoregulation, oxygenation, heart rate, or sleep states during skin-to-skin care. OBJECTIVES: To compare the impact of two different transfer techniques used in skin-to-skin care (nurse transfer and parent transfer) on physiologic stability and other descriptive measures of physiologic stability related to energy conservation in ventilated preterm infants during and after skin-to-skin care. METHOD: Fifteen ventilated preterm infants weighing a mean of 1,094g were randomly assigned to receive either parent or nurse-to-parent transfer on the first of 2 consecutive days and the alternate method the following day. Temperature was taken before and after skin-to-skin care. Oxygen saturation and heart rate were recorded minute by minute, and the Assessment of Behavioral Systems Observation (ABSO) scale scores was used to measure physiologic organization, motor organization, self-regulation, and need for caregiver facilitation during transfer to and from the parent and during pre, post, and skin-to-skin periods. RESULTS: Temperature remained stable. Oxygen saturation decreased and heart rate increased when the infant was transferred to and from the parent, but returned to baseline levels during and after skin-to-skin care regardless of the transfer method. Infants showed more physiologic and motor disorganization, less self-regulation, and more need for caregiver facilitation during transfers to and from the parent than during the pre, post, and skin-to-skin care periods. CONCLUSIONS: Both transfer methods resulted in physiologic disorganization. However, during and after skin-to-skin care, infants exhibited no signs of energy depletion.


Abstract: What happens during the very earliest years of a child’s life, from birth to age 3, influences how the rest of childhood and adolescence unfolds. Yet, this critical time is usually neglected in the policies, programmes and budgets of countries. Drawing on reports from the world over, The State of the World’s Children 2001 details the daily lives of parents and other caregivers who are striving—in the face of war, poverty and the HIV/AIDS epidemic—to protect the rights and meet the needs of these young children.

Available at: http://www.unicef.org/sowc01/

**Abstract:** Transport of sick neonates is far from ideal in the region and needs attention. Pretransport workup does not exist and no data is available regarding the condition prior to transport. The transport facilities are poor and temperature instabilities occur during transport. Various factors may be responsible for this situation like lack of awareness, financial constraints, improper road conditions and lack of skilled manpower (1, 6–9). Outreach educational programmes should be organized to educate the personnel involved in the neonatal care. The importance of early at risk identification, in utero transport, pretransport stabilization and role of skilled manpower during transport needs to be stressed upon during educational programmes. Feedback to the referring doctors incorporating suggestions for future referrals would go a long way in eliminating the more easily preventable adverse factors.


**Abstract:** OBJECTIVES: Although rubella serosusceptibility among women of reproductive age in West Africa ranges from 10% to 30%, congenital rubella syndrome has not been reported. In Ghana, rubella immunization and serologic testing are unavailable. Our objectives were to identify congenital rubella syndrome cases, ascertain rubella antibody seroprevalence during pregnancy, and recommend strategies for congenital rubella syndrome surveillance. METHODS: Congenital rubella syndrome cases were identified through prospective surveillance and retrospective surveys of hospital records. A rubella serosurvey of pregnant urban and rural women was performed. RESULTS: Eighteen infants born within a 5-month period met the congenital rubella syndrome case definitions, coinciding with a 9-fold increase in presentation of infantile congenital cataract. The congenital rubella syndrome rate for this otherwise unrecorded rubella epidemic was conservatively estimated to be 0.8 per 1000 live births. A postepidemic rubella immunity rate of 92.6% was documented among 405 pregnant women; susceptibility was significantly associated with younger age (P=.000) and ethnicity (northern tribes, P=.024). CONCLUSIONS: Congenital rubella syndrome occurs in Ghana but is not reported. Information about congenital rubella syndrome and rubella in sub-Saharan Africa is needed to evaluate inclusion of rubella vaccine in proposed measles control campaigns.