Exploring Influenza Vaccine Uptake among Health-Care Workers: An Integrative Literature Review of Barriers and Facilitators.

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Abstract

Influenza, an infectious disease that occurs annually in temperate regions around the world, affects an estimated 5-15% of the world's population and results in 500, 000 deaths annually (World Health Organization, [WHO], 2009). Since 1981, the Centers for Disease Control (CDC) have recommended that all healthcare workers (HCW) receive influenza vaccination annually. Despite many health authorities' recommendations, influenza vaccination rates among HCW are universally low. Numerous vaccination campaigns encouraging HCW to be vaccinated have been met with resistance. This integrative review encompasses the American and the Canadian research published between 2000 and 2014. In this paper, I explore the extant quantitative and qualitative research that identifies the barriers to and the motivators for influenza vaccination uptake among HCW. An integrative literature review was conducted and the findings were organised using the health beleif model (HBM). An analysis of common themes reveals that the main barriers to receiving the influenza vaccination among the resistant HCW are the fear of the vaccine's adverse effects, the belief that the vaccine is not effective, and the doubt that influenza is a serious disease. The identified motivators are the belief that the vaccine protects oneself, protects the patients, and is effective. Future efforts to improve vaccination should include rigorous education on vaccine safety and efficacy.

Acknowledgment

I would like to extend my sincere gratitude to Dr. Marjorie MacDonald and Dr. Gweneth Doane for their supervisory role even during their work outside Canada. Their guidance and expertise in scholarship have inspired me to improve my critical writing and have brought my critical thinking to heights I did not imagine. Finally, I would like to thank my husband and daughter, for without their love, support, and continual encouragement this project may never have come to fruition.

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Exploring the Influenza Vaccination Uptake Journey

Purpose/Aim of the Project

The purpose of this project is to explore the literature that relates to the determinants of influenza vaccination uptake among HCW. In this project, I critically review and evaluate research that holds relevancy for nursing practice. The overall purpose is to position nurses to provide best care (evidence-informed practices) for vulnerable patients. In addition, this review was chosen to support my learning needs as a novice researcher in furthering my understanding of the concepts, the documented theories, and the existing evidence surrounding influenza vaccination uptake among HCW and to relate this new learning to my nursing practice and to future nursing research. This integrative review has allowed me to explore the barriers to and the predictors of influenza vaccine uptake among HCW. The paper will start with a short introduction to influenza and the importance of HCW vaccination to protect vulnerable patients and will be followed by an in depth discussion of the identified barriers and predictors to influenza vaccination uptake among HCW. Implications of the findings for planning future campaigns will also be discussed in relation to theories of health education and pedagogy. The methodology of the literature review process will be provided and the resulting conceptual framework will be discussed in relation to its relevance for nursing practice, education, and future research initiatives. The goals of the integrative literature review are therefore to:

1. Explore and describe the barriers to and the predictors of influenza vaccination uptake among HCW.

2. Consider approaches that can inform the future design and implementation of a more effective vaccination campaign.

3. Identify areas for future research.

Background and Significance

Nosocomial influenza is associated with considerable morbidity and mortality among the elderly, neonates, and patients with chronic underlying diseases. It also imposes an excess economic load due to prolongation of hospitalization and the costs of infection control measures, tests, and treatment (Poland, Tosh & Jacobson, 2005; Maltezou, 2005). Nosocomial influenza is also associated with staff absenteeism and shortages (Hansen, Stamm-Balderjahn, Zushneid, Behnke, Ruden, & Vonberg, 2007; Poland, Tosh, & Jacobson, 2005). Researchers have demonstrated that influenza can spread easily within closed settings such as hospitals by both symptomatic and asymptomatic persons (Maltezou, 2008). Unvaccinated HCW are the main source of nosocomial transmission of influenza, in part because they may continue working while ill (Maltezou, 2008).

Vaccination against preventable diseases has an important impact on public health worldwide and it is safe and cost-effective (CDC, 1999). The main intervention for the prevention of nosocomial transmission of influenza is the annual vaccination. Influenza vaccination reduces transmission of influenza to the elderly and other vulnerable patients (Poland, Tosh & Jacobson, 2005; Maltezou, 2008). HCW influenza vaccination has been consistently recommended by public-health authorities and various interventions have been implemented to promote immunization such as national or local campaigns that use mainly educational strategies and marketing. Yet, influenza vaccination rates among HCW are unacceptably low worldwide, rarely exceeding 40 %, which is not enough to ensure herd immunity (Hansen et al., 2007; Poland, Tosh & Jacobson, 2005). Herd immunity is a form of immunity that occurs when the vaccination of a significant portion of a population (or herd) provides a measure of protection for individuals who have not been immunized or otherwise developed immunity (Hansen et al., 2007).

Key issues identified in my preliminary review of factors that influence influenza vaccination uptake among HCW include misconceptions about influenza, its risks, the role of HCW in its transmission to

patients, and the risks of not being vaccinated. The main motivators driving HCW vaccination include the desire to protect family members and patients and the belief that vaccination is important even if one is healthy (Corace et al., 2013; Hofmann, Ferracin, Marsh & Dumas, 2006). Hofmann, Ferracin, Marsh, and Dumas (2006) invited us to carefully design our vaccination campaigns to overcome the barriers and increase uptake. The researchers suggested taking account of the specific needs at each healthcare institution, mainly in regard to patient populations and emphasizing the protection of vulnerable patients such as the elderly.

Statement of Problem

The World Health Organization (WHO) Director General, Dr. Margaret Chan, considered vaccination of HCW against influenza as a priority for outbreak management and healthcare pandemic response (Zarocostas, 2009). Despite the proven effectiveness of vaccines, HCW vaccine uptake rates fell well below recommended targets during the past ten years (Poland, 2010). An examination of the broad array of factors that influence vaccination rates, including HCW attitudes and beliefs towards influenza vaccination, is needed to understand the fundamental reasons why a core group of HCW fails to receive the influenza vaccine despite aggressive campaigns. This understanding might help us design and implement a more effective vaccination campaign that goes beyond education and marketing, thereby increasing HCW vaccine uptake. In this context, I plan to pose the following question: What are the barriers to and the predictors of influenza vaccination uptake among HCW? To answer this question, I performed an integrative literature review on the subject to compile and synthesize the existing information and identify the areas of agreement and disagreement in the knowledge base.

Methodological Approach Guiding the Project

In the Methodological approach guiding the project section of the paper, I will define review of the literature mainly the integrative review method. I will also talk about the purpose of the review and identify the problem to provide the focus and boundaries for the integrative review process (Whittemore & Knafl, 2005).

Integrated Review of the Literature

Krainovich-Miller and Cameron (2009) defined review of the literature as "an organized critique of the important scholarly literature that supports a study and is a key step in the research process" (p.85). From the various ways to conduct a review of the literature I chose to use an integrative review method for this project. According to Whittemore and Knafl (2005), the integrative review method "summarizes past empirical or theoretical literature to provide a more comprehensive understanding of a particular phenomenon" (p.546). An integrative literature review aims to compile present knowledge surrounding a specific topic and to synthesize this knowledge into new perspectives (Torracco, 2005). Furthermore, literature reviews can help highlight research gaps or areas that need further exploration (Cooper, 1982). An integrative literature review aligns with my goals to explore the barriers to and the predictors of influenza vaccination uptake among HCW. I believe that this review method supports my learning needs as a novice researcher, and the steps suggested by Whittemore and Knafl (2005) are easy to follow. The framework of Whittemore and Knafl (2005) includes five distinct stages including: (1) problem identification, (2) literature search, (3) data evaluation, (4) data analysis, and (5) presentation.

Problem identification. During the problem identification stage, the variables of interest as well as the target population and the problem are identified (Whittemore & Knafl, 2005). The specific research question I want to answer is: What are the barriers to and the predictors of influenza vaccination uptake among HCWs? One of the concerns I have in my clinical area is the prevention and the control of nosocomial influenza outbreaks. Therefore, the focus of the integrative literature review was specifically on identifying the determinants of influenza vaccination uptake among HCW. Cooper (1982) suggests that identifying a target population is an essential step in the project planning process. My target population for this project was HCW working in a hospital setting, in a long-term care facility, or in public health. My hope was that my project would be rigorous enough to provide insight into the current knowledge that exists about influenza vaccination for nurses, nursing students, physicians, and allied HCW. This information may inform influenza

vaccination campaign leaders to design and implement a more effective vaccination campaign, thereby increasing HCW vaccine uptake. This project was also intended to draw attention to the importance of influenza vaccination uptake among HCW to prevent transmissions of healthcare associated infections and increase vaccination rates among HCW thereby reducing morbidity and mortality in high risk patients. I have delineated the overarching terms influenza vaccination, immunization and uptake to guide my literature search based on my preliminary reading of the literature.

Methods

In the methods section of the paper I will describe the literature search stage and the inclusion/exclusion criteria. I will also discuss how data was analysed and evaluated.

Literature Search Stage

It is crucial to develop a strategy for literature searching, according to Whittemore and Knafl (2005), in order to avoid bias or inaccuracies in the selection of studies. The integrative review was conducted using the Cumulative Index to Nursing and Allied Health Literature (CINAHL), google scholar, PubMed, and Summon, a search engine that draws from the University of Victoria library collection that includes on-line and hard copy materials. Whittemore and Knafl (2005) advised the use of two to three search strategies. Articles used for this literature review were peer-reviewed and retrieved using the following search terms: influenza*, vaccin*, nurs*, health care workers*, health care personnel*, physician*, knowledge*, attitudes*, behavior*, practice*, acceptance*, refusal*, predictor*, infection control*, uptake*, determinant*, Immuniz*, improv* and increase*. These terms were present either in the title or the abstract, which was specified in the advanced search option of each database. The ancestry search approach was also used to broaden the search of the topic. According to Polit and Beck (2008), the ancestry search is referring to earlier studies cited in references of published articles.

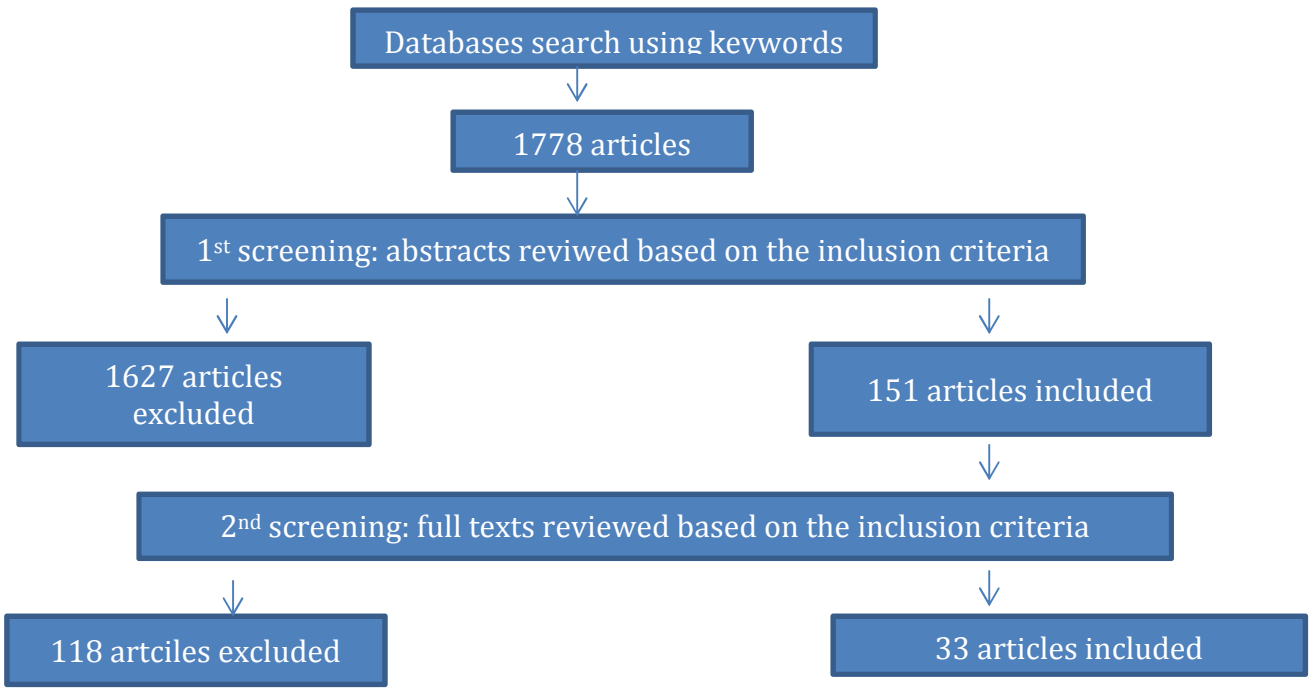
Inclusion/Exclusion Criteria

After conducting the literature search and after reviewing the articles, only the studies that met the inclusion criteria were included in this integrative literature review project. The following inclusion criteria

were applied: the study population included HCW (physicians, nurses, and allied healthcare workers) from hospitals, long term care facilities, or public health. Only peer-reviewed studies were included because scholarly criteria are used to judge the worthiness of publication (Krainovich-Miller & Cameron, 2009). Articles published before 2000 and studies conducted outside of the United States and Canada were excluded to keep the volume of literature manageable and because data from these two countries is likely to be most relevant to my own clinical setting. A total of 1778 articles were found.

The abstracts of the 1778 retrieved articles were reviewed to determine whether they met the inclusion criteria of the review. Through this process, 151 articles were selected based on the abstracts. A second screening was conducted and the full texts of the 151 articles were reviewed. At the end, only 33 articles met the inclusion criteria and were included in this integrative review. Selection of the final articles used in this review was based on being a peer reviewed article and whether the focus of the study was related to HCW' attitudes and beliefs concerning influenza vaccination (see figure 1).

Figure 1. Identification of eligible studies



The research designs varied among the thirty-two articles in this review. Three articles were qualitative studies (Gallant, Vollman, & Sehti, 2009; Kent et al., 2010; Willis & Wortley, 2007), one article was a combination of qualitative and quantitative design (Mehta, Pastor, & Shah, 2008), and twenty nine

articles were quantitative, either cross-sectional or survey-based studies (Banks, Christini, Shutt, & Byers, 2007; Clark, Cowan, & Waterle, 2009; Corace et al., 2013; Cowan et al., 2006; Fernandez et al., 2009; Godin, Vézin, & Naccache, 2010; Hakim, Gaur, & McCullers, 2011; Henresken et al.,2011; Hubble, Nremt, Zontek, & Richards, 2011; Kaboli et al., 2010; Krault, Graff, & McLean, 2011; Lester et al., 2003; Lu, Ding, & Black, 2012; Ludwig-Beymer, & Coghlan Gerc, 2002; Manuel et al., 2002; Manuel et al., 2004; Martinello et al. , 2003; McEwen & Farren , 2005; Norton, Scheifele, Bettinger, & West, 2008; Nowalk et al., 2010; Ofstead, Tucker, Beebe, & Poland, 2008; Rebmann et al., 2011; Rebmann et al., 2012; Rhudy et al., 2010; Steiner et al.,2002; Sherri et al., 2004; Toy, Janosky, & Lairr, 2005; Walker, Stuart Sloan, & Kozlica, 2012). The thirty-two studies that addressed how HCW view influenza vaccination mostly used anonymous closed-ended questionnaires to understand the motivations of HCW in getting vaccinated and the reasons for refusal.

Of the included studies, eight were conducted in Canada (Corace et al., 2013, Gallant, Vollman, & Sehti, 2009; Godin, Vézin, & Naccache, 2010; Kaboli et al., 2010; Krault, Graff, & McLean, 2011; Manuel et al., 2002; Manuel et al., 2004; Lester et al., 2003) and twenty four in U.S. Twelve studies were conducted in large health systems including community, tertiary care and specialty care hospitals, one in a long term care center in Canada (Manuel et al., 2002), one in emergency care units (Fernandez et al., 2009), one in spinal cord injury centers (Sherry et al., 2004), and one in a public health organization (Walker, Stuart Sloan, & Kozlica, 2012). The majority of the participants were nurses, doctors, and allied healthcare workers. Five studies explored specifically the registered nurses' perceptions of the influenza vaccination determinants (McEwen & Farren, 2005; Norton, Scheifele, Bettinger, & West, 2008; Ofstead, Tucker, Beebe, & Poland, 2008; Rhudy et al., 2010; Willis & Wortley, 2007).

Data Evaluation

All of the thirty-three retrieved articles were evaluated using the frameworks developed by Coughlan, Cronin, and Ryan (2007). The guides published in Coughlan et al.'s article titled: "Step-by-Step Guide to Critiquing Research. Part 1: Quantitative Research" (2007, p.658) and "Step-by-Step Guide to Critiquing Research. Part 2: Qualitative Research" (2007, p.738) were used to critique and evaluate the strengths of the

thirty-three retrieved articles. In the data evaluation stage, Whittemore and Knafl (2005) suggest developing a system to evaluate the quality of literature in meeting the project purpose. These researchers recommend incorporating a quality score into the data analysis stage. The studies with high scores indicate a high degree of rigour whereas a low score indicates a low degree of rigour. Low scores suggest t hat these studies would contribute “less to the analytic process” (p.549).

As nursing practice is becoming increasingly more evidence-based, Coughlan et al. (2007) believe that it is important that care has its foundation in sound research. Therefore, Coughlan et al. (2007) created critiquing frameworks to increase the ability of the nurses to critically appraise research in order to identify best practice. The steps in critiquing the quantitative studies (see Appendix A) included elements influencing the believability of the research (writing style, author, report title, and abstract) and the robustness of the research (purpose/research problem, logical consistency, literature review, theoretical framework, aims/objectives/research question/hypotheses, sample, ethical considerations, operational definitions, methodology, data analysis/results, discussion, and references). The steps in critiquing the qualitative studies (see Appendix B) also included elements influencing the believability of the research (writing style, author, report title, and abstract) and the robustness of the research (statement of the phenomenon of interest, purpose/significance of the study, literature review, theoretical framework, method and philosophical underpinnings, sample, ethical considerations, data collection/data analysis, rigour, findings/discussions, conclusions/implications and recommendations, and references).

I used the critiquing questions proposed by Coughlan, Cronin, and Ryan (2007) to evaluate each methodology element and gave each question one point (see Appendices A and B). Finally, the research studies that had medium or high score were included in the literature review and were considered high quality studies. A score less than twenty-nine was used to indicate less rigour. Based on the quality scores, only one article was excluded as the rest of the studies scored thirty or greater. Therefore, thirty-two studies were considered of sufficiently high quality to be included in the synthesis.

Data Analysis

Whittemore and Knafl (2005) suggest that during the data analysis stage, the data are extracted, ordered, categorized and summarized in a unified manner. I used a constant comparison method for the qualitative designs to convert extracted data into systematic categories, facilitating the distinction of patterns, themes, variations, and relationships (Patton, 2002). Extracted data were compared item-by-item and similar data were categorized and grouped together. Subsequently, these coded categories were compared which furthered the analysis and synthesis process. According to Whittemore and Knafl (2005), this approach to data analysis is compatible with the use of varied data from diverse methodologies. The method consists of data reduction, data display, data comparison, conclusion drawing, and verification (Miles & Huberman, 1994).

An example of how extracted data were compared and categorized is the issue of vaccine safety. McEwen and Farren (2005) listed fear of contracting Guillain Barré syndrome from vaccination as a significant barrier to accepting vaccination. HCW in Sherri et al.'s study (2004) refused the vaccination because of the fear of allergic reactions. Concerns about developing Guillain Barré syndrome or having allergic reactions to the vaccine components were both categorized under fear of adverse effects in the data analysis stage.

Data reduction. Data reduction is a necessary process in an integrative review to simplify, focus, and organize data into a manageable framework (Whittemore & Knafl, 2005). The primary sources that were included in the integrative review were divided into subgroups according to some logical system to facilitate analysis. Specifically, the initial subgroup classification was based on type of evidence and was analysed sequentially (that is, examining all qualitative or descriptive studies on influenza immunization and then cross-sectional or survey based designs). Next, data were extracted and coded from primary sources to simplify, abstract, focus, and organize data into a manageable framework.

Pre-determined and relevant data from each subgroup classification were extracted from all primary data sources and compiled into a matrix or spreadsheet (Miles & Huberman, 1994). Thus, each primary source was reduced to a single page with similar data extracted from individual sources (of each subgroup

classification). This approach provided me with a succinct organization of the literature, which facilitated my ability to systematically compare primary sources on the facilitators and the barriers to influenza uptake among HCW.

Data display. The next step in data analysis was data display, which involved converting the extracted data from individual sources into a display that assembled the data from multiple primary sources around the barriers and the motivators to influenza uptake among HCW. Data were displayed in the form of a table to facilitate comparison across all primary sources (see Appendix C). Data were displayed according to the following headings: a) author and country, b) aim, c) theoretical framework and study date, d) setting and sample, d) method, e) findings, f) limitations, and g) comments (Appendix C). These displays enhanced the visualization of patterns and relationships within and across primary data sources and served as a starting point for interpretation (Miles & Huberman, 1994).

Data comparison. To examine data displays of primary source data in order to identify patterns, themes, or relationships, I grouped similar variables near one another and depicted relationships between variables or themes. This process of data visualization and comparison provided some clarity to the empirical and/or theoretical support emerging from early interpretive efforts (see Appendix D). An example of that would be the belief that HCW do not need the vaccine. It was reported in some studies that the resistant individuals did not get the vaccine because they believed that their immune system is strong so they do not need the vaccine. Other researchers reported that HCW did not get vaccinated because they believed that they do not usualy get sick so they do not need the vaccine. These two variables were put near one another and the extracted theme was HCW did not get vaccinated because they believed they do not need the vaccine.

Conclusion drawing and verification. Conclusion drawing and verification was the final phase of data analysis that moved the interpretive effort from the description of patterns and relationships to higher levels of abstraction, subsuming the particulars into the general (Whittemore & Knafl, 2005). I isolated patterns, commonalities and differences and gradually elaborated a small set of generalizations that encompassed each subgroup database of the integrative review in its entirety.

Presentation. The last step of Whittemore and Knafl's framework on integrated review is the presentation of results. In the final section of this paper I will first summarize the methodologies that were used in the studies. I will then compare, contrast, and discuss the findings by focussing on the main determinants of influenza vaccination found in this integrative review. I will also identify an appropriate theory to interpret my findings. Next, I will discuss the implications of the findings for designing better vaccination campaigns. Finally, I will talk about the strength and limitations of this study and conclude with recommendations for clinical nurse specialist practice.

Findings

This integrative review resulted in identification of both perceived barriers and perceived motivators of vaccination uptake among HCW. I will describe first the perceived barriers then I will talk about the perceived motivators.

Perceived Barriers

This construct describes HCW' own evaluation of the obstacles to receiving influenza vaccination. The main barriers to accepting influenza vaccination among HCW identified in this integrative review are: (1) fear of adverse effects and concerns about vaccine safety, (2) concerns about vaccine efficacy, (3) doubt that influenza is a serious disease, (4) fear of injections, and (5) time and location unsuitable.

Fear of adverse effects and vaccine safety. Fear about potential side effects was often cited as the main reason for declining vaccination and was found to be negatively associated with vaccination (Clark, Cowan, & Waterle, 2009; Krault, Graff, & McLean, 2011; Lester et al., 2003; Manuel et al., 2004; McEwen & Farren , 2005; Norton, Scheifele, Bettinger, & West, 2008; Ofstead, Tucker, Beebe, & Poland, 2008; Rebmann et al., 2011; Sherri et al., 2004; Rhudy et al., 2010; Toy, Janosky, & Lairr, 2005; Walker, Stuart Sloan, & Kozlica, 2012). Sherri et al. (2004) found that 48.9 % of those surveyed had concerns about the side effects of the influenza vaccine. In addition, a significant number of HCW also reported that they felt the vaccine has the potential to cause an influenza-like illness and this was their primary reason for declining vaccination (Clark et al., 2009; Hakim, Gaur, & McCullers, 2011; Kent et al., 2010; Lester et al., 2003;

Martinello et al., 2003; Steiner et al., 2002). Nurses' skepticism toward the vaccine's safety, efficacy, and side effects was highlighted via the commentary provided by participants in the focus groups in the qualitative study by Willis and Wortley (2007). The focus group participants voiced concern about the reliability and safety of these vaccines that are manufactured annually without sufficient time or research. A major concern regarding vaccine side effects was mentioned in most of the literature reviewed. Unfortunately, few specific concerns, except in the study by McEwen and Farren (2005), which listed fear of contracting Guillain-Barré syndrome from vaccination, were reported. We know, however, that there is limited evidence that there is a causal relationship between immunization and Guillain-Barre syndrome (Haber et al., 2009) and that when a relationship was indicated, it was in older formulations of the vaccine. A major misconception about vaccine safety was found by Martinello et al. (2003) who showed that up to 44% of the respondents, mostly nurses, felt they could contract influenza from the vaccine.

Vaccine efficacy. The second most common reason for declining the influenza vaccine is doubt about its efficacy**.** Norton, Scheifele, Bettinger, and West (2008) discovered that 30 % of the pediatric nurses surveyed reported no personal need or benefit from the vaccination. Focus group members revealed concern about the influenza vaccine's efficacy from year to year because each year a new vaccine is developed to protect against a new strain of the flu. They voiced concern about the limited time available to safely research the long-term effects of each new form of the vaccine. Between 13% and 31% of nurses felt that the vaccine was not effective enough, contributing to vaccine refusal (Clark et al., 2009; Martinello, Jones, & Topal, 2003; Willis & Wortley, 2007). A study conducted in Illinois, U.S., demonstrated that the major reason for not accepting the vaccine was having received the vaccine previously and gotten sick anyway (23.3%). Of these HCW, 17.3 % had doubts about the vaccine's effectiveness (Ludwig-Beymer & Coghlan Gerc, 2002). In contrast, 82% of a sample of predominantly middle-aged HCW believed the vaccine to be effective (McEwen & Farren, 2005), implying a relationship between age of the HCW and perceptions about the efficacy of the vaccine. Higher confidence in the efficacy of the vaccine was associated with acceptance of the influenza vaccine (Corace et al., 2013; Cowan et al., 2006; Fernandez et al., 2009; Hakim, Gaur, &

McCullers, 2011; Kaboli et al., 2010; Krault, Graff, & McLean, 2011; Manuel et al., 2002; McEwen & Farren , 2005; Nowalk et al., 2010; Toy, Janosky, & Lairr, 2005).

Doubt that influenza is a serious disease and the belief that they are healthy and do not need the vaccine. Many HCW base their decision about whether to receive the influenza vaccine on perceptions of risk, which are often calculated with incorrect or incomplete information. Knowledge deficits about the influenza vaccine can be a significant barrier to increasing vaccination rates. Kaboli et al. (2010) discovered that HCW perceptions of seasonal and pandemic influenza as mild diseases were associated with reduced intentions and lower uptake of the vaccine. Conversely, the perception of influenza as a severe disease was associated with higher acceptance of vaccination (Hakim, Gaur, & McCullers, 2011). A survey testing nurses' knowledge about influenza yielded correct responses by only 9.6% of surveyed registered nurses. Further, a cross-sectional survey of paediatric nurses revealed limited awareness of the effect of herd immunity on reducing influenza (Martinello et al., 2003; Norton et al., 2008; Ofstead et al., 2008; Shahrabani et al., 2009). Many HCW declined the vaccination because they believed that their immune systems were 'strong' and they did not identify themselves as a risk group needing added protection against the disease (Hubble, Nremt, Zontek, & Richards, 2011; Kaboli et al., 2010; Lester et al., 2003; Ludwig-Beymer, & Coghlan Gerc, 2002; McEwen & Farren, 2005; Steiner et al., 2002; Ofstead, Tucker, Beebe, & Poland, 2008; Sherry et al., 2004). Those who intended to get vaccinated or who got vaccinated, on the other hand, had a higher sense of personal susceptibility to influenza (Clark, Cowan, & Waterle, 2009; Hakim, Gaur, & McCullers, 2011; Hubble, Nremt, Zontek, & Richards; 2011; Krault, Graff, & McLean, 2011; Ludwig-Beymer, & Coghlan Gerc, 2002; Manuel et al., 2002; Manuel et al., 2004; Steiner et al., 2002; Sherry et al., 2004).

Avoidance of injections. A fear or dislike of needles has been cited in a few studies exploring low uptake of influenza vaccination among HCW (Clark, Cowan, & Waterle, 2009; Hakim, Gaur, & McCullers, 2011; Kent et al., 2010; Lester et al., 2003; Steiner et al., 2002; Toy, Janosky, & Lairr, 2005, Ludwig et al., 2002; Ofstead et al., 2008). Thirty-five percent of the non-vaccinated participants in Ofstead et al.'s study

(2008) cited aversion to injections as a reason for declining vaccination, whereas other researchers found that only six percent of HCW were afraid of injections and used this fear as a reason for not receiving the vaccine (Ludwig et al., 2002). The reason behind the discrepancy in rates can be explained by the fact that women have significantly more intense fear than men (Fredrikson, Annas, Fisher, & Gustav, 1996). Eighty-nine percent of the participants in Ofstead et al.'s study (2008) were women versus seventy-nine percent in Ludwig et al.'s study (2002). Additionaly, Fredrikson, Annas, Fisher, and Gustav (1996) discovered that older women have lower fear than younger ones. Influenza campaign leaders may need to influence this group about the importance of getting immunized by focusing on the benefits of getting vaccinated that outway the fear of injections barrier. The intra-nasal form of the influenza vaccine (flumist) can be offered to those who avoid injections.

Time and location unsuitable. Other barriers to vaccination identified by HCW are limited time and unsuitable location. This barrier was cited in four of the thirty two articles. HCW stated they had busy schedules and could not find time to receive the vaccine. Some HCW reported influenza vaccination was unimportant and they had more pressing life issues that required their attention (Clark et al., 2009; Gallant et al., 2009). Although time and unsuitable locations do not appear to be a major factor, it is another variable to consider when attempting to improve vaccination rates.

Perceived Motivators

Many motivators for vaccintion have been identified in this integrative review. Protecting oneself is the main motivator for HCW to receive the influenza vaccine and this reason was found in thirteen of the thirty-two studies included in this report. The second main reason is to protect patients and the third major reason is the belief that the vaccine is effective.

Protecting oneself. The most compelling reason to receive influenza vaccine is to protect oneself from potential disease. Hakim et al. (2011) reported that 85.9 % of HCW who received the pandemic vaccine

agreed that the influenza vaccine would reduce their personal risk of getting sick. This was also the most commonly cited reason for pandemic vaccine uptake. HCW identified two important considerations that encouraged vaccination: decreasing the need to take sick leave and personal protection from influenza (Clark et al., 2009). Moreover, vaccine receipt during the previous influenza season was correlated to current vaccine acceptance and a strong predictor of future acceptance (Kaboli et al., 2010; Nowalk et al., 2010; Walker, Stuart Sloan, & Kozlica, 2012).

Protecting patients. Patients' protection through vaccine uptake is the second most compelling reason to receive influenza vaccine. Most vaccinated HCW recognize that protection of patients from pandemic influenza as a result of their vaccination is a benefit of becoming vaccinated (Banks, Christini, Shutt, & Byers, 2007; Clark, Cowan, & Waterle, 2009; Cowan et al., 2006; Hakim, Gaur, & McCullers, 2011; Kent et al., 2010; Lester et al., 2003; Manuel et al., 2002; Manuel et al., 2004; Mehta, Pastor, & Shah, 2008; Sherry et al., 2004; Toy, Janosky, & Lairr, 2005). Many studies noted that HCW believe that it is a professional obligation to be vaccinated because of their role in patient care (Hakim, Gaur, & McCullers, 2011; Krault, Graff, & McLean, 2011). This reflects the ethical principle of ‘‘duty to care’’. The Canadian nursing association (CNA) supports annual immunization as the most effective method of preventing influenza and its complications (CNA, 2012). The CNA also supports removing barriers that would make influenza immunization universally accessible. The CNA even considers mandatory immunization policies by employers to be congruent with the code of ethics for registered nurses in Canada and the obligation to act in the public interest (CNA, 2012).

Belief that the vaccine is effective. The belief of HCW that the influenza vaccine is effective is cited in ten of the thirty two studies included in this report and is, therefore, the third most cited reason for HCW to receive the vaccine (Corace et al., 2013; Cowan et al., 2006; Fernandez et al., 2009; Godin, Vézin., & Naccache, 2010; Manuel et al., 2002; McEwen & Farren, 2005; Nowalk et al., 2010; Rebmann et al., 2012; Toy, Janosky, & Lairr, 2005). It is interesting to see that among those who receive the vaccine, patient safety is more important than the belief in vaccine effectiveness, yet among those who do not get vaccinated, belief

that the vaccine is not effective is more important. It is the belief in the vaccine's effectiveness and the belief in the responsibility of the HCW to protect patients that distinguishes the two groups. Knowledge about vaccine effectiveness appears to be a strong positive factor for vaccine receipt. Having achieved higher levels of education (Master's and baccalaureate versus diploma education) also appears to be positively correlated with vaccine acceptance (McEwen & Farren, 2005; Ofstead, Tucker, Beebe, & Poland, 2008). It is possible that those who have higher levels of education may be more aware of research on vaccine effectiveness. This may be particularly true for nurses with a baccalaureate degree who are more likely to have public health courses than nurses without baccalaureate degree.

Discussion

In the discussion section of the paper, I will summarize and discuss the main findings of this integrative review. I will also identify an appropriate theory to interpret my findings using an article that I found on the health belief model (HBM) that appears to be very relevant to understanding how or why HCW might change their knowledge, beliefs, attitudes, and behaviour with respect to getting vaccinated against influenza. I will then discuss how my findings fit the HBM and identify whether there are some findings that do not quit fit with the HBM and explain why they do not fit. I will also discuss some implications for interventions to promote vaccination uptake among HCW and identify what the HBM tells us about the implications for intervention. I will finally describe other theories that might help to develop appropriate interventions and identify how these theories or concepts can be used.

The HBM and its Relevance to the Findings

Since the results of this review on the uptake of the vaccine demonstrate that vaccination is associated with consumer decisions, beliefs, knowledge, and behaviors, a number of models have been suggested as providing appropriate theoretical frameworks for interpretation. These include the HBM, social learning theory, protection motivation theory, and the theory of reasoned action (Johnson, 2002; Harrison, Mullen, & Green 1992; Rosenstock, Strecher, & Becker, 1988). Based on the findings from my review and the article on the HBM titled: ‘‘Underutilization of Influenza Vaccine: A test of the Health Belief Model’’ (Cheney &

John, 2013), the well-established HBM appears to be the most relevant to apply to understand the findings. Theories of health behaviour offer researchers a theoretical framework to understand factors relating to specific health behaviours, including immunization uptake and/or rejection (Becker, 1974, Montano, 1986). In recent years, the HBM has provided a valuable theoretical framework for understanding factors that influence seasonal influenza vaccine uptake or refusal in a variety of populations (Becker, 1974; Janz & Becker, 1984; Blue, Valley, 2002). In fact, the HBM constructs have been especially robust in explaining influenza vaccination decisions in HCW populations (Becker, 1974; Blue, Valley, 2002; Looijmans et al., 2009).

The development of the HBM occurred in the early 1950's by social psychologists working with the U.S. Public Health Service. The rationale behind the development was "the widespread failure of people to accept disease preventives or screening tests for the early detection of asymptomatic disease" (Rosenstock, 1990; Rosenstock, 2000). The HBM suggests that a person's belief in a personal threat of an illness or disease together with a person's belief in the effectiveness of the recommended health behavior or action will predict the likelihood the person will adopt the behavior.

While the HBM stems from a mixture of psychological and behavioral theories, it stands on two basic principles: 1) the desire to avoid illness, or conversely get well if already ill; and, 2) the belief that a specific health action will prevent, or cure, illness. Ultimately, an individual's course of action often depends on the person's perceptions of the benefits and barriers related to health behavior. There are six constructs of the HBM. The first four constructs were developed as the original tenets of the HBM and the last two were added as research about the HBM evolved. The six constructs of the HBM are: (1) perceived susceptibility, (2) perceived severity, (3) perceived benefits, (4) perceived barriers, (5) cues to action, and (6) self-efficacy (Becker, 1978; Sharma & Romas, 2008). Although self-efficacy is now routinely added to the HBM, it is not needed to understand simple health behaviors like obtaining an influenza vaccination (Brewer & Rimer, 2008). The HBM is very relevant to understanding how or why HCW might change their knowledge, beliefs,

attitudes, and behaviour with respect to getting vaccinated against influenza. The concepts of the HBM are congruent with the factors identified in the review.

Perceived susceptibility refers to a person's subjective perception of the risk of acquiring an illness or disease. There is wide variation in a person's feelings of personal vulnerability to an illness or disease. Perceived severity refers to a person's feelings on the seriousness of contracting an illness or disease (or leaving the illness or disease untreated). Perceived benefits refer to a person's perception of the effectiveness of various actions available to reduce the threat of illness or disease (or to cure illness or disease). Perceived barriers refer to a person's feelings about the obstacles to performing a recommended health action. The person weighs the effectiveness of the actions against the perceptions that it may be expensive, dangerous (e.g., side effects), unpleasant (e.g., painful), time-consuming, or inconvenient. Cue to action is the stimulus needed to trigger the decision-making process to accept a recommended health action. These cues can be internal (e.g., chest pains, wheezing, etc.) or external (e.g., advice from others, illness of family member, newspaper article, etc.).

I found the majority of factors relating to HCW influenza behaviour to be consistent with the HBM constructs of perceived barriers, benefits, severity, susceptibility and cues to action. In other words, HCW were more likely to become vaccinated against pandemic influenza if they: (1) believed themselves to be highly susceptible and the infection to be severe, (2) believed the benefits of vaccination outweighed potential barriers, and (3) were influenced by positive cues to action. These findings further support the use of HBM as an appropriate theory for better understanding HCW influenza vaccination health behaviours.

The findings of this study demonstrate that many of the key factors that influenced influenza vaccination among HCW are similar to factors determined to be important in previous reviews (Thomas & Jefferson, 2010; Hofman et al., 2006). For instance, a literature review of HCW attitudes and beliefs targeting seasonal influenza vaccination by Hofmann et al. (2006) concludes that misperceptions regarding seasonal influenza risk (i.e., susceptibility and severity), vaccine safety (i.e., perceived benefits) and adverse

effects (i.e., perceived barriers), and the role of HCW in influenza transmission to patients to be major barriers to vaccine uptake. Another review of factors predictive in HCW seasonal influenza vaccine uptake by Hollmeyer et al. (2009) finds HCW beliefs in vaccine efficacy and self-protection through immunization to be major motivators for seasonal influenza uptake. The previous reviews did not include exacltly the same articles that are included in this review. The inclusion and exclusion criteria were different. The main differences are in exploring registered nurses' experience only or in including studies that were conducted outside of U.S and Canada. Similarly to these reviews, I also found HCW were more likely to become vaccinated against influenza if they had a history of influenza vaccine uptake, believed the vaccine would be an efficacious mode of protection, and perceived the influenza infection to be severe (Alkuwari, Nazzal, & Al-Nuaimi, 2011; Chor et al., 2011) .

HCW who refused the vaccine often cited lack of personal risk as a reason for their decision (Gallant, Vollman, & Sethi, 2009). It has been demonstrated that many unvaccinated HCW believed they were not at risk for influenza because they were not part of a high-risk group (Willis & Wortley, 2007). Clark et al. (2009) discovered that 19% of the unvaccinated registered nurses surveyed felt they were not at risk for influenza. Many believed they had stronger immune systems because of workplace exposure to the disease (Clark et al., 2009; Gallant et al., 2009; Willis & Wortley, 2007). These findings fit well with the perceived suceptibility concept of the HBM because this model predicts that individuals who perceive that they are susceptible to a particular health problem will engage in behaviors to reduce their risk of developing the health problem (Rosenstock, 1974). Individuals with low perceived susceptibility may deny that they are at risk for contracting a particular illness. Others may acknowledge the possibility that they could develop the illness, but believe it is unlikely (Glanz, Rimer, & Viswanath, 2008). Individuals who believe they are at low risk of developing an illness are more likely to engage in unhealthy, or risky, behaviors, or they will not engage in protective behaviours (e.g. immunization). Individuals who perceive a high risk that they will be personally affected by a particular health problem are more likely to engage in behaviors like vaccination to decrease their risk of developing the condition.

The reasons why vaccinated HCW perceive influenza as a serious disease while the resistant ones do not are not well documented in the chosen articles. Ludwig-Beymer and Coghlan (2002) mentioned that older HCW have more concerns about influenza than younger ones. It is possible that older HCW perceive themselves as more at risk of acquiring influenza and developing complications therefore vaccination rates among older HCW are higher than among younger ones. Future influenza campaign leaders should target younger HCW who disregard the seriousness of influenza. Influenza campaign leaders may need to influence this group about the importance of getting immunized by focusing on herd immunity and patient safety rather than the need to get the vaccine to protect oneself. The findings of this study reveals that HCW who do not believe that influenza is a serious disease are less likely to get vaccinated. The vaccinated HCW have a higher belief in the seriousness of influenza infections than the resistant ones. These findings fit well with the perceived seriousness construct of the HBM. Perceived severity refers to subjective assessment of the severity of a health problem and its potential consequences (Willis & Wortley, 2007). The HBM proposes that individuals who perceive a given health problem as serious are more likely to engage in behaviors to prevent the health problem from occurring (or reduce its severity). Influenza campaign leaders should therefore use startegies that demonstrate the severity of influenza infections.

The main reason for accepting the vaccine among the vaccinated HCW was protecting self. The belief in the vaccine's ability to specifically protect ''self'' emerges as an important benefit of vaccine uptake. Hakim, Gaur, and McCullers (2011) reported 85.9% of HCW who received the influenza vaccination agreed that the influenza vaccine would reduce their personal risk of getting sick. Influenza immunization is a low priority for the resistant group because of their skepticism of the vaccine's value (Rhudy et al., 2010). The analysis of the retrieved articles allows us to see that the resistant HCW who do not believe that influenza is a serious disease and that the vaccine is effective are not convinced that the vaccine protects them or protects their patients. Accepting HCW believe that influenza is a serious disease and that the vaccine is safe and effective. The resistant HCW do not believe in the seriousness of the disease and in the safety of the vaccine and its efficacy. Both groups care about patient safety but the first group is convinced that the vaccine will

protect their patients and the second group do not. Each group has different sets of beliefs therefore the educational strategies has to target the constructs around the HBM because HCW will not get vaccinated unless they believed in the seriousness of the disease, the safety of the vaccine, the efficacy of the vaccine, and the benefits of taking the vaccine for themselves and for their patients.

Doubt about vaccine efficacy was mentioned in ten of the thirty-two studies included in this review. Only in seven of these ten studies, did HCW believe that the vaccine could protect them. Furthermore, the belief that the vaccine can protect the patients was only mentioned in four of these ten studies. These findings might imply that the focus of the future influenza campaign leaders should be on convincing HCW of the effectiveness of the vaccine. Those who doubt the efficacy of the vaccine might not be convinced of its capacity for protecting them or protecting their patients. Further analysis of these studies allows us to see, on one hand, that beliefs that the vaccine is not effective mean that they do not believe that the vaccine will protect the patients. On the other hand, those who receive the vaccine are more likely to believe that the vaccine is effective so getting the vaccine will protect their patients. Thus, it maybe that there is a tension between protecting patients and protecting themselves with some prioritizing personal safety in the decision making about vaccination.

Protecting self, protecting patients, and the belief that the influenza vaccine is effective were identified as the motivators to getting the vaccine. These findings fit the perceived benefits construct of the HBM because, according to Glanz, Rimer, and Viswanath (2008), health-related behaviors are influenced by the perceived benefits of taking actions. Perceived benefits refer to an individual's assessment of the value or efficacy of engaging in a health-promoting behavior to decrease risk of disease (Rosenstock, 1974). If an individual believes that a particular action will reduce susceptibility to a health problem or decrease its seriousness, then he or she is likely to engage in that behavior regardless of objective facts regarding the effectiveness of the action (Glanz, Rimer, & Viswanath, 2008).

The main barrier to receiving influenza vaccination was the fear of adverse reactions. Influenza campaigns leaders should include factual information about possible reactions and their incidence. As with any vaccine, reactions do occur after vaccination (mainly local inflammatory reactions that are generally mild and short lived and rarely fever, myalgia, arthralgia or headache) (Fukuda et al., 2004). Influenza vaccines are generally considered safe.

Other barriers to vaccination concerned the ease of access to vaccine and the fear of injections. The difficulties to access the vaccines can be overcome by careful planning, communication and the use of mobile vaccination carts. The fear of injections barrier can be overcome by (1) demonstrating that the benefits of vaccination outweigh the fears, (2) by using Flumist intranasally rather than intramusculaire injections, or (3) by ultimately mandating vaccination (if all the strategies to improve uptake were exhausted).

Limited time and unsuitable location as a barrier to vaccine uptake was cited in only four of the thirty two articles. HCW stated they had busy schedules and could not find time to receive the vaccine. Some HCW reported influenza vaccination was unimportant and they had more pressing life issues that required their attention (Clark et al., 2009; Gallant et al., 2009). Although time and unsuitable locations do not appear to be a major factor, it is another variable to consider when attempting to improve vaccination rates.

Fear of adverse effects, concerns about vaccine's efficacy and safety, avoidance of injections, and time and location unsuitable were identified as the main barriers to getting the influenza vaccination. These findings fit well with the perceived barrier construct of the HBM. Glanz, Rimer, and Viswanath (2008) argued that the health-related behaviors are also a function of perceived barriers to taking actions. Perceived barriers refer to an individual's assessment of the obstacles to behavior change (Rosenstock, 1974). Even if an individual perceives a health condition as threatening and believes that a particular action will effectively reduce the threat, barriers may prevent engagement in the health-promoting behavior. In other words, the perceived benefits must outweigh the perceived barriers in order for behavior change to occur (Glanz, Rimer

& Viswanath, 2008). Perceived barriers to taking action include the perceived inconvenience, expense, danger (e.g., side effects of a medical procedure) and discomfort (e.g., pain, emotional upset) involved in engaging in the behavior (Rosenstock, 1974).

Encouragement from numerous sources, such as HCW' families, colleagues, supervisors, and physicians had a positive impact on influenza vaccination uptake (Kraut, Graff, & McLean, 2011; Hakim, Gaur, & McCullers, 2011). Hospital departments in which managers actively encouraged and facilitated vaccination had higher rates in general (Mehta, Pastor, & Shah; 2008). The impact of employer effort on immunization rates was confirmed, reemphasizing the importance of a proactive workplace environment to control the transmission of influenza among HCW and their patients (Hubble et al., 2011). Therefore, establishing a culture of influenza vaccination promotion in the workplace with strong pro-vaccination messages from physicians, supervisors, managers and other leaders can enhance vaccine uptake in healthcare settings.

An adequate use of theory-based methods increases the effectiveness of interventions to change behaviour (Abraham & Michie, 2008). Modeling, which involves presenting an appropriate model that performs the desired action (McAlister, Perry, & Parcel, 2008) can be used for various determinants and at various levels. The practical application for HCW would be a nurse or a physician explaining to reluctant HCW why they decided to take the vaccination and how they succeeded in doing so. The practical application for managers would be a manager from another company explaining why the organization decided to organize free vaccination and how they were able to increase the number of vaccinated HCW.

The HBM posits that a cue, or trigger, is necessary for prompting engagement in health-promoting behaviors (Rosenstock, 1974). Cues to action can be internal or external. Physiological cues (e.g., pain, symptoms) are an example of internal cues to action (Glanz, Rimer & Viswanath, 2008). External cues include events or information from close others, the media or health care providers promoting engagement in

health-related behaviors (Rosenstock, 1974). An example on cue to action that I found in the review is facilitating the vaccination and making it accessible at all times during the influenza season.

These findings document that the HBM is a useful framework for understanding differences between HCW who are accepting of and resistant to influenza vaccination, but some of the findings do not quite fit. The strongest predictor of vaccination in Nowalk et al.'s study (2010) was receiving influenza vaccine the previous year. This means that if we get HCW to get the vaccine once, they are likely to keep getting it. Furthermore, it was noticed that those who were vaccinated were much more likely to recommend the vaccine to others (Ludwig-Beymer, & Coghlan, 2002; McEwen & Farren, 2005). Similarly, Nowalk et al.'s study (2010) revealed that HCW were more likely to become vaccinated against influenza if they had history of influenza vaccine uptake, believed the vaccine would be an effective way for protection, and if they believed they were at risk because of work. So it is more than just getting the vaccine the previous year that is important. It is other factors as well. Unfortunatly, past behaviour is not explicitly incorporated into the HBM.

In summary, this study reveals that accepting and resistant HCW have significant, determinant differences in their health beliefs about influenza vaccination such as the opposed views of their susceptibility to the illness and the severity of influenza as a personal health problem. Furthermore, these divergent health beliefs extend to opposing views about the benefits of obtaining a flu vaccination, with accepting individuals subscribing to much more favorable opinions of the vaccine. More differences are evident when barriers are considered. Those accepting influenza vaccination perceive fewer barriers than those who are resistant.

Implications for Interventions to Promote Influenza Vaccination Uptake among HCW

Based on this review's findings, an implementation strategy that targets influenza vaccine uptake among HCW in acute care and long-term care settings is proposed. Such a strategy should target perceptions of

susceptibility and severity of the illness and its effects; perceptions of the benefits of vaccination; and perceptions of the barriers. This involves changing beliefs and attitudes (or reinforcing existing positive beliefs and attitudes) and suggests that an educational strategy is an important element of an approach to increase vaccination uptake. Cues to action encompassing environmental supports become important once positive benefits and attitudes are developed.

Given that an educational approach to changing beliefs and attitudes is warranted, it is important to develop the most effective strategies drawing on appropriate learning and educational theories. Below I present the theories that I believe are most relevant to guide the development of effective educational approaches to promote the uptake of influenza vaccine. These include constructist and transformative learning theory. Constructivist learning theory can be used to develop effective strategies to change HCW's beliefs about vaccination. Constructivist learning theory emphasises the process of how people learn by constructing meaning—people interpret and construct meaning around the information about immunization and it is the meaning that determines how people subsequently act.

Jack Mezirow's transformative learning theory, which is focused on perspective transformation—on transforming people's belief systems to change action, can also be used by the future influenza campaign leaders to increase influenza vaccination rates among HCW. Mezirow (1990) originally studied learning in adulthood as a transformative process. He defined learning as "the process of making new or revised interpretation of the meaning of experience, which guides subsequent understanding, appreciation and action" (Mezirow, 1990, p.l). Transformative learning involves a change in personal feelings, beliefs, and values known as meaning perspectives.

Developing an Effective Strategy

The process of developing and evaluating an implementation strategy should be composed of four steps: 1) a needs assessment; 2) development of theory-based methods and practical strategies; and 3) program planning.

Step one: needs assessment. The findings of this study have demonstrated that the main barriers to accepting influenza vaccination by HCW are: (1) fear of adverse effects and concerns about vaccine safety, (2) beliefs that vaccines are not efficacious, (3) doubt that influenza is a serious disease and the belief of HCW that they are healthy and do not need the vaccine, (4) fear of injections, and (5) unsuitable times and locations for immunization. This study also demonstrated that the main motivators to receiving the influenza vaccination are: (1) protecting oneself, (2) protecting patients, and (3) the belief that the vaccine is effective. To gain insight into how to improve the influenza vaccine coverage of HCW, influenza campaign leaders should first assess the relevant determinants of influenza vaccination behaviour. The content of this review can be used to identify the potential barriers to and the motivators of influenza uptake among HCW.

Step two: program objectives. I propose to set the objectives of future influenza campaigns based on the five concepts of the HBM. Many interventions are proposed in the following tables (see tables. 1 and 2) to guide future campaign leaders into ways to increase influenza vaccination rates among HCW. Further development of the educational strategies based on learning theories are proposed in step three. Based on the five concepts of the HBM, the objectives of the influenza campaign are identified below. The objectives address the concepts in the HBM and identify what is required to change existing beliefs about influenza (see table 1).

The objectifs of the influenza campaign should be:

1. To increase participants'perceptions of their susceptibility to influenza.
2. To increase participants'perceptions of the severity of influenza.
3. To increase participants'perceptions of the benefits of influenza immunization.
4. To dicrease participants'perceptions of the barriers to influenza immunization.
5. To provide cues to action.

There are particular strategies that are likely to enhance HCW perceptions of susceptibility and severity. One strategy would be providing credible high quality evidence about HCW risks for getting influenza, and data about the severity of the illness and its consequences. However, we know that information is not enough, so we need to engage HCW in ways that the information becomes meaningful to them.

Table 1. Framework for Health Belief Model

Concept	**Requirement for the vaccine**
Perceived susceptibility	HCW believe they can get influenza infection
Perceived severity	HCW believe that the consequences of getting an influenza infection are significant enough to try to avoid
Perceived benefits	HCW believe that the recommended action of immunization would protect them from getting an influenza infection and protect patients
Perceived barriers	HCW have personal barriers to immunization that may include fear of needles, beliefs that the vaccine will have negative side effects, doubt about the severity of the disease and doubt about the efficacy of the vaccine
Cues to action	HCW require cues for action that include mobilizing recommendations by influential people in their environment including supervisors, doctors, and managers, giving time off work, and providing convenient and accessible location

To achieve the above objectives, interventions based on the HBM will aim to change the beliefs and perceptions included in the HBM drawing on appropriate educational theories. These are described in table 2.

Table 2. Interventions based on the Health Belief Model

Concept	**Objectives**	**Interventions**
Perceived susceptibility	HCW believe they can get influenza infection	- Influenza educational group sessions using the constructivist theory and/or the transformative learning theory. Interactive sessions that include ways to positively, and in a non-threatening way, challenge peoples' negative beliefs and attitudes are the strategies that are most likely to change beliefs and attitudes. These sessions can provide opportunities to talk through their existing beliefs and allow the HCW to ask critical questions in dialogue with peers and facilitators. -Provide information on influenza, the vaccine and its moderate

		side effects and complete safety through an information stand at different strategic places of the organisation, a website, a folder and plenary meetings - Polls and a quiz on the intranet
Perceived severity	HCW believe that the consequences of getting an influenza infection are significant enough to try to avoid	- Influenza educational group sessions using the constructivist theory and/or the transformative learning theory -Provide information on influenza and the efficacy of the vaccine through an information stand at different strategic places of the organisation, a website, and plenary meetings -Use outbreak statistics of previous years. - Polls and a quiz on the intranet
Perceived benefits	HCW beleive that the recommended action of immunization would protect them from getting an influenza infection	- Influenza educational group sessions using the constructivist theory and/or the transformative learning theory. -Provide information on influenza and the efficacy of the vaccine through an information stand at different strategic places of the organisation, a website, a folder and plenary meetings - Polls and a quiz on the intranet
Perceived barriers	HCW have no personal barriers to immunization	- Focus on advantages of vaccination
Cues to action	HCW have cues for action	- Poster with clear practical information on location and time - Personal invitation at home address with location and time - Extended vaccination hours which take changing shifts into account - Personal invitation letter with information folder and a link to the website at the home address - Video testimonials with role models

Each of the HBM concepts should be discussed by the influenza campaign team in order to determine which behavioural determinants could reasonably be changed through an implementation strategy.

Step Three: theory-based methods and practical strategies. This integrative review shows that HCW are more likely to get vaccinated if they (1) believe that the vaccine protects them, (2) believe that the vaccine protects their patients, (3) are convinced of the efficacy of the vaccine. These findings demonstrate

therefore how vital 'belief' is. HCW need to believe in the efficacy of the vaccine first before deciding whether they will get it or not. Given those findings influenza campaign leaders' strategies will only be effective if they change HCW's beliefs. Giving HCW the 'facts' about immunization (for example, having them attend an in-service, give them written info on a website, etc.) is unlikely to result in change in behaviour or even beliefs but may be an important first step. The HBM as well as the educational literature and the learning theories can be helpful in thinking through strategies to increase influenza vaccination rates among HCW.

Several studies indicated that educational brochures were beneficial for enhancing vaccine acceptance (Clayton, Hickson, & Miller, 1994; Jacobson et al., 1999). However, other studies demonstrated that brochures alone were not sufficient (Dempsey, Zimet, Davis, & Koutsky, 2006). Based on research supporting the use of video and educational sessions to reinforce brochure messages (DiClemente, Salazar, Crosby, & Wingood, 2005; Pignone, DeWalt, Sheridan, Berkman, & Lohr, 2005; Thomas et al., 2003), I propose to integrate a presentation, brochure, and a DVD in an educational intervention. This educational intervention can be guided by constructs from the HBM and transformative learning theory. Mezirow's transformative learning seven step process could be used to structure the educational sessions. For example, in Mezirow's approach to transformative learning the first step is to create a disorienting dilemma where the current beliefs do not hold up in a particular situation. The disorienting dilemma serves to call existing beliefs and assumptions into question. Thus, the educational session might start with actual stories of patients and nurses (for example, nurses who were very healthy and fit) who have become severly ill. The application of the HBM constructs to the educational intervention is presented in the following table (table. 3). Future campaign leaders must not forget that it is both the content and process of the educational session that is very important to making shifts in beliefs and attitudes. Just presenting information is insufficient. Learning strategies need to be interactive and provide opportunities to critically question one's own beliefs and be challenged in a supportive environment. A skit could be a great way to introduce the ideas but then there

needs to be opportunities for participants to engage in critical and reflective dialogue about the content of the skit.

Table 3. Application of HBM constructs to educational intervention content

HBM constructs	Translating constructs to the intervention	Brochure Content	Skit content	Presentation content
Perceived susceptibility	HCW must feel at risk of influenza	Information on how the flu is spread - Influenza is a contagious disease - It is spread easily - HCW are the primary spreaders of the virus in a healthcare setting	Two HCW in the skit, the head nurse of the surgical unit and the nurse in charge who got the flu	Information on how the flu is spread
Percieved severity	HCW must feel that the consequences of influenza are serious	Information about the seriousness of influenza infections - The flu is a serious disease - The flu is a contagious disease spread through coughing and sneezing - About 36,000 people die from the flu every year	The nurse in charge has to miss the LEAN conference that she considers a priority for her professional development because she has the flu. Michelle could not even attend the conference while wearing a mask because she has fever and she has severe cough. Linda does not want to get the flu because she wants to make sure not to miss the LEAN conference	Information about the seriousness of the flu
Perceived benefits	HCW must beleive that influenza immunization will be beneficial in terms of preventing influenza	Information about how the vaccine can help prevent HCW from getting the flu - A flu vaccine is the best way to protect against the flu - The flu vaccine is an effcetive way to protect yourself against the flu Information about how the vaccine can help prevent HCW from spreading the	Linda attends the LEAN conference because she got the influenza vaccine	- Information about how the vaccine can prevent HCW from getting the flu and spreading it to others - Information about herd immunity

		flu to others: protect yourself, your family, and your patients		
Perceived barriers	HCW must feel that they can overcome barriers that would prevent them from being vaccinated, such as fear of needles, belief that the vaccine causes the flu	Information about how the flu shot is safe - the flu shot is safe and highly effcetive Information about the nasal mist vaccine that is needle-free : - There are 2 types of flu vaccine: the flu shot and the nasal mist. The nasal mist is a new vaccine that can protect you, your family members and your patients from the flu - The Mist is needle-free—it is sprayed into your nose - The Mist can't give you the flu - The Mist is generally safe, painless, and highly effective for most people	Daniel says he doesn't want to get the flu shot, because i twill inject him with the flu Linda tell Daniel that the shot does not inject you with the flu—that the infection control nures recommends it because it is safe and effcetive Daniel hates the shots Linda tells Daniel that the shot is really not bad. She also tells him about the nasal mist vaccine, which is needle free	Information about how the flu shot is safe Information about how the Mist vaccine is needle-free
Cues to action	HCW decision to obtain the vaccination will be influenced (cued) by certain factors	The brochure itself serves as a cue to action to get the flu vaccine	The skit itself serves as a cue to action to get the flu vaccine. Other cues include posters, flu clinics on location, etc.	Small gifts can be given to those who attended the educational sessions such as small bottles of hand sanitizers or pencils or key chains, etc.

One of the biggest problems in continuing education initiatives in health care is that the technical information is given in a way that does not support the more adaptive aspect of learning. HCW often do not have the chance to make the information meaningful to their own lives. Some HCW might be offended if we

asked them to get vaccinated for the sake of their patients.

Two years ago, with the patient safety movement, our healthcare organization chose ‘protect your patients, get the influenza vaccine’ as the theme for the annual campaign. The educational sessions emphasised the importance of getting the vaccine to protect the patients. Many HCW reacted quite negatively since they interpreted it (made meaning of the education) as disrespectful. One of the unvaccinated nurses came to my office once to express how hurt she was because she was indirectly blamed for the nosocomial outbreak of influenza that occurred on her unit. This nurse told me that patients’ safety and quality of care are of great interest for her and that she always washes her hands and respects the cough etiquette whenever needed to make sure not to transmit any bug to her patients. She said that she cares about her patients as much as all the vaccinated HCW and it was not fair to put her in this position. This nurse did not believe that influenza is a serious disease and that the vaccine is effective. She could not see the benefits of taking the vaccine therefore did not believe that she needs to take it to protect herself or to protect her patients. This integrative review allows us to see that here are two different groups of HCW. On one hand, there are those who believe that influenza is a serious disease and that the vaccine is safe and effective. On the other hand, there are those who do not believe in the seriousness of the disease and in the safety of the vaccine and its efficacy. Both groups care about patient safety but the first group see that the vaccine will protect their patient and the second group do not. Each group has different sets of beliefs therefore the educational strategies has to target the constructs around the HBM because HCW will not get vaccinated unless they believed in the seriousness of the disease, the safety of the vaccine, the efficacy of the vaccine, and the benefits of taking the vaccine for themselves and for their patients.

Looking back at the campaign strategy I discovered that it would have been more successful if it focused around HCW well-being rather than only to protect patients. This could have given the opportunity for HCW to make meaning of it and to recognize the tension some nurses may feel between protecting patients and protecting themselves. An example of that would be having the insight that getting the vaccine would better ensure HCW do not take any bugs home to their children. Influenza campaign leaders should

look for ways to structure their initiative strategically. These leaders should start where HCW are at. If HCW do not believe in the efficacy of immunization, and this integrative review shows that this is important, then they need to think through how they would intervene to change HCW beliefs. This would require not just giving the technical information, but creating adaptive learning opportunities that can support change in their beliefs so that immunization becomes meaningful to them.

Dubouloz et al. (2000) referred to the growing recognition of how a HCW's meaning perspectives impact health related behaviors and the process of change in meaning perspectives that may be required to get vaccinated against influenza. Adult learning theory provides a context for the exploration of the process leading to the HCW's desired health outcomes based on two implicit principles of learning. The learner participates in constructing knowledge and learning is an interactive process of interpretation, integration, and transformation of experiences by the learner (Merriam, 1993). Transformative learning is an adult learning theory that offers a theoretical framework to understand how change is manifested for HCW who are undecided regarding influenza immunization. Concepts of individual process, meaning from experience and empowerment help to provide a deeper understanding of how HCW construct meaning perspectives about the influenza immunization.

Transformative learning theory acknowledges individual process and the role of the HCW's frame of reference in determining personal meaning and perceptions of experience. Mezirow (1994) suggests that symbols and language are a person's frame of reference and may be culture specific. They may imply unspoken feelings, understandings or expectations. An example of a symbol in our culture would be having influenza symptoms. When thinking about hospitalised patients with influenza, HCW often expect patients with fever, sore throat, cough, myalgia, and dyspnea needing sometimes mechanical ventilation. Meaning perspectives frame expectation by mirroring symbolic models so that the meaning of new experiences can be evaluated and interpreted. The importance of meaning perspectives can be seen when individuals find themselves in unfamiliar situations or experiences. They must rely on familiar ways of thinking, being and understanding as a way of interpreting the new experience. The role of experience in learning can be

appreciated from the standpoint of its importance in confirming or broadening expectations of how things are supposed to be. An assumption that underlies transformative learning theory is that meaning exists within the learner and that interaction and communication with others validates the meanings that the learner attaches to experiences (Cranton, 1994).

Transformative learning theory would suggest that the HCW are central to interpreting the meaning of the disease experience and that the reflection process can lead the HCW through a transformation of meaning perspectives or belief systems. An example of this may be the beliefs HCW have about the efficacy of the vaccine based on previous assumptions. HCW may have believed that the vaccine is not effective based on assumptions that despite getting vaccinated people continue to get sick anyways. During health education sessions HCW may see other vaccinated HCW who either did not acquire influenza or acquired the disease but developed light symptoms and reflect on benefits of getting the vaccine. Reflection on experiences within the health education sessions may lead to transformation of meaning perspectives or belief systems about the importance of getting immunized.

Mezirow (1990) and Cranton (1994) describe the role of transforming meaning perspectives to notions of learner empowerment. "Learner empowerment is both a goal of and a condition for transformative learning" (Cranton, 1994, p.72). Transformative learning theory acknowledges the position of power allotted to the knowledgeable facilitator to support or promote the individual and complex process of change in meaning about influenza immunization. Future influenza vaccination campaign leaders are invited to create the right environment for self-appraisal and self-examination by providing the HCW with feelings of confidence, security and support from others.

Transformative learning theory explains how meaning perspectives can influence the HCW's meaningful experience during an educational sessions about influenza immunization. The transformative learning cycle begins with a disorienting dilemma such as questioning whether or not a HCW should get

vaccinated. This may lead to an examination of personal meaning perspectives about influenza through a reflective process that involves an exploration of new ways of protection. This process may require time before the HCW reintegrate new assumptions and perspectives into their social context (Sinnott, 1994).

The use of transformative learning theory to explore the process of change towards influenza immunization has implications for the future influenza campaign leaders. Learning about the importance of getting vaccinated involves a process of exploring old and shaping new immunization perspectives through reflection of previous influenza experiences and understandings. Influenza campaign leaders can facilitate the exploration of influenza immunization by providing an accepting and encouraging environment for beliefs and attitudes to surface while -encouraging reflection. This theory emphasizes the back and forth movement between what is learned and what is integrated as personally meaningful (Boyd & Fales, 1983). This requires very specific types of educational activities that involve critical dialogue and reflection.

Step four: program planning. The campaign leader should discuss the topics and channels of the strategy methods with the other members of the campaign team. Several meetings are recommended to reach a consensus about the program methods to be used. Common formats and sample materials should be developed and pre-tested by the campaign team, which should be subsequently adapted by the communication departments of each organization. A dedicated website can be developed by a web designer using the structure and contents produced by the influenza campaign team. In order to stimulate discussion among HCW, badges can be developed and handed out to HCW after vaccination. In support of the intervention, the influenza campaign team can provide written information about the relevance of influenza vaccination for HCW and about the time and location of vaccination, for use on individual organisation intranet websites and/or in folders and leaflets. To engage HCW staff in the project, a quiz can also be developed that can be posted on the project website.

Strength and Limitations

The findings of this study are similar to factors determined to be important in HCW influenza vaccination found by previous reviewers (Hofman et al., 2006; Hollmeyer, 2009). For instance, a literature review of HCW' attitudes and beliefs targeting seasonal influenza vaccination by Hofmann et al. (2006) concluded that misperceptions regarding seasonal influenza risk, vaccine safety and adverse effects, and the role of HCW in influenza transmission to patients are major barriers to vaccine uptake. Another review of factors predictive of HCW influenza vaccination found HCWs' beliefs in vaccine efficacy and self-protection through vaccination to be major motivators for seasonal influenza uptake (Hollmeyer et al., 2009). The similarity of the findings might play an important role in the credibility of this integrative review increasing its strength.

The creation of an implementation strategy based on the results of this review increases significantly the strength of the oveall project. To my knowledge this is the first literature review that addresses the barriers to and the predictors of influenza vaccination uptake among HCW and that proposes an implementation strategy for the future influenza campaign. It is also the first review of the determinants of influenza vaccination uptake among HCW that targets specifically the American and the Canadian populations.

The results of this study document that the HBM is a useful framework for understanding differences between those individuals who are accepting and resistant to influenza vaccination. The findings of this review fits nicely with the constructs of the HBM. The HBM allowed us therefore to better understand the determinants of influenza vaccination uptake among HCW.

The vast majority of studies reviewed relied on cross-sectional or questionnaire/survey based study designs and assumed self-reported vaccination status to be a true account of actual vaccination behaviour. These types of study designs can be vulnerable to a variety of bias, such as reporter and information biases.

Conclusion

This integrative review confirms that concerns about adverse reactions related to influenza vaccination coupled with questions about vaccine efficacy and whether influenza infections are serious enough to warrant immunization are barriers to vaccine uptake. Younger HCW believe that they are at less risk than older ones, who seem to follow the recommendations for vaccination. The infection prevention and control nurses who are responsible for influenza vaccination programs might consider adopting an iterative approach to improving coverage. By integrating a survey of HCW beliefs and attitudes as a routine and integral part of a campaign, the answers collected can be used to refine the next season's campaign. This might be my proposal for the doctorate program. It will be certainly interesting for me as well as for all the infection prevention and control staff working in my area (in the northern of Quebec) to explore the determinants of influenza vaccination specific to our staff. Pending the next project, I believe that the findings of this review can help us to plan better our influenza campaigns. I believe that the degree of theory use is a key strength of this integrative review. Influenza vaccination campaigns will only be effective in the long run if HCW have better knowledge about the effectiveness and safety of vaccination. Concerted efforts are required to attain these goals and fulfill recommendations. These findings confirm the need for comprehensive education that covers (1) vaccine efficacy, (2) safety, (3) benefits, and (4) protection of patients, self, and loved ones. Factors that improve vaccine uptake must be promoted by communication campaigns. Educational interventions should be implemented that address factors inhibiting vaccine uptake (i.e. fear of adverse effects, misperceptions about vaccine development and vaccine safety, accessibility of vaccinations, infection susceptibility and severity). Physicians, HCW, or public figures who are positive role models for vaccine uptake must be utilized.

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Appendix A

Appraisal tool criteria for quantitative designs.

Methodology elements	Critique questions	Scores
Writing style	Is the report well written - concise, grammatically correct, avoid the use of jargon? Is it well laid out and organized?	2
Author	Do the researcher (s') qualifications/position indicate a degree of knowledge in this particular field?	1
Report title	Is the title clear, accurate and unambiguous?	1
Abstract	Does the abstract offer a clear overview of the study including the research problem, sample, methodology, findings and recommendations?	1
Purpose/research Problem	Is the purpose of the study/research problem clearly identified?	1
Logical consistency	Does the research report follow the steps of the research process in a logical manner? Do these steps naturally flow and are the links clear?	2
Literature review	Is the review logically organized? Does it offer a balanced critical analysis of the literature? Is the majority of the literature of recent origin? Is it mainly from primary sources and of an empirical nature?	4
Theoretical framework	Has a conceptual or theoretical framework been identified? Is the framework adequately described? Is the framework appropriate?	3
Aims/objectives/research question/ hypotheses	Have alms and objectives, a research question or hypothesis been identified? If so are they clearly stated?	3

	Do they reflect the information presented in the literature review?	
Sample	Has the target population been clearly identified? How were the sample selected? Was it a probability or non-probability sample? Is it of adequate size? Are the inclusion/exclusion criteria clearly identified?	5
Ethical considerations	Were the participants fully informed about the nature of the research? Was the autonomy/ confidentiality of the participants guaranteed? Were the participants protected from harm? Was ethical permission granted for the study?	4
Operational definitions	Are the terms, theories and concepts mentioned in the study dearly defined?	1
Methodology	Is the research design clearly identified? Has the data-gathering instrument been described? is the instrument appropriate? How was it developed? Were reliability and validity testing undertaken and the results discussed? Was a pilot study undertaken?	6
Data Analysis / results	What type of data and statistical analysis was undertaken? Was it appropriate? How many of the sample participated? Significance of the findings?	4
Discussion	Are the findings linked back to the literature review? If a hypothesis was identified was it supported? Were the strengths and limitations of the study including generalizability discussed? Was a recommendation for further research made?	4
References	Were all the books, journals and other media alluded to in the study accurately referenced?	1
Total score		43

Adapted from Coughlan, Cronin, and Ryan (2007). Total scores are 43. High: 40- 43; Medium: 30-39, Low: 29-1.

Coughlan, M., Cronin, P. Ryan, F. (2007). Step-by-step guide to critiquing research. Part 1: quantitative research. *British Journal of Nursing.* 20 (16), 658-663.

Appendix B
Appraisal tool criteria for qualitative designs.

Methodology elements	Critique questions	Scores
Writing style	Is the report well written - concise, grammatically correct, avoid the use of jargon? Is it well laid out and organized?	2
Author	Do the researcher (s') qualifications/position indicate a degree of knowledge in this particular field?	1
Report title	Is the title clear, accurate and unambiguous?	1
Abstract	Does the abstract offer a clear overview of the study including the research problem, sample, methodology, findings and recommendations?	1
Statement of the phenomenon of interest	Is the phenomenon to be studied clearly identified? Are the phenomenon of interest and the research question consistent?	1
Purpose/significance of the study	Is the purpose of the study/research problem clearly identified?	1
Literature review	Has a literature review been undertaken? Does it meet the philosophical underpinnings of the study? Does the review of the literature fulfil its objectives?	3
Theoretical framework	Has a conceptual or theoretical Framework been identified? Is the framework adequately described? Is the framework appropriate?	2

Method and philosophical underpinnings	Has the philosophical approach been identified? Why was this approach chosen? Have the philosophical underpinnings of the approach been explained?	4
Sample	Is the sampling method and sample size identified? Is the sampling method appropriate? Were the participants suitable for informing research?	5
Ethical considerations	Were the participants fully informed about the nature of the research? Was the autonomy/confidentiality of the participants guaranteed? Were the participants protected from harm? Was ethical permission granted for the study?	4
Data collection/data analysis	Are the data collection strategies described? Are the strategies used to analyse the data described? Did the researcher follow the steps of the data analysis method identified? Was data saturation achieved?	3
Rigour	Does the researcher discuss how rigour was assured? Were credibility, dependability, transferability and goodness discussed?	6
Findings/discussion	Are the findings presented appropriately? Has the report been placed in the context of what was already known of the phenomenon? Has the original purpose of the study been adequately addressed?	4
Conclusions/implications and recommendations	Are the importance and implications of the findings identified? Are recommendations made to suggest	4

	how the research findings can be developed?	
References	Were all the books, journals and other media alluded to in the study accurately referenced?	1
Total score		43

Adapted from Coughlan, Cronin, and Ryan (2007). Total scores are 43. High: 40- 43; Medium: 30-39, Low: 29-1.

Coughlan, M., Cronin, P. Ryan, F. (2007). Step-by-step guide to critiquing research. Part 2: qualitative research. *British Journal of Nursing.* 20 (17), 738-744.

Author- Country	Aim	Theoretical Framework/study date	Setting and Sample	Method	Findings	Limitations	Comments

Appendix C
Summary and data extraction of the articles

Ludwig, Beymer, & Coghlan Gerc, 2002; Illinois-US	To better understand the impact of the employee health portion of an influenza prevention initiative and to identify factors that influence acceptance of influenza vaccination by advocate healthcare employees	None May 1999 and June 1999	HCW at Advocate Health care (large integrated healthcare delivery system). It includes 8 hospitals, three large physician groups, a home careagency) 999 (50% response rate) and 24 participated in telephone interviews	Quantitative and Qualitative: Questionnaire and telephone interview	The major reasons for receiving the vaccine are to stay healthy and peer pressure. The major reasons for not receiving the vaccine were: - Receiving the vaccine before and getting sick anyway (23.3%); - 17.3 % disbelieving in the vaccine's effectiveness; - 14 % concerning about the vaccine's safety; - 11 % a believing that they were healthy and not needing any vaccine.	-Study results do not corroborate previous research. -50 % of the respondents reported having received the vaccine, while employee health records for the same time period record immunizing 37 %.	The likelihood of vaccination increased with advancing age. Those who were vaccinated were much more likely to recommend the vaccine to others Acceptance of the vaccine was clearly impacted by the work environment but not by patient contact. This calls for the development of new strategies to communicate why HCWs of all ages should
Manuel et al., 2002; Ontario, Canada	To investigate the health behaviour associated with influenza vaccination among HCWs in long term care facilities	None Jan. and Feb.1999	HCW (nursing staff, healthcare aide, maintenance or housekeeping, activity aide, and management) in 2 long term care facilities. The focus groups were held at one of the two facilities. All	Quantitative and qualitative combined questionnaire from both long term care facilities and focus groups at facility A only Cross sectional self-administered survey of HCWs, augmented with focus groups.	Reasons for accepting the vaccine : Vaccine being effective Reasons for not getting the vaccine: taking other preventive measures such as washing hands, taking vitamins and supplements, eating a nutritious diet, exercising, and taking homeopathic or naturopathic medications and believing that these measures are more effective than vaccination HCWs believing that the main purpose of influenza vaccination programs is to protect	The seemingly paradoxical behaviour of a low likelihood of being vaccinated despite a high risk of infection and transmission to residents may be at least partially explained by value expectancy models that include social influence.	58 % response rate raising the concern that non respondents have health behaviours that are different from those of respondents.

			nonmanageri al staff members at facility A were invited to participate in the focus groups.		resident's health at the expense, potential harm, and burden of responsibility of the staff.		
Steiner et al., 2002; Wisconsin, US	To evaluate the facilitators associated with acceptance of Influenza vaccination and opinions regarding influenza prevention and treatment and willingness to pay	None 1999-2000 influenza season	463 bed, tertiary-care hospital with approximately 5400 employees. 1718 vaccinated employees (78.9%) and 482 (89.4) from the unvaccinated employees	Quantitative: questionnaire	Reasons for accepting vaccination : - avoiding losing work; - being convenient to receive; - being free; - protecting patients; - protecting myself; - being at risk of catching influenza from my patients. Reasons for refusing vaccination : -The vaccine making me sick or giving me influenza; -I am healthy so I will not catch influenza; -The shot is painful; -There are many strains of influenza and it didn't prevent flu before	Self-reporting Selection bias possibly introduced by the use of self-administered survey.	One third of vaccine recipients would refuse vaccination if asked to pay at least 10 $
Lester et al., 2003; Toronto, Canada	To determine influenza vaccination rates, vaccine effectiveness, and factors influencing vaccination decisions among house staff.	None April 2000	All residents registered at the university of Toronto 670 participated (58%)	Cross sectional	Reasons for accepting: self-protection, protect patients, protect family, protect colleagues, hospital staff insisted, and non-hospital staff insisted. Reasons for refusing: Too busy, inconvenient, fear of side effects, don't get sick anyway, flu is not severe enough, vaccine not effective, unawareness of vaccine availability	Recall and volunteer bias	House staff were motivated mostly by self-protection and did report a benefit. Despite busy schedules and an unfounded fear of getting influenza symptoms from the vaccine, many thought the vaccine should be mandatory.
Martinello et al., 2003; Connecticut ,US	To determine whether belief in commonly held influenza vaccine	None December 2000 through	Nursing staff and physicians at Yale- New Haven hospital : a large Urbain teaching	Quantitative: Cross-sectional	Misconceptions about influenza vaccination was significantly associated with influenza vaccine declination among nursing staff (deficits in general influenza vaccine	Self-reporting Selection bias possibly introduced by the use of self-administered survey. Unvaccinated	Reasons for influenza vaccine non receipt may differ between nursing and physician staff.

	misconceptions was associated with influenza vaccine acceptance	March 2001	hospital 212 participants		knowledge)	HCWs may have been less inclined to complete the survey despite he explicitly stated study anonymity. This potential bias may have led to an overestimation of the vaccination rate. However because nearly all of the surveys were returned completed, it is unlikely that this potential bias would have significantly affected the results. -Discrepancy between the reported vaccination rates and the statistics of the occupational health department. The reason might be that staff got vaccinated from other sources. The researchers did not assess where those who were vaccinated received their vaccination. -The attending physician, patient care associate, and medical student subgroups were small and limited the extent of the analysis.	

Manuel et al., 2004; Calgary, Canada	To understand how to promote participation in influenza vaccination among the staff of a cancer treatment center.	None Sep 2002	The staff of Tom Baker Ambulatory Cancer Center were surveyed included all individuals working within the cancer center whether or not they had direct patient contact within a clinical setting. This included medical and nursing staff, and allied health care workers. 363 completed the questionnaire (70%)	Quantitative: Self-administered questionnaire	Reasons reported for being vaccinated 4 or 5 times in the previous 5 years : - self-protection - patients' protection - Family protection Reasons for vaccination 1 to 3 times in the previous 5 years : - Did not work in healthcare for past 5 years. - Previous vaccination made me ill. - No suitable time to get vaccinated. Reasons staff members were not vaccinated in the previous 5 years : - Vaccine is not effective. - Vaccine may harm my health. - Vaccine has unpleasant side effects. - I am not at risk for influenza.	Self-reporting Selection bias possibly introduced by the use of self-administered survey Some potential respondents did not receive the vaccine (questionnaire was distributed in the hospital rather than being mailed to all staff). 30 % of staff did not complete the questionnaire (bias the results). Historical participation in influenza vaccination was self-reported., and staff therefore, may have over or underreported their participation in vaccination programs.	Staff perceptions about influenza vaccination differ according to the past frequency of vaccine uptake. Strategies for promoting vaccination should be guided by these differences.
Sherri et al., 2004; US	To examine influenza vaccination status and predictors for vaccine receipt among healthcare workers caring for patients with spinal cord injuries and disorders.	None Spring 2002	3 Categories: nurses, practitioners, and therapist or psychosocial workers. Twenty-three designated VA spinal cord injury centers serve the complex	Cross-sectional, nation-wide anonymous survey	Self-reported motivators : - To protect myself. (77%) - To protect patients (49%). - Always get influenza vaccination (46%) - It is easy to get influenza vaccination (46%)	Self-report and recall bias is a possible limitation. Due to anonymous nature of the survey, differences in respondents and non-respondents were not assessable because data were not assessable for	Strategies to increase vaccination rates among HCWs should address concerns about side effects, effectiveness, and protective value of the vaccine and access to it.

			medical, functional, and psychosocial needs of individuals with spinal cord injuries and disorders throughout their lifetime in inpatient, outpatient, and home care settings. 1140 participants (73.3%)		- Hospital recommendations encourage staff to get influenza vaccinations (42%) Self-reported influences for not getting an influenza vaccine : - Concerned about side effects (48.9%). - Do not think vaccine prevents influenza (20%). - Healthy or prefer to rely on immune system (35%)	non-respondents. Generalizability (only staff working with spinal injury patients)	
Toy, Janosky, & Lairr, 2005; Pennsylvania, U.S.	To explore the barriers to acceptance of influenza immunization among medical residents.	None Jan. to Feb. 2004	43 residents at the western Pennsylvania hospital,	Quantitative: Cross-sectional survey using an anonymous questionnaire	Reasons for getting flu shots : - At risk because of their work (80%). - Risking transmission to patients (68%). - Influenza vaccine generally safe (56%). - Influenza vaccine is effective (36%). - Flu is a serious disease (28%). Reasons for not getting the flu shot : -Forgot (44%). - Not interested (17%). - Not in high risk group (17%). - Not likely to get the flu (17%).	The study was conducted during a single influenza season and in a single facility (generalizability affected).	Looking at the overall vaccination rate, the results of the study suggest that awareness does not always translate to vaccination rate. Although 91% of the residents reported being aware of the influenza vaccine campaign, only 58.1% eventually received the vaccine. The discrepancy between awareness and vaccination rates may be due in part to differences in knowledge of the evidence behind the intervention as well as beliefs about appropriateness, effectiveness, and feasibility among the participants.

					- Vaccine is not effective (11%). - Do not like needles (11%). -Concerns about adverse effects (11%).		
McEwen & Farren, 2005; Texas, US	To analyse the beliefs and actions among registered nurses in Texas related to immunization recommendations.	HBM	246 RNs One state Random sampling	Quantitative : questionnaire based on the HBM concepts (closed\open) Pilot tested	82 % RNs believed that immunization was effective; 37% concerned about side effects; 30% perceived being low risk; 28 % claimed becoming ill despite receiving the flu vaccine.	Low response rate (246 of 1000) Larger sample of vaccinated nurses replied and may have seen more value in the survey. Definition of « ill » needs clarification	Authors felt that findings of the study strongly correlated with the tenets of the HBM. Vaccination rate was 59% (n=595), which is higher than CDC (2006). 75 % were older than 45 years; higher education level: 47 % BSN or higher.
Cowan et al., 2006; U.S.	To assess influenza vaccination status and related knowledge, attitudes, and beliefs among national sample of primary care physicians and subspecialists likely to see patients at high risk for complications from influenza.	May 2004	National random sample of family physicians, internists, geriatricians, and pulmonologists from the American medical association 688 surveys were analysed. Response rate 38 %	Quantitative : Mail survey Pilot tested	Significant predictors for influenza vaccination : -strong agreement that HCWs have professional responsibility to be vaccinated - access to vaccination on site and free of charge -strong worksite recommendation for HCWs to be vaccinated -strong agreement that benefits of vaccination outweigh risk of side effects.	Low response rate (38%) and the related potential for response bias if those not vaccinated were less likely to respond than those vaccinated. Non respondents differed by gender, age, specialty, and board certification. The response rate limited the researchers' ability to make robust comparisons across physician specialty and age group.	Physicians reported a high influenza vaccination rate. To improve these rates further, with likely benefits for other HCWs, worksite policies that facilitate access to vaccination and documentation of reductions in nosocomial influenza associated with HCW vaccination should continue to be pursued.
Banks Christini , Shutt, & Byers, 2007; Pittsburg	To determine vaccination rates and motivators among	July 10 and Sep. 30, 2005	Physicians, nurses, nursing aides, and other staff working at	Cross-sectional survey	The most common reason for rejecting vaccination was a concern about availability.	Self-reported data may have served as source of bias in data interpretation. The researchers	Significant differences in vaccination exist among physician specialties and employee groups, and there are inadequate vaccination rates among those with the

h, US	different HCW groups during the 2004-2005 influenza season		two tertiary care teaching hospitals in urban centers in the university of Pittsburgh medical center (UPMC) in USA. Surveys were collected from 1042 HCWs (response rate 42%).		Understanding that HCWs may transmit the virus to patients correlated with vaccine acceptance.	sought to optimize participation and reduce the potential self-selection bias by enrolling the maximum number of clinical divisions and units.	greatest amount of patient contact, potentially providing a basis for group-specific interventions. The researchers recommended that education campaigns preferentially focus on improving compliance rates among nurses, nursing aides, and surgeons. If resources allow, the program can be extended to include internists and paediatricians. These programs should emphasize vaccine efficacy, safety, and risk to patients if vaccination is declined, CDC recommendations and vaccine availability.
Willis & Wortley, 2007; US	Explore attitudes and concerns of RNs related to inactivated influenza vaccination.	None	71 RNs In two states In urban settings Birmingham Detroit	Qualitative Eight focus groups Telephone screening used and questionnaire to prequalify direct patient care nurses.	Major concern was vaccine safety and effectiveness Unvaccinated nurses tended to be less aware of the ACIP immunization recommendations; Overall, nurses were not aware of the rationale for vaccination. Black nurses in the Birmingham focus groups mentioned historical mistrust of vaccination programs related to Tuskegee Syphilis Experiment.	Small sample size and small number of geographic areas Education level not included in demographics.	The authors confirmed the importance of comprehensive approaches that combine education and convenience, and suggest that emphasizing the rationale for HCW vaccination may contribute to increasing vaccination rates.
Norton, Scheifele, Bettinger, and West, 2008; US	Identify reasons for non-vaccination of RNs after a hospital evidence-based vaccination program and predictors of future vaccination	None April 2000	585 paediatric RNs (48%) Two urban hospitals	Quantitative Cross-sectional Questionnaire (closed/open) Pilot tested	Primary reasons given for refusing influenza vaccine : -No personal need or benefit (30%) - Concern about side effects (15%) - Previous symptoms attributed to vaccine 10%) - Personal belief against vaccination (10%)	Self-reporting Demographics of nurses not available : age and education level	The findings support interventions that improve the convenience of hospital immunisation programs for influenza, particularly those that are aimed at nurses and that promote vaccine efficacy and benefits.

	intent.				predictors of influenza vaccination intent : - Program convenience; - Received vaccine in index season; - Past history of vaccination		
Mehta, Pastor, & Shah, 2008; US	To identify vaccination rates among employees of Bronx-Lebanon Hospital Center, which groups refused the influenza vaccine, why they refused and factors influencing their refusal. The researchers alsi hoped to understand if there are relationships among vaccination rate, job position, and frequency of patient contact.	None	570 HCW convenience sample method 2 waves for data collection: single page questionnaire addressed to all employees. Second wave: interview of the managers.	Quantitative and qualitative Cross-sectional Questionnaire (closed/open) Pilot tested Interview	Participants who received the vaccine had a significantly higher mean influenza knowledge score compared to those who did not receive the vaccine. A relationship was identified between those who received the vaccine and the perception that the purpose of the vaccine is to prevent patients from being exposed to influenza.	Physicians comprised the largest percentage of responders (29.2 %). Some groups of employees were under-represented in the data collection, including night shift and outpatient clinic HCWs. The researchers are not certain if they captured all of the factors that played a role in individual department vaccination rates.	Hospital departments in which managers actively encouraged and facilitated vaccination had higher rates in general.
Ofstead, Tucker, Beebe, & Poland, 2008; US	To understand decision making about influenza vaccination among RNs due to their close contact with patients and staff and being the largest class of HCWs	HBM July 2005	513 inpatient RNs Large, renewed academic hospital Random sample	Quantitative Questionnaire Some question tested knowledge about the flu vaccine Pilot tested	64.5 % (n :331) intended to receive flu vaccination Barriers included concern about vaccine side effects and perceived low risk Only 49 (9.6%) of RNs gave correct answers to more than 85 % of knowledge questions on the survey	Self-reporting	Recommended to change from HBM to ecological model due to lack of association between vaccination and the receipt of information about certain topics considered important under the HBM
Gallant, Vollman , & Sethi,	Nurses are eligible to receive the influenza	Gener ate a subst antive	11 RNs in the province of Nova Scotia	Qualitative Grounded theory theoretical	Generated a theoretical model entitled « influenza Vaccination : a personal decision »		Decisions were based on sources of information, personal knowing, and personal modifiers.

2009; Nova Scotia Canada	vaccine, How do they decide whether to be vaccinated?	theor y		sampling Unstructured and conversational interview method			
Clark , Cowan & Wartley, 2009; U.S	Explore RNs' knowledge, attitudes, and beliefs about influenza vaccination.	None Jan-Mar, 2006	1,017 RNs, four states	Quantitative Cross - sectional Questionnaire (closed/open) Pilot tested	59 % (n : 595) of nurses received vaccination and major reasons for being vaccinated : - Protect myself from illness; - Protect my patients from illness; - Member of target group for vaccination; primary reasons for not getting the vaccine : - Concern about adverse reactions - Small chance of contracting influenza - Limited contact with high-risk patients - Flu vaccine not effective enough - Busy/forgot	Self-reporting Small sample from single site	19 % did not receive vaccine because of misconception that they may contract the flu it.
Fernand ez et al. (2009), U.S.	Examine knowledge, attitudes, and practices related to influenza vaccination of HCWs in an emergency department setting	None Sep 2005	126 emergency department full time staff (nurses, residents, and emergency medicine faculty) from an academic urban hospital	Quantitative Questionnaire Pilot tested	45 % of nurses felt vaccine was effective and only 42 % planned to receive it, compared to 82 % of attendings who felt vaccine was effective and planned to receive it.	Self-reporting Small sample from single site	When asked who should receive the influenza vaccine, 100% of residents, 94 % of physicians, and 67 % of nurses felt HCWs should be vaccinated.
Kaboli et al. (2010) BC, Canada	To assess HCWs attitudes and concerns regarding seasonal and pandemic influenza vaccines in order to improve vaccination campaign	None Aug 30 – Sep 30, 2009	4,046 HCWs returned the survey	Quantitative Cross sectional survey	The most important predictor of the intention to receive the vaccine was having received the vaccine the seasonal previous year. Worry about making loved ones ill was the only attitude associated with intention to receive the pandemic H1N1 vaccine. Concerns with vaccine	Self-selection and information bias because it is a volunteer self-reported survey. The numbers of respondents in occupational groups other than nurses were not	Vaccination campaigns for pandemic H1N1 should use messages that emphasize the risk of illness among younger people and the opportunity to protect loved ones by getting the vaccine and should address concerns about the safety and effectiveness of the vaccine.

	communications.				safety and belief that H1N1 is not severe enough were independently associated with the intention to reject the pandemic H1N1 vaccine.	sufficiently large to draw conclusions that are occupation specific.	
Godin, Vézin, & Naccache, 2010; Quebec, Canada.	To identify the determinants of influenza vaccination and the moderators of the intention-behaviour relationship among HCWs.	Theory of planned behaviour Sep 2008	Random sample of 424 HCWs working at three university-affiliated public hospitals.	Quantitative Prospective survey with 2 month follow-up	Determinants of influenza vaccination : - intention - moral norm - anticipated regret - work status Moral norm interacted with intention as a significant moderator of the intention –behaviour relationship.	The researchers admitted that even though the questionnaire was anonymous, it is still possible that a social-desirability bias tainted respondents 'answers to the questionnaire about intentions.	Influenza vaccination among HCW is mainly a motivational issue. In this regard, it can be suggested to reinforce the ides that getting vaccinated can reduce worry and protect family members.
Nowalk et al., 2010; U.S	To determine self-reported influenza vaccination rates and predictors of vaccination following the efforts to increase HCP influenza vaccination rates.	Theory of reasoned action May 2007	853 participants (65.8%) Working at diverse facility types in a large health system including community, tertiary care and specialty hospital.	Quantitative Survey	The strongest predictor of vaccination was receiving influenza vaccine the previous year, although other factors were significantly associated for younger and older HCW.	This study was conducted in one region of the country and the predominant minority group sampled was African American ,thereby, limiting the researchers' ability to generalize the findings to regions with racial/ethnic population ratios	Establishing the influenza vaccination habit using age-based targeted messages may be the most effective way to increase rates for HCP without mandates
					-		
Kent et al. , 2010; North Carolina, U.S.	To investigate the percentage of employees receiving seasonal influenza vaccination, including	None May 2008	1209 respondents completed the survey (73%)	Quantitative Self-administered survey	Reasons for receiving the vaccine : - To protect people around me (66%) - Strongly encouraged by my health department (60%)	Recall bias and voluntary response bias.	Efforts may be successful in increasing influenza vaccination coverage of HCWs.

	perceptions and attitudes of employees of 17 health agencies in a 25 –county region in eastern, rural North Carolina.				- It was provided at no cost (59%) - To avoid missing work (55%) Reasons for declined vaccination : - It was inconvenient (19%) - I believe the flu shot will make me sick (18%) - Bad prior experience with the flu vaccine (16%) - Dislike of needle (15%).		
Rhudy et al. ,2010; Rocheste r, U.S	To understand the factors influencing nurses' decision-making about personally receiving immunizatio n against influenza	None Dec 2007-April 2008	14 RNs	Qualitative descriptive design Semi-structured interviews	Influenza immunization is a low priority for nurses. Subthemes include a sense of good health, scepticism of the vaccine's value, fear of vaccine side effects, hand washing as prevention, and inconvenient immunization locations.	Generalizability is limited by the small convenience sample	Patient safety outcomes were not expressed as a factor in making the decision to decline influenza vaccination.
Hubble, Nremt, Zontek, & Richards , 2011; North Carolina, U.S	To document vaccination rates of EMS professionals and identify predictors of vaccination uptake.	HBM	Convenience sample of EMS personnel from 14 North Carolina EMS systems. 601 EMS completed the survey administrativ e personnel were excluded	Quantitative Cross-sectional Survey	Reasons why respondents did not receive influenza vaccination : - Healthy (25%) - Have had the vaccine and got sick anyway (22%) - Not required by employer (21%) - Don't think vaccine is effective (19%) Reasons why respondents did receive influenza vaccine :	Sample composed entirely of north Carolina paramedics, and the generalizability of the findings outside North Carolina is unknown.	The impact of employer effort on immunization rates was confirmed, reemphasising the importance of a proactive workplace environment to control the transmission of influenza among EMS workers and their patients.

					- Employer provides free vaccinations (76%) - Feel I a mat risk for the flu due to my work (72%) - Believe it protects me from the flu (61%) - Being vaccinated protects my family (59%).		
Rebman n et al., 2011; St Louis, US	Determine EMT (emergency medical technicians) uptake rates for 2010/2011 seasonal influenza vaccine, pandemic H1N1 influenza A vaccine, and 2009/2010 seasonal influenza vaccine and to determine predictors for uptake /compliance with 2010/2011 seasonal vaccine and intent to be vaccinated during 2011/2012 season.	None Mar. to Jun. 2011	EMTs working for emergency response agencies in the St. Louis region and members of EMS organization s.	Quantitative Survey	Determinants of intent to be vaccinated included having the vaccine available on-site and free of charge and belief that EMTs should be vaccinated each year.	The potential issues of responder and/or social desirability biases.	
Henrikse n et al., 2011;	To assess vaccination uptake, attitudes,	None Early 2010	1,073 physicians and nurses (69%).	Quantitative Self-administered survey	Factors independently associated with receiving H1N1 influenza vaccine : - Accurately	Sample limited only to one state in U.S.A. Response bias.	These data raise important questions about inter-professional education and differences in response to

Minnesota, US	and distinguishing characteristics (including doctor-nurse differences) of health care workers who did and did not receive the pandemic H1N1 influenza vaccine in late 2009.			Pilot tested	estimating the risk of vaccine side effects; - Agreeing with a professional obligation to be vaccinated; - An ethical obligation to follow public health authorities 'recommendations; - Laws mandating pandemic vaccination.		pandemics and how states might enlist the optimal support of HCW in achieving vaccination targets during pandemics.
Hakim, Gaur, and McCullers (2011) US	To evaluate factors associated with HCW uptake of influenza vaccines in a high compliance rate setting.	None July-August 2010	2036 All hospital staff	Quantitative Cross-sectional	Reasons for acceptance of influenza among HCW (in contact with patients) : - Influenza vaccine reduces my risk of getting sick; - Influenza vaccine reduces the risk of transmitting influenza virus to patients; - Influenza vaccine reduces the risk of transmitting influenza virus to my family and friends. Resaons for refusal of influenza vaccines among HCW : - Influenza vaccine might make me sick; - Influenza vaccine has rare but serious side effects	Results may not reflect HCW in other environment.	Researchers suggested that customized programs that reinforce the motivating factors for voluntary HCW vaccination might be successful in improving vaccination rates.

					- Influenza vaccine does not always work; - I do not like needles.		
Kraut, Graff,& McLean , 2011; Winnipeg, Canada	To evaluate the attitudes to influenza vaccination of a group of HCP who routinely choose not to get vaccinated, but accepted the H1N1 vaccine.	None Fall 2010	684 respondents (29%) HCP: primarily nurses, other clinical staff, and support staff, few physicians.	Quantitative Survey	The most common motivators for getting vaccinated for both NRV and RV groups related to concerns about personal or family safety, while the choice to decline seasonal vaccination related primarily to lack concern about the illness and concerns about vaccine effectiveness and safety.	Response bias (29% response rate). Timing less than optimal (potentially affecting recall of the attitudes at that time).	Educational campaigns that focus on personal benefit, engage peer champions, and address concerns about the vaccine may improve influenza vaccine uptake among HCW.
Rebman n et al., 2012; St Louis ,Missouri, US	To examine the factors influencing influenza vaccine compliance among hospital and nonhospital HCWs	None March-June 2011	3,188 HCW working in myriad healthcare settings	Quantitative Questionnaire	The determinants of vaccination against the 2010/2011 seasonal influenza among nonhospital-based HCWs included having a mandatory vaccination policy, perceived importance, no fear of vaccine adverse effects, free and on-site access, and perceived susceptibility to influenza. Determinants of hospital-based HCW vaccine compliance included having a mandatory vaccination policy, belief that HCWs should be vaccinated every year, occupational health encouragement, perceived importance of vaccination, on site access, and no fear of vaccine adverse effects. The strongest predictor of both worker groups was existence of a mandatory vaccination policy.	Responder and /or social desirability bias Generalizability	The reasons for vaccine uptake among nonhospital-based versus hospital based HCWs differed. Targeted interventions should be aimed at workers in theses settings to increase their vaccination compliance, including implementing a mandatory vaccination policy.
Walker, Stuart Sloan, & Kozlica,	To assess flu vaccine acceptance, as well as	None May	Public health in rural and metropolitan health	Quantitative Cross sectional cohort study	Factors found to be associated with acceptance of the 2009 H1N1 vaccine were	Response bias	Further research should be conducted with public health workers during non-pandemic years.

2012; Southern Tennessee, US	behaviours and beliefs regarding acceptance, among public health workers in Southern Tennessee.	18, 2010	departments workers 295 participants (55.1%)		direct patient care, previous flu vaccination, vaccine safety concerns, and receipt of seasonal flu vaccine.		
Lu, Ding, and Black, 2012; US	To assess 2009 H1N1 and seasonal influenza vaccination coverage and identify factors independently associated with vaccination among HCP in the U.S.	None Mar. -jun. 6201 0.	16,975 HCP	Quantitative Telephone based Survey	Characteristics independently associated with an increased likelihood of 2009 H1N1, seasonal, and any-dose vaccinations among HCP were as follows: non-Hispanic white, higher income, having a high-risk condition, having health insurance, the ability to see a doctor if needed, and having had a routine check-up in the previous year.	People without telephone might have been excluded from the survey	Recommended approaches include emphasizing the benefits of HCP vaccination for staff and patients, considering the level of vaccination coverage among HCW to be one measure of patient safety and quality assurance, electronic tracking of coverage levels by ward, unit , and occupation, providing vaccinations in work place so they are easily accessible, and implementing catch-up vaccination programs for HCP who are already employed and ensuring that newly hired HCP receive necessary vaccinations.
Corace et al., 2013; Ontario, Canada	To examine the motivators and barriers influencing HCW pH1N1 vaccination to identify modifiable factors that can improve influenza vaccine uptake.	June 2010	3275 HCW at a large Canadian tertiary care hospital.	Cross – sectional Survey	Key modifiable factors driving HCW vaccination include : - desire to protect family members and patients; - belief that vaccination is important even if one is healthy; - confidence in vaccine safety; - Supervisor and physician encouragement.	Time lag between the time of the survey and the peak of the pandemic, which may have influences HCW recall of their responses to the questionnaire items.	To enhance vaccine uptake, it is important to target HCW attitudes in influenza vaccine campaigns and create culture of vaccine promotion in the workplace, including strong messaging from supervisors and physicians.

Appendix D

Data Display of the barriers and predictors of uptake of influenza vaccine among HCW.

	To protect oneself	To protect family	To protect patients	Peer pressure	Vaccine is effective	Free and convenient vaccination	Avoid lost work	Hospital recommendations	At risk because of work	Received the vaccine earlier	Flu is a serious disease	Other preventive measures are more effective than vaccination	Concern about vaccine safety	Fear of adverse effects	Misconception that vaccination can cause influenza	Time location of vaccination not suitable	Inefficacy of the vaccine	Fear of injections	Doubt that influenza is a serious disease-belief that they are health and don't need the vaccine	Already received the vaccine and got sick anyway
Ludwig-Beymer and Coghlan Gerc (2002)	x			x									x				x		x	x
Manuel et al. (2002)	x	x	x		x							x								
Steiner et al. (2002)	x		x			x	x		x						x			x	x	x
Lester et al. (2003)													x	x	x	x	x	x	x	x
Martinello et al. (2003)															x					
Manuel et al. (2004)	x	x	x										x	x		x	x			x
Sherry et al. (2004)	x		x			x		x						x			x		x	
Toy, Janosky, and Lairr (2005)			x		x		x		x		x		x	x				x		
McEwen & Farren (2005)					x									x					x	x
Cowan et al. (2006)	x		x		x	x		x												
Banks, Christini, Shutt, and Byers (2007)	x		x													x				
Willis and Wortley (2007)													x				x			
Norton, Scheifele, Bettinger, and West (2008)						x								x			x			
Mehta, Pastor, and Shah (2008)			x																	
Ofstead, Tucker, Beebe, and Poland														x					x	

(2008)																				
Gallant, Vollman, and Sethi (2009)																				
Clark, Cowan, and Waterley (2009)	x		x											x	x		x	x		
Fernandez et al. (2009)					x															
Kaboli et al.(2010)	x	x			x					x			x						x	
Godin, Vézin., and Naccache (2010)																				
Nowalk et al.(2010)					x					x										
Kent et al. (2010)		x	x			x	x								x	x		x		
Rhudy et al. (2010)												x	x	x						
Hubble, Nremt,Zontek, and Richards, (2011)	x	x				x			x								x		x	x
Rebmann et al.(2011)						x			x											
Henresken et al. (2011)								x	x											
Hakim, Gaur, and McCullers (2011)	x	x	x		x										x		x	x		
Krault, Graff, and McLean (2011)	x	x												x			x			
Rebmann et al.(2012)					x	x		x	x					x						
Walker, Stuart Sloan, and Kozlica (2012)							x		x	x				x						
Lu, Ding, and Black (2012)																				
Corace et al. (2013)		x	x		x			x												