

New research on flu vaccination in PLoS Medicine

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As this year's flu season gets underway in the northern hemisphere, new research finds that when it comes to flu vaccination, more appears to be better.

Two new studies published in the open access journal *PLoS Medicine* show that increasing the number of people vaccinated against influenza can decrease the burden of the disease, and not just in the individuals receiving the vaccine.

Targeted vaccination programs, in which flu vaccine is recommended for particular groups at high risk of spreading or experiencing complications of influenza, are commonly implemented. In contrast, the Canadian province of Ontario initiated a universal immunization program in 2000, in which flu vaccination is promoted and provided free of charge to everyone over the age of 6 months. The first study, by Jeff Kwong of the Institute for Clinical Evaluative Sciences in Toronto and colleagues, evaluated the effect of this universal immunization program on influenza-associated health outcomes.

The researchers analyzed national and provincial data from 1997 to 2004, to compare changes in Ontario's flu outcomes before and after introduction of universal vaccination with outcomes in other provinces, which continued targeted vaccination programs. They found that, compared with other Canadian provinces, Ontario's universal vaccination program was associated with reductions in influenza outcomes including flu-related deaths, hospitalizations, and visits to emergency departments

and doctors' offices.

The results did suggest, however, that increasing immunization rates may not be as effective in reducing mortality and health care use in older people, particularly those over 75 years of age, compared to younger people. However, even with enhanced access to free flu vaccines in Ontario, only an estimated average of 38% of the overall household population reported receiving them, suggesting that protection of older people by higher immunization rates of younger contacts who might expose them to influenza may still be of benefit.

The second study further investigated the concept of herd immunity, by which immunization of some individuals protects the overall population by reducing exposure of those who are not immunized. Using a mathematical model to simulate spread of influenza in nursing homes, Carline van den Dool and colleagues at the University Medical Center, Utrecht, the Netherlands found that increasing the number of health care staff who are vaccinated can protect additional patients from influenza. They calculated that increasing the proportion of vaccinated health care workers from zero to 100% in a 30-bed nursing home department would reduce patient infections by about 60%, and that vaccinating seven health care workers would on average prevent one patient from getting influenza.

They also found that no level of health care worker vaccination guarantees complete herd immunity, suggesting that even at high levels of immunization, increasing the number of nursing home staff who are vaccinated against flu each year will further reduce risk to patients. The authors also note that random variation, which occasionally leads to large outbreaks, limits the ability of small vaccination trials to assess the actual relationship between health-care worker vaccination and patient risk of influenza.

In a perspective accompanying the two research papers, Cécile Viboud and Mark Miller of the Fogarty International Center, US National Institutes of Health, who were not involved in the studies, discuss the value and limitations of evaluating influenza vaccination strategies in observational settings.

Citation: Kwong JC, Stukel TA, Lim J, McGeer AJ, Upshur REG, et al. (2008) The effect of universal influenza immunization on mortality and health care use. PLoS Med 5(10): e211.

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