

Peer-reviewed articles

REVIEW OF STRATEGIES TO ENHANCE THE UPTAKE OF SEASONAL INFLUENZA VACCINATION BY AUSTRALIAN HEALTHCARE WORKERS

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Abstract

Annual vaccination of healthcare workers (HCWs) against seasonal influenza is recommended by The Australian Immunisation Handbook to prevent personal morbidity and transmission to patients. There are limited data available concerning the uptake of this vaccination by Australian healthcare workers, and few studies have investigated the determinants of this uptake. This report therefore aims to review the seasonal influenza immunisation uptake rates of Australian HCWs, the determinants of these rates, and strategies to improve them. The Cumulative Index to Nursing and Allied Health Literature, PubMed and the Cochrane Library were searched for literature published online between January 2000 and May 2011. A manual search of the grey literature was also undertaken. Studies of influenza pandemic A(H1N1) 2009 immunisation were excluded. Eleven relevant studies were identified. The published data suggests that annual seasonal influenza immunisation rates among Australian HCWs are below recommended levels (range 22%–70%). Factors contributing to the decision to be immunised demonstrate only minor variations from those identified in international samples. There is little high quality evidence to support specific strategies and interventions to increase uptake of immunisation in HCWs. Further high quality research is needed to demonstrate the efficacy of strategies and interventions on HCW immunisation uptake, particularly in Australian samples, and if conventional interventions continue to prove ineffective, policy change to mandatory seasonal influenza immunisation should be considered. *Commun Dis Intell* 2012;36(3):E268–E276.

Keywords: influenza, vaccination, Australia, health personnel

Introduction

The recent pandemic A(H1N1) 2009 influenza and its public health response has significantly raised the public profile of both influenza and influenza vaccine in the context of an influenza pandemic. However this may not have significantly altered the attitude or behaviour of healthcare workers (HCWs)

vaccination for seasonal influenza.¹ The overall burden of disease attributable to influenza remains difficult to quantify, and consistent data are generally unavailable for low and middle income countries.^{2,3} Data from the United States of America (USA) estimated the burden of influenza related disease to be 334,185 hospitalisations and 41,008 deaths annually, with direct medical expenses of \$10.4 billion, and a total economic burden of \$87.1 billion each year.⁴ Australian data also indicate a significant burden of disease attributable to seasonal influenza including, 18,404 hospitalisations, and up to 3,457 deaths per annum with a cost to the healthcare system of \$115 million each year.^{5,6} The influenza related hospitalisation estimates per 100,000 population are comparable between Australia and the USA; 94.2 and 88.4 respectively.⁵

Influenza vaccines are currently funded by the Australian Government for high risk groups including patients with medical comorbidities, Indigenous people and those aged over 65 years.⁷ It has been demonstrated to be efficacious and cost effective in the latter group.^{8,9} The cost effectiveness of lowering this threshold to 50 years of age has been debated, although there is currently insufficient evidence to recommend this.^{10,11} There is some evidence that HCWs are at increased risk for influenza, and nosocomial infection with influenza has been reported in various healthcare settings.^{12–14} Influenza vaccination for HCWs is frequently recommended in hospitals and other settings as a measure for reducing both nosocomial infection and staff absenteeism,^{15,16} however compliance with these recommendations has been historically poor.^{17–22}

Worldwide, many studies have attempted to identify the factors influencing the decision to be vaccinated, and many strategies have been trialled to enhance the uptake of influenza vaccination by HCWs.^{23–27} Internationally, the most commonly cited factors predicting vaccination are desire for self-protection, belief in vaccine effectiveness, and previous receipt of vaccination. The most commonly cited barriers to vaccination were lack of knowledge about influenza virus infection and lack of convenient access to vaccine.^{23–27} The disparity in healthcare systems, workplace environments and cultures between HCWs

from different countries is known to influence attitudes to influenza and influenza vaccination.²⁸ Therefore it is unclear whether the same barriers or enabling factors identified in these studies would translate to the Australian healthcare workforce and whether the strategies trialled in overseas hospitals are relevant to the Australian setting. This paper aims to review the literature as it applies to the Australian context by identifying the rates of influenza vaccination in Australian HCWs, the factors influencing the decision to be vaccinated, and the effectiveness of strategies that have been trialled to increase these rates.

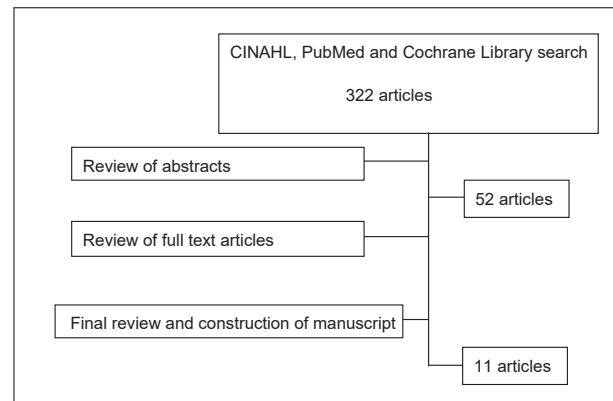
Methods

In this literature review the Cumulative Index to Nursing and Allied Health Literature (CINAHL), PubMed and the Cochrane Library were searched with the following terms: (Influenza OR flu OR orthomyxoviridae) AND (vaccin*(truncation) OR immunis*) AND Austral*. Human studies published online and in English between January 2000 and May 2011 were included. Initial searches yielded a total of 322 articles. After review of abstracts for relevance to the main aim of this review 52 articles were retrieved and studied. Studies of both hospital and non-hospital based healthcare workers were included. At both stages articles were excluded if they did not contain data from an Australian sample ($n=289$), were primarily concerned with pandemic A(H1N1) 2009 influenza vaccination ($n=21$), or if full text copies could not be retrieved ($n=1$). In addition, articles were obtained from an examination of the reference lists of several review articles. In total, 11 articles remained and were included in the final results (Tables 1–3). The Figure depicts this strategy. A manual search of the grey literature was also undertaken with the same search terms, which encompassed state health department web sites and the web sites of infection control interest groups. From this search only the Centre for Healthcare Related Infection Surveillance and Prevention (CHRISP) web site from Queensland Health provided relevant data and was included.

Results

The data on vaccination rates for Australian HCWs are limited (Table 1). These rates are highly variable (range 22%–70%) and predominantly from cross sectional surveys of self-reported vaccination. Notably, in the single relevant published study, HCWs employed in primary healthcare had higher rates of influenza vaccination than those employed in major metropolitan hospitals or aged care.²⁹ Although these searches did not identify any published results for the state of Queensland, the CHRISP reports on their web site that influenza vaccination coverage of government employed healthcare workers in

Figure: Study inclusion flowchart



* Figure includes non-clinical staff.

Queensland was 26% in 2006 and 60% in 2009.¹⁶ Overall, these rates are comparable to those noted in HCWs overseas,^{30–32} but still fall short of the 80% coverage recommended by the Centers for Disease Control and Prevention (CDC).³³ Studies of overseas samples often suggest that medical staff demonstrate the lowest uptake of seasonal influenza vaccination compared with other HCWs, however it is unclear whether this pattern holds for Australian HCWs also. It is concerning to note that Seale et al demonstrated that the lowest rates of coverage in their study were in the highest risk patient areas (15% in neonatal unit, 20% in intensive care).³⁴

Table 2 summarises the literature detailing the enabling factors and barriers to seasonal influenza vaccination in Australian HCWs. Enabling factors were defined as reasons cited for obtaining influenza vaccination by personnel who were vaccinated in the last 12 months. Barriers to vaccination were defined as reasons cited by personnel who were not vaccinated in the last 12 months. Enabling factors and barriers were included in the table if they were cited by 20% or more of the study respondents.

The major enabling factors for seasonal influenza vaccination were consistent across studies; in all studies that included the question, the majority of HCWs replied that their key motivating factor in receiving vaccine was the desire to protect themselves, their friends, family, and patients.^{21,34–37} Additionally, convenience was highlighted by several studies as a key enabling factor,^{21,34} and lack of convenience as a key barrier to vaccination.²¹ Reduction in sick leave and workplace guidelines were less frequently cited motivators.^{21,34,35,37} Campos et al and Seale et al both determined that the perception of influenza as a serious illness was significantly associated with uptake of vaccination.^{34,35}

Table 1: Baseline annual seasonal influenza vaccination coverage of Australian healthcare workers

Author/date	Aim	Design	Sample	Vaccine free of charge	Rate: medical staff	Rate: nursing staff	Rate: other clinical staff	Rate: total
Murray et al, 2002 ¹⁷	Investigate vaccination status and determinants at a Victorian hospital	Cross sectional survey. 87% response rate Vaccination self-report	Tertiary hospital staff: 245 Nursing, 101 Medical, 67 other	No	–	–	–	48%
Cooper et al, 2002 ¹⁸	Demonstrate the efficacy of a novel staff vaccination strategy in a Melbourne hospital	Unclear	Tertiary hospital staff: 1,362 distribution unclear	Yes	–	–	–	49%*
Halliday et al, 2003 ³⁶	Investigate vaccination status and staff attitudes in aged care facilities in the Australian Capital Territory	Cross sectional survey. 65% response rate Vaccination self-report	Aged care facility staff: 381 Nursing	Some facilities	–	28%	–	28%
Bull et al, 2007 ¹⁹	Investigate vaccination rates in Victorian hospitals	Cross sectional survey. 70% response rate Vaccination self-report	>100 bed hospital staff: 5,411 Medical, 19,665 Nursing, 11,885 other	Not reported	29%	35%	50%	38%
Bellaard-Smith et al, 2008 ²⁰	Investigate attitudes to influenza vaccination and strategies to increase uptake in a Victorian Health service	Unclear	Metropolitan health service staff: 10,000 distribution unclear	Yes	–	–	–	42.5%*
Kaufman et al, 2008 ²¹	Investigate vaccination status and determinants at Royal Darwin Hospital	Cross sectional survey: 62% response rate Vaccination self-report	Tertiary hospital staff: 150 Medical	Yes	28%	–	–	28%
Ballestas et al, 2009 ²²	Trial and intervention to increase HCW influenza vaccination in South Metropolitan Perth	Review of vaccination consent forms and staff numbers from Health Corporate Network	Metropolitan health service staff: 11,000 staff	Yes	–	–	–	29%–51% across all hospitals*
Seale et al, 2010 ³⁴	Investigate attitudes and beliefs toward vaccination in Sydney hospitals	Cross sectional survey: 74.5% response rate Vaccination self-report	Tertiary hospital staff: 281 Medical, 512 Nursing, 165 other	Yes	29%	19%	23%	22%
Osman et al, 2010 ³⁷	Investigate enabling factors and barriers to influenza vaccination in a Melbourne emergency department	Cross sectional survey: 0% response rate Vaccination self-report	Tertiary hospital emergency department staff: 12 Medical, 39 Nursing	Yes	58.3%	56.4%	–	58.7%*
Ward et al, 2011 ²⁹	Investigate vaccination rates in primary healthcare staff in New South Wales	Cross sectional survey: 36% response rate Vaccination self-report	Primary healthcare staff: 79 General practitioners, 60 Nursing	Some facilities	–	–	–	70%

Table 2: Enabling factors and barriers to seasonal influenza vaccination in Australian health care workers

Author/date	Objectives	Design	Sample	Major enabling factors (>20%)	Barriers (>20%)
Campos et al, 2002 ³⁵	Investigate predictors of vaccination in a New South Wales hospital	Cross sectional survey: 80% response rate	200 bed hospital staff: 232 Nursing	Belief that influenza is a serious illness (60%)	Belief vaccine may cause flu (40%)
Halliday et al, 2003 ³⁶	Investigate vaccination status and staff attitudes in aged care facilities in the Australian Capital Territory	Cross sectional survey: 65% response rate Vaccination self-report	Aged care facility staff: 381 Nursing	Protect self (68%), family/friends (57%), patients (73%) Vaccination recommended for healthcare workers (64%) Reminder system (28%)	Side effects (including flu) (42%) Poor efficacy (32%) Belief that HCW is at low risk of infection (30%) Unaware vaccination is recommended (26%)
Bellaard-Smith et al, 2008 ²⁰	Investigate attitudes to influenza vaccination and strategies to increase uptake in a Victorian Health service	Semi-structured interview	Metropolitan health service staff: 20 who refused influenza vaccination, 7 Medical, 11 Nursing, 2 other	-	Belief that HCW is at low risk of infection (60%) Belief vaccine may cause flu (60%) Lack of information and evidence provided (50%)
Kaufman et al, 2008 ²¹	Investigate vaccination status and determinants at Royal Darwin Hospital	Cross sectional survey: 62% response rate	Tertiary hospital staff: 150 Medical	Protect self (90%), family/friends (57%), patients (71%) Convenience (57%) Reduced sick leave (43%) Peer pressure (26%) Reminder system (22%)	Unable to access conveniently (59%) Unaware of how to access (26%)
Ballestas et al, 2009 ²²	Trial and intervention to increase HCW influenza vaccination in South Metropolitan Perth	Cross sectional survey: 29.7% response rate	Metropolitan health service staff: 201 Nursing	Belief that influenza is a serious illness (38%)	Belief that HCW is at low risk of infection (56%) Belief vaccine may cause flu (43%) Poor efficacy (22%)
Seale et al, 2010 ³⁴	Investigate attitudes and beliefs toward vaccination in Sydney hospitals	Cross sectional survey: 74.5% response rate	Tertiary hospital staff: 281 Medical, 512 Nursing, 165 other	Protect self (76%), family/friends (82%), patients (77%) Convenience (91%) Reduced sick leave (67%)	Belief vaccine may cause flu (53%) Belief that HCW is at low risk of infection (33%)
Osman et al, 2010 ³⁷	Investigate enabling factors and barriers to influenza vaccination in a Melbourne emergency department	Cross sectional survey: 90% response rate Vaccination self-report	Tertiary hospital emergency department staff: 12 Medical, 39 Nursing	Protect self (59%), family/friends (40%), patients (70%) Infection control campaign (31%)	Trust in or wish to challenge natural immunity (33%) Belief vaccine may cause flu (27%) Not concerned about flu (23%)

Barriers to vaccination included the perception that influenza was not a serious illness or that the HCW was at low risk of infection was held by more than 20% of respondents and considered a major barrier to vaccination in most studies.^{20,22,34–37}

Further misconceptions also presented significant barriers to vaccination in many studies. Between 27%–60% of HCWs in each of the samples believed that the inactivated influenza vaccine provided by their hospital may cause influenza.^{20,22,34–37} There was also a prevalent belief in several samples, albeit in a smaller percentage of responders, that the influenza vaccine has poor efficacy.^{20,22,36} Additionally, a significant percentage of HCW who were not vaccinated claimed to be unaware of guidelines recommending HCW influenza vaccination, or how to access this.^{20,21,36}

Only 3 studies were identified which documented a trial of an intervention to increase the uptake of seasonal influenza vaccination in Australian HCWs (Table 3). All of these studies described the use of a free, mobile vaccination clinic and educational or promotional materials as strategies to increase vaccination rates of HCWs. Both Cooper et al¹⁸ and Bellaard-Smith et al²⁰ included the provision of an after-hours clinic to reach these staff, however it is unclear whether Ballestas et al²² also provided this service. Furthermore, all studies demonstrated a positive effect of their interventions on vaccination rates.^{18,20,22} Other strategies employed included: the vaccination of non-clinical staff to avoid confusion over eligibility;¹⁸ the recruitment of senior staff as ‘Flu Champions’ to provide peer leadership;²² incentives, educational sessions; and declination forms.²⁰

Discussion

To the author’s knowledge, this is the first paper to review strategies to enhance the uptake of influenza vaccination by Australian HCWs and the factors which influence this uptake. A recent review concluded that influenza vaccination rates of Australian hospital based HCWs are consistently low.³⁸ This review extends that finding to non-hospital based and non-clinical HCWs. Although the data for the Australian context are currently very limited, all available studies demonstrated an insufficient uptake of seasonal influenza vaccination by Australian HCWs in all settings.^{17–22,29,34,36,37} The CDC recommends 80% coverage of HCWs to obtain the benefits of herd immunity to the vaccine strains, however 60% coverage of HCWs has also been demonstrated to be effective in reducing patient mortality in the United Kingdom.³⁹ This review found that vaccination rates amongst health-care workers fall short of these targets, with rates below 50% in the majority of included studies. This is comparable to the situation internationally; a systematic review by Hofmann et

al demonstrated rates below 60% in all Canadian and European studies included, and only studies including promotional interventions reached above 60% coverage in the USA.²⁴

This review has several limitations: the low response rates to several surveys and heterogeneity of study populations precludes further statistical meta-analysis of the data in Table 1, particularly with regard to comparisons between medical and nursing staff, or between primary care and major hospital staff. Additionally, comparisons with the international literature are complicated by the design of many Australian studies using closed questionnaires based upon factors identified in the international literature.

The majority of the key themes identified as enabling factors or barriers to vaccination in this review align closely with those described in overseas studies.^{23–25} The most prevalent enabling factors in both Australian and international samples were a desire for protection of self, patients, family and friends, and convenience.^{21,24,25,34,36,37} Additionally, in all studies of Australian HCWs, previous influenza vaccination was significantly associated with current vaccination or intention to be vaccinated.^{20,22,34–37} This is also the most consistent predictor of influenza vaccination in international studies.^{23–25} This suggests that intensive campaigns to increase uptake may provide recurring benefits in subsequent annual uptake.

The key barriers to vaccination identified in Australian and international samples were common misconceptions about influenza or influenza vaccination. The most prevalent included: the belief that the vaccination may cause influenza or influenza-like illness; the belief that influenza is not a serious illness, or the HCWs are at low risk of influenza virus infection; and doubts about the efficacy of the vaccine.^{24,25} Any successful educational campaign must aim to address these issues.

Aside from the aforementioned similarities in identified enabling factors and barriers in Australian and international studies, this review has also identified several differences. Perhaps the most significant omission from Australian questionnaires is the fear of injections, which has been shown to account for up to 26% of vaccine declination in reviews of the international literature.^{24,25} Future studies should ensure this is included in their questionnaires. Also, the reviews of international studies describing motivations for vaccination have found only one study in which the desire to protect patients is ranked as a more significant motivation than the desire for self-protection.^{24,25} Conversely, three out of the seven surveys of Australian samples found that HCWs ranked patient protection as a greater motivator than self-protection.^{34,36,37} This discrepancy is highly

Table 3: Strategies to enhance the uptake of seasonal influenza vaccination

Author/date	Objectives	Design	Intervention	Sample	Pre-intervention coverage	Post-intervention coverage
Cooper et al, 2002 ¹⁸	Demonstrate the efficacy of a novel staff vaccination strategy in a Melbourne hospital	Interventional study	Free of charge Mobile vaccination clinic After hours clinic Educational pamphlet Vaccination of non-clinical staff	Tertiary hospital staff: 1,362 distribution unclear	49%	81%
Bellaard-Smith et al, 2008 ²⁰	Investigate attitudes to influenza vaccination and strategies to increase uptake in a Victorian health service	–	Free of charge Mobile vaccination clinic After hours clinic Educational pamphlet, posters, memos Opportunistic education sessions Reward for reaching target % Limited use of declination forms	Metropolitan health service staff: 10,000 distribution unclear	42.5%	57.5%
Ballestas et al, 2009 ²²	Trial of intervention to increase HCW influenza vaccination in South Metropolitan Perth	Interventional study	Free of charge Mobile vaccination clinic Educational/promotional pamphlets, posters, emails Recruitment of senior staff	Metropolitan health service staff: 11,000 staff	29%–51%	48.8%–76.5%

relevant to advertising and promotional campaigns in Australian hospitals, suggesting that these campaigns should emphasise the protective effect of this vaccine on patients.

In the author's experience, many Australian health-care settings and hospitals employ some form of seasonal influenza vaccination campaign. However this search of the literature demonstrated that these strategies have very seldom been published (Table 3). The report of Cooper et al was in the form of a letter to the editor and provided no description of the means of data collection employed in their study.¹⁸ The study by Bellaard-Smith et al was primarily reporting on the results of a qualitative interview series as described in Table 2, and only incidentally reported on the intervention they utilised to increase HCW influenza vaccination.²⁰ Conversely, Bellestas et al reported their data collection procedures and the design of their study in significantly more detail.²² However, there is a paucity of good quality evidence in comparison with the data that has been generated internationally, which includes a number of randomised controlled trials (Lam et al, 2010²⁷). The systematic review by Lam et al determined that there remains a paucity of well-designed trials of interventions to increase influenza vaccination uptake, particularly those that dissect the benefits attributable to individual arms of each intervention. The available evidence suggested that educational and promotional campaigns alone were associated with minor or non-significant improvements in uptake, whereas multi-faceted interventions were associated with greater improvements.²⁷ In the absence of good quality evidence for each specific strategy, it is difficult to make evidence based recommendations for components to be included in an institutional vaccination campaign.

Interventions that have been trialled in Australian and international studies have most frequently included the provision of mobile clinics and a range of promotional and educational activities. These strategies clearly address the key barriers to vaccination, such as inconvenience and misconceptions about influenza and vaccination. When considering the provision of mobile clinics it is important to recognise the importance of after-hours clinics to cover staff on those shifts.^{18,20} As a general principle, promotional and educational activities should be tailored to their target population and evolve as the needs of that population change. This requires an understanding of the knowledge and attitudes of that population and should be supported by standardised data collection at baseline and follow-up to monitor the effectiveness of this strategy. To this point, very few studies have reported utilising such an approach

and this is suggested to represent a key deficiency in many interventions.²⁷ Additionally, the value of highly visible endorsement from senior clinical and management staff as part of a promotional campaign should not be understated.^{22,27}

Other strategies that have been trialled include significant institutional policy changes. The introduction of mandatory declination forms, requiring non-vaccinated staff to wear protective masks during times of peak influenza activity, or simply introducing mandatory vaccination for all staff have all been trialled and resulted in a significant increase in uptake.^{26,40,41} While these measures may potentially be viewed as draconian, strict adherence to the principles dictating that HCWs should at all times act in the best interests of their patients would mandate vaccination.^{42,43} Some authors have suggested that institutional HCW vaccination rates should be reported publicly as a quality and safety metric.⁴⁴

Influenza vaccination of HCWs is both efficacious in preventing inpatient mortality and cost effective,³⁹ yet annual seasonal influenza vaccination rates remain low. Because effective protection from influenza is dependent on annual vaccination, healthcare institutions worldwide will grapple with encouraging annual influenza vaccination uptake. Improvement of current strategies will require high quality research including randomised controlled trials in various healthcare settings, and samples specific to each culture and healthcare system. Only with such high quality evidence can cost effective and comprehensive vaccination campaigns be planned. Additionally, the development and inclusion of novel strategies such as non-binding declination forms into existing interventions may provide some benefit.^{20,26} It is important to recognise that no combination of current strategies has been consistently documented to increase vaccination uptake above the 80% recommended by the CDC.³³ If conventional strategies prove unable to increase and maintain vaccination rates at sufficient levels then more significant policy changes may be required. The clear benefits of increasing HCW influenza vaccination rates should encourage a dialogue between staff, senior hospital management, and state health departments regarding a potential policy shift to mandatory seasonal influenza vaccination for HCWs.

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