influenza

Strategies to increase the uptake of the influenza vaccine by healthcare workers: A summary of the evidence

This evidence summary document has been prepared for the National Collaborating Centres for Public Health (NCCPH) collaborative Influenza and Influenza-like Illness project. Influenza and influenza-like illnesses (ILI) are a persistent public health issue that practitioners have to deal with annually, caused by seasonal influenza and other respiratory pathogens, as well as under emergency situations in pandemics. Many unanswered questions remain about how to best measure, control and communicate what we know about influenza. The National Collaborating Centre for Infectious Diseases (NCCID) and its partners asked public health stakeholders — what are the priorities and what types of knowledge projects are most useful? The themes and questions most often mentioned were *Vaccine effectiveness, Primary prevention, Rapid diagnostics, Surveillance & burden of illness, Communication & messaging, and Equity*.

This document summarizes two systematic reviews that have assessed the effectiveness of strategies for increasing the uptake of the influenza vaccine by healthcare workers (HCW). This information will be relevant to public health managers, decision makers and policy makers.

During January 2014, a search of www.healthevidence.org was conducted to identify systematic reviews that analysed strategies that have been used to increase the uptake of the influenza vaccine by HCW. Two reviews were identified (Hollmeyer et al 2013 and Lam et al 2010): these reviews are summarized in Table 1.

The review by Hollmeyer et al (2013) was rated by healthevidence.org using their appraisal tool as "moderate" due to several factors. Firstly, the search strategy employed to identify studies was not comprehensive. Only one database was searched, PubMed, which may have led to key studies not being identified. Whilst reference lists of relevant publications were checked, journals were not hand searched, key informants were not contacted and there was no search of unpublished (grey) literature. Again, this could have led to important studies being missed. For those studies that were included in the review, the methodological quality was not assessed, this could have led to studies that were poorly designed and/or conducted being included. As the methodological quality of the studies was not reported and it was not reported if a minimum of two reviewers were involved in the process, the review cannot be described as transparent. The results of the included studies were not combined, only described individually. In general, the conclusion of the review is consistent with the data presented and the authors do state there have been few methodologically rigorous studies published. However, they do not advise caution about drawing conclusions from the review.

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	Hollmeyer et al (2013)	Lam et al (2010)
Study design	Systematic review (25)	Systematic review (12)
Objective	To analyse interventions used to increase the uptake of the influenza vaccine by healthcare workers	To determine which influenza vaccination campaign or campaign components in healthcare settings were significantly associated with higher rates of influenza vaccination among staff
Setting	Acute care hospital	Non-hospital healthcare settings (long term care facilities) (5) and hospitals (7)
Populations in identified studies	• Generic HCW • Hospital employees in general • Non-physician employees • HCW with direct patient contact only	Non-hospital healthcare settings: • Physicians • Nurses • Nursing assistants • Housekeeping staff • Technicians • Other professionals and administrators Hospital settings: • Medical residents • Nurses • Physicians • Other professionals • Administrators • Housekeeping staff • Volunteers
Interventions	Access related: 1. Free vaccine 2. Flexible and worksite vaccine delivery Knowledge and behaviour related: 3. Education material 4. Education sessions 5. Reminders 6. Incentives Management and policy related: 7. Assignment of dedicated staff 8. Feedback 9. Signed declination statements 10. Mandatory vaccine	1. Education or promotion 2. Improved access to vaccine 3. Education + improved access to vaccine 4. Education + improved access to vaccine + legislation (mandatory declination forms and mandatory masks for unvaccinated workers) + role models 5. Education or promotion + improved access to vaccine 6. Improved access to vaccine + measurement, feedback

	Hollmeyer et al (2013)	Lam et al (2010)
Controls	Historical or concurrent control	Comparison campaign
Outcome measures	For before and after studies, results were presented as the % increase in vaccination uptake between the baseline season and after one season of the intervention. For before and after studies with a control, results were presented as the odds ratio (95% CI) of vaccination after the intervention compared to the control. For interventions that had been implemented consistently for 10 years or more, results are presented as the increase in the % of staff vaccinated between the baseline and after several seasons.	For before and after studies with a control and for randomized control trials, post-intervention vaccine rates were used to calculate the risk ratio (RR) and 95% confidence intervals. These were summarized in a forest plot. Interrupted time series studies were summarized descriptively in the text.
Findings	Components were not analysed individually. There was a dose-response relationship between the number of components used in an intervention and the % increase in vaccination rate (r=0.25). For studies that only had one year of intervention, the % increase in vaccination uptake ranged from 2.5% to 49%. For studies that had more than one year of intervention, the % increase in vaccination uptake ranged from -12% to 43.6%. For the before and after studies with a control, the OR (95%) of receiving the vaccination after the intervention ranged from 1.19 (0.77-1.83) to 24.93 (20.82-28.72) compared to an historical control, and 1.04 (0.68-1.59) to 20.50 (17.5-24.1) compared to a concurrent control. For the two studies that consistently implemented an intervention for over 10 years, the vaccination coverage range increased from 4% to 67% and <25% to 65%. Interventions where the vaccination was mandatory resulted in almost universal coverage with an uptake of between 97.6% and 99.0%.	Non-hospital healthcare settings (long term care facilities): The results ranged from RR=1.04 (95%CI 0.81-1.35) for a campaign with one component, to RR=8.05 (95%CI 6.30-10.30) for a campaign with four components. Risk ratios increased in favour of the intervention when more components were included. The two interrupted time series studies led to vaccinations increasing from 21% to 55% in one study and 33% to 52% in the other. Hospital settings: Results ranged from RR=0.86 (95%CI 0.80-0.92) to RR=2.71 (95%CI 1.53-4.81). However, results were mixed and there was no association between risk ratios and the number of components used.
HE rating	5 moderate (see below)	9 strong (see below)

Table 1. Summary of systematic reviews that assessed strategies to increase the uptake of the influenza vaccine among healthcare workers.

Lam et al (2010) received a strong rating, 9, from healthevidence.org. All criteria used in the healthevidence.org appraisal tool were met, with the exception of the assessment of methodological quality. Whilst the research design, study sample and sources of bias were assessed, participation rates, data collection, follow-up rates and data analysis were not assessed. However, as two reviewers were involved in the assessment, the results can be described as transparent.

Hollmeyer et al (2013) identified studies from a search of PubMed and from references in the articles found. A total of 25 before and after studies were included in the systematic review. All studies were set in acute care hospitals. Lam et al (2010) identified studies from searching Ovid SP, MEDLINE, EMBASE, CINAHL, Science Citation Index Expanded (Web of Science), Database of Abstracts of Reviews of Effects, Cochrane Database of Systematic Reviews, Cochrane Central Register of Controlled Trials and Proquest for dissertations and theses. In addition, infection control experts were consulted and bibliographies of relevant papers hand searched. Finally, using articles already located, the related articles feature of PubMed was utilized. Of the 12 studies included in the review, 7 were set in hospitals and 5 in non-hospital settings such as long-term care facilities. The studies included randomised control trials, cluster randomised control trials, controlled before and after studies and interrupted time series designs.

Both Hollmeyer et al (2013) and Lam et al (2010) included studies whose interventions assessed improved access to vaccines, education or promotion via materials or sessions and feedback. Free vaccines were included in studies in both systematic reviews but only as part of the comparison campaigns in Lam et al (2010). Hollmeyer et al (2013) also included studies that assessed programmes where the vaccine was mandatory. Lam et al (2010) included studies that included mandatory declination forms and mandatory wearing of masks for unvaccinated workers.

Control groups in the studies included by Hollmeyer et al (2013) were either intervention programs from previous influenza seasons (one to eighteen years in duration) or concurrent programmes with the same baseline components. In the studies included by Lam et al (2010), controlled before and after studies had at least one comparison group and an observation point before and after the intervention. Interrupted time series studies had to state clearly at what point the intervention began, with a minimum of five recorded pre-intervention observations. Shorter interrupted time series studies required at least three recorded points prior to and after the intervention.

Neither of the systematic reviews pooled the results of included studies. Hollmeyer et al (2013) reported the % increase in vaccination uptake for before and after studies and for studies that had been implemented consistently for over ten years or more. For studies that evaluated interventions across different settings and different groups of HCW, results were presented as the % increase in vaccination uptake and odds ratios. The review did not conduct a meta-analysis to estimate overall magnitude of effect for a single component. Lam et al (2010) reported risk ratios and 95% confidence intervals of post intervention vaccination rates for randomized control trials and before and after studies. The interrupted time series studies were summarized descriptively.

Hollmeyer et al (2013) found that the more components used to encourage immunization, the higher the vaccine coverage ($r^2 = 0.025$); each additional component led to an increase of 5-6%. However they were not able to analyse individual components but only describe them. There were 18 intervention programmes identified that were conducted as before and after studies. The median baseline vaccination rate observed in these studies was 29% (range 2%-73%); after the interventions, the median rose by 17% (range -12%-49%). The most effective intervention was a mandatory vaccination policy; studies including this component reached almost universal coverage.

Lam et al (2010) found that the most frequently used components, in both hospital and non-hospital settings, were education and improved access to the vaccine. In non-hospital settings, adding improved access to vaccines to education resulted in higher coverage than education alone; one identified study reported an RR of 2.43 (95% CI 1.33-4.41). Only one study utilized more than two components and as such no conclusions about multiple components can be made. In the hospital setting, education and improved

access to the vaccines only had a small impact; one identified study reported an RR of 1.64 (95% CI 1.49-1.80). The two interrupted time series studies included mandatory components; in programmes that featured the mandatory wearing of masks for unvaccinated workers, coverage increased from 33% to 52%. Similarly, when mandatory declination forms were a component, coverage increased to 55%; in the previous nine years rates had ranged from 21% to 38%.

Lam et al (2010) acknowledged that many included studies were at high risk of bias which may have resulted in an overestimation of intervention effect. Lam concluded by recommending that more rigorous research is needed. Hollmeyer et al (2013) acknowledged that their analysis of programs was limited but recommended that in order to increase the number of HCW being vaccinated, intervention campaigns need to be committed to both well-designed and long-term intervention campaigns that have a variety of components.

In conclusion, compared to other strategies, mandatory vaccines resulted in the greatest rate of coverage. In the studies where vaccination was mandatory, it was made a condition of employment that staff receive the vaccine. Staff could apply for exemption on medical or religious grounds. Barring mandatory vaccine, utilizing multiple knowledge translation components provided the next highest rate of coverage although this was still low. Knowledge translation strategies implemented in Canada should be rigorously evaluated in order to augment the evidence base.

References:

Hollmeyer, H., Hayden, F., Mounts, A, & Buchholz, U. (2013). Review: Interventions to increase influenza vaccination among health-care workers in hospitals. Influenza and other Respiratory Viruses, 7(4), 604-621.

Lam, P.P., Chambers, L.W., Macdougall, D.M. & McCarthy, A.E. (2010). Seasonal influenza vaccination campaigns for health care personnel: Systematic review. CMAJ: Canadian Medical Association Journal, 182(12), E542-E548.

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