

Newsletter

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Hot Topics

Influenza: a much greater public health threat than SARS

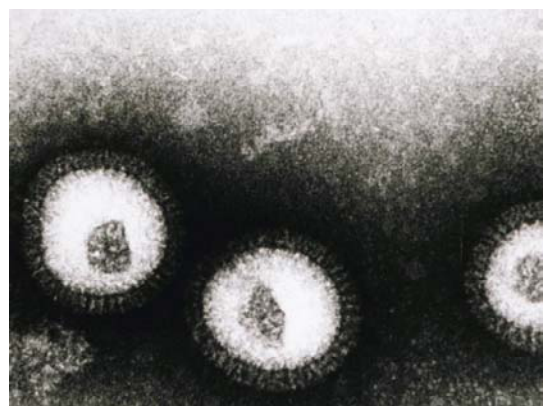
Influenza immunisation is a safe, cost-effective public health intervention. Health-care providers should encourage it, particularly for at-risk patients. Studies consistently show that the most important influence on people's decision to be vaccinated is their doctor's recommendation. Health-care providers should also ensure they are themselves vaccinated annually to protect their patients.

Influenza continues to be a major threat to public health worldwide because it can spread rapidly & tends to mutate into new strains. The recent multi-country outbreak of SARS has shown how much greater impact an influenza pandemic would have. In 1918-1919 the infamous 'Spanish Influenza' pandemic killed 40 million people, incapacitated health-care systems & caused massive social disruption around the world. Since the 1997 Hong Kong 'chicken flu' outbreak, in which six people died from a completely new strain that leapt the species barrier, the urgent importance of planning for another influenza pandemic has been recognised. Australia is well advanced in this planning process; see the Australian pandemic plan at: <http://www.health.gov.au/pubhlth/strateg/communic/tech/influenza.htm>.

Pandemics aside, despite the media coverage, the number of global SARS deaths so far is less than the number of deaths resulting from influenza-related illness in Australia each year—in 1999, pneumonia & influenza accounted for 1898 deaths nationally.

The influenza virus

There are three types of influenza virus—A, B & C (although type C is of little significance). A variety of subtypes have been identified, characterised by distinct differences in the surface proteins (antigens) of the virus. Small mutations occur regularly & create variation in these surface proteins, giving rise to new strains through 'antigenic drift'. Greater variation is generally associated with greater epidemic potential. Each winter epidemics of influenza A & B are associated with significant morbidity & mortality from complications such as viral or bacterial pneumonia, particularly in those over 65 years of age & other high-risk groups. Pandemics occur regularly, but unpredictably, when new subtypes of influenza A emerge ('antigenic shift'). These pandemic subtypes may arise when bird or pig influenza viruses infect humans & then adapt by genetic re-assortment with human influenza viruses.



Electron micrograph of influenza virus

Influenza vaccination in Australia: the vaccines and their effectiveness

Current Australian influenza vaccines contain three strains of inactivated recently circulating virus; their composition changes from year to year. These vaccines provide up to 90% short-term protection against illness in healthy adults, depending on how closely virus strains in the vaccine match those circulating in the community. Effectiveness in preventing illness in the elderly is somewhat lower at 50-60%. However, immunisation has been associated with reduced rates of hospitalisations for pneumonia & other respiratory conditions (~30%) & cardiac disease & stroke (~20%) in the elderly, along with ~50% reduction in deaths from all causes. Most economic analyses show that influenza immunisation of the elderly is cost-effective, indeed often associated with cost savings, in temperate countries such as Australia.

Who should be vaccinated?

Annual influenza vaccination is currently recommended in Australia for:

- 1) Individuals at increased risk of complications
 - Anyone aged 65 years or more
 - Aboriginal & Torres Strait Islander people aged 50 years or more
 - Anyone aged 6 months or more with chronic medical conditions including heart disease, bronchiectasis, emphysema, diabetes, kidney failure, immunodeficiency
 - All residents of nursing homes & other long-term care facilities
- 2) Those who can transmit influenza to people at increased risk
 - All health-care workers, staff of nursing homes & long-term care facilities
 - All household members (aged 6 months or older) of individuals in high-risk groups
- 3) Anyone wishing to reduce the likelihood of getting influenza, particularly people providing essential community services
- 4) Other groups, such as pregnant women. The benefits of influenza immunisation in pregnancy (1-2 second or third trimester hospitalisations prevented per 1000 women immunised) outweigh any theoretical risk of giving an inactivated vaccine in early pregnancy. Influenza vaccine should be offered to women planning a pregnancy & to

pregnant women likely to be in the second or third trimester during the influenza season.

National influenza program

Under a joint Commonwealth-State program, influenza vaccine is available free to all people 65 years & older & to all Aboriginal & Torres Strait Islander people 50 years of age or older.

Immunisation uptake in Australia

At-risk groups: A recent survey found that 77% of Australians aged 65 years & over were vaccinated against influenza in 2002. However, only 42% of 40-64 year olds with risk factors were vaccinated. <http://www.aihw.gov.au/publications/phe/ivs02sr/index.html>.

Health-care workers: Less than 30% of health-care workers are immunised. This needs to improve, because there is strong evidence that increasing vaccination rates in health-care workers can substantially reduce mortality among elderly people.

Adverse events

Minor local reactions (induration, swelling, redness & pain) are relatively common (>10%). Fever, malaise & myalgia can occur (1-10%) & may last for one or two days. While these symptoms may mimic influenza, the vaccine does not contain live virus so cannot cause influenza. More severe adverse events such as allergic reactions are rare.

Contraindications

Influenza vaccine should not be given to anyone with: (a) a history of severe allergic reaction to eggs; (b) a history of severe allergic reaction to any of the product components; or (c) a fever over 38.5°C.

New developments

A live-attenuated influenza vaccine delivered by nasal spray has been shown in trials to be safe, effective & well tolerated. United States regulatory bodies are currently assessing an application for approval for its general use.

Overview of recent work at NCIRS

On Thursday 29 May 2003 Ms Mary Murnane, Deputy Secretary of the Department of Health & Ageing, visited NCIRS for a briefing on its contribution to surveillance & research of VPDs in Australia. Below is a summary of the key material presented.

The ACIR

The Australian Childhood Immunisation Register (ACIR) is administered by the Health Insurance Commission. It includes data on all Australian children aged less than 7 years registered with Medicare or who have had one or more vaccinations notified. It contains data on vaccines given, provides information for doctors & parents about individuals & reports on coverage at various regional levels.

NCIRS is the only repository of a complete set of all ACIR cohort data. It analyses, evaluates & interprets these data. Reports are published regularly in *Communicable Diseases Intelligence* & maps are used to display coverage data. The quality of the data reported & the effect of special initiatives (such as the Measles Control Campaign (MCC)) & parental incentives have been evaluated: the increase in coverage over time is a result of both better reporting & better uptake.

Now that reporting of Indigenous status has improved, estimation of coverage rates in Aboriginal & Torres Strait Islander people & communities is possible. Preliminary findings show excellent immunisation rates in the ACT & NT but lower rates in the other States.

Mathematical modelling

One cannot always wait for a prospective study, especially if effects are likely to be long-term. Mathematical modelling can often predict the future behaviour of infectious diseases, providing a dynamic picture. For example, it was used to show that, without the MCC, there would have been a measles epidemic in Australia. It was then used to evaluate the Campaign that averted the epidemic & has since been used to predict the recurrence of measles in Divisions of General Practice across Australia if current Divisions' vaccination rates remain unchanged.

Modelling can predict epidemics & suggest the need for additional vaccine campaigns, evaluate the long-term impact of new vaccines (eg. varicella vaccine to prevent shingles), allow selection of the optimal vaccination schedule, & evaluate eradication targets & strategies. Diseases which have been mathematically modelled at NCIRS include measles, varicella-herpes zoster, pertussis, hepatitis A & hepatitis C. In the future we plan to model other potentially vaccine-preventable infections such as human papilloma virus & *Helicobacter pylori*. Modelling is heavily dependent on data from nationally representative serosurveys.

National serosurveys

National serosurveys can be used to determine community levels of immunity to VPDs. The information

obtained can be used to: illustrate the impact of past vaccination policies; evaluate specific campaigns; understand the natural history of an infection; aid policy and planning by identifying groups at particular risk of an infection or by predicting future problems.

The first serosurvey undertaken by NCIRS included: measles, mumps & rubella (both before & after the MCC), varicella-zoster, hepatitis A, B & C, diphtheria, tetanus, poliomyelitis & pertussis. It allowed us to measure the impact of the MCC, identify at-risk groups & to provide information to use in modelling the effect of varicella vaccine. The second serosurvey is under way. It will provide information about diseases where we expect changes such as measles, rubella, hepatitis A & B and baseline information for diseases targeted by future vaccines (eg. Epstein Barr virus, cytomegalovirus, *Helicobacter pylori*, & human papilloma virus). Thanks are due to the many laboratories around Australia contributing sera to this effort.

Pertussis

NCIRS research & surveillance projects have shown a true increase in pertussis incidence, not accounted for by changes in methods of diagnosis or vaccination coverage. A collaborative study with the APSU showed that hospitalised infants catch pertussis from an adult, usually a parent or occasionally a health-care worker. Based on these considerations and modelling data, the Pertussis Working Party recommended both replacing the 18-month dose with an adolescent booster and advising new parents to be vaccinated against pertussis to protect their infant.

Attitudes

Media coverage of immunisation in Australia between 1993 & 1998 was predominantly positive, only 5% was negative. The fact that immunisation coverage is now 90% by 2 years of age shows that most parents support it. One study found that only 2-3 % of parents are opposed & that the most common reasons for concern were fear of vaccine side effects (45%) & belief that vaccines are ineffective (13%). Consumer responses to media controversies showed that most people, while initially concerned or upset about a story, returned to supporting vaccination because of a variety of factors, particularly trust in providers and the opinion of family & friends.

Providers are very important in parental decision-making about vaccination. A study evaluating parent incentive payments found that 31% of parents felt that providers were the single most important factor in their decision to vaccinate. How do providers address parental concerns about vaccination? An interview study suggested that the most important responses are to acknowledge concerns, discuss choices & provide an estimation of risk.

Current & future projects include a national serial survey of parental attitudes, a study of GP & nurses' attitudes & experiences, a study of GPs' knowledge & training needs, the effect of the MMR controversy on the parents of children with autism & developing risk communication strategies for providers & media spokespersons.

Recent Publications

- ◆ McIntyre P, Williams A, Leask J. Refusal of parents to vaccinate: dereliction of duty or legitimate personal choice [editorial]. *Medical Journal of Australia* 2003;178:150-1. http://www.mja.com.au/public/issues/178_04_170203/mci10747_fm.pdf
 - ◆ MacIntyre CR, Burgess MA, Hull B, MacIntyre PB. Hepatitis A vaccination options for Australia. *Journal of Paediatrics & Child Health* 2003;39:83-7.
 - ◆ Wood N. Immunisation adverse events clinics. *New South Wales Public (NSW) Health Bulletin* 2003;14:25-7.
 - ◆ Lawrence GL, Campbell-Lloyd S, Rixon G. Monitoring adverse events following immunisation. *NSW Public Health Bulletin* 2003;14:21-4.
 - ◆ Burgess MA, Lester R. Meningococcal vaccines. *Australian Prescriber* 2003;26:56-8.
 - ◆ Roche P, MacIntyre P, Spencer J. Pneumococcal disease in Australia: current status & future challenges. A report of the workshop held at NCIRS 8-9 November, 2002. *Communicable Diseases Intelligence* 2003;27:79-84.
 - ◆ Gidding HF. Australia's national serosurveillance program. *NSW Public Health Bulletin* 2003;14:90-3.
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Recent Journal Club Topics

Conjugated pneumococcal vaccine in the USA

A study in the *New England Journal of Medicine* (2003;348:1737-46) by Cynthia Whitney found that vaccinating children with 7-valent pneumococcal conjugate vaccine (PCV7) reduced the rate of pneumococcal disease in US children. It also reduced the rate in adults & reduced the rate of penicillin resistance.

Vaccination of US children under the age of 2 years commenced in mid-2000. The incidence of invasive pneumococcal disease (IPD) (isolation of *Streptococcus pneumoniae* from a normally sterile site) before & after introduction of PCV7 was calculated, & isolates were serotyped & tested for susceptibility. Between 1998 & 2001 the incidence of IPD fell from 23.4 to 17.3 per 100 000. The largest decline (69%) was in children under 2 years of age. Rates also declined in all adult age groups, with the greatest fall in 20-30 year olds (32%) followed by >65 year olds (18%). Penicillin resistance dropped by 35%. These data suggested that herd immunity may play a role in protecting unvaccinated adults. Longer term follow-up data combined with vaccination coverage data are needed to confirm these findings.

Polysaccharide pneumococcal vaccine in US adults

A second study in the *New England Journal of Medicine* (2003;348:1747-55) found that 23-valent pneumococcal polysaccharide vaccine (PPV) protected adults aged 64 years & older against pneumococcal bacteraemia, but not against hospital or community-treated pneumonia.

In a retrospective cohort of 47 365 adults aged 65 years or older studied over three years, the study outcomes (pneumonia requiring hospitalisation, pneumonia treated on an outpatient basis & pneumococcal bacteraemia) were determined from administrative databases. Although it significantly reduced the incidence of invasive pneumococcal disease (IPD), PPV did not reduce outpatient pneumonia (hazard ratio 1.04; 95%CI 0.96 to 1.13) or all community-acquired pneumonia, whether or not it required hospitalisation (hazard ratio 1.07; 95%CI 0.99 to 1.14).

This study adds to other data suggesting that PPV protects against IPD, including bacteraemic pneumonia, but not non-bacteraemic pneumonia. However, lack of specificity in the diagnosis of pneumococcal as opposed to other causes of pneumonia without IPD is problematic and can only be addressed in randomised trials as opposed to observational studies. Trials are too costly to conduct and are unlikely to be approved. Nevertheless, the benefits of PPV against IPD alone are sufficient to render it cost-effective in the elderly >65 years of age, at least up to age 85.

For further information, or if you would like to provide feedback on the NCIRS Newsletter, please contact Karyn Phillips at karynp@chw.edu.au