THORAX

Editorials

Influenza vaccination

Influenza vaccine is prepared from inactivated, highly purified viruses grown in hens' eggs. A single dose produces protective antibodies in adults in about 14 days. As the influenza "season" usually begins towards the end of November, immunisation should therefore begin in October. Children aged under 12 years receiving vaccine for the first time should receive two doses separated by 4–6 weeks. One major difficulty in producing effective vaccines is that the virus changes its surface antigens each year – so-called "antigenic drift" – and occasionally a major change occcurs called "antigenic shift". New vaccine is therefore produced every year which contains antigenic components of strains related to those expected by the World Health Organisation to be circulating during the coming winter. For instance, the current vaccine contains two type A strains and one type B strain. Protection therefore only lasts for one season.

Influenza is common and outbreaks of influenza A occur most winters, while influenza B outbreaks occur after an interval of several years. Epidemics are associated with considerable morbidity and mortality. During the last moderately severe epidemic in the UK during 1989–90 there were 20 000–30 000 more deaths than would have been expected for that time.[1] About half of these were the result of respiratory causes, but other groups of diseases such as circulatory disease (cardiac and stroke), mental conditions, musculoskeletal disease, and endocrine disease (mainly diabetes) were also cited more often than expected as causes of death. Of all influenza-associated deaths, 80–90% occur in persons aged 65 or older. Exacerbations of chronic respiratory diseases such as asthma, chronic bronchitis, and bronchiectasis are frequently associated with viral infections, and bacterial pneumonia may be a sequel to influenza.[2] Influenza is a major cause of lost productivity and in the USA is said to cause 15 million lost days from work each year.[3]

The efficacy of influenza vaccine has been extensively studied.[4–9] It has been estimated that healthy people achieve about 70% protection in the context of antigenic drift, but the vaccine may become ineffective every 10 years or so when antigenic shift occurs. In the elderly the degree of protection is probably less, but there is good evidence that vaccination reduces the severity of the illness and causes a significant reduction in the complications of influenza such as hospitalisation and death. The best evidence of benefit is in residential populations where occupants are often elderly with chronic illness and their close proximity makes transmission frequencies high. It is also clear that influenza vaccine is safe with very few serious side effects.[10] Minor side effects are also infrequent and usually relate to soreness at the site of injection. Occasionally an influenza-like syndrome begins 12 hours or so after the injection and lasts for 48 hours. There are rare allergic reactions to residual egg protein and the vaccine should not be given where there is known hypersensitivity to egg products. There is little evidence to support worries about exacerbation of airflow obstruction in asthmatic patients after vaccination.[11–13]

The guidelines on influenza vaccination issued by the Department of Health are as follows.[14] Immunisation is strongly recommended for people of all ages, and especially the elderly who, by virtue of disease or treatment, are at special risk of influenza-related complications or exacerbation of their underlying disease – for example, those with chronic respiratory disease including asthma; chronic heart disease; chronic renal failure; diabetes mellitus and other endocrine disorders; immunosuppression due to disease or treatment. Immunisation is also recommended for residents of nursing homes, old peoples' homes, and other long stay facilities. Routine immunisation of fit adults and children is not advised. Despite these clear guidelines, uptake of influenza vaccination is very poor – even in those groups for whom it is strongly recommended. Public demand for vaccination is unpredictable and is often influenced by media speculation about an epidemic leading to a sudden increase in demand from people in whom vaccination is not necessarily recommended. Manufacture of the vaccine is complex and has to keep to a very tight schedule, so it takes time for manufacturers to respond to an increased demand. If this occurs during an influenza season it is unlikely that new vaccine can be supplied in time for it to be given usefully. On the other hand, overproduction is wasteful because the current vaccine is inappropriate for the following year. An increased uptake of vaccination by appropriate patients would remove most of these difficulties by giving the companies producing the vaccine a predictable and appropriate demand to satisfy.

In a large study in Trent[2] less than one in five of the elderly population was vaccinated, and in nursing homes it was only about 50%. Acceptance of the vaccine – had it been offered – was high: 72% in this study and 84% in another.[15] In a study of patients with chronic cardiac disease only 15% had received influenza vaccine during the last five years, mainly because it had never been offered.[2] Only three of 57 patients with cardiac disease plus another chronic disease had been vaccinated. In a number of studies the major reason given for not being vaccinated was that it was not offered, although patients were concerned about side effects and had doubts about efficacy.[2] Most hospitals in the UK do not have a vaccination programme despite the fact that most patients discharged from hospital are in a high risk category. In a Canadian study about 80% of elderly patients hospitalised with respiratory conditions during the influenza outbreak season had had at least one health care contact for some reason during the preceding vaccination period,[16] showing that opportunities for vaccination are present but are often missed.

The most likely reason for doctors not recommending vaccination to their patients is that they are not convinced of the magnitude of the benefits. A number of recent studies, all from outside Europe, have supported the institution of vaccination programmes, even in populations outside those recommended by our own Department of Health. A large study was made in 20 hospitals in Michigan, USA of 449 non-institutionalised people aged 65 or over admitted to hospital with pneumonia and influenza during and outside an outbreak of influenza A.[17] These cases were closely matched with community-based controls and surveillance was made of the incidence of influenza illness in the community at the time. The effectiveness of vaccination in preventing all pneumonia and influenza admissions was 45% ($p<0.01$), compared with 21% (not statistically different from zero) in a period of low or absent virus activity. This is likely to be an underestimate of the efficacy of vaccination since agents other than influenza are responsible for admissions with pneumonia or influenza even during times of peak influenza activity. This study was part of a larger Medicare influenza vaccine demonstration study conducted during 1988–92.[18] A cost-benefit analysis was also performed. At a vaccination rate of 40% and an estimated effectiveness of vaccination of 42% in a high influenza prevalence year and 21% in a lower prevalence year, Medicare funding of influenza vaccination would incur zero net costs. Assuming similar figures, the cost of the programme per year of life gained was 145 US dollars compared with at least 1600 US dollars per year of life gained through cervical cancer screening. Thus, influenza vaccine is very cost effective.

In Canada, as in the USA, the Ministry of Health recommends vaccination of all persons aged 65 and over. A large cost-benefit study in Ontario[19] estimated that the cost of influenza vaccination was 7·54 Canadian dollars per vaccination. The benefits of the vaccination programme considered were reductions in the costs of hospitalisation, physician, and prescriptions by preventing influenza in the elderly. The calculated benefit was 11·40 Canadian dollars, giving a net saving of 3·86 Canadian dollars per vaccination. A second Canadian study assessed clinical effectiveness of influenza vaccination in preventing influenza-associated hospital admissions and death in non-institutionalised persons aged 45 years or older.[20] A case-control study was performed during two outbreaks of influenza A. Influenza vaccination prevented 32–39% of hospital admissions with pneumonia and influenza and 15–34% of admissions with all respiratory conditions. Vaccination was 43–65% effective in preventing hospital deaths from these conditions and 27–30% effective in preventing deaths from all causes.

Active encouragement of vaccination targeted at high-risk groups will increase uptake.[2,21,22] Interventions include computer generated invitations to attend for vaccination and reminders for those who fail to attend, flags in notes of high-risk patients, delegation of responsibility for vaccination to nurses, and vaccination clinics with easy access. Doctors and patients require education about the safety and efficacy of influenza vaccine, and hospitals should play a more active part in vaccinating high-risk patients. The single most important factor in influencing patient acceptance of influenza immunisation has been shown to be recommendation by a doctor. Doctors should identify those patients at risk and order sufficient vaccine for them well in advance so that demand can be met. Vaccination should be recommended for all those patients who are in the risk groups.

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