Sickness absence due to influenza

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In addition to its recognized health effects, influenza has socio-economic consequences, most notably sickness absence and associated work disruption. It may account for 10–12% of all sickness absence from work. Data on the impact of influenza on work are limited. Most research has assessed the impact of an intervention, usually influenza immunization. Within the available literature, there are five randomized controlled trials in the workplace that have assessed the effectiveness of influenza immunization as an intervention: two in the general working population and three in the health sector. If the benefit desired is a reduction in sickness absence as a cost-effective measure, the likely outcome is a modest gain in years when incidence of influenza is increased in the community. There are some distinctive factors in the health care industry: health care workers may exhibit different absence behaviour, they may be more exposed to infection at work and they may pose a risk as a source of nosocomial infection. From the occupational health perspective, how do we best inform employers currently? The cost-effectiveness case has not been absolutely proven. More research appears necessary, including assessment of those factors that influence uptake of influenza immunization. In the interim, a targeted approach to certain job categories may be the way forward.

Key words: Absenteeism; health care sector; immunization; influenza; influenza vaccine; sick leave; workplace.

Introduction

There are difficulties in studying the effects of influenza on communities. Influenza cannot be satisfactorily distinguished on clinical grounds from respiratory infections caused by other organisms [1]. Studies use differing clinical definitions, making comparisons difficult. Laboratory analysis, by virtue of low sensitivity, may underestimate the presence of infection. Total sickness absence may capture other respiratory illnesses. Influenza itself may cause characteristic symptoms in no more than 50% and upper respiratory tract symptoms only with no fever in 30% of cases, while in 20% there are no symptoms of note [2].

In addition to recognized health effects, influenza has socio-economic effects, most notably sickness absence and associated work disruption in a community. It has been estimated that, in the seven influenza seasons from 1971 to 1978, influenza-related disease accounted for 15 million days of self-reported work loss each year in the USA [3]. It may account for 10–12% of all sickness absence from work [4].

The impact of influenza on work has been measured by a variety of methods, including days lost from work per case [5]; productivity loss; and attendance at work but of reduced effectiveness [4,6]. Influenza-like illness (ILI) symptoms and health care utilization among employees have also been measured [4].

The economic consequences of epidemic influenza for society have been considered using the concept of direct and indirect costs. Direct costs reflect health care utilization and treatment. Indirect costs occur through lost productivity and have a substantial monetary value, estimated to exceed 75% of the total costs [5].
The impact of influenza on work

The impact of an influenza epidemic on a working population has been poorly documented, with little information on the socio-economic consequences [4]. Most of the substantial work has assessed the impact of an intervention, usually influenza immunization.

Using data from the National Health Survey in the USA, which conducts household interviews, Kavet [5] estimated the days lost from work per case and reported a range of 3.2–3.4 days, with days of restricted activity being in the range 5.0–6.2 days. A similar US study estimated 2–3 days lost per influenza illness [7].

A small survey of 411 employees in the pharmaceutical industry, with influenza or ILI, based on clinical definition, provided information on the impact on productivity in industry. On average, employees were incapacitated or confined to bed for 2.4 days, missing 2.8 days from work per episode of illness, and were unable to resume normal activity until 3.5 days after the onset of symptoms [4].

The duration of absences in this study was lower than the 10 day average in a study of post office workers [8]. The authors attribute this difference to the size of the outbreak and the influenza virus responsible.

Some assessment of the impact of influenza on work has been undertaken in the health care sector. Respiratory illness is one of the main causes of absence in health care workers (HCWs) [9]. A severe epidemic of influenza A in Canada in 1981–1982 caused a near 2-fold increase in absence, with the highest rates of absenteeism recorded in the paediatric, medical and respiratory wards [10]. Other studies, in Canada and the UK, have shown smaller increases in staff absence [11,12]. This may be explained by a less virulent strain, a difference in population immunity or methodological differences in the studies.

In a study in Glasgow during a mild epidemic in 1993–1994, serological evidence of infection was present in 23% of HCWs, but 59% of these could not recall having had influenza [13]. HCWs may be reluctant to take sick leave when they experience a febrile respiratory illness, a characteristic that may differ from that of the general adult working population [14]. The possibility that influenza may be a nosocomial infection has been suggested by a number of studies [15,16]. The concern of possible nosocomial infection of elderly patients from health care staff has prompted the use of influenza immunization of HCWs. It has been demonstrated that this strategy reduces total mortality in this vulnerable group [17].

In addition to absence, influenza has significant effects on performance. A study of the effects of experimentally induced influenza in volunteers showed a significant impairment on tasks involving attention and motor skills [6]. Viral infections, unaccompanied by clinical symptoms, also impair performance [6].

The available data on the impact of influenza on work are limited. What information there is indicates that the impact on work is dependent on the severity of the influenza epidemic. There is also a measurable reduction in effectiveness among both those infected with the viruses who remain in work and those returning after a period of absence.

The effect of intervention

Influenza vaccines have been available since the 1950s. Currently, only inactivated viruses are licensed. These are modified annually, according to the guidance from the World Health Organization.

Studies of the effectiveness of influenza immunization in the working population have shown conflicting results. Sickness absence after influenza immunization of 140 pharmaceutical workers in the UK was compared with a similar number of controls, and no significant difference was detected [18]. However, influenza activity was low during the period of the study (1981–1982), the vaccinees were self-selected and the study involved small numbers.

A double-blind, randomized, placebo-controlled trial involved nearly 1200 Ford Motor Company workers during two influenza seasons, 1997–1998 and 1998–1999. Laboratory confirmation defined the length of the influenza season and characterized the circulating virus. The measured outcomes were clinically defined ILI, associated physician visits and lost workdays. In the first influenza season, vaccine recipients reported significantly more ILI-related sick days (45% more) than the controls. Despite a significant 32% fewer lost workdays ($P = 0.002$) in the vaccine recipients during the second season, there was no net economic benefit in either year [19]. The low sickness absence in this study, at 0.56 days per illness in the placebo group, was felt by some to explain the lack of benefit achieved. This low absence was attributed to its possible association with male sex and older age [20].

In a 5 year study, 60 000 postal and telecommunication workers were offered influenza immunization, and were compared with a matched control group from the same industry. The acceptance rate in the group offered immunization fell from 42 to 25% over the 5 years. Sickness absence, measured as the number of working days lost due to all causes, showed a small reduction in the group offered influenza immunization. This was evident not only during the influenza outbreaks but also in the winter periods outside the epidemic periods, and was attributed to placebo and Hawthorne effects. Overall, the average annual difference between the two groups during the influenza periods of the last 4 years of the study was 4% ($P < 0.05$) [8].

A service company offered influenza immunization to 2557 employees. Of these, 23% accepted. All-cause sickness absence was reported for the influenza season
prior to the trial period and showed a higher rate of absence in the subsequently vaccinated group than in the non-vaccinated group. Total sickness absence after immunization was then recorded over the 1991–1992 influenza season. There was a saving of 0.17 days per 100 days worked compared with the non-vaccinated group \((P < 0.00004)\) [22]. Again, the vaccinees were volunteers and appear to have been well motivated, booking appointments 2 weeks in advance of immunization. They may, therefore, not have been typical of the total workforce.

In a non-randomized control trial in a US textile industry, 131 vaccinated employees were compared with the same number of matched controls. Outcomes assessed were clinical ILIs and workdays lost over a 6 month period of the 1992–1993 influenza season. There was a significant difference with total workdays lost in the vaccinated group of 43 versus 93 \((P = 0.00004)\) [22]. There was potential for information bias, as stated by the authors. The control group comprised employees of a different plant, who may have been exposed to different respiratory pathogens. Also, the nurses collecting information were not blinded to participants. Previous sickness absence is not stated.

In an important double-blind, randomized, placebo-controlled trial, involving 849 general workers in the USA, Nichol et al. [23] note previous mixed results and the limitations of study design. Their results indicate a benefit of influenza immunization that decreased the frequency of upper respiratory illnesses by 25\% \((P < 0.001)\) and absence from work due to respiratory illnesses by 43\% \((P = 0.001)\). It was estimated that immunization was associated with cost savings of $46.85 per person immunized, which equates to approximately a day less sickness absence per vaccinee [23]. However, some concerns were raised by the apparently high infection rate in the placebo group, at 3–10 times the level expected. If the usual attack rates of 5–15\% were applied, then the cost benefits would be lost [24]. Also, if the protective immunity of previous influenza infection, which was not considered, lasts for 6 years, then sequential immunization would probably cost more than it would save [25].

Another study followed in the same geographical area and involved 17 000 employees of a manufacturing industry. Individuals were self-selected for immunization in the two influenza seasons 1995–1996 and 1996–1997. Sickness absence was compared between the two seasons in both new (vaccinated in the second season only) and consecutive vaccinees. New vaccinees took, on average, 1.2 h sick leave less during the second season than the first \((P < 0.05)\). Consecutive vaccinees had increased absence during the second season. The study identified a subgroup of new vaccinees, who were female employees under the age of 50 years with two or more children, who had 3 h less sick leave. This was attributed to their potentially greater exposure to the infecting viruses [26].

Since 1984, the Advisory Committee on Immunization Practices (ACIP) in the USA have advised that HCWs be immunized if they come into contact with people in high-risk groups [27]. Comparison of the policies of 28 European countries in 1995 showed that most advocated the immunization of HCWs [28].

Studies conducted specifically among health care professionals have shown mixed results with regard to work absence. In a double-blind, randomized, placebo-controlled trial undertaken during the 1985–1986 influenza season, involving 179 HCWs in a hospital in the USA, no significant difference was found in rates of absenteeism or durations of reported illness between vaccinated and unvaccinated groups during the 8 week study period [29]. The authors suggest that the negative results could be explained by antigenic drift, which resulted in a poor match between the virus in the vaccine and the circulating virus. An editorial comment on this paper suggested three other reasons for the lack of effect: late immunization; poor case definition; and lack of statistical power due to the small number of subjects [30].

In a retrospective Canadian study within a large tertiary care hospital, absenteeism among HCWs who were working in areas deemed to be at high risk for nosocomial infection was increased by a significant 35\% during the virulent epidemic of 1987–1988 compared with periods outside the influenza season and the previous season. The increase in absence in other HCWs was not significant. The vaccinated group within these ‘high-risk’ HCWs escaped the increase in absenteeism, but the numbers were small (48 out of 800) and the difference was not deemed significant [11].

Saxen and Virtanen [31] studied sickness absence attributed to respiratory infections in 427 HCWs at a paediatric tertiary care hospital in Finland through a double-blind, randomized, placebo-controlled trial. Follow-up was for 4 months. The immunized group had significantly fewer sick leave days because of respiratory infections \(1.0 \text{ versus } 1.4 \text{ days, } P = 0.02\), but no effect on the duration of illness was observed. The reduction in absence was attributed to the good match between the vaccine and circulating influenza virus strains, thus producing a virus-specific benefit.

Wilde et al. [14] completed a double-blind, randomized, placebo-controlled trial, over the three consecutive seasons 1992–1993, 1993–1994 and 1994–1995, involving 264 hospital-based doctors, nurses and therapists within two US hospitals. They assessed serologically defined influenza, days of febrile illness and days absent from work. Confirmation of immunological response to the vaccine was obtained. There were 9.9 days of absence per 100 influenza vaccinees, versus 21.1 per 100 control subjects \((P = 0.41)\), this reduction not being statistically
significant. Subjects in the immunized group had fewer cumulative days of febrile respiratory illness (29 per 100 subjects versus 73 per 100 control subjects; \( P = 0.57 \)), but again this was not statistically significant [14].

In studies involving hospital personnel, absence attributed to side-effects of immunization showed no significant increase [14,29,32]. Two studies in hospital workers have recorded the time lost to adverse reactions to be 0.013 days [11] and 0.05 days per immunized employee [33].

The potential benefits of influenza immunization are mitigated by a number of factors, including the average probability of an epidemic (33%) and the average infection rate (20–30%). Thus, the chance of getting influenza is likely to be in the range of 6–10%, and since the vaccine is only 60–70% efficacious, the expected benefit of influenza immunization in the average year is only 4–7% of the average cost of a case when it occurs [34].

Cost–benefit models have been constructed and generally indicate that the benefit gained outweighs the cost of influenza immunization for people aged ≥65 years and also when the cost of a case of influenza would be very high, such as in cases of chronic heart and lung disease. Such cost–benefit models have demonstrated cost effectiveness for healthy working adults with a high income and a low cost of immunization, such as doctors [34].

Discussion

Five randomized controlled trials in the workplace—two in the general working population [19,23] and three in the health sector [14,29,31]—have now assessed the effectiveness of influenza vaccine as an intervention and appear to give conflicting conclusions. The reported cost savings are modest.

A governmental review in France concluded that economic arguments were not strong enough to promote immunization against influenza among working adults [25]. Similar reviews in the USA reached the same conclusions [35]. If the benefit desired is a reduction in sickness absence as a cost-effective measure, the likely outcome is a modest gain in some years, with a cost deficit in most others. Any potential benefit will be increased by the provision of the vaccine at the lowest cost to the individual worker.

Further research, particularly in the health care sector, is justified. The Department of Health UK has extended the target groups of influenza immunization to include ‘employees directly involved in patient care’ [36]. There appear to be distinctive factors in the health care industry. HCWs may be less likely to be absent from work even when they experience a febrile respiratory illness. They may represent a subgroup with different sickness behaviour that cannot be extrapolated to the general working population [14]. Furthermore, there is the concern of potentially greater contact with influenza viruses, and therefore an increased risk of acquiring influenza and of nosocomial spread.

In addition to measuring the effectiveness of an immunization intervention, research to assess those factors that influence uptake of influenza immunization would also be appropriate. In the extensive Post Office study discussed previously [8], the proportion accepting vaccine fell from an initial 42% to 25% at the end of the 5 years. Interest in immunization appears to wane following seasons of low infectivity, and this has been observed in the health care sector (NI Regional Audit Group, personal communication).

A targeted approach to certain job categories may be appropriate. This may avoid the loss of critical staff, the absence of whom might severely disrupt a company’s productivity. There is also the cost-effective approach to those individuals with high income. Targeting could also be considered for people within a certain age band, and vulnerable groups. The judicious use of amantadine for prophylaxis during an outbreak of influenza A for key personnel could be considered.

References


