Effectiveness of seasonal influenza vaccination in healthcare workers: a systematic review

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CRD summary
This review concluded that there was limited evidence that influenza vaccination may reduce incidence of laboratory-confirmed infection in healthcare workers, but no evidence for any effect on influenza-like illness outcomes or working days lost. Data were insufficient to assess vaccine-related adverse events or to draw firm overall conclusions. The conclusions presented were appropriately cautious.

Authors' objectives
To assess the effectiveness of influenza vaccines in health care workers and to assess vaccine-related adverse events.

Searching
Twenty-two bibliographic databases and Internet resources were searched from inception to March 2011; search terms were reported. The bibliographies of all retrieved articles were screened for additional studies. Only articles written in English or Chinese were included.

Study selection
Eligible randomised controlled trials (RCTs) compared the effectiveness of any kind of influenza vaccine, in health care workers in all healthcare settings, with a placebo/vaccine other than the influenza vaccine/no intervention. Outcomes of interest were laboratory-confirmed influenza infections, influenza-like illness, working days lost and vaccine-related adverse events.

All included studies used the trivalent inactivated parenteral seasonal influenza vaccine and were conducted in hospital settings in Europe or the USA. Control groups received intramuscular saline or control vaccine (meningococcal or pneumococcal vaccine). Study participants were generally healthy. Studies were conducted between 1985 and 1997. Outcomes were generally self-reported using diaries, questionnaires or telephone interviews.

Two reviewers independently assessed studies for inclusion and any disagreements were resolved by consensus.

Assessment of study quality
The methodological quality of the included studies was assessed using the following criteria: randomisation process; allocation concealment; blinding of participants, investigator, and outcome assessors; completeness of outcome data; selective outcome reporting; other potential threats to quality.

Two reviewers independently assessed study quality and any disagreements were resolved by consensus.

Data extraction
The incidence of laboratory-confirmed influenza infection, influenza-like illness and adverse events after influenza vaccination in vaccine and control groups were extracted for each study and relative risks (RRs), with 95% confidence intervals (CIs), were calculated. Number of days with influenza-like illness and work days lost was extracted to calculate mean differences. Absolute vaccine efficiency was expressed as a percentage using the formula: vaccine efficiency=1-RR whenever the outcome of the laboratory-confirmed influenza infection and the incidence of influenza-like illness was statistically significant.

Two reviewers independently extracted data and any disagreements were resolved by consensus.

Methods of synthesis
Studies were summarised in a narrative synthesis due to different methods of reporting and missing data. A fixed-effect model was used to calculate a pooled estimate of mean difference in the number of working days lost between vaccinated and unvaccinated health care workers.

Between-study heterogeneity was assessed using $\Gamma^2$. 
Results of the review
Three RCTs, with a total of 967 participants (488 in the influenza vaccination group and 479 in the control group), were included in the review. Methodological quality of included studies was rated as high for two studies and moderate for the remaining study. No studies used intention-to-treat analysis. The moderate quality study had a relatively high dropout rate (22%) and did not provide adequate information on sequence generation, allocation concealment and the blinding of investigators and outcome assessors.

One study reported laboratory-confirmed influenza infections. The risk of infection was significantly lower in the vaccination group, RR 0.12 (95% CI 0.04 to 0.41) and vaccine efficiency 88% (95% CI 59 to 96%).

One study reported incidence of influenza-like illness and showed no significant difference between the vaccine and control groups. A second study reported the number of influenza-like illness episodes and found no significant difference between the vaccine and control groups. The third study reported no significant difference in days with influenza-like illness symptoms between the vaccine and control groups.

There was no significant difference in the mean number of working days lost between vaccinated and unvaccinated health care workers (two studies, I²=0%).

All three included studies reported absenteeism and other adverse effects after the receipt of an influenza vaccination. Adverse effects were mainly localised, including pain at the site of the injection to erythema with or without induration, and were mild and transitory. There were no reports of life-threatening or persistent adverse reactions.

Authors’ conclusions
There was limited evidence that influenza vaccination reduced laboratory-confirmed infections in health care workers. Influenza vaccinations had no effect on the incidence of influenza-like illness, number of influenza-like illness episodes, days with influenza-like illness symptoms or amount of sick leave taken. There were insufficient data to assess adverse effects after vaccination. Data were insufficient to draw firm conclusions and further research was needed.

CRD commentary
The review provided a clear objective and inclusion criteria. A large number of sources were searched for relevant studies, but the restriction to studies in English or Chinese raised the possibility of language bias and may have resulted in relevant studies being missed. Measures to minimise error and bias were applied throughout the review process. The methodological quality of included studies was assessed and incorporated into the reporting of results. The largely narrative synthesis was appropriate.

The authors noted that results may not be generalisable to workers in other healthcare settings. The authors’ conclusions were suitably cautious and reflected the limited data available. It should be noted that the authors recommended that promotion of influenza vaccination amongst healthcare workers should focus on patient protection, but no evidence of the effects of healthcare worker vaccination upon influenza outcomes in patients was presented.

Implications of the review for practice and research
Practice: The authors stated that promotion of influenza vaccination amongst healthcare workers should focus on patient protection, with accurate information to address concerns and misconceptions.

Research: The authors stated that further well-designed multicentre RCTs were needed to assess the effectiveness of annual vaccination in protecting health care workers against infection. Research should be conducted in diverse healthcare settings and should include laboratory confirmation of influenza as an outcome measure.

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