MODULE THREE:

Hazards, Their Potential Effects and Their Control

The occupational hazards to which health workers are exposed are well documented and generally fall into the following six basic categories:

- **Biological or infectious hazards.** These include infectious and biological agents such as bacteria, viruses, fungi, or parasites that may be transmitted through contact with contaminated material or with bodily fluids or secretions (examples of these hazards include the human immunodeficiency virus [HIV]; hepatitis B and C viruses; tuberculosis bacillus).

- **Environmental hazards.** An adequate water supply and a clean overall environment are basic for protecting workers and patients in a health care center as asepsis and cleanliness are required for successful medical interventions. Adequate natural or artificial ventilation is essential to combat many of the threats to workers’ health such as the transmission of tuberculosis and the exposure to anesthetic gases. In addition, health care facilities generate contaminated water and hazardous solid waste that require proper treatment, processing, and disposal. Ignoring these hazards would put workers and the entire community at risk.

- **Physical hazards.** These hazards involve agents in the work environment such as radiation (X rays, laser, etc.), electricity, extreme temperatures, and noise that can cause tissue damage and other injury.

- **Chemical hazards.** These are various chemical substances that are toxic or irritating to the body system, including medications, solvents, and gases (for example, ethylene oxide, anesthetic gas wastes, glutaraldehyde).

- **Mechanical hazards.** These factors in the work environment increase or augment the risk of accidents, wounds, injury, or discomfort (e.g., poor lifting devices or inadequate equipment, slippery floors, etc.).

- **Psychosocial hazards.** These are factors and conditions associated with work tasks or working environments that cause or augment the risk of stress, emotional strain, and interpersonal problems (e.g., stress, work shifts).

This Manual contains modifications to the above classifications in order to emphasize various hazards particularly relevant to health workers which would otherwise be overlooked. Thus, hazardous waste management, ergonomic hazards, laboratory safety, and violence in the workplace were extracted from other classification categories to become hazard categories in their own right thereby increasing the number of categories in this module to 10.
The order in which hazards are presented in this module is not ranked. The importance of each risk factor varies depending on the type of services provided and the characteristics of the health care facility such as size and location. However, the serious and widespread risk presented by bloodborne microorganisms (chiefly hepatitis B (HBV), hepatitis C (HCV), and human immunodeficiency virus (HIV)) calls for the urgent adoption of control measures.

3.1 BIOLOGICAL AND INFECTIOUS HAZARDS

Biological and infectious agents may be transmitted to a person through inhalation, injection, or by skin contact. Sources include patients, asymptomatic carriers, or vectors such as rats, cockroaches, and mosquitoes. The number of organisms in the environment, coupled with their virulence and a person’s resistance to them, determine whether the person will contract the disease or not.

An infection control program should define the necessary policies, procedures, and practices in order to minimize the risk of disease occurrence and transmission at a health care facility. This requires that workers be consulted and that the effort is supported by all of management and staff.

It is important that the policy and the practice of infection control consider the characteristics and risks of infection for each establishment given that health care facilities vary widely in size, patient population, inpatients, and available resources.

A. Responsibilities

Management Responsibilities

The employer in a health care facility is responsible for providing adequate protection against infections and offering a safe working environment to all staff. At the end of this Manual, you will find references that provide further details on biological safety programs.

Any establishment that provides health services should define safe work practices within the context of hazard identification, assessment, and control. These practices should include:
• baseline monitoring of previous exposures (for example, hepatitis B immunity status, baseline Mantoux, etc.) as a part of recruitment;

• staff access to appropriate testing, vaccinations, and counseling;

• procedures for conducting biological monitoring of workers’ health;

• procedures for reporting illnesses, accidents, and injuries and for conducting appropriate follow-up including the surveillance of occupational and work-related illness and accident occurrence (this is particularly important for the prevention of occupational HIV, hepatitis B, and hepatitis C). Tool 18 presents the EPINET form for registering cuts and needle punctures;

• reporting serious accidents to responsible governmental offices;

• educating and training staff on the principles, policies, and practices of infection control. This applies to all personnel including both those in support positions and clinical staff;

• the implementation of adequate controls including engineering controls such as appropriate ventilation systems (these are very important in the prevention of airborne transmission of infections such as tuberculosis). See links for further information at end of this chapter;

• standard work practices that improve safety (for example, infection control in the administration of injections, Tool 17);

• the provision of necessary personal protective equipment to protect workers’ health (e.g., gloves for general precautionary measures, masks, clothing, etc.) and safety equipment to prevent puncture injuries from needles and other sharp objects (such as hard containers for the disposal of materials used during injections and surgery);

• regular monitoring of the work environment and work practices to assess compliance with infection control as part of the facility’s occupational health and safety policy; and

• practices that ensure that “universal precautions” are implemented throughout the facility.

Worker Responsibilities

All workers are responsible for taking every necessary step to protect their health and that of their workmates, patients, visitors and other users of the health care facility. These practices must be followed in order to ensure that the policies and practices of the facility’s infection control program are implemented.
B. Management of Biological Hazards

In general, Hepatitis B, hepatitis C, HIV, and tuberculosis are among the most important risks for health workers. In addition, many other microorganisms such as influenza, cytomegalovirus, etc. may present occupational hazards for health sector workers.

The policies and practices for controlling risks should cover all tasks and routines related to cleaning the facility overall as well as in specific areas such as isolation wards, operating rooms, patient-care equipment, and the handling of spills.

The following section deals with the most important issues related to the management of biological risks in health care facilities.

Cleaning and Laundry Services

Laundry services also should have safe policies and procedures to collect, handle, store, and distribute linens to ensure that there is no risk of biological contamination. These procedures should cover handling contaminated items and clothing of persons known to be infected.

Vaccinations

Because health workers are often exposed to, and have contact with, persons that are likely to be infected, these workers can be a significant source of transmission (such as transmission of measles to children). This makes it all the more important to have immunization programs in place.

Given the seriousness of hepatitis B, its high prevalence worldwide, and the availability of a highly effective preventative means through vaccination, it is important to implement hepatitis B immunization programs for each worker (17) including the often overlooked workers who collect waste.

Vaccination of workers against hepatitis B:

- should be implemented as early as possible;
- does not routinely require booster vaccines; and
- if possible, should be followed by a determination of antibody response 2–6 months following the last dose.
The following table shows the most highly recommended vaccinations for health care workers in general. This table serves as a guide that should be adapted to local epidemiological conditions and national legislation.

<table>
<thead>
<tr>
<th>GENERIC NAME</th>
<th>ADMINISTRATION SCHEDULE</th>
<th>INDICATIONS</th>
<th>PRECAUTIONS AND CONTRAINDICATIONS</th>
<th>SPECIAL CONSIDERATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>HEPATITIS B RECOMBINANT VACCINE</td>
<td>Two doses IM in the deltoid muscle 4 wks apart (up to 2 months); 3rd dose 5 mo. after 2nd; booster doses not necessary</td>
<td>Workers at risk of exposure to blood or bodily fluids</td>
<td>No apparent adverse effect on developing fetus; not contraindicated in pregnancy. Persons with history of anaphylactic reaction to common baker’s yeast</td>
<td>No therapeutic or adverse effect in HBV-infected persons. Cost-effectiveness of pre-vaccination screening for susceptibility to HBV virus depends on the cost of vaccination, antigen testing, and prevalence of immunity in the group of potential vaccinees; health workers that have ongoing contact with patients or blood should be tested 1-2 mo after completing the vaccination series to determine serological response</td>
</tr>
<tr>
<td>INFLUENZA VACCINE (INACTIVATED WHOLE OR SPLIT VIRUS)</td>
<td>Annual single-dose IM</td>
<td>Workers in contact with high-risk patients or working with chronic care installations; workers with high-risk medical condition and/or are ≥65 yr</td>
<td>History of anaphylactic sensitivity to eggs</td>
<td>No evidence of maternal or fetal risk</td>
</tr>
<tr>
<td>MEASLES LIVE-VIRUS VACCINE</td>
<td>One dose SC, 2nd at least 1 month later</td>
<td>Workers without documentation of (a) receipt of two doses of live vaccine on or after 1st birthday (b) physician-diagnosed measles, or (c) laboratory evidence of immunity</td>
<td>Pregnancy; immunocompromised state (including HIV-infected persons with severe immuno-suppression); history of anaphylactic reaction after gelatin or receipt of neomycin; or recent receipt of immune globulin</td>
<td>MMR is the vaccine of choice if recipients are also likely to be susceptible to rubella and/or mumps; persons vaccinated with (a) killed measles vaccine alone; (b) killed vaccine followed by live vaccine; or (c) a vaccine of unknown type should be revaccinated with two doses of live measles vaccine</td>
</tr>
<tr>
<td>MUMPS LIVE-VIRUS VACCINE</td>
<td>One dose SC, no booster</td>
<td>Workers considered susceptible can be vaccinated; adults born before 1957 can be considered immune</td>
<td>Pregnancy; immunocompromised state; history of anaphylactic reaction after gelatin or receipt of neomycin</td>
<td>MMR is the vaccine of choice if recipients are also likely to be susceptible to measles and/or rubella</td>
</tr>
<tr>
<td>RUBELLA LIVE-VIRUS VACCINE</td>
<td>One dose SC, no booster</td>
<td>Workers of both sexes who lack documentation of receipt of live vaccine on or after their 1st birthday or of laboratory evidence of immunity; adults born before 1957 can be considered immune, except women in childbearing age</td>
<td>Pregnancy; immunocompromised state; history of anaphylactic reaction after gelatin or receipt of neomycin</td>
<td>Women pregnant when vaccinated or who became pregnant within 3 mo. of vaccination should be counseled on the theoretic risks to the fetus, the risk of rubella vaccine-associated malformations in these women is negligible; MMR is the vaccine of choice if recipients are also likely to be susceptible to measles and/or mumps</td>
</tr>
<tr>
<td>CHICKENPOX-ZOSTER LIVE-VIRUS VACCINE</td>
<td>Two 0.5 ml doses SC 4-8 wk apart if ≥13 yr</td>
<td>Workers without reliable history of varicella or laboratory evince of varicella immunity</td>
<td>PREGNANCY, immunocompromised state; history of anaphylactic reaction after receipt of neomycin or gelatin; salicylate use should be avoided for 6 wk after vaccination</td>
<td>Because 71-93% of persons without a history of varicella are immune, serologic testing before vaccination may be cost-effective</td>
</tr>
</tbody>
</table>
Universal Precautions and other Standard Precautions

“Universal precautions” are those that the entire health personnel apply to all outpatients and inpatients, regardless of their presumed infectious status. These precautions assume that the blood of any person (or any substance contaminated with blood) may be infectious. Precautions are required to reduce the risk of disease transmission from known or unidentified sources of infection.

Standard precautions combine the most important aspects of universal precautions (designed to reduce the risk of transmission of bloodborne pathogens) and the isolation of other bodily substances (designed to reduce the risk of transmission of pathogens from moist bodily substances). Standard precautions include, but are not limited to, handwashing, use of protective gloves, and use of barrier protection. These precautions are established according to the type of services dispensed, clientele, etc.

Websites with more detailed information on standard precautions by type of services are listed at the end of this chapter.

Minimal Precautions

At a minimum, every health service should implement the following general precautions for its workers:

- Avoid contact with blood and all bodily fluids, secretions, and excretions except sweat (whether they contain blood or not), broken skin surfaces, and mucous tissue, by:
  - using gloves in operating rooms and elsewhere. Gloves should be doubled during surgical operations where extensive exposure to blood is expected;
  - using masks, face shields, protective eyewear, and gowns where spills or effusions may occur;
  - using waterproof bandages to cover the worker’s cuts and wounds;
  - immediately cleaning and decontaminating all spills, blood spots, and other bodily fluids;
- preventing injuries from sharp objects; not covering needles; using puncture-proof containers to dispose of used needles, etc

- Provide rigorous training in the basic techniques for using sharp instruments
- Combat fatigue by establishing rest periods
- Establish an institutional approach for treating exposure to accidents

Treatment after Exposure

The institution’s approach to post-exposure treatment should include:

- a sustained educational campaign on hazardous exposure for the entire facility;
- a protocol on immediate exposure management made available in the work areas;
- post-exposure assistance within one hour;
- a protocol for handling questions on problems such as hepatitis B, syphilis, etc. (not HIV);
- antiretroviral agents that are immediately available;
- a protocol for examining the “source patient”;
- availability of medical follow-up for those who decide to undergo antiretroviral chemotherapeutic prophylaxis;
- confidential medical registry of exposure; and
- serological follow-up of all involved patients.

The following table shows the norms that the United States Federal Government uses for the post-exposure prophylaxis to materials potentially contaminated with hepatitis B virus.
### Table: Recommended Post-exposure Prophylaxis for Exposure to Hepatitis B Virus

<table>
<thead>
<tr>
<th>Vaccination and antibody response status of exposed workers*</th>
<th>Source HBsAg† Positive</th>
<th>Source HBsAg Negative</th>
<th>Source Unknown or Not Available for Testing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unvaccinated</td>
<td>HBIG§ x 1 and initiate HB vaccine series¶</td>
<td>Initiate HB vaccine series</td>
<td>Initiate HB vaccine series</td>
</tr>
<tr>
<td>Previously vaccinated Known Responder**</td>
<td>No treatment</td>
<td>No treatment</td>
<td>No treatment</td>
</tr>
<tr>
<td>Known Non-Responder††</td>
<td>HBIG x 1 and initiate revaccination or HBIG x 2§§</td>
<td>No treatment</td>
<td>If the high risk source is known, treat as if source were HBsAg positive</td>
</tr>
</tbody>
</table>

- * Persons who have previously been infected with HBV are immune to reinfection and do not require post-exposure prophylaxis.
- † Hepatitis B surface antigen
- § Hepatitis B immune globulin; dose is 0.06 mL/kg intramuscularly.
- ¶ Hepatitis B vaccine
- ** A responder is a person with adequate levels of serum antibody to HBsAg (i.e., anti-HBs >10 mlU/mL).
- †† A nonresponder is a person with inadequate response to vaccination (i.e., serum anti-HBs <10 mlU/mL).
- §§ The option of giving one dose of HBIG and reinitiating the vaccine series is preferred for nonresponders who have not completed a second 3-dose vaccine series. For persons who previously completed a second vaccine series but failed to respond, two doses of HBIG are preferred.
- ‡‡ Antibody to HBsAg


Several tools that can be used for managing biological risks are presented in the final section of this Manual. Tool 15 presents tables organizing the use of personal protective equipment by the task performed. After adaptation for local use, these tables may be kept in places where workers can consult them before beginning their respective tasks. Tool 17 provides WHO norms, including the most adequate practices for the control of infections when administering injections. Tool 18 is a form for registering wounds caused by needles or sharp objects (based on the EPINET surveillance system) that is widely used in many countries that have experience in occupational health and safety management.

### ADDITIONAL INFORMATION

**GENERAL:**

(ENGLISH)
CDC. http://www.cdc.gov/ncidod/hip/isolat/isopart2.htm

Prevention of Infections (including guidelines for immunization and PEP): Updated U.S.
Public Health Service Guidelines for the Management of Occupational Exposures to HBV,
http://www.cdc.gov/mmwr/preview/mmwrhtml/box5#box5


Warning Signs on Infectious Transmissions for Healthcare Facilities, hchsa, Ontario, Canada.
http://www.hchsa.on.ca/products/resrcdoc/lap_010.pdf


http://www.hchsa.on.ca/products/resrcdoc/lap_263.pdf

GEN-06. Green Birthdays. Health Care without Harm.
Publications: contact Jolie Patterson atjpatterson@hcwh.org to receive free brochures.

Precautions Against Bio Hazards (POSTERS). HCHSA Ontario.
http://www.hchsa.on.ca/products/resrcdoc/lap_010.pdf


Developing Infection Control Policies & Procedures: Information for Care Providers.
Health Care Health & Safety Association (HCHSA) of Ontario.

(PORTUGUESE)

Site em português de Saúde Ocupacional no Setor de Saúde da União Européia
http://europe.osha.eu.int/good_practice/sector/healthcare/pt/

Lavar as Mãos – informações para o profissional de saúde
http://www.cvs.saude.sp.gov.br/zip/lavar.zip

Portaria 37 - proposta de texto de criação da Norma Regulamentadora N. ° 32 – Segurança e
Saúde no Trabalho em Estabelecimentos de Assistência à Saúde.


(SPANISH)
TUBERCULOSIS:

(ENGLISH)

English version: http://www.who.int/gtb/publications/healthcare/summary.html


Stop Tb: Guidelines for Workplace Tb Control. WHO. 2003

Guidelines for Preventing the Transmission of Tuberculosis in Canadian Health Care Facilities and Other Institutional Settings. Volume: 22S1 • April 1996.

(Spanish)

Normas para la prevención de la transmisión de la tuberculosis en los establecimientos de asistencia sanitaria en condiciones de recursos limitados. OMS. 2002
http://www.who.int/gtb/publications/healthcare/Sp/index.htm

HEMATOGENIC PATHOGENIC AGENTS:

(ENGLISH)

EPINet, International Health Care Worker Safety Center University of Virginia. Dr. Janine Jagger. www.med.virginia.edu/epinet

http://www.hopkins-heic.org/disease_exposures/STIXguidelines.htm

Exposure to Blood: What Health-Care Workers Need to Know. CDC

Updated U.S. Public Health Service Guidelines for the Management of Occupational Exposures to HBV, HCV, and HIV and Recommendations for Postexposure Prophylaxis. CDC. June 29, 2001 / 50(RR11); 1-42.
http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5011a1.htm

AN INTEGRATED PROTOCOL TO MANAGE HEALTH CARE WORKERS
Environmental hazards occur frequently in Latin American and Caribbean (LAC) health care facilities. Most of the time, these hazards are generated by:
• inadequate supply, distribution, and availability of water for human consumption;

• air quality problems in confined spaces that aggravate chemical and biological hazards; and

• improper handling of hazardous solid waste (this item will be treated in detail in the section entitled “Hazardous Solid Waste” found later in this chapter).

PAHO offers guidance on the use of appropriate technology for dealing with these environmental hazards.

### 3.2.1 Water Supply for Health Care Establishments

The principal hazards associated with water supply in health care establishments are:

• water scarcity due to low coverage of the water supply system, intermittent supply, or inadequate installations and maintenance at the health care facility;

• contamination of water supplies due to inadequate or nonexistent management, treatment, and protection of water sources by municipal authorities or contamination of the establishment’s water sources caused by improper discharge of wastewater; and

• environmental contamination of the buildings due to inadequate treatment of municipal wastewater. Only 14% of all Latin American and Caribbean (LAC) wastewater drainage networks lead to some kind of wastewater treatment and only half of those are sanitary.\(^\text{18}\) This often results in the contamination of the entire surrounding area, making it necessary to treat the establishment’s wastewater before it leaves the premises because it contains infectious, radioactive, and laboratory subproducts and sterilizing agents.

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The consequences of disregarding environmental hazards include a risk of infectious and parasitic diseases to workers and patients because necessary antiseptic routines cannot be maintained or harm to medical procedures such as hemodialysis that have strict norms for the water that is being used. The ecosystem and the entire population in the area may also be put at risk.

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### 3.2.2 Air Quality Problems

Air quality problems in a health care facility are mainly due to:
• improper flooring material - the insufficient cleaning of floors may lead to infections and allergic conditions; excessive use of sterilizing agents are associated with neoplastic and reproductive diseases; and vinyl and latex spills are associated with allergies;

• air conditioning and ventilation problems - air flow should move from a less contaminated area toward a more contaminated one in order to protect workers against transmission of tuberculosis and inhalation of hazardous substances;

• laser fumes that may contain viruses, dead cells, and toxic gases that promote visual problems and cellular mutation;

• cigarette smoke from smoking workers or visitors;

• asbestos - this compound is often seen in heat-resistant laboratory gloves that begin to break down at high temperatures as well as in the insulating material used in chimneys and ceilings. It is a causal to lung, stomach, and brain cancer and tumors as well as other pulmonary problems; and

• lead-based paints - this has been linked to different forms of anemia, hypothyroidism, male reproductive problems and various renal, cardiac, and cerebral problems.

ADDITIONAL INFORMATION:

(ENGLISH)

http://www.cepis.ops-oms.org/indexeng.html


Health Care without Harm Publications:
Contact Jolie Patterson at jpatterson@hcwh.org to receive free brochures

GEN-06 Green Birthdays

MER-02 Protecting by Degrees: What Hospitals Can Do to Reduce Mercury Pollution

(PORTUGUESE)
3.3 HAZARDOUS SOLID WASTE

Health care facilities produce large quantities of hazardous solid waste generated during various phases of medical care such as diagnoses, treatment, immunization, research, etc. These wastes are sources of infectious, neoplastic, and reproductive diseases.

In addition to common waste (administrative, foodstuffs, packing materials, etc.), there are other types of medical waste, such as:

- infectious waste, meaning waste that contains pathogens; and
- special wastes - corrosive, reactive, flammable, toxic, explosive, or radioactive materials.

The establishment that generates the waste should be responsible for ensuring its safe disposal through an environmental waste management policy that conforms with legal requirements. The procedure adopted should protect the health and safety of those in the facility and in the community.

In order to protect persons charged with waste disposal from risk of HIV or hepatitis, for example, through accidents involving contaminated sharp objects, solid waste disposal containers must be closed before they are completely filled to avoid accidents. In addition, refuse collectors should be given personal protective equipment (special gloves, etc.) and should be provided with training and vaccination against hepatitis B.

Policies for handling hazardous waste should be developed in consultation with the workers who generate and handle the waste and those who dispose of it. The chain of
responsibility, and the responsibilities at all levels of the organization, have to be identified as the policy is developed and implemented.

Waste management policies should cover the entire process, from the origin of the waste to its final destination. At a minimum, policies should cover:

- the identification of waste materials;
- a comparison between the benefits of using the materials and the problems linked to their disposal;
- preparation of a transport and disposal flowchart from the waste’s point of origin to its final destination;
- clear assignment of responsibilities at each step in the process; and
- training of personnel on waste management procedures and hazards.

It is unclear which practices are best for the final disposal of institutional solid waste. Controversies include economic and organizational factors and the environmental risks of incinerators, among others. The safest strategies involve minimizing waste, which can be attained by separating waste; working on source reduction, recovery, and recycling; and properly treating and disposing of the waste.

**FURTHER INFORMATION**

(ENGLISH)


PAHO (1995) GUIDELINES FOR THE INTERNAL MANAGEMENT OF SOLID WASTES AT HEALTH CARE CENTERS


Health Care without Harm Publications: contact Jolie Patterson at jpatterson@hcwh.org to receive free brochures

- GEN-06 Green Birthdays
- MWT-02 Medical Wastes Treatment Technologies: Evaluating Nonincineration Alternatives
• MWT-03 Non-Incineration Medical Waste Treatment Technologies


(PORTUGUESE)

NBR 12809, INMETRO


Centro de vigilância Sanitária. Listagem de normas técnicas referentes a resíduos de serviços de saúde http://www.cvs.saude.sp.gov.br/publ_leis3.html

(SPANISH)


Gestión y Tratamiento de los Residuos Generados en los Centros de Atención de Salud http://www.ccss.sa.cr/germed/gestamb/samb06b4.htm

3.4 PHYSICAL HAZARDS

Physical hazards that affect health workers include exposure to noise, vibration, ionizing and nonionizing radiation, and electricity. A systematic survey should be conducted in order to identify all possible hazards. For the purposes of identification, an inspection can be conducted during the installations with a properly trained person or a selected group representing the Health and Safety Committee following consultations with workers in each area. All hazards and potential risks should be identified and recorded.

Tools 11 and 12 in the final section of this Manual present two checklists that can aid in identifying occupational hazards, including physical hazards. These checklists can be used during an inspection of the installations.

After identifying hazards and their potential effects, risks should be assessed to establish which ones can cause serious harm (Tool 14). Once priority hazards have been identified, a series of steps ranked by importance should be implemented to eliminate, isolate or minimize these risks.
3.4.1 Noise

Exposure to excessive noise levels may cause hearing loss and annoyance. Excessive noise levels also can interfere with communication and lower performance.

Excessive noise levels may be encountered in various areas of a health care facility such as in workshops, laundry areas, and orthopedic units, as well as in areas where plaster casts are prepared. A preliminary assessment should be conducted to identify the areas where noise levels exceed or could exceed permissible exposure levels.

A more detailed assessment may be necessary in order to:

- determine noise levels to which workers are exposed;
- help identify sources of noise;
- develop noise control strategies; and
- determine the needs for hearing protection.

A clear hierarchy of controls should be adopted, making the control of risk due to noise through engineering controls the highest priority. When dealing with machinery or processes where engineering controls do not sufficiently reduce noise levels, exposure should be reduced by isolating workers from the noise. Personal noise protectors should be used continuously only when engineering controls and isolation are not feasible.

As new techniques are developed to control noise, management must stay on top of technological advances and be prepared to purchase the most effective equipment for noise reduction as it becomes available.

Many countries have specific noise-reduction regulations. In the United States, for example, the allowable limit for an eight-hour workday is 90 dBA. Hearing protection programs are mandatory for workers who work eight hours at an average level that exceeds 85 dBA. In Brazil, the law sets an 85 dBA limit for an eight-hour work day and requires the implementation of a hearing protection program.

**Hearing Protection Program**

Excessive noise can be controlled by introducing hearing preservation programs in the workplace. Such programs may include:
• identifying the risk of hearing loss in the workplace;
• assessing noise hazards;
• developing a noise abatement policy;
• implementing control measures;
• conducting periodic audiometric testing of all employees continually exposed to excessive noise;
• providing training in noise reduction and prevention;
• disseminating information to ensure that workers perform work tasks in a safe and healthy manner; and
• consulting with the workers at each step of the process.

FURTHER INFORMATION

(ENGLISH)

New Zealand’s OSH Publications:

Management of Noise at Work: Resource Kit, including

• Control Guide: Management of Noise at Work
• Approved Code of Practice for the Management of Noise in the Workplace
• List of Graded Hearing Protectors
• Fact Sheets and Employee Booklets


Noise-induced Hearing Loss - A Message to Employees on Preventing Hearing Loss

USA:


(PORTUGUESE)

3.4.2 Vibration

Noise processes are often associated with vibration. Intense vibration may be transmitted to workers who drive vehicles or use hand-held equipment or tools. Workers may be exposed to vibration in different ways:

- whole body exposure, as while driving an ambulance; or
- partial or local body exposure, as while using vibrating tools such as drills in orthopedic rooms.

Exposure to whole body vibration is primarily associated with lumbar pain and early degeneration of the spine. Operators of hand-held vibrating tools have an increased risk of “white finger syndrome.” In addition, vibration can affect tendons, muscles, bones, joints, and the nervous system. As a whole, these effects are known as “hand-arm vibration syndrome.” Exposure to cold can aggravate hand symptoms.

Exposure should be controlled at all times and kept within limits that protect from adverse health effects. International standards and other documents contain recommendations for limits (for example, see ISO 2631 and ISO 5349). Obviously, the most effective control is to reduce vibration. This includes:

- ascertaining the vibration levels in a given tool or machinery before deciding to purchase it; wherever possible, low-vibration equipment should be chosen;
- considering whether the work can be done without high-vibration tools;
- using tools designed to minimize vibration;
- providing good maintenance of tools and equipment;
- assuring that workers use tools correctly; and
- changing work to reduce the grip and pressure the worker needs to apply.
When workers must carry or use high-vibration tools, other measures may be adopted to assist in the reduction of harmful effects, such as:

- the establishment of work breaks to avoid long periods of continuous exposure to vibration
- showing workers hand and finger exercises to stimulate blood flow; and
- informing and training workers on vibration hazards, signs of injury, risk reduction methods, and reporting of any symptoms.

FURTHER INFORMATION

(ENGLISH)

ISO 5349: 1986. Mechanical vibration - Guidelines for the measurement and the assessment of human exposure to hand-transmitted vibration

3.4.3 Radiation

Management in a health facility that uses any source of radiation is responsible for:

a) protecting exposed workers and

b) complying with all technical standards.

3.4.3.1 Non-ionizing Radiation

As with visible light, non-ionizing radiation can increase the temperature of a targeted object. The different types of non-ionizing radiation include radio frequency waves, microwaves, infrared light, visible light, ultraviolet radiation, lasers, magnetic fields, and ultrasound.

Ultraviolet Radiation

Ultraviolet radiation is used in certain dermatological procedures. It also is used as a germicidal lamp in tuberculosis control. Germicidal lamps are used to disinfect foodstuffs, in the sterilization of equipment, in phototherapy lamps, and in illuminating lamps. The biological effects of exposure to ultraviolet light are due to damaging photochemical reactions in living tissue and depend on the wavelength range of the radiation. Since penetration is low, effects are limited to the anterior parts of eyes and to
unprotected skin causing temporary conjunctivitis, partial loss of vision, early aging of the skin, and cancer of the skin.

When sources are sufficiently intense to pose a risk, protection against overexposure can be achieved by combining:

- administrative control methods;
- engineering control methods; and
- personal protection.

Administrative and engineering controls should be given priority so as to minimize the need for personal protection.

**Lasers**

Laser radiation may damage living tissue, primarily by a thermal effect. The extent of damage depends on the frequency of the radiation, the intensity of the beam, the duration of exposure, and the type of exposed tissue. The most sensitive tissues are those of the eyes and the skin - the retina may be temporarily or permanently damaged, skin may sustain burns, and tissue proteins may be denatured.

Lasers are used in surgery, microsurgery, blood tests, ophthalmologic surgery, and dental procedures.

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**In general, the number of persons exposed in the vicinity of a working laser should be minimized, and the duration of their potential exposure should be kept as short as possible. Laser operations should be under the control of a competent person who is aware of the hazards. A functioning laser should only be accessible to authorized personnel.**

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The potential hazards from direct or reflected emission may be reduced using physical barriers (closed rooms, absorbent panels, closed instrument cases), interlocks, and beam shutters.

Health care facilities should launch special laser safety programs. Exposed workers should be educated and trained in laser precautions. At a minimum, these programs should include:

- policies and practices for the safe use of lasers;
• training of workers in the proper use of lasers;

• assurance that the points of laser impact are free of flammable or combustible substances;

• warning signs placed at the entrance of laser-use areas; and

• precautions that are put in place for the safe use of lasers, including:
  
  - providing eye protectors, protective eyeglasses, or goggles to patients and exposed workers and ensuring that they are properly used;
  
  - protecting eyes, skin, and tissue during laser use;
  
  - extracting fumes at the source (e.g., isolation) whenever particulate matter is produced and providing high-filtration masks (or respirators if this is unfeasible); and
  
  - providing baseline and periodic medical surveillance (e.g., eye and skin examinations) of exposed personnel.

**Microwave and Radio Frequency Radiation**

These can be dangerous because they can produce heat within body tissue. The degree of heat depends on the radiation’s intensity, the duration of exposure, and the tissue’s water content and its capacity to dissipate heat. A potential effect of this type of radiation is an observable decrease in sperm count.

Microwaves are generally used for cooking or heating meals or in patient rooms. They also may be found in physiotherapy or surgery areas where they are used to heat up various elements. Microwaves can cause disturbances in pacemakers. Warning signs should be posted where microwaves are present.

Radio frequency radiation is found in communication systems that transmit radio waves, walkie-talkies, and cellular telephones used at the facility. They also are found in telemetry systems and cardiac monitors, magnetic resonance procedures, and improperly covered video terminals. Warning signs should be posted wherever radio frequency radiation may cause injury.

**Infrared Radiation**

Exposure to infrared radiation can occur during laser and thermographic operations. They may cause skin burns and eye injuries.
**Ultrasound**

Ultrasound is used in physical therapy, surgery, diagnostic procedures and obstetrics. Ultrasound consists of high-frequency sound waves that cannot be detected by the human ear.

Although ultrasound apparently does not pose harm to health, exposure to auditory radiation greater than 19 kHz may result in a syndrome involving nausea, migraine headache, tinnitus, pain, dizziness, and fatigue. Temporary hearing loss also could occur.

Low-frequency ultrasound radiation also could have consequences for persons who touch areas where ultrasound is being applied. Exposure to potent ultrasound sources may cause injuries to the peripheral nervous system and to vascular structures at contact points.

Workers who operate or install ultrasound equipment may need to use adequate protective equipment for a given task if there is a probability of exposure to radiation higher than 10 kHz or low frequency radiation.

**Cellular Phones**

Because cellular telephones use high frequencies, they may interfere with electromedical equipment. Studies have shown that cell phones generate enough electromagnetic interference to reach up to 2 m. Through this distance, interference can go through solid concrete walls, floors, and ceilings, as well as a room’s interior. Obviously, there must be a clear policy on the use of cellular telephones in a health care establishment.

### 3.4.3.2 Ionizing Radiation

Ionizing radiation has the same properties as non-ionizing radiation with an added capability of producing ions in the exposed material. This ion production may result in direct damage to cellular genetic material and/or the production of cytotoxic materials (e.g., peroxide).

The different types of ionizing radiation are:

- alpha particles;
- beta particles;
- neutrons;
- X rays; and
- gamma radiation.

Ionizing radiation is used in a variety of treatment and diagnostic procedures, such as:

- X rays
- fluoroscopy
- angiography
- computerized axial tomography (CAT or CT scan)
- nuclear medicine scans
- teletherapy
- cobalt treatment

The effects of ionizing radiation are cumulative and can, in the long run, damage tissue. Patients and workers must be monitored and protected against scattered and direct non-essential exposure.

There are several chemical products (radiopharmaceuticals) that contain radioactive substances such as unencapsulated radioisotopes that are injected or implanted into patients. These radioactive substances are potentially absorbable. Normal use of these products causes none or minimal risk to workers, but certain accidents, such as spills, may expose workers to high radiation levels. It is therefore necessary to comply with guidelines for the handling of these substances.

Radiological Protection

The basic principle of radiological protection is to avoid all unnecessary exposure to radiation. Three fundamental strategies should be adhered to:

- **Time.** The shorter the duration of exposure, the lower the dose. Very careful work planning is therefore recommended to avoid unnecessary exposure.

- **Distance.** The greater the distance from radiation source, the lower the dose. Distance provides highly effective protection against radiation exposure.
• **Protective shielding.** If physical conditions preclude reducing radiation’s intensity by increasing distance, adequate absorbent material should be placed between the worker and the radiation source such as lead aprons and other leaded barriers.

Among additional recommendations of ILO, WHO, and PAHO on occupational exposure to ionizing radiation, the following principles deserve mention:

• Work conditions should not depend on whether there is a possibility of occupational exposure. Special remuneration, agreements, or preferential treatments in terms of salary, insurance coverage, work hours, vacation time, additional days off, or retirement benefits should not be granted or used as substitutes for a provision of appropriate safety measures that ensure the required conformance to corresponding standards.

• Any woman worker should notify her employer if she thinks she is pregnant so that her working conditions can be modified accordingly. Pregnancy notification cannot be used as a reason to exclude a worker from her job. Rather, the employer must adapt working conditions to ensure that the fetus receives the same protection from exposure as does the public at large.

• No worker under age 16 shall be engaged in work involving ionizing radiation.

• No worker under age 18 shall be authorized to work in a controlled area unless under supervision and only for training purposes.

**Video Terminals and Computers**

Most video terminals today are based on cathode ray tube (CRT) technology. CRT emits various types of ionizing and non-ionizing radiation. There is no conclusive study to date that shows the health effects of occupational exposure to radiation emitted by video terminals. At the same time, there is no assurance that they are harmless. Alternative technology such as the most recent generation of terminals - liquid crystal display (LCD) - exposes workers to lower radiation levels.

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**FURTHER INFORMATION**

(ENGLISH)


OSHA: http://www.epa.gov/radiation/index.html


Control of Smoke From Laser/Electric Surgical Procedures, NIOSH. http://www.cdc.gov/niosh/hc11.html

(PORTUGUESE)

COMISSÃO NACIONAL DE ENERGIA NUCLEAR (CNEM)


(SPANISH)

International Comission on Non-ionizing Radiation Protection: Recomendaciones para Limitar la Exposición a Campos Eléctricos, Magnéticos y Electromagnéticos (hasta 300 GHz)


Efectos de los Riesgos Ocupacionales en la Salud Reproductiva de la Mujer, NIOSH. http://www.cdc.gov/spanish/niosh/docs/99-104sp.html

3.4.4 Electricity

Improper use of electricity may cause death or serious injury. The health care facility should ensure that all electrical equipment and fixtures pose no risk to the health and safety of workers, patients, and other users.

In general, a health care facility’s manager or administrator should ensure that:

- adequate equipment has been chosen for each task, taking into account the environment, the design, and capacity;

- equipment has been properly installed by a competent person, adhering to the manufacturer’s instructions. If doubt exists concerning the possible electric overload when a new machine is brought on line, an electrician should be consulted;

- operators have been properly trained in the use of the equipment and understand that defective, obsolete, redundant and home-made or home-repaired equipment is unacceptable in the workplace; and

- all electrical equipment is properly maintained by qualified persons; “Do Not Use” and “Lockout” signs may be used when necessary.

Principal subcontractors should ensure that all independent employers and workers in a project comply with electrical safety requirements.

Inspections and regular checks of all electric equipment in the unit are good preventive and maintenance practices.

All new equipment should be inspected before first use, preferably by an authorized electrician. This is particularly important in the case of imported equipment in order to verify that they comply with national electrical safety specifications.

Electrical installations in hazardous areas such as locations where ignitable dust, vapors or gases may accumulate should be especially designed. This may imply the use of fire-resistant equipment, purging systems, intrinsically safe and/or dust-eliminating equipment, and protective equipment against ignition. If the ambient air is highly corrosive, protecting the equipment or using different equipment is recommended.

High-voltage Equipment
Some laboratory equipment such as electrophoresis baths utilize energy supplies capable of delivering high voltages and currents. This type of equipment and its power supply should incorporate:

- automatic breakers if ground leaks are detected;
- protection against overloads to safeguard the supply unit;
- security breakers to shut off power;
- grounded outlets;
- unobstructed air intakes;
- clean, unsaturated dust filters; and
- operation strictly in accordance with manufacturer’s specifications.

Once this type of equipment is in use, the unit and the power supply should be labeled using signs with the warning, “DANGER – HIGH VOLTAGE”.

**FURTHER INFORMATION**

(ENGLISH)


NZECP12: 1993 New Zealand Electrical Code of Practice for Electrical Installations - The Safe Use of Electricity in Medical Locations and Associated Areas

Standards of the United States of America

AS 2500: 1986 Guide to the Safe Use of Electricity in Patient Care

AS 3003: 1995 Electrical Installations - Patient Treatment Areas of Hospitals and Medical and Dental Practices


**3.5 CHEMICAL HAZARDS**

Several factors can affect the injuries caused by chemical hazards in the workplace. These factors include the toxicity and physical properties of the substances, work practices, the nature and duration of exposure, the effects of combined exposure, the routes of entry to the body, and the worker’s susceptibility.
A chemical safety program’s main objective is the systematic identification and investigation of potentially harmful risks so as to minimize the occurrence of damaging effects on health caused by chemical substances in the workplace.

The program should define ways to ensure that workers potentially exposed to chemical agents are offered education and training on the nature of the risks and ways to assess and control chemical exposures. This includes safe storing and emergency plans.

Transport, storage, and disposal of chemical wastes and therapeutic and diagnostic agents should comply with toxic waste/residue management policies.

**Principles of Operational Control**

The principles of operational control for the use of chemical products are:

- eliminating hazardous substances wherever feasible;
- substituting a less hazardous substance or process (for example, a less flammable solvent);
- isolating the hazard by increasing the distance or erecting a barrier between the substance and the worker;
- minimizing the risk during installation by providing overall and local ventilation to remove or reduce the concentration of airborne contaminants such as fumes, gases, vapors, and mists;
- establishing engineering controls to control or minimize the generation of hazardous substances (for example, smoke extractors)
- protecting workers by providing personal protective equipment to prevent physical contact with contaminants; and
- establishing safe work practices; these usually include management decisions that require workers to work in a safe manner (for example, giving access to authorized persons only; reducing re-exposure time; systematic cleaning and decontamination, etc.).

**Potentially Hazardous Chemical Substances**

Health care workers are potentially exposed to many chemical substances in the workplace, such as:
• anesthetic waste gases and vapors (nitrous oxide, enflurane, halothane, isoflurane);
• chemotherapeutic agents (antineoplastic, cytotoxic, antiviral, and antibacterial drugs);
• cleaning agents (disinfectants such as isopropyl alcohol, iodine, betadine, chlorine);
• sterilizing agents (such as glutaraldehyde, ethylene oxide);
• X-ray developing agents;
• insecticides and rodenticides;
• medications;
• soaps and detergents;
• solvents (such as ethanol, acetone, benzoin);
• tissue fixers and agents;
• inorganic mercury;
• latex.

The following sections summarize the most common categories of chemical hazards.

3.5.1 Aesthetic Gases and Wastes

*Occupational exposure to anesthetic gases may cause spontaneous abortions, infertility, congenital malformations, and cancer. Nitrous oxide is also responsible for hematological abnormalities and neurological injuries, while enflurane (ethrane®) is also hepatotoxic, a nervous system irritant, and cardiotoxic.*

Anesthetic gases may be released into work areas such as operating rooms, patient recovery areas, and delivery wards.

While most gas leaks occur through defective equipment seals, poor administrative techniques and exhalation by patients also can be sources. Low levels of nitrous oxide, halothane, enflurane, and isoflurane may be released by any of these means. Exposure to gases generated by anesthetic vaporizers while the anesthesia technician fills the vaporizer also may occur.
Recommendations

Adequate ventilation, gas scavenger systems for extracting waste and exhaled gases in induction masks, and regular checks of anesthetic equipment are important components of exposure reduction programs.

3.5.2 Chemotherapeutic Agents

Some medications may be extremely dangerous for those handling them frequently in their work. This category of chemical substances includes most of the antineoplastic agents (used in the treatment of cancer and other tumors) such as vincristine, dacarbazine, mitomycin, cytosine, arabinoside, and fluorouracil. The handling of antibacterial, antiviral, and other classes of drugs (e.g., interferon A, chloramphenicol, etc.) also requires special precautions.

The most severe dangers are mutagenicity (cancer) and genotoxicity (malformations in children and fetal loss).

The greatest risk of occupational exposure to cytotoxic drugs occurs while they are being prepared and administered. Other aspects of patient care such as the management of spills and waste may generate additional occupational hazards.

There are no available screening tests that reliably assess exposure. Employers are responsible for ensuring that the employees who are involved in the handling of cytostatic drugs are aware of the latest techniques for monitoring their exposure and health.

Recommendations for Health Care Facilities that Use Cytotoxic Drugs

- All workers who could be exposed should be fully informed of all potential hazards and of the need to take adequate precautions.

- Written policies and procedures must be set.

- Management should invest in educational and training programs in order to teach personnel about the hazards associated with handling these types of drugs, the different exposure routes, and the ways to protect themselves and others from unnecessary exposure.
• Adequate safety measures should be taken in preparing and administering drugs to patients, managing spills, and routinely disposing of wastes as ways to reduce unnecessary worker exposure.

• Any direct exposure should be documented for future consultations.

3.5.3 Sterilizing Agents

This section describes some of the most frequently used agents in health care establishments.

Ethylene Oxide

Ethylene oxide is used in the health industry as a sterilizing agent for accessories and medical equipment. Hospital areas that use sterilizing agents include operating rooms, supply centers, renal dialysis units, departments of respiratory therapy, and areas with autoclaves. Its use is particularly important in the sterilization of items that are sensitive to heat and humidity such as some plastics that cannot, therefore, be sterilized with vapor.

There is evidence that the inhaled gas may cause leukemia among sterilization service personnel. The liquefied gas provided in gas cylinders can cause dermatitis, blisters, and burns when spilled or splashed upon the skin. It has also been reported that ethylene oxide induces premature births and abortions after exposure during pregnancy.

Recommendations

• Apply effective control measures (for example, enclosed use or installation of local exhaust ventilation).

• Introduce safe work practices in order to reduce worker exposure.

Since the odor of ethylene oxide cannot be detected until concentrations reach roughly more than 700 ppm, significant exposure may occur without the worker’s awareness. This characteristic underscores the importance of establishing an effective and reliable exposure control system.

Formaldehyde

Formaldehyde is a tissue sterilizer and preservative used in dialysis units, pathology departments, supply centers, and anatomy laboratories.
Gaseous formaldehyde is an eye and respiratory-tract irritant. As a liquid solution, formaldehyde can cause primary irritation and allergic dermatitis. Formaldehyde exposure has been associated with occupational asthma in hospital settings and other working environments.

The U.S. Environmental Protection Agency (EPA) has classified formaldehyde as a probable human carcinogen, the use of which has to be controlled in order to maintain exposure levels as low as possible.

Recommendations

- educate personnel on chemical risks;
- conduct health surveillance of exposed workers; and
- provide adequate ventilation.

Glutaraldehyde

Glutaraldehyde is used as cleansing agent, disinfectant, sterilizing agent, biological tissue fixative, and as a component in the development of X-ray films.

Skin contact with glutaraldehyde solutions, aerosols, and vapors may cause eye irritation and irritant or allergic contact dermatitis. Inhalation of vapors and aerosols may cause nose, throat, and lung irritation as well as headaches and nausea. Respiratory sensitization may cause allergic rhinitis and reactions that resemble asthma.

Recommendations

- substitute a less hazardous product for glutaraldehyde or change the process; and
- if it is impossible to introduce a substitute, isolate the procedures and processes where glutaraldehyde is used, institute proper work practices, install local exhaust ventilation and use personal protective equipment (gloves, eye protectors, masks, and, when necessary, certified respiratory protective equipment).
3.5.4 Chemical Products for Processing X-ray Films

Because there are so many chemicals involved in developing X-ray films, it is important to fully understand the best procedures that can be used to avoid associated health risks.

Repeated skin exposures to certain chemical products may cause dermatitis. Gases produced may irritate the eyes and throat as well as cause respiratory difficulties. Extreme exposure may cause headache or chest pain.

Recommendations

Control should focus on containing chemical substances at their source. Ventilation should be provided as a second-line defense. If technically possible, safer chemical substances should be substituted.

Skin contact should always be avoided. Adequate protective work clothing should be worn during the routine cleaning of processor units and while manually mixing chemical products.

3.5.5 Inorganic Mercury

Acute exposure to mercury vapor can produce nausea, chills, malaise, thoracic pains, breathing difficulties, coughing, inflammation of buccal mucosa and the gums, salivation, and diarrhea. Acute inhalation of a large quantity of the substance may cause serious respiratory irritation and kidney damage. Chronic exposure may cause fatigue, anorexia, and gastrointestinal disturbances.

Mercury contamination in health care facilities is primarily caused by breakage of thermometers and blood-pressure monitors. Most of these spills do not pose serious hazards provided that proper cleaning measures are taken. If the spills are not properly cleaned, mercury may accumulate on a surface and then evaporate where it will then be constantly inhaled by workers.

Recommendations

- The first step should be to immediately isolate and clean the area.
• As with any hazardous substance in the workplace, a procedure should be established for managing spills and cleaning contaminated surfaces.

• Any person who cleans up spills should use adequate personal protective equipment including protective clothing and gloves.

• Cleaning after a major spill or a major mercury contamination (for example, mercury extracted from manometers) should be conducted exclusively by trained persons.

• The floor and working surfaces in areas where equipment that contains mercury is used should be waterproof.

• It is important to control the disposal of mercury waste in dentistry centers.

3.5.6 Latex Sensitivity

The introduction of standard universal precautions in health care has brought about major improvements in infection control. Gloves are a principal means of protection. Health care workers they protect themselves against HIV and other bloodborne diseases by using protective gloves.

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Sensitivity to latex is a serious threat to the health and work of some health professionals and patients. It can cause a variety of allergic reactions ranging from urticaria to rare anaphylactic shock. Skin injuries caused by the allergic process can be a portal for infections.

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Recommendations

• Disseminate information on the effects of latex sensitivity to enable workers to identify adverse reactions and adopt preventive action before the symptoms worsen.

• Encourage personnel to seek help when actual or potential allergy is present.

• Provide alternatives to latex-based equipment, if possible.

• Compile information about different options to be considered for purchase.

FURTHER INFORMATION

(ENGLISH)

Chemical Safety:
http://osha.gov/dts/osta/otm/otm_vi/otm_vi_2.html
http://www.cwru.edu/finadmin/does/web/Forms/PDFdocs/ChemMan.PDF


Control of Nitrous Oxide during Cryosurgery http://www.cdc.gov/niosh/hc29.html


Written Benzene Program, Case Western Reserve University, 1999. http://www.cwru.edu/finadmin/does/web/Forms/PDFdocs/Benzene.pdf

American Nurses Association (ANA) Latex Allergy page: http://nursingworld.org/osh/latex.htm

Massachusetts Chemical Fact Sheet: Ethylene Oxide http://www.h2e-online.org/pubs/eco.pdf

OSHA Safety and Health Topics: Hazardous Drugs http://www.osha.gov/SLTC/hazardousdrugs/


Etheylene Oxide Sterilizers In Health Care Facilities: Engineering Controls and Work Practices http://www.cdc.gov/niosh/89115_52.html?


3.6 LABORATORY SAFETY

Conducting hazard assessment in hospital laboratories is particularly difficult considering the wide range of occupational hazards present: fires, explosions, toxic aerosols and vapors, corrosive-substance spills on the skin and eyes, thermal burns, cryogenic burns, falls, cuts, and abrasions. Chemical substances and radiation and infectious agents are the
most difficult to assess. Compared to industrial environments, laboratory exposures are typically short lived, intermittent, and involve small quantities of compounds and mixtures. Little is known about the health effects of such exposures.

Given the difficulties in quantifying risk, an effective strategy for achieving laboratory safety is to ensure that control measures are developed or that universal precautions are applied. In this context, “universal precautions” are understood as the measures such as ventilation, substitution, personal protection, and documentation of storing, handling, and disposal procedures that can be taken to eliminate exposure regardless of the agent involved.

The first step in establishing a laboratory health and safety system is to develop policies and procedures. For the system to function adequately, policies and procedures must be converted into standardized work practices.

FURTHER INFORMATION

(ENGLISH)


http://www.hchsa.on.ca/products/resrcdoc/rlabe314.pdf

General Laboratory Health and Safety, CDC, 2001.

3.7 ERGONOMIC HAZARDS

3.7.1 Handling Loads

Musculoskeletal injuries and back pain are serious problems in the health industry and represent a major cause of absenteeism.

Although lumbar injuries may occur as a result of a single event, they are usually a cumulative effect of many episodes of improper postures, movements, weights, and forces that cause progressive wear and tear over time.

Handling loads deals not only with lifting, transferring, and positioning of patients, but also with other tasks such as those of staff working in ambulances, doing computer work, providing support services, and working in areas such as radiology and physiotherapy.
In community services, load handling problems may derive from difficult working conditions and limited possibilities for altering the environment so as to minimize hazards.

Training and education of workers on lifting methods cannot by themselves solve the basic problems involved in the manual handling of loads. A broader, multidisciplinary focus is necessary. Employers and employees must collaborate to reduce hazards in load-handling tasks and prevent injuries and accidents.

This requires:

A. The identification of hazards and dangers in the manual handling of loads should be based on a preventive and curative focus:

- Preventive methods include safety inspections, monitoring of tasks, and the application of ergonomic principles in the design of equipment and installations.

- Curative methods include research reports, reports of discomfort, use of a hazard registry to identify existing and potential problems and an event analysis for investigating and preventing accidents and incidents.

B. The assessment of load handling tasks that present the highest risk of accidents should take into account the following factors:

- how tasks are performed by observing activities - for example, assessing the nature of loads, heights, postures, actions, and movements involved in the work;

- worksite design and layout and ergonomic principles;

- the duration and frequency of load handling;

- location of loads and distances moved;

- loads and forces including assessment of patient size, extent of mental cooperation, and physical coordination;

- properties of the loads and the equipment;

- organization of the work and the work load;

- environmental conditions (such as lighting, heat and humidity, noise, vibration, condition of floor surfaces);

- skills and experience (knowledge of health and safety in the handling of loads and teaching ways to perform tasks that minimize accident risk);
- physical capacity of workers;

- work clothing (design of comfortable uniforms and anti-slip footwear);

- special requirements (for example, pregnancy or disability, gradual return to work, etc.); and

- maintenance and design of equipment and furniture.

C. Control options may include:

- design and redesign. Ideally, the entire facility and its equipment should be designed according to ergonomic and safety principles. Examples include the reorganization and redesign of jobs, tasks, and loads in terms of layout and, as far as possible, the elimination or reduction of the amount of manual load handling;

- ways of reduction of load handling;

- pre-purchase assessment of load-handling risks when considering new equipment or furniture; an expert in ergonomics may need to be consulted;

- provision of information on, and training in, safe load handling and lifting as part of job induction programs as well as continuing training programs for personnel;

- provision of information and education on accident prevention and principles of back care (this could be included in a health promotion program); and

- design of protective clothing that allows workers to restructure load handling tasks in a simple and safe manner. Safety footwear should be comfortable, provide good support, and have anti-slip soles.

D. Control methods must be evaluated to verify their functioning.

- The moment hazards are identified is the ideal moment to design an evaluation of the impact of actions undertaken to minimize the detected hazards.

- The evaluation and the methods that can be used to evaluate control methods are not presented in detail in this document.

3.7.2 Treatment of Injuries from Load Handling

The policy for treating load handling injuries should include a reporting system and early management of lumbar pain and the accidents that cause or trigger them. Appropriate access of workers to medical or rehabilitation services will facilitate the proper
management of recovery. The policy also should cover follow-up and monitoring of the worker once he or she has returned to work.

3.7.3 Occupational Overuse Syndrome (OOS)

“Occupational overuse syndrome” is a term that incorporates a range of conditions including injuries characterized by the ensuing discomfort or persistent pain in muscles, tendons, nerves, soft tissues, and joints with evidence of clinical signs. Symptoms such as pain, discomfort, and muscular weakness may continue even after clinical signs have diminished. The common feature of all of these symptoms is that they are caused by excessive and prolonged muscular tension, forced movements, repetitive movements, and improper postures.

Occupational overuse syndrome can be divided into three broad groups: local inflammations, compression syndromes, and pain syndromes. There is a variety of problems associated with the syndrome that can be distinguished from pains and ailments that are part of normal life.

The development of occupational overuse syndrome may include other factors such as stress, difficult working conditions, and improper handling of loads.

Occupational overuse syndrome may affect persons in a wide variety of jobs in health care facilities, including:

- medical and dental professionals;
- housekeeping staff;
- kitchen and laundry staff;
- maintenance workers (for example, carpenters); and
- office and other personnel who use visual display units (VDUs).

The introduction of VDUs into the workplace has changed work tasks, organization, and environment. The health sector is no exception. While the shift to electronic workstations has increased work capacity and efficiency, it also has introduced health problems often caused by a lack of knowledge and understanding. Occupational overuse syndrome is a health problem that is often related to VDU.

Risk factors for occupational overuse syndrome should be treated as priorities since these symptoms develop over time and may cause serious disturbances to body functions. This syndrome may also lead to a tendency toward accidents that prevent a return to work for long periods. Hazard control includes:
• work organization and design: control of overload, task specification, established rest breaks;

• workplace and workstation design: layout should be based on ergonomic principles;

• equipment and task design that permits relaxed postures and movements; and

• education, training, and development of skills among personnel: the worker will be provided, from his or her induction, with knowledge of safe work practices, causes and early symptoms of occupational overuse syndrome, and ways to obtain assistance to solve the associated problems.

If a worker encounters a priority hazard that cannot be reasonably eliminated or isolated, the employer should take all practicable steps to minimize the hazard and monitor worker exposure.

An early reporting system should be established for the incidence of ailments, pains, and discomfort. Workers should be trained to use it and become able to tackle the problem quickly before symptoms become serious or chronic. Workers’ access to medical services and appropriate assessment will benefit accurate diagnosis and appropriate rehabilitation.

Given the widespread nature of the symptoms and the difficulty of treatment of occupational overuse syndrome, the slogan “better prevent than cure” becomes particularly important.

FURTHER INFORMATION

(ENGLISH)

New Zealand OSH Publications

Approved Code of Practice for the Safe Use of Visual Display Units

Occupational Overuse Syndrome - Guidelines for Prevention and Management

Occupational Overuse Syndrome - Checklists for the Evaluation of Work

Occupational Overuse Syndrome – Treatment and Rehabilitation: A Practitioner’s Guide

The Pocket Ergonomist (Keyboard/Clerical)

The Floppy Ergonomist - floppy disk and explanatory leaflet
3.8 MECHANICAL HAZARDS

3.8.1 Preventing Slips, Trips, and Falls

Slips, trips, and falls are the most common causes of accidents. They also are the most easily preventable. Identification of potential of slip, trip, or fall hazards is important in the prevention or reduction of the incidence of accidents in all work areas.

Many falls are the results of hazards that are permanent nature. These hazards are tolerated and ignored until an incident or accident draws attention to them. Notice how a simple walk in a hospital corridor may be a veritable challenge: corridors tend to get crowded with housekeeping carts, seats, wheelchairs, extra beds, stretchers, and groups of people.

Basic safety practices accomplished through order, cleanliness, and regular maintenance will eliminate a good deal of this risk. Preventative practices to consider include:

- regular inspection of floor surfaces for needed changes such as surface leveling or damage repair;
• regular inspection, and immediate correction, of any floor that is warped or uneven;

• immediate cleanup of spills;

• staff education on potential hazard and danger recognition (for example, preventing coffee or tea spills by lowering the fill level) and documenting the control measures;

• placement of signs that warn about spills or cleaning processes;

• design of effective drainage;

• assurance that all hallways and work areas (including bathrooms and kitchens) are unobstructed by unnecessary equipment and furniture;

• assurance that all hallways and stairs are always well lit;

• assuring power outlet safety in all areas, for example, in patient rooms, for computer equipment, and in hallways;

• provision and proper use of safe stepstools and ladders to reach high storage areas; and

• provision and use of appropriate footwear in work areas.

3.8.2 Vehicle Safety

Vehicles that are used in the normal course of work are considered part of the worksite.

If a facility employs workers who regularly drive on public roads from worksite to worksite, on patient visits, when transporting patients (in ambulances), or when carrying goods or equipment, management should take all possible steps to ensure the health and safety of these workers and those who may be affected by their activities.

Employers should ensure that all vehicles are regularly maintained and have a valid guarantee certifying that they are safe to be driven. Thus, all internal accessories and equipment such as those used to restrain wheelchairs, stretchers, gas canisters, etc. should be regularly checked and maintained.

Workers must have a valid driver’s license and they should be given information, training, and supervision to ensure their safe driving.
Depending on the type of driving required, an employer may need to provide guidelines on safe procedures, information, and training in:

- safe loading and securing of goods;
- safe loading and securing of persons, for example, those in wheelchairs and stretchers;
- safe handling of loads;
- safe handling and transport of chemical substances, including gas canisters and bottles;
- safe handling and transport of medical supplies and samples;
- provision and safe use of fire extinguishers;
- first aid procedures;
- defensive driving and driver awareness training;
- use of safety belts and headrest adjustment;
- the consumption of tobacco, alcohol, and other drugs while driving; and
- the use of cellular phones in vehicles.

### 3.8.3 Vehicle Loading

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**Workers who drive as part of their regular normal duties require training in how to secure loads in order to prevent them from shifting during transport and how to balance these load for smooth steering and braking.**

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Vans, station wagons, and trucks used to transport equipment and other loads should be furnished with adequate safety barriers behind the front seats to protect the driver and passengers from being struck by objects that are flung forward in collisions or after sudden braking.

When possible, vehicles should be evaluated for hazards during loading or unloading, particularly when these operations occur many times during the shift as is the case for community nurses.
Vehicles intended for passengers with special requirements (i.e., disabled passengers that require crutches, wheelchairs or other types of implements in order to move) should be furnished with special equipment.

FURTHER INFORMATION

(ENGLISH)

New Zealand. Governmental Publications.

Everly, M. Drive to Survive. Health and Safety at Work, November 1996

Transportation of Dangerous Goods, Land Transport Safety Authority

Transportation of Medical Supplies, Ministry of Health

Vehicle Standards (Passenger Service Vehicle Construction), LTSA

3.9 VIOLENCE IN THE WORKPLACE

In recent years, violence in the health sector has received increased attention. This is primarily due to the growing incidence of assaults and physical threats suffered by health care workers in their daily work. WHO estimates that one-quarter of all violence in the workplace occurs in the health sector. Violence should be viewed as a significant occupational hazard. This hazard is also responsible for many cases of high occupational stress level.

Violence and aggression in the workplace and the fear they generate may have far-reaching effects. Any form of violence may lower morale among workers, increase financial costs, and decrease productivity at a health care facility. Furthermore, victims carry psychological scars of emotional trauma.

The various manifestations of violence in the workplace include:

- using physical force to endanger or damage persons or their property;
- engaging in intimidation, coercive behavior, or fear-mongering; and
- engaging in verbal abuse and harassment including sexual, racial, and psychological harassment at work (mobbing).
Some aspects of violence, such as physical abuse, are obvious. However, the use of language is more difficult to quantify - abuse by words or gestures may be construed as offensive and distressing by some, but it may be a way to let off steam by others.

Violence in the workplace includes any incident where a worker is abused or threatened in circumstances directly related to the execution of his or her normal tasks. This type of behavior can be shown by patients, clients, visitors, members of the general public, or by fellow workers.

The WHO Program of Workplace Violence in the Health group has pinpointed situations that increase the risk of violence at workplace:

a) **Organizations at increased risk are:**
   - located in urban, highly populated, and high crime areas;
   - small and isolated;
   - understaffed;
   - under the strain of reform and downsizing;
   - operating on insufficient resources, including inappropriate equipment;
   - functioning in a culture that tolerates and accepts violence;
   - working under a management style based on intimidation; and
   - noted for poor communication and interpersonal relationships.

In this regard, attention also should be paid to abnormally high levels of absenteeism on grounds of sickness, high levels of staff turnover, and a history of violent events.

b) **Potential perpetrators** (consideration should be given to the fact that many perpetrators have themselves been victims of violence).

In general, a potential perpetrator’s background may include:

- a history of violent behavior;
- a difficult childhood;
- problems of psychotropic substance abuse, especially problems with alcohol;
• serious mental illness, whose symptoms are not being adequately identified or controlled; and

• access to firearms or objects that can be used as weapons.

The following can be considered as warning signals:

• aggressive or hostile postures and attitudes;

• repeated manifestations of discontent, irritation, or frustration;

• alterations in tone of voice, pupil dilation, muscle tension, sweating; and

• the escalation of signs and a build-up of tense situations.

c) Potential victims (as with potential perpetrators, care should be given to avoid the use of labeling).

Professions (although all health sector professions are potentially at risk for workplace violence, the following seem to be at high risk) to particularly note:

• nursing and ambulance staff - extremely high risk;

• doctors, support and technical staff - at high risk; and

• all other allied professionals - at risk.

Real or perceived vulnerable populations:

• minorities;

• persons working in training or in admissions;

• workers in precarious jobs;

• young people; and

• women.

Experience/attitudes/appearance may include:

• a lack of experience;

• the display of unpleasant or irritating attitudes,
• the absence of coping skills, and
• the wearing uniforms or name tags.

3.9.1 Psychological Abuse (Harassment, Bullying, Mobbing)

Psychological abuse is a type of violence in the workplace inflicted by a person or a group of persons toward a worker in a systematic manner following a given pattern. Examples include attacks to a person’s personal dignity, placing obstacles to hamper work performance, manipulating information, and perpetrating acts of inequality.

Mobbing in the workplace generates a great deal of occupational stress. This stress can trigger a wide spectrum of illnesses and has come to be a public health issue in most developed countries.

The following practices help reduce the incidence of mobbing at workplace:

• Reduce the factors that motivate harassment: promote ethical values, justice and transparency towards employees; by example, management should promote a people-centered organizational culture instead of leadership based upon intimidation; show appreciation for staff members who have greater capability for interpersonal relationships and communication; include explicit rules in the staff manual about unacceptable persecutory or harassment behaviors (See the section “Psychosocial Risks” further on in this chapter).

• Increase awareness of those who deal in occupational health in health care establishments (occupational health and safety committees and units, supervisors, etc.) and further train them to manage mobbing.

• Adopt tools that, on the one hand, provide procedures to combat mobbing and, on the other, have a preventive effect. These include sessions with a trained facilitator; work agreements to combat mobbing; preparation of clear policies to abate the problem; establish an investigative system and registry; management of conflicts; rapid and discreet investigation of complaints; protection of the rights of the persons involved, etc.

3.9.2 Abuse and Aggression in the Workplace

Abuse and aggression are more frequent in certain types of activities such as:
• working in emergency services;
• being in contact with the public;
• working with valuable objects (money, storing of drugs, valuable equipment);
• working with persons under stress (those suffering pain, psychiatric disturbances or engaging in alcohol or drug abuse, etc.); and
• doing solitary work at isolated worksites.

The potential to have incidents that involve aggression is a significant risk. As for any other workplace risk, it is the responsibility of managers or administrators to take measures in order to protect workers from incidents involving violent behavior that may result in injuries, damage or health.

It also is the duty of health workers to ensure their safety at work and to be aware that their actions or omissions might cause harm to others.

**Managing Risks Associated with Assaults and Aggression**

Early intervention is the most effective means of dealing with violence in the workplace. The recommended approach involves eliminating opportunities for violent or threatening behaviors to occur. An occupational health and safety action plan to prevent violent acts should identify the potential for violence, evaluate violent incidents, and determine control measures during or after incidents of violence.

Workers must be involved in the preparation of the action plan.

**A. Identification**

Management should provide staff with information that will increase the understanding and awareness of violence and that will also bolster the motivation to report all incidents of violent behavior. A confidential reporting system should be put in place. Management should identify situations in which violent or aggressive behaviors by patients, suppliers, or clients, among others, may occur. For example:

• incidents of dissatisfaction of patients or their relatives with delays or deficiencies in the services;
• cases where the number of assigned staff is incompatible with the level of patient dependency;
• situations in which assistance is being provided to overstressed, annoyed, stress-laden, displeased or needy persons;

• dealing with disturbed persons (such as those suffering from mental or intellectual impairments or under influence of drugs or alcohol);

• working with persons in the community who have a history of violence;

• working with institutionalized clients who could have aggressive behavior toward other inpatients or staff;

• working in sites where drugs are administered or stored;

• working in isolation; and

• having insufficient security in the building and its surroundings.

Incident and accident reports should be evaluated to identify the nature and range of any violence as well as the areas at greatest risk. By grouping incidents that share similar features, patterns may be revealed that could help design preventative measures.

The registration form should include:

• where the incident occurred (including the physical environment);

• the date and hour of the incident;

• activity being performed at the time of the incident;

• victim details;

• relationship of the victim with the perpetrator;

• an account of what happened;

• witnesses;

• consequences;

• measures taken after the incident; and

• recommendations for preventing similar incidents in the future.

Reporting and investigative procedures also should be reviewed to assess their efficacy.
B. Control Measures

For All Workers

Every measure should be taken to control actual or potential incidents of violence. This means that the environment and the administrative systems may need to be redesigned in order to:

- promote a humane culture that favors a pleasant social atmosphere;
- facilitate a flow of information among staff members, work units, patients, and the public (this can be accomplished by conducting team meetings, issuing protocols and codes of conduct that explain the responsibilities and rights of the patient, friends, and family members, etc.);
- change the work system to reduce the likelihood of any violent behavior (for example, by improving the handling of cash money or drugs);
- issue clear guidelines of what to do in threatening situations;
- elaborate a list of persons with sufficient experience and training in handling violent incidents including staff available during weekends and night shifts;
- keep flexible staff levels to adjust to needs;
- reduce work pressures and waiting times;
- provide information, training and follow-up in the prevention and management of violence (this should be included in employment induction programs);
- issue clear-cut policies and procedures to be followed in cases of sexual harassment;
- provide effective security and communication systems through the use of premises surveillance, controlled access, alarm systems, adequate lighting, systematic maintenance and provision of personal locators for staff that must work in isolated areas;
- change the physical environment (isolate disturbing noise, paint walls with warm tones, eliminate foul smells); and
- monitor and evaluate the effectiveness of preventive measures, for example, arrangements should be put in place so that workers can provide feedback to evaluate the effectiveness of the changes made.

Large health care facilities may consider assembling a trained crisis intervention team to respond to emergencies and, when necessary, provide escort and transport services.
For Workers Who Work in Isolation

Measures that can reduce risks for persons who work in isolation, such as those that work alone in the community, include:

- providing training to detect signs of disturbance and to resolve conflicts;
- assessing risk situations and changes in client attitude and conditions;
- providing pertinent information to staff on the risk posed by the client;
- establishing two-person work teams;
- providing an adequate communication system, such as through the use of cellular phones and periodical reporting to headquarters; and
- providing special safety procedures for night work.

Interventions in Response to Violence

Measures taken in response to violent incidents should aim to minimize the repercussions of violence in the workplace and to ensure that such violence will not recur.

Measures should include:

- Implementation of an action plan that helps all workers cope with the emotional and operational aspects of the issue. This action plan should also help them to react to the situation as a collective social group.
- Implementation of the use of reporting and registration systems. Workers should be guided on how and when to notify an incident without fear of retaliation or criticism.

C. Assistance to Victims of Violence

In order to minimize the negative effects of a violent incident, an appropriate post-incident response system should be provided and organized. This sort of service to internal clients should include debriefing, counseling, and support to victims and their colleagues, especially if the latter were witnesses to the violence.

This type of program should provide, at a minimum:

- medical evaluation and treatment of injuries,
- help in completing medical and legal documents, and
legal representation and guidance.

FOR FURTHER ORIENTATION

Specialized consultants

Police

Labor unions

Employee association

FURTHER INFORMATION

(ENGLISH)

http://www.mobbing.nu/index.htm

Workplace Violence in the Health Sector – State of Art, IST & NIOSH.
http://www.icn.ch/SewWorkplace/WPViolenceSAP.pdf

New Zealand OSH Publications

A Guide for Employers and Employees on Dealing with Violence at Work

Guidelines for the Safety of Personnel from the Threat of Armed Robbery

What Employees need to know about Violence at Work

USA:

http://www.dir.ca.gov/dosh/dosh%5Fpublications/hcworker.html


VIOLENCE: Occupational Hazards in Hospitals, NIOSH, 2002


Canada:
http://www.healthandsafetycentre.org/pdfs/healthcare/code_white.pdf


Injury Prevention Resources for Health Care – Violence, British Columbia
http://healthcare.healthandsafetycentre.org/s/Violence.asp

ILO – WHO:

Framework Guidelines for Addressing Workplace Violence in the Health Sector (2002)

Raising awareness of Psychological Harassment at Work; Protecting Workers's Health series no. 4 (2003)
www.who.int/oeh/OCHweb/OCHweb/OSHpages/OSHDocuments/WHOOSHDocuments/WHOOCHDocumentsHQDocs.htm#PWH

(PORTUGUESE)


(SPANISH)


ACOSO MORAL: http://www.mobbing.nu/index.htm

Consejos para defenderse en caso de acoso laboral
http://www.mobbing.nu/primerosconsejos-achp.htm

Mobbing, violencia psicológica en el trabajo, 2000
3.10 PSYCHOSOCIAL HAZARDS

Violence, which is considered to be the greatest source of stress in the health sector, was presented in detail in the section “Violence in the Workplace” that appeared earlier in this chapter. This section deals with other psychosocial issues in the health sector.

These are highly important aspects, not only from the viewpoint of managing occupational health and safety, but also for the overall administration of costs, quality of services, and personnel. It is important to note that psychosocial risks among health workers are most often associated with burnout. This syndrome manifests itself in workers’ behavior along three dimensions that are highly detrimental to patients and the services in general: exhaustion, cynicism, and inefficacy.

3.10.1 Stress and Fatigue

Psychosocial stress (or, in this Manual, simply “stress”) can be defined as the psychophysiological mechanisms through which psychosocial risk factors affect an organism.

All workers are exposed to some source of pressure at work. Individuals react differently and have unique capabilities for coping with stressful situations. Many do not suffer any adverse effects from the exposure. However, prolonged exposure to intense pressure may have detrimental effects on health. Stressors in a person’s life and work may lead to anxiety when that person’s coping mechanisms overload due to conditions such as repeated exposure to stressors, high stressor intensity, or an individual’s susceptibility.

Occupational stress is a complex process that links and combines several aspects of workers’ everyday life such as working hours, job organization, physical environment, personal health, and private life pressures.

Factors that may contribute to stress in the health sector include:

- the intensity and duration of physical and mental loads - a state of “chronic emergency,” difficult work shifts, inflexible working hours, unpredictable working hours, prolonged working hours, or shifts without social interaction;
- emotional stress in caring for the ill;
- the worker’s personal or health problems (healthy and fit persons often cope better with physical and mental stress);
• organizational factors such as the lack of control over workload, poor work planning, inadequately trained personnel for client dependency, poor communication in the workplace, organizational changes that lead to job insecurity, etc.; and

• the immediate working environment - lighting, noise, work space, workstation design, etc.

| Stress in workers may manifest in high absenteeism rates, high turnover, low productivity, high accident and illness rates, and poor concentration that leads to greater error rates and mood problems. Alcohol and drug dependency and depression also are more frequent among employees under stress. |

Occupational stress theories once focused on the individual more than on the work. Today, however, it has become clear that a stress management program offered to workers will not control the causes of stress. Although such programs may be able to help, they will not remove the risk because they act upon the victim and not on the stress factor. Such programs may assist the victim but do not address the source of the stress with the aim of alleviating the hazard.

| Consequently, today it is understood that an adequate management of occupational stress implies organizational changes including improved communication in the workplace and support for changes in staff such as physical training, relaxation, and adequate time management. |

From a legal point of view, aspects related to personnel stress and fatigue may be handled in the same manner as other hazards or risks in the workplace. Managers or administrators should be accountable for taking feasible measures to prevent health problems caused by the way work has been organized at the health care facility. Under certain circumstances, the effects of stress and fatigue represent an important danger that may lead to serious legal consequences since persons under stress are more prone to commit errors and cause accidents.

3.10.2 Effort, Reward, Demands, and Control

There have been models constructed to explain how organizational factors can cause health problems among workers. The best known are Karasek and Theorell’s model and the Siegrist model which study problems of two organizational anomalies, “high effort/low reward” and “high demand/low control,” respectively.
The high effort/low reward model applies to organizations in which the worker considers the work rewards as insufficient in terms of both remuneration and incentives such as recognition of effort. High demand/low control organizations require high performance but give the worker no freedom to organize his or her own way to accomplish a task. Often, these two characteristics coexist in the same organization.

The following figure summarizes the results of studies conducted on the two models. These studies illustrate the strong influence of psychosocial factors on workers’ health problems.

Example: Workers under prolonged conditions of high effort/low reward and high demand/low control have a 2 to 3 times higher probability of contracting infections in comparison to workers that do not suffer these conditions.

Adapted from the Minister of Public Works and Government Services Canada (20)

Recent studies have delved deeper into these matters, demonstrating the important synergistic effects of these organizational hazards when workers consider them as unjust and as signs of disrespect. According to these studies, two types of justice are involved: distributive (who receives what and when) and process-oriented (what processes are involved in decision-making).
3.10.3 Shift Work

Health care facilities provide continuous care to highly dependent patients in emergency circumstances. Such services require the constant mental alertness and concentration of health care employees and emergency staff.

Regardless of the pattern pursued, shift work is a significant stress factor to most workers and their families.

Most shift workers face serious difficulties in biological and social adjustments. Shifts cause disturbances in circadian rhythms, poor sleep patterns, and social isolation. Night work is particularly exhausting since the employee works during physiological rest hours and sleeps during daytime thereby making his or her sleep less restorative than that of those who sleep during the night.

**Fatigue is a particular occupational hazard for those who work in shifts.**

Services that continually ask employees to work overtime, to be on call for longer than 24-hour periods, or to work irregular shifts without adequate rest use work practices that represent a health and safety risk and as such need to be regulated.

**FURTHER INFORMATION**

(ENGLISH)


Stress and Fatigue: Their Impact on Health and Safety in the Workplace. OSH. New Zealand.


Stress at work. NIOSH. http://www.cdc.gov/niosh/stresswk.html


WHO - Work Organization & Stress, Protecting Workers' Health series, no. 3 (2003);
3.10.4 Substance Abuse

Depending on the case, use of drugs and alcohol can be considered as a factor that contributes to stress or as a mistaken means to cope with stress.

Substance abuse may be associated with a significant rise in the incidence of injuries as well as with a drop in productivity and an increase in illnesses and absenteeism. Not only will the risk of accidents increase in the one abusing substances, but the abuse also may put coworkers at risk. The employer is confronted with late arrival at work and absenteeism, loss of time from accidents and inefficiency, and damage to installations, equipment, and other property.

The use of prescribed medications should not be overlooked when considering substance or alcohol use in the workplace. However, management of these medications may require different strategies. Strategies for substance abuse in the workplace should be integrated into the overall occupational health and safety strategy and should include identification and management of the hazards and risks.

Drug and alcohol consumption in the workplace can be dealt with by developing a clear policy for consumption, rehabilitation, and counseling. Prevention also should play a role in management’s drug and alcohol policy, particularly through the Employee Assistance Program.

When a supervisor believes that work performance is deteriorating because of substance abuse, he or she can take measures to protect the health and security of the person who may be suffering from the effects of substance abuse as well as the rest of the workers. If it is concluded that the deficient performance of the worker increases the risk to
him/herself or to his/her coworkers, the employer has no other option but to remove the risk.

### 3.10.5 Recommendations

a) It is recommended that the situation be monitored, stress hazards be systematically identified, significant damages evaluated, and effective control methods determined. Working situations vary among and within health care facilities which implies a diverse nature in the stress factors.

b) A confidential notification system of signs and symptoms of stress and fatigue, administered by the health care facility’s Occupational Health and Safety Unit, may function as:

- a database of factors in the organization that generate unnecessary stress among the staff that will be used in the design and evaluation of interventions; and

- a portal for medical attention targeted at stress treatment of workers through the Employee Assistant Program (the Occupational Health and Safety Unit and the Employee Assistance Program were described in Module 2).

c) Because an accumulation of factors are involved in generating stress, it is difficult to determine whether an employee’s work is actually affected by personal problems. Consequently, it is important to implement a system that offers employees the opportunity to receive (through the Employee Assistance Program) professional help for any personal problem.

### FOR FURTHER GUIDANCE

Health Centers

Doctors

Ministers of Health

Labor unions

Employee associations