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Nurses' knowledge, attitudes and practices regarding influenza vaccination: an integrative review

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Nurses' knowledge, attitudes and practices regarding influenza vaccination: an integrative review

Abstract

Aims and objectives To critically analyse the literature describing nurses' knowledge, attitudes and practices regarding influenza vaccination. **Background** Influenza is a serious illness that has significant impacts on productivity, health outcomes and healthcare costs. Despite the recommendations for nurses to be vaccinated annually against influenza, the vaccination rates remain suboptimal. **Design** Integrative literature review. **Methods** An integrative review was conducted as described by Whittemore and Knafl (2005). A search of CINAHL, Cochrane Library, ProQuest Central, ClinicalKey, ScienceDirect, Wiley Online Library, and Informit was undertaken to identify relevant papers. Given the heterogeneity of included studies, a narrative approach was used to analyse the data. **Results** There was limited research available on this topic area, with only 10 papers identified as meeting the inclusion criteria. Five themes were identified: the relationship between knowledge and influenza vaccination, perception of risk, motivators for influenza vaccination, barriers to influenza vaccination and impact of demographics on vaccination. **Conclusions** Despite the evidence for the protective effects of influenza vaccination, rates of vaccination among nurses remain sub-optimal. Nurses' influenza vaccination practices likely relate to their level of knowledge and perception of risk; the greater nurses' knowledge regarding influenza and influenza vaccination the higher their perception of risk and the more likely they are to be vaccinated. This also translates to the advice that they give patients with vaccinated nurses more inclined to recommend vaccination than those unvaccinated. **Relevance to clinical practice** The practices of nurses related to influenza vaccination may translate to the advice that they give their patients. Understanding the knowledge levels, practices and attitudes of nurses can assist in developing strategies to enhance education of nurses.

Disciplines

Medicine and Health Sciences | Social and Behavioral Sciences

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Nurse's knowledge, attitudes and practices regarding influenza vaccination: An integrative review

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Abstract

Aim: To critically analyse the literature describing nurse's knowledge, attitudes and practices regarding influenza vaccination.

Background: Influenza is a serious illness that has significant impacts on productivity, health outcomes and health care costs. Despite the recommendations for nurses to be vaccinated annually against influenza, the vaccination rates remain suboptimal.

Design: Integrative literature review

Methods: An integrative review was conducted as described by Whitemore and Knaf (2005). A search of CINAHL, Cochrane Library, ProQuest Central, ClinicalKey, ScienceDirect, Wiley Online Library, and Informat was undertaken to identify relevant papers. Given the heterogeneity of included studies, a narrative approach was used to analyse the data.

Results: There was limited research available on this topic area, with only ten papers identified as meeting the inclusion criteria. Five themes were identified: the relationship between knowledge and influenza vaccination, perception of risk, motivators for influenza vaccination, barriers to influenza vaccination and impact of demographics on vaccination.

Conclusions: Despite the evidence for the protective effects of influenza vaccination, rates of vaccination amongst nurses remain sub-optimal. Nurses' influenza vaccination practices likely relate to their level of knowledge and perception of risk; the greater nurses knowledge regarding influenza and influenza vaccination the higher their perception of risk and the more likely they are to be vaccinated. This also translates to the advice that they give patients with vaccinated nurses more inclined to recommend vaccination than those unvaccinated.

Relevance to clinical practice: The practices of nurses related to influenza vaccination may translate to the advice that they give their patients. Understanding the knowledge levels, practices and attitudes of nurses can assist in developing strategies to enhance education of nurses.

Keywords: nurse, immunisation, vaccination, attitude, knowledge, perception, opinion, belief, integrative review.

What does this article contribute to the wider global clinical community?

- There are missed opportunities to reduce the spread of influenza by enhancing the vaccination rate of both nurses and the community.
- A barrier to the uptake of influenza vaccination is the knowledge level and attitude of nurses.
- Improved education of nurses around influenza vaccination may increase vaccination rates.

INTRODUCTION

Influenza is a key respiratory pathogen that causes a significant burden of disease internationally during periods of epidemic and pandemic (Alonso *et al.* 2015). Influenza circulates easily and can affect any age group, with the elderly, those with a pre-existing medical condition and pregnant women being most at risk of complications and negative sequelae if they contract the virus (National Centre for Immunisation Research & Surveillance (NCIRS) 2014). Influenza is estimated to affect 5-15% of the world population annually, in high risk groups it can result in serious illness and even death (Zhang *et al.* 2011). The influenza virus is subject to spontaneous genetic mutations, or antigenic drift which causes seasonal epidemics and allows new viral strains to spread rapidly among the population, making influenza an ongoing challenge to healthcare systems and vaccination coordinators worldwide (Goodband 2014). The World Health Organization (WHO) (2014) estimates that the annual epidemics of influenza result in approximately 3 to 5 million cases of severe illness and 250 000 to 500 000 deaths worldwide. In 2010, the estimated cost of seasonal influenza in the United States of America alone was in excess of 19 million dollars (Peasah *et al.* 2013). Influenza is cited as the cause of death of an average 36,000 Americans each year (Thompson *et al.* 2003) and is related to one in every twenty deaths in Americans older than 65 years (Thompson *et al.* 2004).

Studies have shown that healthcare workers are key sources in the spread of influenza with transmission of influenza between patients and health care workers leading to illness, absenteeism and disruption to the health care system (Carman *et al.* 2000, Saxén & Virtanen 1999, Seale *et al.* 2010b). Although health care workers are encouraged to stay at home from work when they are ill, many continue to work despite having influenza which increases the potential of exposing co-workers and patients (Poland *et al.* 2005).

Vaccinating health care workers against influenza can reduce both negative patient outcomes and absenteeism (Zhang *et al.* 2011).

Influenza vaccination is the most effective way to prevent infection however, despite the national recommendations that all health care workers be vaccinated against influenza (World Health Organization (WHO) 2014) the rates of vaccination uptake remain suboptimal internationally (Abramson & Levi 2008, Fernandez *et al.* 2009, Seale *et al.* 2010a, Seale & Macintyre 2011). Nurses are the largest group of health care workers and are generally in the most direct contact with patients (McEwen & Farren 2005). This puts nurses in a prime position to give advice and information to patients about the safety and effectiveness of the influenza vaccine (Leask *et al.* 2008). Given that nurses are more reluctant to receive the influenza vaccination than other health care workers (Brunton *et al.* 2005, Norton *et al.* 2008, O'Reilly *et al.* 2005a), which likely impacts on the advice they give to patients (Potter *et al.* 1997), it is important to understand nurse's knowledge, attitudes and practices regarding influenza vaccination in order to inform future strategies to improve the uptake of influenza vaccination in this group.

THE REVIEW

Aims

The purpose of this review was to critically analyse the literature describing nurse's knowledge, attitudes and practices regarding influenza vaccination. Understanding nurse's knowledge, attitudes and practices is important in terms of both their own personal vaccination status and potential to spread the virus and the impact of their own perceptions on the advice that they provide to patients.

Methods

The framework developed by Whitemore and Knafl (2005) was utilised to guide this integrative review. This method combines the evidence from multiple studies to inform clinical practice and is the method of choice for evidence based practice (Whitemore & Knafl 2005). A problem was identified and systematic literature searches were undertaken (Whitemore & Knafl 2005). Data from the included papers was analysed and categorised into themes which was then presented in a table which allowed conclusions to be drawn (Whitemore & Knafl 2005).

Search strategy

A comprehensive strategy was implemented to search for primary literature. Firstly, an electronic database search using the following key terms was conducted; 'nurs*', 'influenza', 'immunisation', 'vaccination', 'attitude', 'knowledge', 'perception', 'opinion', and 'belief'. The databases searched were CINAHL, Cochrane Library, ProQuest Central, Clinical Key, ScienceDirect, Informit and Wiley. Secondly, the reference lists of identified papers were reviewed for additional relevant literature.

Papers were only included if they reported primary quantitative research, had been published after 2005 and were written in the English language. Papers were confined to quantitative research to enhance the homogeneity of the included papers. Those papers published before 2005 were excluded as health systems and understandings of influenza were somewhat different ten years ago. For example; it is only in more recently that the world has seen a number of major influenza pandemics that have emerged internationally. Papers were eligible for inclusion if the study was specific to nurses, and their knowledge, opinion and practices regarding the influenza vaccine. Where papers reported studying other vaccines or where nurse specific data could not be extrapolated, for example

including nurses within a study of a broader group of health care workers, these were excluded.

****INSERT TABLE 1 HERE****

Search outcome

Results from all electronic database searches were exported into Endnote[®] Version 7 and duplicates were removed. As shown in Figure 1, this yielded 536 papers that were potentially relevant to the review. An evaluation of the title and abstract revealed 43 potentially eligible papers, which were then read in their entirety. The reference lists of these papers were also searched for relevant citations, resulting in a further 6 papers being included. A total of 49 papers were subject to a full review. These papers were screened for relevance by one author (SS), resulting in 10 papers being identified as meeting the inclusion criteria. These 10 papers were reviewed by all authors to confirm that they met the inclusion criteria.

****INSERT FIGURE 1 HERE****

Appraisal of methodological quality

Assessing the quality of each primary study is an important part of an integrative review and involves the extraction of methodological features. Due to its content and construct validity (Thomas *et al.* 2004) and capacity to evaluate a variety of quantitative study designs (Armijo-Olivo *et al.* 2012), The Effective Public Health Practice Project (EPHPP) *Quality Assessment Tool for Quantitative Studies* (Effective Public Health Practice Project (EPHPP) 2009b) was used by two authors to assess the quality of papers included in this review. The tool assesses six domains; selection bias, study design, confounders, blinding, data collection method and withdrawal/dropouts and rates each domain on a 3-point Likert scale from strong, to moderate or weak (Armijo-Olivo *et al.* 2012). A global

rating is then awarded based on the ratings from each domain. A strong paper has no weak domain ratings, a moderate paper has one weak domain rating, whilst a weak paper has two or more weak domain ratings (Effective Public Health Practice Project (EPHPP) 2009b).

Data abstraction and synthesis

As the papers were dissimilar in their methodological approach it was not possible to perform a meta-analysis. Therefore, a constant comparative approach was used to analyse the data (Whittemore & Knafl 2005). In the first stage of this process we extracted all data into a matrix summary table. Once the data was tabulated the data was viewed by all authors to search for common themes. One author (SS) presented a potential thematic structure and this was discussed with the other authors (JS and EH). Following discussions a final thematic framework was developed upon which all authors agreed.

RESULTS

Included Papers

Four (40%) studies were conducted in the United States of America (Clark *et al.* 2009, Fernandez *et al.* 2009, Johansen *et al.* 2012, McEwen & Farren 2005), and one (10%) study was reported each from Switzerland (Falomir-Pichastor *et al.* 2009), Canada (Norton *et al.* 2008), Northern Ireland (O'Reilly *et al.* 2005a), China (Seale *et al.* 2010b), Israel (Shahrabani *et al.* 2009) and United Kingdom (Zhang *et al.* 2011). Four studies (40%) collected data via a postal survey sent to randomly selected nurses (Clark *et al.* 2009, Falomir-Pichastor *et al.* 2009, Johansen *et al.* 2012, McEwen & Farren 2005). Of the remaining six studies, two (20%) (Fernandez *et al.* 2009, Norton *et al.* 2008) collected data from surveys conducted at a single hospital, two (20%) (Shahrabani *et al.* 2009, Zhang *et al.* 2011) collected data at a single University and two (20%) (O'Reilly *et al.* 2005a, Seale *et*

al. 2010b) collected data from multiple hospital sites. The design features and main findings are detailed in Table 2.

****INSERT TABLE 2 HERE****

Quality appraisal

The EPHPP (2009) appraisal resulted in a quality rating of 'weak' for two papers, 'moderate' for seven papers and 'strong' for one paper (Table 3). The target population and study design was similar in all papers; however low participation rates in two studies influenced the rating of 'weak' for these papers (McEwen & Farren 2005, Norton *et al.* 2008). The paper by Zhang *et al.* (2011) was the only study to be scored a 'strong' rating as it was the only study to implement data collection measures that had been previously validated (Effective Public Health Practice Project (EPHPP) 2009b). Given the limited pool of relevant literature all papers were retained, however, care needs to be taken in interpreting the findings of the weaker papers given the limitations in their methods.

****INSERT TABLE 3 HERE****

Themes

Five themes were identified from the literature, namely: (1) the relationship between knowledge and influenza vaccination, (2) perception of risk, (3) motivators for influenza vaccination, (4) barriers to influenza vaccination and (5) impact of demographics on vaccination. Each of these is discussed in turn below.

The relationship between knowledge and influenza vaccination

Zhang *et al.* (2011) reported that nurses with a high level of influenza knowledge were significantly more likely to be vaccinated for influenza in the previous year ($p < 0.001$). Additionally, those vaccinated were more likely to agree to the knowledge statements that vaccination is the most effective way to prevent influenza and its complications ($p = 0.010$)

and children under two years old and nursing home residents are one of the highest risk groups of seasonal influenza ($p=0.010$, $p=0.028$ respectively).

In contrast, knowledge deficit regarding influenza and vaccination programmes also had implications on vaccination uptake. Zhang *et al.* (2011) found that there was poor knowledge about influenza and vaccinations amongst their participants citing that vaccination is unsafe and can give people influenza with unvaccinated respondents more likely to agree to this statement than vaccinated respondents. Similarly, Johansen *et al.* (2012) reported that 48% of their respondents indicated that the influenza vaccine would give the recipient influenza, with 3% of respondents strongly agreeing that the vaccine can cause the illness and 43% agreeing that the vaccine can cause influenza in the study conducted in China by (Seale *et al.* 2010b).

Perception of influenza risk

Several studies commented on the differences in perception of risk of influenza between vaccinated nurses and unvaccinated nurses. Respondents with a high risk perception were more likely to be vaccinated in the last twelve months than those with perceived low risk (Clark *et al.* 2009, O'Reilly *et al.* 2005a, Shahrabani *et al.* 2009, Zhang *et al.* 2011). Additionally, Shahrabani *et al.* (2009) found that vaccinated nurses perceived influenza as a more serious illness and perceived more benefits from vaccination than unvaccinated respondents. Zhang *et al.* (2011) reported that a high knowledge level was associated with a higher level of risk perception ($p<0.001$).

In several studies, it was reported that many respondents felt that health care workers are at a greater risk than the general public of contracting influenza (Clark *et al.* 2009, Johansen *et al.* 2012). In their study, O'Reilly *et al.* (2005a) reported that vaccinated respondents were more likely than non-vaccinated respondents to agree that staff are at greater risk of influenza compared with the public ($p<0.001$).

Motivators for influenza vaccination

Four studies reported that the main reason for participants receiving vaccination was self-protection from illness (Clark *et al.* 2009, Johansen *et al.* 2012, O'Reilly *et al.* 2005a, Zhang *et al.* 2011). Other reasons for receiving the influenza vaccine included protection of patients from influenza (Johansen *et al.* 2012, McEwen & Farren 2005, O'Reilly *et al.* 2005a, Seale *et al.* 2010b, Zhang *et al.* 2011) and protecting family and/or friends from influenza (Seale *et al.* 2010b, Zhang *et al.* 2011).

Habit also played a role in motivating nurses to receive the influenza vaccine with having the influenza vaccine previously being a positive indicator of subsequent vaccinations (Johansen *et al.* 2012, Norton *et al.* 2008). O'Reilly *et al.* (2005a) found that respondents who had received the influenza vaccine in the past were more likely to have the vaccine again and Zhang *et al.* (2011) found that nurses who had received the influenza vaccination were more likely to recommend the vaccine to their patients. A correlation between occupational cohort and willingness to be vaccinated was found by Falomir-Pichastor *et al.* (2009); when nurses socially-identified more closely with the nursing profession they were more likely to be vaccinated in the previous year and have intentions to be vaccinated in the following year. Respondents in two studies agreed or strongly agreed that getting vaccinated was a professional responsibility (Clark *et al.* 2009, Johansen *et al.* 2012). Johansen *et al.* (2012) also reported that the majority (81%) of respondents felt that their employer strongly recommended the vaccine and facilitated workers obtaining the influenza vaccination. Similarly, McEwen and Farren (2005) reported that 89% of respondents indicated that they were provided with influenza vaccination free of charge by their employer and of the respondents that were vaccinated at the hospital where the study was conducted 96% reported that the program was convenient (Norton *et al.* 2008).

Barriers to influenza vaccination

The most frequently cited reason for not receiving the influenza vaccine was concern about adverse reactions or side effects of the vaccination (Clark *et al.* 2009, Johansen *et al.* 2012, McEwen & Farren 2005, Norton *et al.* 2008, O'Reilly *et al.* 2005a, Zhang *et al.* 2011). Interestingly, respondents in half of the studies believed they did not require the influenza vaccine due to the belief that they had self-immunity (Johansen *et al.* 2012, McEwen & Farren 2005, Norton *et al.* 2008, O'Reilly *et al.* 2005a, Zhang *et al.* 2011). Notably vaccinated nurses had fewer perceived barriers to getting the influenza vaccination than non-vaccinated nurses ($p=0.01$) (Shahrabani *et al.* 2009).

Although concern about adverse events was a common barrier to vaccination, reported adverse events or side effects were rare and non-serious (Clark *et al.* 2009, Fernandez *et al.* 2009, Johansen *et al.* 2012, McEwen & Farren 2005, Norton *et al.* 2008) with the most common post vaccine symptom being arm soreness (McEwen & Farren 2005, Norton *et al.* 2008) followed by body aches, fever, sore throat and cough (McEwen & Farren 2005).

Impact of Demographics on vaccination practices

Some included studies explored the differences in nurses' vaccination practices based on demographic characteristics. Both Clark *et al.* (2009) and Falomir-Pichastor *et al.* (2009) found that an increase in nurses age increased the influenza vaccination rate ($p=0.001$). Two studies also found that more male respondents accepted the influenza vaccine compared to female ($p=0.008$, $p=0.04$ respectively) (Falomir-Pichastor *et al.* 2009, O'Reilly *et al.* 2005a). Despite this evidence for the impact of demographics, not all studies demonstrated demographic differences (McEwen & Farren 2005).

DISCUSSION

Although evidence has shown that vaccination is the best defence against seasonal influenza, it appears that it is still not a priority for nurses to accept the influenza

vaccination. This review demonstrates that vaccination rates amongst nurses remain suboptimal (Clark *et al.* 2009, Johansen *et al.* 2012, McEwen & Farren 2005, Norton *et al.* 2008, O'Reilly *et al.* 2005a, Shahrabani *et al.* 2009, Zhang *et al.* 2011). Whilst all HCWs should be vaccinated (World Health Organization (WHO) 2014), the data from included studies demonstrated that current vaccination rates fall far below this.

Misconceptions about influenza and its risks and the influenza vaccine were the most commonly cited reason for health care workers not getting vaccinated in the included studies (Alshammari *et al.* 2014, Bali *et al.* 2013, Hofmann *et al.* 2006, Osman 2010, Seale *et al.* 2010a). Additionally, there were links between high and low knowledge levels and vaccination rates (Johansen *et al.* 2012, Seale *et al.* 2010b, Zhang *et al.* 2011). These findings are similar to other studies of acceptance of vaccination, where knowledge is a direct indicator of vaccine uptake (Maltezou *et al.* 2012, Martinello *et al.* 2003, Nowak *et al.* 2015, Top *et al.* 2010). This highlights that despite the recent attention given to influenza following recent pandemics there is still a need for education amongst nurses to ensure that they have sufficient knowledge to inform their decision making.

This review found that, in many instances, nurses did not identify influenza as a serious illness or feel that they were at risk of contracting the virus and therefore did not receive the influenza vaccine (Norton *et al.* 2008, O'Reilly *et al.* 2005a, Seale *et al.* 2010b). Despite the risk of influenza to public health, health care workers still do not see influenza vaccination as a priority. Studies have found that physicians are more accepting of vaccines (Abramson & Levi 2008, Fernandez *et al.* 2009, Seale *et al.* 2010a) and of the implementation of mandatory vaccination policies than other health care workers (Maltezou *et al.* 2012). Further studies of physician motivators and barriers may prove useful in understanding why this cohort's vaccination coverage is greater than other health care workers and be used to inform the development of strategies to target other groups of health professionals.

LIMITATIONS

This integrative review has several limitations. Firstly, despite nurses having the most frequent direct patient contact of all health care workers, there has been limited research based solely around this professional group regarding influenza vaccination. Whilst other studies with mixed groups of health professionals may have provided a different insight, they would not have allowed conclusions to be drawn around the attitudes and knowledge levels of the nursing profession. Having an understanding of nurses distinct from other professional groups is important given the significant role of nurses in health education and vaccination. Further, much of the current literature is based in acute settings, such as the emergency department or general hospital wards, not giving a true reflection of nurses employed in all areas of nursing. This is significant given the demonstrated impact that nurses' vaccination practices have on their recommendations to patients (Zhang *et al.* 2011). To date, few studies have been undertaken solely around the knowledge and opinions in regards to influenza vaccination of nurses in who specifically work in primary care areas such as general practice nurses or where data about nurses can be separated from a mix of other general practice staff. However general practice nurses play a very important role in vaccination education given that they are the first point of contact for individuals with the health system and their ongoing and opportunistic contact with their patients (Halcomb *et al.* 2004).

Finally, most included studies were conducted in the United States (Clark *et al.* 2009, Fernandez *et al.* 2009, Johansen *et al.* 2012, McEwen & Farren 2005). Each country has its own slightly different recommendations in regards to seasonal influenza vaccination and the education and training of nurses differs between jurisdictions. Also, many studies were confined to a single hospital or local health service. These settings may have

particular nuances that impact on the findings. Future research needs to have a broader focus to allow findings to be generalisable to a range of settings.

Relevance to clinical practice

Nurses have a significant role to play in influenza management. As frontline healthcare workers they have the potential to spread the virus to other HCWs and to their patients. Additionally, nurses have a key role to play in educating the community and providing advice around vaccination. The findings of this review can assist nurses, nurse educators and policy makers to understand the current knowledge, attitudes and practices of nurses related to influenza vaccination. Given the need to enhance vaccination rates amongst both nurses and the wider community, this understanding can inform the development of future education programs, health plans and clinical policy which aims to enhance the uptake of influenza vaccination amongst both nurses themselves and the community as a whole.

CONCLUSION

This review has analysed the literature describing nurse's knowledge, attitudes and practices regarding influenza vaccination. It has demonstrated that nurses' influenza vaccination practices relate to their level of knowledge and perception of the risk of influenza. The review has found that the greater nurses knowledge regarding influenza and influenza vaccination the higher their perception of risk and the more likely they are to be vaccinated. The practice of nurses related to influenza vaccination also likely translates to the advice that they give patients, with vaccinated nurses more inclined to recommend vaccination to their patients. These findings have implications in all areas of nursing, especially in primary care where nurses undertake a high level of opportunistic patient encounters and have a significant impact on patient outcomes. There is a compelling lack

of studies undertaken in this area of nursing and that of which can be generalised globally. It is for this reason future studies should be done in a general practice environment and the focus of increasing vaccination rates be on improving education of nurses in regards to the influenza virus and influenza vaccination.

Conflict of Interest

No conflict of interest has been declared by the authors.

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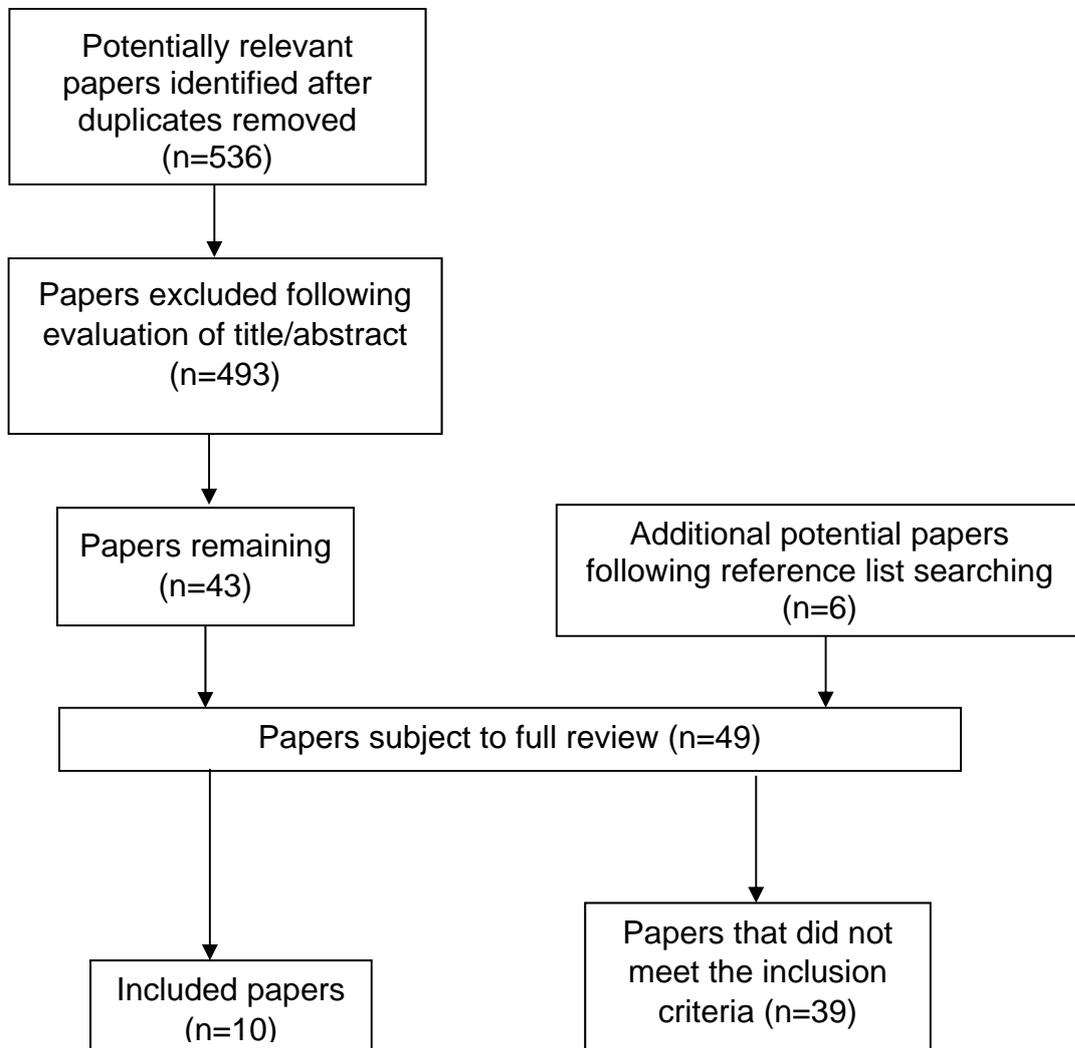


Figure 1. Process of paper selection – Prisma Flow diagram

Table 1. Study eligibility criteria

Inclusion Criteria	Exclusion Criteria
<ul style="list-style-type: none">• Written in English language• Papers focussing on nurses• Papers focussing on influenza vaccination• Papers published since 2005• Papers studying personal knowledge, opinions and practices of nurses regarding influenza vaccination• Quantitative studies	<ul style="list-style-type: none">• Written in language other than English• Unable to isolate or extract data specific to nurses• Unable to isolate or extract data specific to influenza vaccination• Qualitative studies

Table 2: Summary Table

Reference	Country	Sample	Methods	Findings
Clark <i>et al.</i> (2009)	USA	1017 registered nurses across 4 US States (72% response rate)	Postal survey	<ul style="list-style-type: none"> • 59% reported being vaccinated in 2005-2006 season • Vaccination rates were significantly higher among older nurses ($p=0.001$), those with a chronic condition with potential for influenza-related complications ($p<0.001$), and those who considered their patients a high influenza risk ($p<0.001$). • Vaccination status did not differ significantly by respondents' race/ethnicity or whether they provide inpatient care • Most common reason for getting vaccinated was protecting self from illness (95%) • Most common reason for not getting vaccinated was concern about adverse reactions (39%) • 95% agree or strongly agree influenza and its complications can be serious • 60% agree or strongly agree systemic adverse events from influenza vaccine are rare • 78% agree or strongly agree influenza vaccine is effective in preventing influenza related hospitalisations • 79% agree or strongly agree HCWs are at higher risk of getting influenza than the general public • 84% agree or strongly agree vaccination of HCWs can prevent the spread of influenza to patients • 58% agree or strongly agree getting vaccinated a professional responsibility • Vaccinated respondents were more likely than unvaccinated respondents to "strongly agree" to all of the knowledge, attitude and beliefs statements ($p<0.001$)
Falomir-Pichastor <i>et al.</i> (2009)	Switzerland	531 nurses from Geneva and Zurich (89% response rate)	Postal survey	<ul style="list-style-type: none"> • More men than women vaccinated ($p=0.008$) • Vaccination increased with age ($p=0.001$) • The perceived negative consequences of having the influenza were associated with vaccination ($p=0.001$) • Knowledge of vaccination benefits associated with vaccination ($p=0.001$) • Group identification was associated with vaccination status ($p=0.04$) • Group identification was only marginally related to the intention to be vaccinated the following year ($p=0.08$) • Sex, age and vaccination status impacted on intention to be vaccinated in the following year ($p=0.001$) • The perceived negative consequences of having the influenza and knowledge of vaccination benefits impacted on intention to be vaccinated the following year ($p=0.001$) • Age, vaccination status and participants sex were predictors of participants self-protection goals in vaccination ($p=0.001$) • Age, vaccination status and participants sex were predictors of participants patients protection goals in vaccination ($p=0.001$)
Fernandez <i>et al.</i> (2009)	USA	58 Emergency department nurses (46% of total respondents)	Survey	<ul style="list-style-type: none"> • 67% of nurses had ever had the influenza, 29% of nurses agreed they were likely to get infected this year, 71% of nurses agreed influenza is a serious illness • 45% of nurses agreed vaccine is effective, 97% of nurses agreed side effects are not common, 94% of nurses agreed that side effects are not severe, 69% of nurses had heard of someone having an adverse event, 11% of nurses had personally had an adverse event, 45% of nurses had been vaccinated last year, 42% of nurses were likely to be vaccinated this year • 91% of nurses agreed people over 65 should be vaccinated, 67% of nurses agreed HCWs should be vaccinated, 93% of nurses agreed people over 65 with chronic medical illness should be vaccinated • 100% of nurses agreed or strongly agreed that vaccine program should be in the outpatient clinic, 54% of nurses agreed or strongly agreed that vaccine program should be in the inpatient ward, 32% of nurses agreed or strongly agreed that vaccine program should be in the emergency department

<i>Reference</i>	<i>Country</i>	<i>Sample</i>	<i>Methods</i>	<i>Findings</i>
Johansen <i>et al.</i> (2012)	USA	155 Registered nurses in North and South Dakota (80.3% response rate)	Postal survey	<ul style="list-style-type: none"> • 10% had not received influenza vaccination in past 10 years, 36% had been vaccinated 10 times in past 10 years • 50% strongly agreed that getting the influenza vaccine was a habit, 79% strongly agreed that influenza and its complications can be serious, 44% strongly agreed that HCW's are at a higher risk of getting influenza than the general public, 32% strongly agreed that they were knowledgeable of CDC recommendation for HCW's influenza vaccinations • 7% reported that their employers charge for vaccination, 4% reported their employer not offering vaccination at all, 4% reported their employer does not make provision for vaccination • 89% reported that their employer made it somewhat or extremely easy to obtain the influenza vaccine, 2% reported that their employer required influenza vaccine unless medically inappropriate, 81% reported that their employer strongly recommended the vaccine • 32% strongly agreed influenza vaccine is effective in preventing influenza illnesses in HCW's, 41% strongly agreed that the influenza vaccine prevents the spread of influenza to patients, 34% strongly agreed that the influenza vaccine is effective in preventing influenza-related hospitalisations in vaccinated persons • 52% strongly agreed that the influenza vaccine cannot give the recipient influenza, 3% strongly agreed that the vaccine can cause influenza, 61% strongly agreed that the benefits of vaccine outweigh the risks of side effects • 10% strongly disagreed to the statement 'I intend to get the influenza vaccine every year', 9% reported it highly unlikely that they would plan to get vaccinated in the upcoming influenza season • 35% strongly agreed that HCW's have a professional responsibility to get vaccinated annually, 65% strongly agreed that their employer believed they should get vaccinated • 60% agreed getting the influenza vaccine would be extremely good, extremely safe (54%), extremely valuable (52%), extremely wise (61%) and extremely rewarding (37%) • 33% strongly agreed that systemic side effects are rare, 76% strongly or somewhat agreed that vaccination of HCW's is effective in preventing the spread of influenza to patients, 3% somewhat or strongly disagreed that vaccination is effective in preventing the spread of influenza to patients • The reasons for HCW's to get the influenza vaccine were to protect oneself (47%), to protect patients (34%) and decreased and prevent the incidence of influenza (32%) • The reasons for not being vaccinated were contraindications and allergies (32%), side effects and past vaccine reactions (28%) personal choice (11%) belief that the vaccine is not necessary due to self immunity (7%), and inconvenience (7%)

Reference	Country	Sample	Methods	Findings
	USA	246 registered nurses in Texas (24.6% response rate)	Postal survey	<ul style="list-style-type: none"> • 86% reported that they had ever had a influenza vaccine • 69% reported being vaccinated during two of previous four years • 50% had received five or more influenza vaccinations • There were no significant differences in demographics between those who were and those who were not vaccinated • 89% indicated that their employer provided free influenza vaccination • The reasons for declining the influenza vaccine included concern about side effects (37%), not concerned about getting the influenza (30%), ill in the past despite having the influenza vaccination (28%) • The reasons for receiving the influenza vaccine included belief that it is effective in preventing the influenza (82%), it is provided by employer free of charge (75%), concern about being at risk of exposure (66%), work with clients who are high risk (44%), had the influenza in the past and do not want to experience again (38%), over 50 years of age (35%) • Common side effects that were reported were sore arm (89%), body aches (50%), fever (32%), sore throat (15%) and cough (11%) • There were no reports of serious side effects
Norton <i>et al.</i> (2008)	Canada	585 nurses at the Children's and Women's Health Centre of British Columbia (48% response rate)	Data analysis of vaccination program and survey	<ul style="list-style-type: none"> • 76% of eligible nurses were vaccinated in the hospital program • Including nurses vaccinated elsewhere, the effective vaccine coverage rate exceeded 78%, vaccine coverage was highest on the neurosciences inpatient unit (74%) and was lowest on the antepartum and postpartum units (26%) and the neonatal intensive care unit (32%) • 51% were vaccinated in the hospital vaccination program, 5% were vaccinated elsewhere, 44% were not vaccinated • The reasons for refusing vaccination were no personal need or benefit (30%), concern about side effects (15%, previous symptoms attributed to vaccine (10%), personal belief against vaccination (10%), absolute or relative contraindication (7%), infrequent or sporadic work hours (6%) and unavailability of the program (4%), other reason (4%) and reason not given (14%) • 16% that had been vaccinated the hospital had received the vaccination for the first time • 96% of the respondents that were vaccinated at the hospital reported the program to be convenient • All respondents, whether vaccinated or not indicated they were aware of the program • 39% of the respondents that were vaccinated at the hospital indicated at least 1 post vaccine symptom • Arm soreness for more than one day was reported in 60% of those reporting adverse effects and 23% overall • Among those reporting adverse events 42% rated these as minimal, 39% as mild, 17% as moderate, 2% as severe or unacceptable, 3% had symptoms lasting more than 3 days • Adverse effects reported by the respondents included soreness for >1day (23%), redness (9%), swelling (8%), limitation of arm movement (6%), myalgias/aching (15%), fever/chills (7%), headache (2%), nausea (2%), cough/rhinorrhoea/sore throat (1%) • 55% stated that they intended to be vaccinated the following winter • 91% of the respondents that were vaccinated at the hospital indicated that they would receive the vaccination again, 20% of unvaccinated respondents indicated they would receive the vaccination • Vaccination intent did not differ between paediatric and women's nurses (p=0.5) • Variables that predicted intent to be vaccinated the following year included program convenience, being vaccinated in the current season, attending any number of physician visit for respiratory illness • Severity or type of side effects, reason for vaccine refusal, being vaccinated for the first time, working in a high- risk unit, site of work were not predictive of future acceptance or refusal

<i>Reference</i>	<i>Country</i>	<i>Sample</i>	<i>Methods</i>	<i>Findings</i>
O'Reilly <i>et al.</i> (2005b)	Northern Ireland	203 nurses at three Belfast hospitals from acute elderly wards (100% response rate)	Survey	<ul style="list-style-type: none"> • 37% of participants were vaccinated, 63% of participants not vaccinated • Vaccine recipients more likely to be male (p=0.04), full-time (p=0.005) and previously had influenza vaccine (p<0.001) • 96% of vaccine recipients cited protecting oneself as reason for vaccination • 14% of vaccine recipients cited protection of patients as reason to get vaccinated • Of those who declined vaccination, the most common reason was there was no personal benefit as they were healthy (69%), and concern about side effects (19%) • Non- vaccinated respondents were more likely to agree than vaccinated respondents that vaccination is not required for a healthy person (p<0.001) • Vaccinated respondents were more likely than non-vaccinated respondents to disagree that influenza vaccination does not work (p=0.077) • Vaccinated respondents were more likely than non-vaccinated respondents to agree that staff are at greater risk of influenza compared with the public (p<0.001) • Vaccinated respondents were more likely than non-vaccinated respondents to agree that vaccination of staff will help patients avoid the influenza (p<0.001) • Vaccinated respondents were more likely than non-vaccinated respondents to agree that they would be influenced by the OH department recommendation for vaccination (p<0.001) • Vaccinated respondents were more likely than non-vaccinated respondents to agree that they would be influenced by the DOH recommendation for vaccination (p<0.001)
Seale <i>et al.</i> (2010b)	China	1143 registered nurses (99% response rate)	Survey	<ul style="list-style-type: none"> • 55% agreed vaccine safe • 53% agreed vaccine is effective • 51% agreed vaccination is important to protect patients • 56% agreed vaccination is important to protect family • 48% disagreed they are at low risk of catching influenza • 43% agreed the influenza vaccine can cause influenza in some people • 68% disagreed the influenza vaccine is only for older people • 40% disagreed that vaccination will have no benefit to them because they do not get influenza • Nurses more likely to be vaccinated than Doctors (p<0.001)
Shahrabani <i>et al.</i> (2009)	Israel	299 undergraduate and postgraduate nursing students	Survey	<ul style="list-style-type: none"> • 34% of respondents vaccinated, 66% of respondents unvaccinated • Vaccinated nurses felt they were more susceptible to influenza than non-vaccinated nurses (p=0.01) • Vaccinated nurses perceived influenza as more serious illness than non-vaccinated nurses (p=0.01) • Vaccinated nurses perceived more benefits from vaccination than non-vaccinated nurses (p≤0.01) • Vaccinated nurses had fewer perceived barriers to getting the influenza vaccination than non-vaccinated nurses (p=0.01) • Vaccinated nurses had more knowledge (p≤0.01), higher levels of health motivation (p=0.01) and higher levels of cues to action (p≤0.01), than non-vaccinated nurses

<i>Reference</i>	<i>Country</i>	<i>Sample</i>	<i>Methods</i>	<i>Findings</i>
Zhang <i>et al.</i> (2011)	UK	522 registered nurses (77.7% response rate)	Survey	<ul style="list-style-type: none"> • 36% of respondents reported being vaccinated in the last twelve months, 61% were unvaccinated and 41% reported never getting vaccinated in the past • Nurses with a high knowledge level were more likely to be vaccinated in the last twelve months ($p < 0.001$) • Vaccinated respondents were more likely to agree that vaccination is the most effective way to prevent influenza and its complications ($p = 0.010$), children under 2 years one of the groups at highest risk of complications of seasonal influenza ($p = 0.010$), nursing home residents are one of the groups at highest risk of complications of influenza ($p = 0.028$) and elderly individuals living at home are one of the groups at highest risk of complications of seasonal influenza ($p = 0.040$) • Unvaccinated respondents were more likely to agree that vaccination gives some people influenza ($p = 0.002$), influenza vaccines are unsafe ($p = 0.002$) and vaccination may have serious adverse effects ($p = 0.019$) • Respondents with a high risk perception of influenza were more likely to be vaccinated in the last twelve months than those with a low risk perception ($p = 0.019$) • Vaccinated respondents were more likely to agree that without the influenza vaccination they will get the influenza this year ($p < 0.001$), if they do not get the H1N1 vaccination this year they are very likely to get this influenza this year ($p = 0.010$), H1N1 can cause death ($p = 0.030$) and if they have influenza they would pass it onto their patients ($p = 0.037$) • A high knowledge level was associated with a higher level of risk perception ($p < 0.001$) • The respondents who had received influenza vaccination in last 12 months more likely to report more frequent recommendations to their patients in the past ($p < 0.001$), more intent to recommend to patients in the future ($p < 0.001$) and more likely to have the intention to be vaccinated in the next season ($p < 0.001$) • The main reasons for being vaccinated were to protect self (57%), to protect patients (26%) and to protect family, children, friend (16%) • The main reasons for not being vaccinated were concern about side effects (63%), no need (46%) and concern about vaccine's effectiveness/safety (35%)

Table 3. EPHPP (2009a) appraisal

Author	EPHPP (2009a) rating
McEwen and Farren (2005)	Weak
Norton <i>et al.</i> (2008)	Weak
Clark <i>et al.</i> (2009)	Moderate
Falomir-Pichastor <i>et al.</i> (2009)	Moderate
Fernandez <i>et al.</i> (2009)	Moderate
Johansen <i>et al.</i> (2012)	Moderate
O'Reilly <i>et al.</i> (2005b)	Moderate
Seale <i>et al.</i> (2010b)	Moderate
Shahrabani <i>et al.</i> (2009)	Moderate
Zhang <i>et al.</i> (2011)	Strong