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Exploring Predictors of Influenza Vaccination Among Hospital Based Nurses

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Exploring Predictors of Influenza Vaccination among Hospital Based Nurses

by
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Exploring Predictors of Influenza Vaccination among Hospital Based Nurses
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Abstract

The purpose of this study was to explore the attitudes and beliefs of nurses regarding the seasonal influenza vaccine and how these beliefs and selected demographic characteristics predict individuals' vaccination status. This comparative descriptive study was conducted using a cross section of nurses working at two acute care hospitals and one palliative care hospital in Windsor, ON during the 2009/2010 influenza season. A sample of 202 nurses participated in an online self-reported survey. Both univariate and multivariate analysis was completed for both the vaccinated and unvaccinated respondents. This study found that being vaccinated in the previous flu season was the strongest predictor of influenza vaccination in the current season. In addition, perception of increased job risk, perception of protection provided by the immune system, workplace clinics and campaigns, and convenience were all found to be independent predictors of influenza vaccination or intent to vaccinate in the current season.

DEDICATION

I would like to dedicate this research study to my family for their love and support throughout this process. To my husband, Greg, for his friendship, love and support every day. To my oldest son, Ryan, who always believed I would succeed and who never failed to encourage me along the way. To my son, Josh, for his upbeat attitude, encouraging words, and computer help late at night. I especially want to acknowledge and thank my daughter, Melissa, for being my constant work companion these past three years. Her exceptional work ethic kept me focused and her commitment to helping me through this process never wavered. I hope they are all as proud of me as I am of them.

I would also like to dedicate this work to my mother and father. I know my mother shares in my success and my father would be very proud if he were with us today. I would also like to thank my brother, Stephen, for his kindness and support, during a difficult time in his life. In addition, I would like to thank my Aunt Teresa for her many years of friendship and support. I would also like to thank my very dear friend, Cindy, for always believing in me. Finally, I would like to sincerely thank my dear sister, Genevieve, and my brother-in-law, Greg, for their encouragement, love, and support throughout the Master's program. Their belief in me was instrumental in my decision to return to school and I truly share this accomplishment with them.

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CHAPTER I

INTRODUCTION

Influenza affects between 10 - 20% of Canadians each year with 35% of all confirmed cases occurring in the province of Ontario (Public Health Agency of Canada, 2008b). It is estimated that 2% of all deaths can be attributed to influenza, which has a mortality rate of 13 per 100,000 people (Schanzer, Tam, Langley, & Winchester, 2007). However, this number increases to 108 per 100,000 for those over the age of 65 years. The National Advisory Committee for Immunization (NACI) recommends annual immunization for high risk groups including children and the elderly. While it is extremely important that those deemed high risk ensure protection from influenza through vaccination, it is equally important for healthcare workers (HCWs) to be vaccinated for the protection of their patients and coworkers (Carman et al., 2000; Potter et al., 1997). Transmission of the influenza virus can occur even before symptoms appear, making infected HCWs a potential vector for spreading influenza to their patients and coworkers (Bridges, Kuehnert, & Hall, 2003). As well, studies have shown that HCWs continue to work despite being ill, which further puts their patients at risk of becoming infected with the influenza virus (Public Health Agency of Canada, 2007).

There is agreement among health officials in Canada that the best defence against influenza is vaccination (Public Health Agency of Canada, 2007). However, due to slight changes in the influenza virus from year to year, it is necessary for individuals to be vaccinated annually. Vaccination ("the vaccine") has been shown to be 70% - 90% effective in preventing influenza in healthy children and adults when there is a good match between the circulating virus and the current vaccine (Centers for Disease Control

and Prevention, 2008; Public Health Agency of Canada, 2008b). Hence, recommendations for annual influenza vaccination of HCWs have been in place in Canada for over 20 years. The National Advisory Committee on Immunization (NACI) recommends influenza immunization for HCWs who may potentially transmit influenza to those at high risk of influenza complications (Public Health Agency of Canada, 2007). As well, the Advisory Committee on Immunization Practices (ACIP) in the United States recommends annual influenza vaccination for all HCWs including students, physicians, nurses, and emergency response workers (Centers for Disease Control and Prevention, 2007). Similar recommendations are evident around the world including Jerusalem, Spain, Italy, Germany, Greece, and the United Kingdom.

Significance of the Problem

Despite evidence of the importance of vaccination, rates among HCWs continue to be a concern. According to the unpublished Adult National Immunization Coverage Survey (2006) (as cited in PHAC, 2007), vaccination rates for healthcare workers in Canadian hospitals and long term care facilities range from 26% - 61%, with a rate of 69.7% for those workers who have direct contact with patients (Public Health Agency of Canada, 2007). A review of vaccination rates of HCWs in the U.S. using the National Health Interview Survey (NHIS) data showed that vaccination rates among HCWs increased from 10% in 1989 to 38.4% in 2002. Data from the NHIS showed that 42% of HCWs were vaccinated in the 2005/2006 influenza season (Centers for Disease Control and Prevention, 2007). As well, data showed that hospital workers had higher rates of influenza vaccination than non hospital workers (45.2% and 33.2%, respectively) (Walker, Singleton, Lu, Wooten, & Strikas, 2006).

With evidence that HCWs continue to work despite being ill, vaccination for the prevention of influenza is an ongoing issue. Piccirillo and Gaeta (2006) found that 24% of emergency department personnel (n = 200) who provided direct patient care at a New York City hospital reported working despite being ill from influenza. Such a practice presents the potential for sick workers to infect their coworkers and patients, further compromising the health of their patients. The importance of vaccination becomes evident when workers feel an obligation to work while ill. It supports the need for increased vaccination among HCWs. Nichol (2001) examined the economic benefits of vaccinating healthy adults between the ages of 18 - 64 years and found that an influenza illness resulted in an average of 3.2 - 3.4 missed days from work. Nichol acknowledged that those ill may either continue to work or return to work while still ill. These findings were similar in other studies by Backer (2006), Public Health Agency of Canada (2007), and Tucker, Poland, and Jacobson (2008).

Much attention has been given to the vaccination rates of HCWs in the past few years, yet recommendations by NACI, Ministries of Health, and ACIP, and requirements by facilities and some states have not been sufficient to increase vaccination rates among HCWs. Current research regarding influenza vaccination of HCWs has addressed overall vaccination rates, perceived barriers and benefits to annual vaccination, incentives and campaigns implemented to increase rates, and compliance with current recommendations. Although there was an abundance of literature that explored the influence of hospital vaccination campaigns, there was a noticeable lack of research that examined the impact of the news stories and public media campaigns on vaccination uptake. Overall, a review of the literature showed a general lack of Canadian studies regarding influenza

vaccination, and more specifically, studies that investigated the attitudes and beliefs of nurses. More information related to the beliefs of unvaccinated HCWs is needed in order to adequately address the low vaccination rates among nurses. As well, few studies explored the predictors of influenza vaccination.

Despite clear recommendations for influenza vaccination of HCWs, vaccination rates continue to be low among this group. In order to develop more effective strategies to increase the vaccination rates among HCWs, it is important to explore what factors play a role in their decisions to obtain or not obtain annual influenza vaccination.

Purpose of the Study

The purpose of this study is to explore the predictors of influenza vaccination among hospital based nurses.

Conceptual Framework

The Health Belief Model (HBM) was used as the conceptual framework for this study because of its ability to explain why some people adopt preventive health measures to protect themselves from illness and others do not (Pender, 1996). The model has its roots in social-psychological theory described by Lewin and later modified by Becker (as cited in Pender, 1996). As well, Burns (1992) credits Kasl and Cobb (1966) and Rosenstock (1966) for their contributions in providing a framework for the HBM in explaining the adoption of preventive health behaviour. Three stages for preventive health care that directly impact the foundations of the HBM were identified as threat assessment, action assessment, and outcome assessment (Burns, 1992). According to Rosenstock, Strecher, and Becker (1988), an individual assesses his or her own susceptibility to the potential health risk and its potential severity, then explores and

weighs the benefits of health behaviours in addressing the health risk, and commits to an action. Similarly, the HBM hypothesizes that the preventive health related behaviour is determined by the identification of a relevant health concern by the individual, the perception that there is a legitimate threat to his or her health, and that the adoption of the preventive measure provides greater benefit to the individual than potential barriers (Rosenstock et al., 1988).

Variables from the HBM that affect individuals' decisions to engage in preventive health behaviours are the individuals' perceptions of (a) their susceptibility to the illness, (b) the severity of the illness, (c) benefits of the preventive health behaviour, and (d) barriers associated with the preventive health behaviour. Hence, the decision to engage in preventive or protective health care behaviours is attributed to the perceived threat to personal health and the degree to which the perceived benefits of the health behaviour supersede the perceived barriers of the health behaviour (Pender, 1996). The individual's perceptions of his or her own susceptibility to the illness or disease, as well as his or her perception of the seriousness of the disease, are factors in determining the overall threat of having the disease (Pender, 1996). In addition, "modifying factors", such as "cues to action" indirectly impact the perceived threat of illness (Pender, 1996). Demographic variables such as age, race, and ethnic background are included in the HBM as indirectly affecting the perceived threat of illness (Pender, 1996).

A review of the literature suggests that HCWs accept or reject influenza vaccination for a variety of reasons. One study specifically identified the use of the HBM to predict influenza vaccination practices of HCWs (Ofstead, Tucker, Beebe, & Poland,

2008). Figure 1 depicts the HBM as it is adapted for the current study to explain the preventive health care behaviour of influenza vaccination among HCWs.

Using the concepts of the HBM to explain the receipt of influenza vaccination among HCWs, one can conclude that the perceived susceptibility of contracting influenza contributes to the overall perceived threat of influenza. Janz and Becker (1984) defined perceived susceptibility as "one's subjective perception of the risk of contracting a condition" (p. 2). As well, according to the HBM, "cues to action" indirectly affect the perceived threat to illness. "Cues to action are statements, warnings, comments, or other external signals that initiate or perpetuate a person's realization that he or she is at health risk" (Burns, 1992). HCWs have access to influenza vaccination information through several venues including mass communication campaigns, Ministry of Health recommendations, and workplace clinics. Perceived severity deals with the individual's assessment of the seriousness of contracting a specific illness or health condition (Janz & Becker, 1984). The severity of contracting the illness is measured by the potential impact the illness would have on the individual's personal and social life. Thus, within the context of influenza vaccination, perceptions of the extent to which influenza impacts HCWs' home and work obligations will contribute to their overall perception of the severity of the illness and influence their decision to be vaccinated.

Janz and Becker (1984) indicated that the likelihood of choosing a specific health behaviour was dependent upon the perceived effectiveness of the health behaviour. HCWs have cited self protection and patient protection as reasons for being vaccinated against influenza (Christini, Shutt, & Byers, 2007; LaVela et al., 2004; Tapiainen, Bär, Schaad, & Heininger, 2005; Toy, Janosky, & Laird, 2005). Thus, within the context of

the influenza vaccination, the HBM suggests that HCWs must believe these benefits outweigh perceived barriers in order for influenza vaccination to occur. The HBM views barriers as those events that serve as a deterrent to the adherence of the specific health care behaviour. Perceived barriers may include financial costs, fear, side effects, and inconvenience (Rosenstock et al., 1988). According to the HBM, if these barriers are perceived to be greater than the benefits of vaccination, then HCWs will be more likely to refuse vaccination.

This study tested the constructs of the HBM in relation to nurses' vaccination status. Specifically, the study measured the perceived susceptibility and seriousness of contracting influenza, the perceived benefits and barriers to receiving the influenza vaccination, and the modifying factors that influence the decision by nurses to obtain the influenza vaccination. Based on the literature review and the exploratory nature of this study, and based on the HBM, it was hypothesized that hospital nurses would be more likely to be vaccinated if they perceived themselves to be at risk of influenza, believed it was a serious illness, and believed the benefits of protection through vaccination was greater than any perceived barriers.

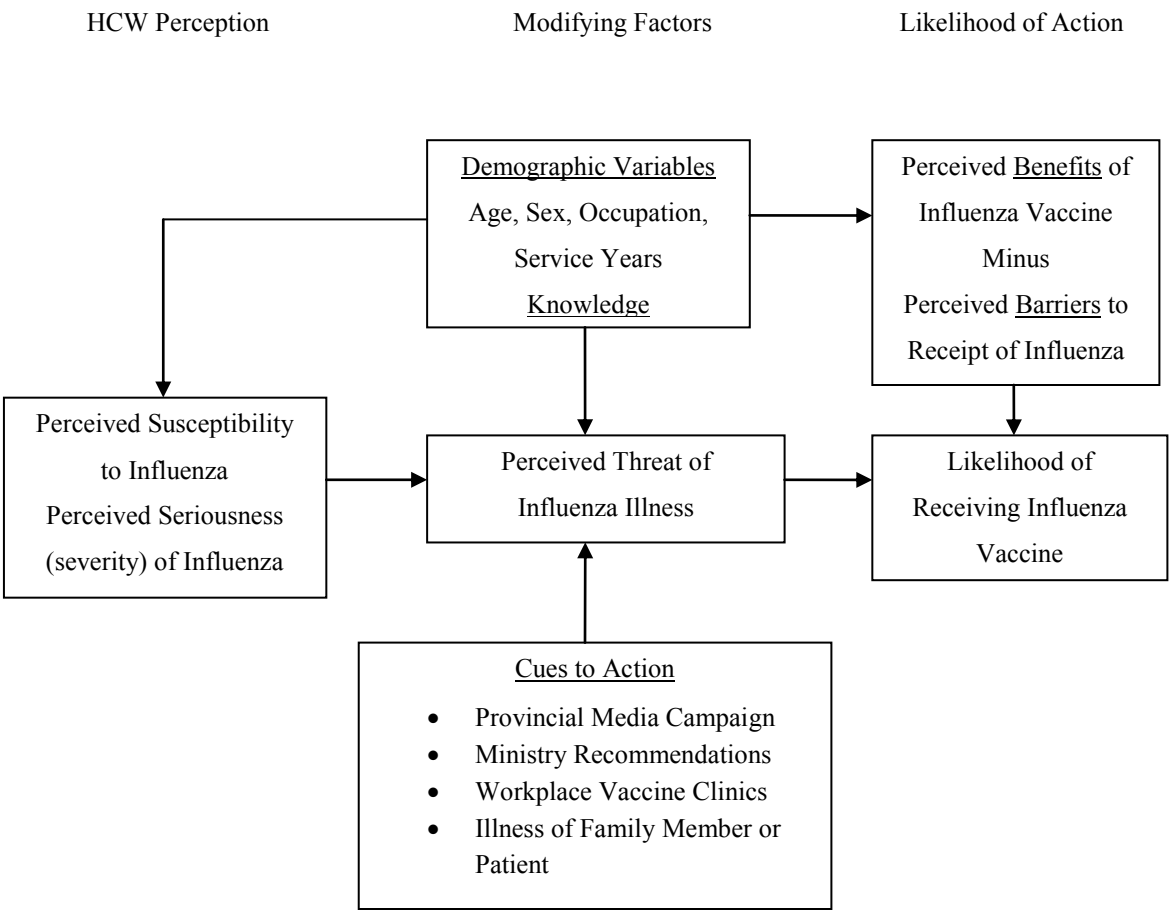

***Figure 1*. The Health Belief Model adapted for Influenza Vaccination of HCWs**

(From Becker, Haefner, Kasel et al. as cited in Pender, 1996 and Janz and Becker, 1984)

Research Question

What are the predictors of influenza vaccination among Canadian nurses practicing in hospital settings?

Significance for Nursing

Unvaccinated HCWs who become infected with influenza place their patients at increased risk of contracting influenza, especially if they are asymptomatic or come to work ill.

This study examines the perceived benefits and barriers of hospital nurses regarding their acceptance or rejection of the influenza vaccination. Locally, employers of HCWs are faced with less than optimal vaccination coverage rates in their facilities. While coverage rates for long term care facilities in 2008 ranged from 52% - 99%, coverage rates for hospital staff varied from 42% - 54% (Windsor-Essex County Health Unit, 2009). This study has significant implications for nursing practice and provides information that can be used by hospital administrators and policy makers to increase vaccination rates among nurses, which in turn, may decrease days off work and associated costs, reduce transmission to patients, and hence reduce morbidity and mortality.

CHAPTER II

REVIEW OF THE LITERATURE

Vaccination for influenza is recommended annually for HCWs in Ontario and around the world. However, immunization rates for this sector have consistently been low (Public Health Agency of Canada, 2007). Attitudes, knowledge, and beliefs of HCWs have been explored to determine reasons for acceptance and declination of the influenza vaccine. A review of the literature has shown that much research has been completed around this topic from site specific surveys by facilities to larger scale studies. This literature review highlights perceptions of HCWs, including barriers and motivators for influenza immunization, influenza immunization rates among HCWs, and strategies implemented in attempts to increase vaccination rates among HCWs. Predictors of influenza vaccination are less evident in the literature and are categorized in the literature review according to demographics, knowledge, barriers and benefits of vaccination, and cues to action.

Demographics

HCW designation. Research regarding influenza vaccination among HCWs is diverse. While some studies involved only workers who had direct contact with patients, others included employees who had indirect patient contact as well. The National Advisory Committee on Immunization (NACI) defines a healthcare worker as a "person who provides direct patient care, as well as one who provides health services in an indirect fashion, such as through administrative activities in a setting where patient care is conducted" (Public Health Agency of Canada, 2007 p. 22). As well, the term "direct patient contact" is defined as activities that allow opportunities for influenza transmission

between HCWs and a patient" (Public Health Agency of Canada, 2007 p. 22). For the purposes of this study, nurses are categorized as a subgroup of HCWs with both direct and indirect responsibilities in the provision of care to the patient.

Christini et al. (2007) examined different healthcare groups in a study that involved two hospitals in the United States that had an overall influenza vaccination rate of 52%. The authors found that physicians and medical students were more likely to be vaccinated against influenza than nurses (69%, 63%, and 46% respectively). In a cross sectional study of emergency room personnel at a Boston, MA hospital that had an overall projected vaccination rate for the upcoming season of 69% for all staff (N=130), only 42% of nurses (n = 58) planned to be vaccinated (Fernandez et al., 2008). Further, Martinello, Jones, and Topal (2003) reported that physicians had higher vaccination rates than nurses (82% and 62%; p = .0009). Other researchers (Abramson & Levi, 2008; Bautista, Vila, Uso, Tellez, & Zannon, 2006; Lester, McGreer, Tomlinson, & Detsky, 2003; Trivalle, Okenge, Hamon, Taillandier, & Falissard, 2006) have also reported higher vaccination rates among physicians as compared to nurses. Among the physician group, in a study by Christini et al. (2007), paediatricians showed higher vaccination rates than internists and surgeons (84%, 69%, and 43%). Maltezou et al. (2007) found that vaccination rates were highest in paediatric hospitals (20.4%) and lowest in psychiatric facilities (9.7%). This same study found no significant difference in vaccination rates between physicians and nursing staff (16.87% and 16.70%), but was able to identify that paediatric hospitals had overall higher vaccination rates.

Being a HCW in a hospital was associated with higher vaccination rates (Centers for Disease Control and Prevention, 2008). This was also supported by Walker et al.

(2006), who reported that hospital employees working in a facility with more than 100 employees and who had greater than 10 years service at the facility showed increased rates for influenza vaccination. However, in a review of vaccination rates among five hospitals in Alberta, Russell and Ferguson (2001) found that the overall vaccination rate was 57%, with higher vaccination rates among long term care HCWs as compared to acute care workers (57.2% and 46.2%, respectively).

Age and gender. According to Statistics Canada (2005), several factors have been associated with an increased likelihood of obtaining the influenza vaccination: being female, older, and having a chronic illness (Kwong, Rosella, & Johansen, 2007). However, this data was based on the general population and not specific to HCWs. Steiner, Vermuelen, Mullahy, & Hayney (2002) found similar traits among 1,718 HCWs surveyed following the 1999/2000 influenza season. The percentage of female staff was 76% for the hospital. Those who received the influenza vaccine had a mean age of 39.5 ($SD \pm 12.2$) as compared to unvaccinated employees ($M = 37$; $SD \pm 10.1$) $p < .001$, and reported more chronic illnesses (23.2% and 18.1%; $p = .019$). A study by Saluja, Theakston, & Kaczorowski (2005) found that age >41 years and having a chronic medical condition were associated with having received the influenza vaccination. Older HCWs were more likely to be vaccinated in other studies as well (Piccirillo & Gaeta, 2006; Takayanagi, Cardoso, Costa, Araya, & Machado, 2007; Tapiainen et al., 2005).

Past immunization history. Previous receipt of the influenza vaccine appears to be a predictor of accepting the vaccine in the future. In their study of 126 emergency room personnel including nurses, residents, and attending physicians, Fernandez et al. (2008) found that those who had received the vaccine in the last influenza season were

more likely to get vaccinated than those who had not received the vaccination (95% and 12%; $p < 0.001$). Ofstead et al. (2008) found similar results among nurses whereby those who had previously been vaccinated against influenza were more likely to accept the vaccine again compared to those who had never received the vaccine (73.3% and 7.4%; $p < 0.001$). As well, a study by Toy et al. (2005) found that past receipt of the vaccine by medical residents at a Pennsylvania hospital in the U.S. was associated with intent to be vaccinated in the future ($p = .026$). Other studies concurred that past vaccination of influenza, especially in the most recent influenza season, was a strong predictor of receiving the vaccine in the upcoming season (Abramson & Levi, 2008; Bautista et al., 2006; Bryant et al., 2004; Hauri, Uphoff, Gussmann, & Gawrich, 2006; Ong, A. K. Y., Srimanunthiphol, & Frankel, 2000; Saluja et al., 2005; Steiner et al., 2002).

Knowledge of Influenza

Most studies included a knowledge component regarding basic understanding of the influenza virus, including transmission of the virus to others. In a cross sectional survey of HCWs in two teaching hospitals in the U.S., Christini et al. (2007) found that 57.9% of vaccinated HCWs acknowledged that transmission could occur while asymptomatic, however 38.6% believed that workers could not transmit the virus to patients if asymptomatic. Physicians in this study cited transmission to patients as the main reason for vaccination. In another cross sectional survey conducted in 23 Veteran Affairs spinal cord injury centres across the U.S., 69% ($N = 1,140$) of HCWs believed it was important that HCWs be vaccinated to decrease transmission to patients (LaVela et al., 2004).

In another cross sectional study by Martinello et al. (2003), HCWs were asked five general knowledge questions related to influenza. Results showed that among nursing staff, nurses who correctly answered all five questions had a significantly higher vaccination rate than the nurses who did not get a perfect score (80% and 49%, respectively). These findings suggest that lack of knowledge regarding influenza for the nursing group could be a potential barrier to receiving the vaccine (Martinello et al., 2003). In another study of medical residents at a teaching hospital in Pennsylvania, U.S., Toy et al. (2005) found that residents who scored higher on the knowledge questions of a survey on the influenza vaccine were "significantly more likely to recommend strongly the influenza vaccine (p = .04) and be immunized (p = .022)" (p. 475).

In a survey of 513 nurses working at a U.S. hospital that had an extensive influenza campaign, 85% of the nurses claimed they had received sufficient information regarding influenza, yet only 9.6% of the nurses (n = 49) received a score of 85% or higher on the knowledge section of the survey (Ofstead et al., 2008). It is evident that further research addressing the general knowledge level of HCWs with respect to influenza vaccination is needed.

Perceived Barriers to Influenza Vaccination

Effectiveness. The Centers for Disease Control and Prevention (2007) states that "immunization is the most effective means to reduce the impact of influenza" (p. 2). When the circulating virus and current vaccine are a good match, the vaccine may be 70 - 90% effective in preventing illness in healthy children and adults (Centers for Disease Control and Prevention, 2006a; Public Health Agency of Canada, 2007).

The effectiveness of the influenza vaccination in decreasing influenza illness among HCWs was studied in a randomized, double blind, controlled trial by Wilde, McMillan, & Serwint (1999). The patterns of respiratory illness and laboratory confirmed influenza illness were tracked in healthy HCWs under the age of 50 years (M = 28.4) over three influenza seasons. Two hundred and sixty-four workers participated in season one; 49 workers remained for season two, and 24 workers in season three. The study looked not only at the incidence of influenza between the vaccinated workers and control group (1.7% and 13.9% respectively), but also the number of work days missed due to illness (9.9day/100 subjects and 21.1 days/100 subjects; p = .41). Although the number of work days missed was not statistically significant between the vaccinated and unvaccinated groups, the study showed that among the unvaccinated workers who had confirmed influenza, there was higher absenteeism from work (p = .006) and higher mean number of days absent (p = .001) as compared to unvaccinated workers who did not have influenza. Wilde's findings produced substantial support for influenza vaccination citing fewer episodes of febrile illness and sick days in the vaccinated group as compared to the control group. Wilde also observed that "the mean number of reported febrile days actually exceeded the mean number of absence days, suggesting that these healthcare workers reported to work during febrile respiratory illnesses" (Wilde et al., 1999 p. 911). Similar controlled studies are lacking in the literature requiring a need for this type of research in the future.

A study by LaVela et al. (2004) explored the attitudes of HCWs workers in Veteran Affairs spinal cord injury centres and found that 96% of respondents (N = 1,140) believed the vaccine was either "very effective" or "somewhat effective" and were more

likely to recommend the vaccine to their patients compared to those HCWs who believed the vaccine was not effective (93% and 53% respectively; $p < .001$). The belief that the vaccine did not prevent influenza was the second most frequently reported reason for those who did not get the vaccine (LaVela et al., 2004). Likewise, Ofstead et al. (2008) found that among 513 nurses surveyed, information that related to the safety ($p = .001$) and effectiveness ($p < .001$) of the vaccine was positively associated with their intention to receive the vaccine. Furthermore, Manuel, Henry, Hockin, & Naus (2002) found similar intentions among vaccinated staff who believed the vaccine was safe and effective.

The perception that the influenza vaccine was ineffective was identified as a barrier to staff immunization in a study conducted by Goldstein, Kincade, Gamble, & Bearman (2004). As well, a survey of 343 emergency room HCWs at four teaching hospitals in London, ON showed that although half of the workers thought the vaccine was effective, 31.3% were uncertain about the effectiveness of the vaccine (Saluja et al., 2005). The perceived effectiveness of the influenza vaccine is an important factor when examining vaccination compliance and should be included in future studies.

On the other hand, following a review of studies that examined the effectiveness of the influenza vaccination in decreasing infection among patients in long term care facilities, one study by Thomas, Jefferson, Demicheli, & Rivetti (2006) found that vaccination of HCWs did not impact the patient's susceptibility to influenza infection. The effectiveness of the influenza vaccine has been questioned by HCWs in many studies and is considered one of the primary barriers to receiving the vaccination (Christini et al., 2007; Fernandez et al., 2008; Tapiainen et al., 2005; Tucker et al., 2008).

The studies above addressed the perceptions of HCWs regarding the effectiveness of the vaccine in preventing influenza, but few studied the practice of recommending the vaccine to others in their daily practice if they believed the vaccine was ineffective. Further studies should include this component as it may impact on vaccination rates of coworkers, families and patients.

Adverse side effects. Hofmann, Ferracin, Marsh, & Dumas's (2006) review of the literature pertaining to influenza and HCWs highlighted 17 studies that cited adverse effects as a reason HCWs avoided the influenza vaccination. The most common reaction following influenza vaccination is local tenderness at the injection site that can last up to two days (Public Health Agency of Canada, 2007 p.17). In a cross sectional study of emergency room workers at a teaching hospital in Boston, MA, Fernandez et al. (2008) found that those who did not think side effects were common were more likely to get vaccinated than those concerned about side effects (98% and 83%, $p < 0.05$). In another study, Golstein et al. (2004) conducted a telephone survey of infection control managers who worked at 268 facilities that provided specialty health services for the elderly. Participants were asked 45 questions related to policies and mandates pertaining to annual influenza immunization for the staff, strategies to increase vaccination rates, and barriers among staff regarding vaccination receipt. "Fear of side effects" was cited as the main deterrent in four out of the five types of facilities surveyed: hospitals (77%), home health care facilities (65%), nursing homes (74%), and dialysis centres (79%). As well, LaVela et al. (2004) found that 48.9% of those not vaccinated ($n = 563$) indicated side effects as a barrier to vaccination. An interesting finding came out of a study by Mah et al. (2005) at the Tom Baker Cancer Centre in Calgary, Alberta. Employees were asked to

complete a questionnaire prior to the 2002 influenza season that examined their immunization practices for the past five years, and the influences and barriers to vaccine receipt. The response rate was 70% among HCWs having direct and indirect patient contact ($N = 515$). A common concern among each group was the belief that adverse effects of the vaccine were underreported, however this concern was highest among the non-vaccinated group 56% ($n = 94$). Another study (Saluja et al., 2005) of emergency room personnel in four London, ON hospitals found that, although 76.8% of those vaccinated ($n = 127$) did not have any side effects, 28.3% of all people surveyed ($N = 343$) believed that side effects of the vaccine were common. Concern regarding adverse effects was also identified as a barrier to immunization in other studies (Abramson & Levi, 2008; Christini et al., 2007; Lester et al., 2003; Takayanagi et al., 2007; Tucker et al., 2008).

Belief that vaccine causes the flu. Education of HCWs regarding the misconception that the vaccine causes influenza is recommended by the Healthcare Infection Control Practices Advisory Committee (HICPAC) and ACIP in the United States. HCWs should be properly informed regarding the inactivated vaccine and the fact that it cannot cause influenza (Centers for Disease Control and Prevention, 2006b p. 10). It is important to acknowledge that while many facilities held immunization campaigns that promoted influenza vaccination uptake among staff, the literature was lacking in specific examples of campaigns that actually dispelled common myths associated with the vaccine.

In a survey where 265 out of 995 Pittsburgh, PA hospital employees indicated they would not be getting vaccinated in the upcoming influenza season, 26.4% claimed

that it was due to concerns that the vaccine caused flu-like symptoms (Chan-Tompkins, Sahud, Pucci, & Herbert, 2008). As well, in a cross sectional study, Martinello et al. (2003) surveyed 212 HCWs to determine if knowledge of influenza was a predictor of vaccination acceptance. Forty percent of unvaccinated nurses (n = 39) indicated that their main reason for not getting vaccinated was the belief that the vaccine caused an influenza-like illness. Furthermore, in a study of 513 nurses at the Mayo Clinic in Minnesota, U.S., where a comprehensive influenza campaign had been implemented, Ofstead et al. (2008) found that nurses who believed that the injectable vaccine did not contain the live virus and therefore could not cause influenza were more likely to be vaccinated than those who believed the vaccine contained the live virus. Another study conducted by Piccirillo & Gaeta (2006) showed that 36% of unvaccinated "professional" emergency department staff (physicians, residents, nurses, and students) believed that the vaccine caused influenza. Manuel et al. (2002) found similar results in a survey of 231 HCWs at two long term care hospitals in Waterloo, ON, where 36% of all staff members believed that the flu or similar illness could be attributed to having obtained the vaccine. Several other studies (Abramson & Levi, 2008; Bryant et al., 2004; Gornick, Nelson, Scanlan, & Lang, 2007; Weingarten, 1989) also reported that HCWs believed that the vaccine could lead to influenza.

Not at risk for influenza. Several studies found that another barrier to vaccination of HCWs was the belief that they were not at risk for influenza and/or didn't get the flu. In a study by Nichol and Hauge (as cited in Talbot, Bradley, Cosgrove, & Ruef, 2005) it was found that "…healthy HCWs often do not recognize their role in

influenza transmission to their patients or their families, seeing themselves at low risk for influenza infection and subsequent morbidity."

Willis and Wortley (2007) conducted focus groups of vaccinated and unvaccinated nurses who provided direct patient care in selected hospitals in Alabama and Michigan, United States. There were four groups at each site with two groups having received the influenza vaccination in the previous year and two groups that had not received the vaccine. The authors found that the unvaccinated nurses felt they were not the target population for influenza immunization and were not at risk for the illness. They also believed that the hospital setting had provided them with immunity and that other methods of prevention, such as handwashing, were effective for influenza prevention.

An influenza vaccination campaign held at Children's Hospital of Orange County, CA during the 2006/2007 influenza season required staff to be immunized with the option of signing a declination form (Gornick et al., 2007). This hospital obtained a vaccination rate of 60% (N = 1973) and asked those who had declined their reasons for doing so. One of the reasons cited for not obtaining the vaccination was never having contracted the flu in the past and therefore not needing the vaccine. An analysis of the numbers was not presented in this publication, which is a limitation for this particular study.

A study conducted by Bryant et al. (2004) provided 76 paediatric facilities across the U.S. and Canada with posters promoting influenza vaccination with the goal of achieving 50% vaccination rates among staff for the 2000/2001 influenza season. Additional materials were available upon request. Hospitals that ordered additional

materials (n = 32) were surveyed as to the types of influenza campaigns they held with 19 hospitals responding. The final phase of the study included a questionnaire directed at HCWs in neonatal intensive care units (NICU), paediatric intensive care units (PICU), and oncology units. The questionnaire addressed vaccination receipt or non receipt and reasons for acceptance and refusal of the vaccine via Likert scale. Reasons for acceptance and refusal differed among the three specialty areas and are discussed in other parts of this literature review. However, an interesting result among unvaccinated oncology staff was their primary reason for refusal, which was that "they never catch the flu" (Bryant et al., 2004 p. 915). In another Canadian study, Norton, Scheifele, Bettinger, & West (2008) examined vaccination rates and attitudes of nurses working in a paediatric hospital who provided care to neonates, children, and mothers. Even though the facility had a comprehensive influenza that reached 76% of nurses who provided direct patient care, 30% of unvaccinated nurses (n = 258) did not believe the vaccine was necessary for their protection.

A study conducted by Abramson and Levi (2008) showed similar findings among community clinic HCWs in Jerusalem. Among unvaccinated pharmacists, nurses, administrative staff and physicians, the perception that they were at "low risk of contracting severe influenza" was the second most common reason for not receiving the vaccine (24.3%; n = 185) (Abramson & Levi, 2008 p. 2486). Similarly, Esposito et al. (2007) found that 56.8% (n = 542) of HCWs (physicians, nurses, and paramedics) across three specialities (obstetrics, neonatal, and paediatrics) reported "no fear of influenza" (p. 5278) as their primary reason for not getting vaccinated. As well, in a cross-sectional survey of 144 nurses and healthcare assistants in two hospitals in the United Kingdom,

Canning, Phillips, & Allsup (2005) found that the main reason for non-vaccination was the belief that the vaccine was unnecessary 28.9% (n = 128). In this particular study the majority of participants had not been vaccinated in the previous season, with only 7.6% (n = 144) who had accepted the vaccine. Convenient access to the vaccine during working hours was a potential barrier that may have affected vaccination rates for the applicable influenza season in this study.

Alternative methods. Several studies found that HCWs believed they could protect themselves from influenza using methods other than vaccination. Willis and Wortley (2007) found this perception among unvaccinated nurses who had participated in focus groups that explored the attitudes and beliefs about the vaccine. Hand hygiene and gloves were deemed more important than vaccination. Another study by Manuel et al. (2002) found similar results among HCWs from two long term care facilities in Waterloo, Ontario. Overall, 72% of participants (N = 231) felt handwashing was the best defence against influenza. As well, unvaccinated workers were twice as likely to rely on other means of prevention rather than vaccination. Survey results showed that handwashing, healthy eating, use of vitamins and other homeopathic remedies, and physical activity were deemed more effective than being vaccinated against influenza ($p < .05$) (Manuel et al., 2002 p. 611). Moreover, another study by Trivalle et al. (2006) found that unvaccinated HCWs in an elderly facility in France were nearly six times more likely to believe in alternative therapies to vaccination for prevention of influenza as compared to vaccinated workers (58% and 14%; $p < .001$) (p. 1279).

Perceived Benefits of Influenza Vaccination

Self protection. Protection from contracting influenza was cited as a motivator for receiving the vaccine in several research studies. A literature review of 25 articles conducted by Hofmann et al. (2006) about the attitudes and beliefs of HCWs regarding the influenza vaccination showed that self protection was "the strongest motivation (33 - 93%) even among non-vaccinated individuals" (p. 145). Christini et al. (2007) found that fear of getting the disease was the number one reason for vaccination reported by 77% of nurses (n = 153) who participated in a study of influenza vaccination among HCWs in two hospitals in Pittsburgh, Pennsylvania. LaVela et al. (2004) found that 77% of HCWs (N = 1,140) who responded to an anonymous questionnaire about attitudes regarding the influenza vaccine reported self protection as a motivating factor for immunization. As well, Lester et al. (2003) reported self protection as the primary reason for vaccination among 86.3% of the vaccinated interns and residents (n = 344) at the University of Toronto's Faculty of Medicine in Toronto, Ontario. The questionnaire addressed attitudes, illness history, and knowledge about influenza and the vaccine. Abramson and Levi (2008) found similar results in a study of 275 HCWs who had direct patient contact and worked in community health centres in Jerusalem. The survey was conducted following the 2006/2007 influenza season in order to address low vaccination rates among HCWs. The overall vaccination rate was 30.2% for this sample. Self protection was listed as a major motivator for immunization among 92.5% of those vaccinated. Tapiainen et al. (2005) reported interesting results of a survey that was administered before and after an educational intervention designed to increase vaccination rates among HCWs in a paediatric hospital in Switzerland. In the pre-

intervention survey, all healthcare groups (physicians, nurses, and other HCWs) stated that self protection was the primary reason for immunization. However, in the post-intervention survey, the physician group cited protection of patients (83%) as more important than self protection (74%) for influenza immunization. Similarly, other studies (Manuel et al., 2002; Takayanagi et al., 2007; Toy et al., 2005) cite self protection as a major reason for vaccination. In a study of 5,270 vaccinated HCWs in Greece, Maltezou et al. (2007) found that 89.1% reported doing so for their own protection.

Patient protection. The National Advisory Committee on Immunization NACI (2008) is clear about HCWs and their obligation to obtain annual influenza vaccination for the protection of their patients, especially for those whose duties require the worker to be in direct contact with the patient. NACI states that vaccination is "…an essential component of the standard of care…" (Public Health Agency of Canada, 2008 p. 26). The importance of vaccinating HCWs to decrease the incidence of influenza and complications of influenza in patients, particularly the elderly, is consistent throughout the literature (Bridges et al., 2003; Christini et al., 2007; Tucker et al., 2008).

Fear of transmitting influenza to patients was cited as the primary reason physicians sought influenza vaccination in a cross-sectional study conducted by Christini et al. (2007). A survey distributed to HCWs in two teaching hospitals at the University of Pittsburgh Medical Centre to assess vaccination rates and reasons for having accepted the influenza vaccine showed that 78% of physicians (n = 194) stated patient protection was of upmost importance. However, upon further analysis, this belief was highest among internists (82%) and paediatricians (84%) as compared to surgeons (47%) and other physicians (56%). Protection of patients was identified as the primary reason for

immunization by only one other healthcare group ('technician or aide'), who also cited "fear of getting influenza" equally as important (Christini et al., 2007 p. 174). In this same study, 59% nurses (n = 153) cited patient protection as the most important reason for vaccination as compared to 77% who believed self protection was most important (Christini et al., 2007). As well, the study found that those workers who correctly believed that influenza could be passed from an asymptomatic worker to their patients were more likely to be vaccinated as compared to those who did not believe transmission could occur (57.9 and 38.6, respectively; p = .0004).

An editorial by Hoffmann and Perl (2005) questioned the effectiveness of hospital campaigns that focused on self protection and the reduction of sick days from work. Hoffmann believed that efforts that focused on the protection of the patient would be more effective: "HCW vaccination can be viewed as a means of protecting patients from influenza exposure and the related mortality seen among vulnerable populations and should be presented as such to both HCWs and the hospital leadership" (Hoffmann & Perl, 2005 p. 851).

Patient protection was cited as a reason for accepting the vaccination in several studies, including LaVela et al. (2004). Again, there was a difference between healthcare groups in that physicians were more likely to report patient protection as a reason for vaccination than were nurses (54% and 43% respectively; p = .0002). Another study of HCWs in 19 paediatric hospitals across the U.S. and Canada was conducted in 2001 by Bryant et al. (2004) following an educational influenza vaccination campaign. Staff who worked in NICU, Paediatric ICU and oncology units participated in the follow up surveys (N = 1,123), with the majority of participants being nurses (n = 1,003). Among those

who received the vaccine (53%), protection of their patients was identified as the main reason for vaccination and was reported highest among oncology HCWs (93%; $p < .001$).

A study by Esposito et al. (2007) explored the attitudes of 740 HCWs who specialized in obstetrics and gynecology, neonatal and paediatric care in Milan, Italy. The study examined current practices regarding recommending the vaccine to pregnant women and children. Patient protection was reported as the main reason for immunization among paediatric physicians and nurses. However, vaccination rates for these two groups were low (33.3%, 12.2% respectively). The other two speciality HCWs cited fear of transmission to family members as their primary reason for vaccination, with the exception of the neonatal physicians, who cited fear of transmission to family and patients as equally important (Esposito et al., 2007). Trivalle et al. (2006) found that obtaining vaccination for the protection of patients was a primary factor among 94% of vaccinated HCWs ($n = 80$) in a geriatric hospital in France as compared to 65% of unvaccinated HCWs ($n = 310$).

Cues to Action

Convenience. Convenience and easy access in obtaining the influenza immunization was a factor in many studies. Convenience was cited as a reason for vaccination throughout the literature (Ong, A. K. Y. et al., 2000; Steiner et al., 2002; Weingarten, 1989; Wells, Faris, Abell, Sweigert, & Stephens, 2008; Willis & Wortley, 2007). Several studies showed that the use of a mobile cart improved vaccination rates (Christini et al., 2007; Kuntz et al., 2008; Ong, A. K. Y. et al., 2000; Steiner et al., 2002; and Weingarten, 1989). Inconvenience was cited as reason for not receiving the vaccine in two studies (Bryant et al., 2004; Lester et al., 2003).

Campaigns. The implementation of facility-wide influenza vaccination campaigns was a common strategy used to address low vaccination rates among HCWs in Canada, U.S., and around the world. However, one campaign that involved the use of a letter and raffle tickets as an incentive for staff to vaccinate showed no increase in vaccination rates (Doratotaj, Macknin, & Worley (2008). Campaigns that included the use of mobile carts helped to increase rates (Christini et al., 2007; Kuntz et al., 2008). Comprehensive campaigns that included educational components, convenient access to the immunization clinics, and tracking mechanisms proved to increase vaccination rates among HCWs as well (Dunais et al., 2006; Gazmararian et al., 2007; Hauri et al., 2006; Keedick, 2007; Kuntz et al., 2008; Polgreen, Pottinger, Polgreen, Diekema, & Herwaldt, 2006; Vaughan, 2006; Wells et al., 2008). One study showed a drop in vaccination rates when the intensity of the campaign was not sustained on an annual basis (Takayanagi et al., 2007).

Influence of Leadership

There were mixed results in the literature related to the influence of administration and supervisory staff on the uptake of influenza vaccination among their employees. Dunais et al. (2006) found that participation of the head nurse in receiving and promoting the influenza vaccination to staff in a hospital in Nice, France helped to increase rates. As well, Bryant et al. (2004) encouraged administrators to convey their expectations to attain high vaccination rates. Likewise, D'Heilly and Nichol (2004) found that vaccination campaigns were more successful if administration was supportive of vaccination. In another campaign, McCullers, Speck, Williams, Liang, & Mirro (2006) found that the involvement of the head nurse who provided staff with feedback

regarding vaccination rates and contacted unvaccinated staff helped to increase vaccination rates. However, a study of workers in long term care facilities in Waterloo, ON found that unvaccinated workers were not influenced by those in a leadership position (Manuel et al., 2002). As well, Mah et al. (2005) found that "a strong recommendation for vaccination from the employer was the least important motivation for participation" (p. 248).

Policies and Mandates

There has been much discussion regarding the issue of mandatory influenza vaccination for HCWs as a mechanism to ensure adequate vaccination rates among HCWs. Some studies determined that being unaware of national recommendations may be a contributing factor to declination of the vaccine. Nichol (2006) believes this to be true. While others maintain that even though 13 states in the U.S. require influenza vaccination in long term care facilities, there is no follow up action for HCWs who decline (Lugo, 2007). Lugo (2007) maintains that the Occupational Health and Safety Administration (OSHA) in the U.S. will not address influenza vaccination, because unlike Hepatitis B requirements, the influenza vaccination is primarily for the protection of the patients and not the HCW (p. 4). Lugo (2007) cites an arbitration settlement in Canada involving the Service Employees International Union (SEIU) in 1999/2000 which declared mandatory vaccination was deemed a "violation of employees' rights" (Service Employees International Union Research communique as cited in Lugo, 2007). In a continuation of an analysis of a study done by Ofstead et al. (2008), Poland, Ofstead, Tucker, & Beebe (2008) refered to specific questions that explored the acceptance of a mandated policy regarding influenza vaccination for HCWs. Fifty- nine percent of

nurses who were surveyed supported a policy with appropriate exemptions for medical or religious reasons. In another article by Poland, Tosh, & Jacobson (2005), the authors contend that more media attention around outbreaks and low vaccination levels among HCWs would bring a heightened awareness of this issue and add pressure for mandatory vaccination policies. Goldstein et al. (2004) found that nearly half of infection control personnel across 268 facilities caring for the elderly were in support of mandatory vaccination for HCWs with direct patient contact. A limitation of this study was that the survey was completed by infection control contacts and not the actual staff caring for the patients. In an earlier study by Weingarten (1989), 72.8% of physicians and nurses (n = 193) at a California hospital stated they would receive the influenza vaccination if it were a national mandate. As well, Saluja et al. (2005) found that 24.4% of HCWs in emergency room departments across four teaching hospitals in London, ON (n = 343) were in favour of making influenza vaccination mandatory for HCWs. In contrast, 72% of 363 employees at a cancer facility in Calgary, AB were opposed to mandatory influenza vaccination (Mah et al., 2005).

Summary of Literature Review

A review of the literature regarding influenza vaccination and the attitudes and beliefs of HCWS included many recent U.S. studies and fewer Canadian studies that examined both the motivators and the deterrents for receipt of the vaccine.

There appeared to be a consensus in the literature regarding barriers to receipt of the influenza vaccination by HCWs. Lack of knowledge regarding the vaccine and influenza illness was a factor in several studies and was clearly evident in research done by Ofstead (2008). As well, perceived ineffectiveness of the vaccine, concerns regarding

side effects of the vaccine, and the misconception that the vaccine causes influenza were common themes throughout the literature. Three studies highlighted alternative behaviours to vaccination that HCWs believed were more effective than the vaccine (Manuel et al., 2002; Trivalle et al., 2006; Willis & Wortley, 2007).

Several factors associated with increased acceptance of influenza vaccination were consistent in the literature. Convenient access to being vaccinated during the work day was considered to increase vaccination rates among HCWs. This issue was addressed in all influenza campaigns in attempts to meet the needs of staff. In 10 studies, HCWs were more likely to receive the vaccine if they had received the vaccine in the past. As well, 10 studies found that protection of patients was a motivator for obtaining the vaccine, while 13 studies found that protection of one's own health was a factor in receipt of influenza vaccination. Several studies also showed that physicians were more likely to be vaccinated than nursing staff and that older staff was more receptive to being vaccinated.

Gaps in the Literature

The universal influenza program for residents of Ontario was introduced in 2000 and was credited for increased vaccination rates among those with chronic illnesses (Kwong, Sambell, Johansen, Stukel, & Manuel, 2006; Kwong et al., 2007). As well, the province of Ontario was a forerunner among all the Canadian provinces for higher influenza vaccination rates between 2000 and 2003. Although several articles highlighted studies in Alberta and Ontario regarding influenza vaccination among HCWs, in general Canadian studies were limited. As well, the impact of the universal program on receipt of vaccination was not addressed in studies done in Ontario.

Most studies relied on data from self reported questionnaires and recall of receiving or not receiving the influenza vaccination in previous seasons. This method may be more accurate if recall was limited to the most recent or current season. The dissemination of surveys and questionnaires varied among the studies; some studies addressed previous influenza seasons, current seasons and intent to receive the vaccine in future seasons. As well, Polgreen et al. (2006) questioned if the Hawthorne effect played a role in increasing the acceptance of the influenza vaccine, based on the fact people were participating in a study.

Another limitation identified through the literature review and in a study by Tapiainen et al. (2005) was the potential under representation of unimmunized HCWs. While most studies surveyed both the vaccinated and unvaccinated groups, the sample size was commonly lower in the unvaccinated group. Further efforts exploring attitudes of those who choose not to be vaccinated would assist with efforts to increase vaccination rates among HCWs.

The literature showed that vaccination rates were typically lower among nursing staff as compared to other healthcare personnel. This finding supports the need for further studies of nurses and their reasons for compliance and non compliance with influenza vaccination recommendations. In addition, the influence of working in specialty units needs further analysis.

Another area that was overlooked in the literature was the general acceptance of other vaccines important in the healthcare field and how this affects the acceptance of influenza vaccination. Studies did not typically examine beliefs regarding mandatory vaccinations such as the Hepatitis B vaccine, but should be considered when assessing

acceptance of the influenza vaccine. In addition, Talbot et al. (2005) questioned the impact of tracking vaccine receipt in facilities. This area requires further study.

Another important gap in the literature was the impact of the media on attitudes about influenza and decisions regarding the vaccine. Only one study considered the influence of the media (Abramson and Levi, 2008). While specific hospital campaigns were abundant in the literature, the influence of public services announcements, paid media advertisements and news items was not.

A further area that was missing in the literature was ascertaining how and where HCWs obtained their information about the influenza vaccine. Most studies addressed the attitudes and beliefs of HCWs regarding the vaccine, but did not ask where this information originated from. Correction of misinformation in campaigns and educational strategies may be instrumental in increasing coverage rates among HCWs, but this type of information was absent in the literature.

Overall, there is an abundance of literature regarding influenza vaccination among HCWs with regards to their general attitudes and beliefs. However, there were few studies that explored the predictors of receiving the influenza vaccine for HCWs. As nurses comprise the majority of HCWs in hospitals, further research is recommended with particular emphasis on the nursing sector.

CHAPTER III

METHODOLOGY

Research Design

A descriptive cross-sectional design was conducted on a non-probability convenience sample of registered nurses working at two acute care hospitals and one palliative care hospital in Windsor, ON. A self-administered questionnaire was used to examine the predictors of influenza vaccination among this group. The questions were developed for the purpose of this study. This was a suitable design as the in-house survey provided a means of obtaining information from nurses in an efficient manner during their normal work day. In addition, self-administered studies allow the researcher to ask a multitude of related questions and do not require disclosure of personal views directly to an interviewer that may impede accurate responses (Fowler, 2002). The online survey was promoted through email announcements, unit posters, business cards, and hospital newsletters. Participants were eligible to enter a random draw for gift certificates of $100 for completing the requirements of the study.

Setting and Sample

The online survey was accessible to 1900 nurses (registered nurses [RN], nurse practitioners [RN(EC)], and registered practical nurses [RPN]) who worked at two acute care hospitals in Windsor, ON (Hotel Dieu-Grace Hospital and Windsor Regional Hospital- Metropolitan Campus) and one palliative care hospital (Windsor Regional Hospital-Western Campus). Nurses were eligible to participate in the study if they worked full or part-time at one of the three identified facilities, and if they provided direct or indirect care to patients during the 2009/2010 influenza season.

A power analysis was conducted using computer software (Dupont & Plummer, 2009) to determine the sample size needed with 80% power and an α of .05. The power analysis showed that a sample of 772 nurses was needed for this study. However, Field (2005) and Stevens (2000) suggest that 15 cases per predictor are needed to run a meaningful regression analysis. Using this method, a sample of 195 participants was needed for this study, assuming the inclusion of 13 independent predictors in the regression model. Alternatively, Green (1991) and Tabachnick and Fiedel (2007) suggest that $50 + 8k$ (k = number of predictors) provides an accurate sample, when one uses an alpha of 0.05, and assumes 80% power and a medium effect size. Using this formula, with the inclusion of 19 independent predictors, the sample size needed was 202 participants. Thus, the acquired sample of 202 nurses was adequate for this analysis.

Protection of Human Subjects

Approval from the University of Windsor's Research Ethics Board (REB) was obtained prior to the implementation of the study. As well, approval was obtained from the REBs of Hotel Dieu-Grace Hospital and Windsor Regional Hospital. Participation in the study was voluntary and participants were provided with a Letter of Information (Appendix A) detailing the purpose of the study, confidentiality and protection of the data, contact information for the researcher, and assurances about the protection of the anonymity of responses. In addition, participants were advised that they could decline from answering specific questions if they desired to do so. Online consent by nurses was confirmed by pressing the "I Agree to Participate" button which linked them to the survey. Those who did not wish to participate could press the "I Do Not Agree" button which exited them from the site.

Instrumentation and Definitions

A self-administered survey was developed for the purpose of this study using the components of the Health Belief Model (HBM) (see Appendix B). The survey consists of two sections. Section A is comprised of 20 questions related to the participant's demographic information and vaccination history. Section B includes 33 items that measure the respondent's knowledge of influenza vaccination and his or her perception of influenza threat, severity, and the benefits and barriers to influenza vaccination. Section B of the survey was posted two weeks following the initial study. The purpose of completing this section twice was to determine the tool's reliability. However, testing for validity and reliability of the survey tool was beyond the scope of this study and therefore each indicator was measured as a stand alone variable.

Vaccination status. Nurses who had received or intended to receive the influenza vaccination in the current flu season were classified as the vaccinated group. Nurses who had not received the vaccine and did not intend to receive the vaccine were classified as the unvaccinated group. It was necessary to define the vaccination status groups as both already vaccinated and intention to vaccinate due to the timing of the study during the influenza season while influenza vaccination was still available.

Demographics. Demographic variables such as age, race, and ethnic background are included in the HBM as they are believed to have an indirect effect on the perceived threat of illness (Pender, 1996). In this study, demographic data were collected on the following variables: age, gender, ethnic background, marital status, number of children and adults living in the household, professional designation, level of education, number of years practicing as a nurse and number of years working in the identified facility,

employment status, nature of patient care (i.e. direct vs. indirect), type of nursing unit, identified contraindications to receiving the vaccine, smoking status, history of a chronic medical condition, receipt of influenza vaccine in the past, and intent to receive the vaccine in the future.

Knowledge and perception of influenza threat. Knowledge and perceptions pertaining to influenza were measured in Section B of the survey using 31 items that examined knowledge about influenza vaccination (six questions), perception of susceptibility to influenza (five questions), perceived severity of influenza (four questions), perceived benefits of influenza vaccination (five questions), and perceived barriers to obtaining vaccination (four questions), and cues to action (seven questions). In addition, there were two general questions regarding the likeliness that the respondent would recommend the vaccination for his or her patients and families. The 33 items in this section of the questionnaire were measured using a likert scale ranging from 1 (*strongly agree*) to 5 (*strongly disagree*).

Knowledge. According to Encarta (2008), knowledge is defined as a "general awareness or possession of information, facts, ideas, truths, or principles." Misinformation and lack of knowledge may impact one's decision to vaccinate or not to vaccinate against influenza. In this study, knowledge was measured using six close ended statements to elicit information on the knowledge of respondents regarding influenza and influenza vaccination (Section B, Items 1 – 6, Appendix B). The following six questions addressed the knowledge component:

1. The seasonal influenza vaccine can cause the flu or flu like symptoms.
2. Seasonal influenza vaccination is recommended for healthcare workers.

3. Seasonal influenza vaccination is not contraindicated in pregnancy.

4. Fever, headache and body aches are symptoms of influenza.

5. Seasonal influenza vaccination is recommended annually.

6. Seasonal influenza vaccination will provide protection against the H1N1 virus.

Perceived susceptibility. Janz and Becker (1984) defined perceived susceptibility as "one's subjective perception of the risk of contracting a condition" (p. 2). Using the concepts of the HBM to explain the receipt of influenza vaccination among nurses, the perceived susceptibility of contracting influenza contributes to the overall perceived threat of contracting influenza. Perceived susceptibility was measured by five items (Section B, Items 7 – 11, Appendix B) that elicited information pertaining to the perceived risk of contracting influenza if unvaccinated. The five items were as follows:

1. I am at risk of getting influenza if I am not vaccinated.
2. My job puts me at greater risk for getting seasonal influenza.
3. My immune system will protect me from getting seasonal influenza.
4. Handwashing is more important than vaccination in the prevention of seasonal influenza.
5. I have never had seasonal influenza or an influenza-like illness.

Perceived severity. Perceived severity, as defined by Janz and Becker (1984), is the individual's "feelings concerning the seriousness of contracting an illness (or of leaving it untreated)..." (p. 2). Consideration for both medical and social implications contributes to perceived severity of the illness (Janz and Becker, 1984). Thus, the extent to which being sick with influenza impacts on home and work obligations for nurses will contribute to their overall perception of the severity of the illness and influence their

decision to be vaccinated. This concept was measured with four items (Section B, Items 12 – 15, Appendix B):

1. Influenza is not a serious illness.
2. I would still be able to work if I was sick with seasonal influenza.
3. I would still be able to fulfill my family and social obligations if I was sick with seasonal influenza.
4. I cannot spread seasonal influenza if I am asymptomatic.

Perceived benefits. Janz & Becker (1984) indicate that perceived benefits are "… beliefs regarding effectiveness of the various actions available in reducing the disease threat" (p. 2). According to the HBM, nurses must believe these benefits outweigh perceived barriers in order for influenza vaccination to occur. This concept was measured with five items (Section B, Items 16 - 20, Appendix B). Each variable examined a perceived benefit of receiving the influenza vaccination as supported in the literature review. The five items included:

1. The seasonal influenza vaccine is safe.
2. The seasonal influenza vaccine is effective in preventing influenza.
3. By getting vaccinated against the flu, I am protecting my patients.
4. By getting vaccinated against the flu, I am protecting my family.
5. By getting vaccinated against the flu, I am protecting my coworkers.

Perceived barriers. The HBM views barriers as those events that serve as a deterrent to the adherence of the specific health care behaviour. Perceived barriers may include financial costs, fear, side effects, and inconvenience (Rosenstock et al., 1988). Barriers cited in the literature specific to HCWs and influenza vaccination included fear

of adverse effects, inconvenience, and misinformation regarding the vaccine (Abramson & Levi, 2008; Fernandez et al., 2008; Weingarten, 1989). According to the HBM, if these barriers are perceived to be greater than the benefits of the vaccination, then HCWs will be more likely to refuse vaccination. This concept was measured by four items (Section B, Items 21 – 24, Appendix B) that elicited information pertaining to perceived barriers to vaccination:

1. A dislike of needles prevents me from getting the flu shot.
2. The seasonal influenza vaccination has unpleasant side effects.
3. It is inconvenient getting the seasonal influenza vaccination.
4. I am too busy to fit the seasonal influenza vaccination into my schedule.

Modifying factors. According to the HBM, modifying factors include "cues to action" that indirectly affect the perceived threat to illness. "Cues to action are statements, warnings, comments, or other external signals that initiate or perpetuate a person's realization that he or she is at health risk" (Burns, 1992, p. 38). This concept was measured by seven items (Section B, Items 25 – 31, Appendix B) that examined the impact of media campaigns, workplace initiatives, Ministry recommendations, recommendations by coworkers, and knowing a patient or family member who had been sick with influenza. The items are as follows:

1. Local and provincial media campaigns influence my decision to receive/not receive the seasonal influenza vaccination.
2. Workplace vaccination clinics and campaigns influence my decision to receive/not receive the seasonal influenza vaccine.

3. Ministry of Health recommendations influence my decision to receive/not receive the seasonal influenza vaccine.
4. Recommendations by coworkers influence my decision to receive/not receive the seasonal influenza vaccine.
5. Having known a family member/ patient who had influenza influenced my decision to receive/not receive the vaccine.
6. Having been sick with influenza or an influenza-like illness in the past influenced my decision to receive/not receive the seasonal vaccine.
7. Media news stories about the H1N1 virus have influenced my decision to receive/not receive the seasonal influenza vaccine.

Data Collection Procedures

Permission to promote the study at each site was obtained prior to the launch of the survey. Due to the REB application process, the survey was launched at one site prior to the other. Nurses at the first site were sent an email notification about the online survey from the hospital's Infection Control Practitioner (ICP). In conjunction with the email notice, a flyer was posted on every unit with the assistance of the ICP. A reminder email encouraging nurses to complete the survey if they had not already done so was sent to nursing staff one week after the initial email.

Promotion of the survey at the second site presented a challenge as the facility did not provide email access to all staff and the researcher was informed that posting the survey on the hospital's E-learning site would not generate a response to the survey. Thus, business cards that promoted the online survey link and applicable contact information were provided to all nursing staff members. The business cards were

delivered to nurses' hospital mailboxes, or they were given directly to the nurse by the investigator or their unit manager. In addition, flyers were posted on every unit and an article promoting the survey was posted in the hospital's newsletter the day the survey was launched and again one week later. Nursing staff who had access to a computer were able to complete the survey at some time during their work day or alternatively, link to the survey on their home computer after hours.

The online survey was developed using the survey service platform Lotus Notes with the support of the Information Technology Department at the University of Windsor. Two databases were created for the purpose of this study. Survey data were stored on a database at the University of Windsor and results were emailed to the researcher in an Excel spreadsheet and then imported into Predictive Analytics Software (PASW) Statistics Version 17.0. The second database contained the contact information for those participating in the random draw. The online survey was accessible for a 2 week period at each site.

Data Analysis

The PASW statistical package Version 17.0 was used to analyze the data. Prior to the actual analysis, the data were explored and screened for violations of univariate and multivariate assumptions of parametric statistics. Missing data on an independent variable were assigned a conservative value as appropriate (0 for discrete variables and the mean group value for continuous variables). Data analysis procedures included basic descriptive statistics, univariate analysis (Chi-square, *t*-test, Mann Whitney U and ANOVA), and multivariate logistic regression analysis.

Basic descriptive statistics included general frequencies of the discrete and categorical variables, as well as the means, standard deviations (SD), and standard errors (SE) of continuous variables. Univariate correlation analysis using Chi-square comparisons was performed to compare the vaccinated and unvaccinated groups on their nonparametric independent variables. Student *t*- tests were performed to compare the two groups on each parametric independent variable.

Survey data from Section B was collected using a likert scale ranging from 1 (*strongly agree*) to 5 (*strongly disagree*). Data from Section B were then recoded into a categorical reference of agree and disagree. The likert scale of 1 = strongly agree, 2 = agree, and 3 = somewhat agree were all given the value of 1 = agree. The likert scale of 4 = disagree and 5 = strongly disagree were recoded as 0 = disagree. Recoding of data was necessary to meet the assumption for binary regression that variables be dichotomous or continuous (Field, 2005). This allowed the variables to be entered into the regression model. However, it is acknowledged that recoding the scale in this manner may have resulted in a loss of important data. Chi-square comparisons were used to compare the vaccinated and unvaccinated groups.

Multivariate logistic regression analysis is a specialized form of multiple regresson and is usually used when the outcome variable is binary (Field, 2005). It allows researchers to determine which variables affect the probability of a particular outcome by finding the best fitting model that describes the association between the outcome variable and a set of independent predictors. Given the exploratory nature of this study, stepwise regression approach was implemented. All variables having a *p* value of ≤ 0.25 in the univariate analysis were considered in the logistic regression

iteration process. The selection of a liberal p value of ≤ 0.25 was used to avoid unnecessary deletion of potentially significant independent predictors from the final multivariate regression model (Hosmer & Lemeshow, 1989). A 95% confidence interval (CI^{95}) was the criteria used to determine whether or not a variable was an independent predictor. The resulting regression model was examined for appropriateness through goodness of fit statistics (Hosmer & Lemeshow, 1989). Forward stepwise regression was used for the analysis. Sensitivity, specificity and positive/negative predictive values of the regression model were also examined.

CHAPTER IV

FINDINGS

This chapter presents the results of the online survey containing 54 variables. Twenty-one variables comprised the demographic section of the survey and 33 variables examined the knowledge and perceptions of nurses regarding the influenza vaccine. Following the deletion of seven duplicate cases and five cases that did not complete both sections of the survey, the total sample size was 202 cases. Data screening and preparation, descriptive statistics, univariate analyses, and multivariate logistic regression are presented in the analysis.

Data Screening and Preparation

Missing data. Five cases (2.5%) did not complete Section B of the survey, which included 33 variables and accounted for 62% of the survey; these cases were thus deleted from the study. There were no missing data on the continuous variables. The missing data on categorical variables were all < 5% of the total missing for each variable and were conservatively treated by assigning the most frequent group response. Table 1 provides an overview of the missing data on categorical variables and the associated handling procedures.

Table 1

Frequencies of Missing Data and its Treatment

	Frequency			Treatment	
Variable	Valid	Missing	% Missing	%	Value
Gender	201	1	0.5	94.5	Female
Ethnicity	199	3	1.5	97.5	White
Marital Status	201	1	0.5	76.6	Married
Nursing Designation	201	1	0.5	90.6	RN
Education level	200	2	1.0	52.0	College
Hospital	193	9	4.5	47.0	WRH Main
Employment status	197	5	2.5	61.4	FT
Patient contact	199	3	1.5	82.7	Direct
Smoking status	201	1	0.5	89.6	No
Chronic medical condition	199	3	1.5	86.4	No
Current season (flu vaccine)	201	1	0.5	55.7	Yes
Current season (H1N1)	201	1	0.5	80.2	Yes

Univariate outliers. Field's (2005) method of checking for outliers (i.e., using the *z*- score values for each case on a variable) was used with the continuous variables of *age, number of children, number of adults in household, total years nursing,* and *years at current hospital* (p. 76). All scores were within ± 3.29 with the exception of *number of adults in household* ($M = 2.07$, $SD \pm 0.92$), which had four outliers with *z*- scores that exceeded ± 3.29. The four outlier cases on this variable were corrected by assigning each

a value of four which was "the mean plus two standard deviations" (Fields, 2005, p.79). In addition to checking for outliers in the total sample, univariate outliers were checked in the grouped data for vaccinated and unvaccinated nurses. There were no outliers for either group.

Normality. The values for skewness and kurtosis regarding *age, number of children, number of adults, total years nursing*, and *years at current hospital* were converted to *z*-scores and examined for normal distribution. A *z*-score of $\leq \pm 3.29$ was used as an acceptable indicator of normal distribution (Fields, 2005). Thus, *age, number of children,* and *years at current hospital* were accepted as being normally distributed. However, *number of adults in household* and *total years nursing* were outside this margin. Transformation using log transformation, square root transformation, and reciprocal transformation failed to produce normal distributions for the two variables. Thus, *total years nursing* and *number of adults in household* were recoded into categorical variables. Table 2 provides the skewness and kurtosis statistics for the continuous variables and the recoding for *total years nursing* and *number of adults in household*.

Table 2

Tests of Normality

	Distribution		Recoding	
Variable	Skewness	Kurtosis	Code	Freq (%)
Age	2.31	3.14		
Number of children	3.11	2.17		
Number of adults	**6.26**	**4.44**	1 – 2	172 (85.1)
			3 – 4	30 (14.9)
Total years nursing	.87	**3.65**	0 – 10	60 (29.7)
			11 – 20	35 (17.3)
			21 – 30	63 (31.2)
			31 – 40	44 (21.8)
Years at current hospital	3.16	3.06		

Bold numbers indicate significant skewness and/or kurtosis

Homogeneity of variance. Levene's test was used to determine if the assumption of homogeneity of variances was met between the vaccinated and unvaccinated groups. The variances were equal for *age*, F (1,200) = 1.06, ns; *number of children*, F (1,200) = 0.06, ns; *total years nursing*, F (1,200) = 3.78, $p > .05$; and *years at current hospital*, F (1,200) = 0.48, $p > .05$. However, for *number of adults in household*, the variances were significantly different, F (1,200) = 4.022, $p < .05$.

Sample Characteristics

The total sample of 202 respondents was obtained by surveying nurses at three sites: HDGH (34.7%; $n = 70$), WRH (Main Campus) (51.5%; $n = 104$), and WRH (Western Campus) (13.9%; $n = 28$). Results of the one-way ANOVA showed that the mean age across the three hospitals was not significantly different, F (2, 199) = 1.93, $p = .149$, nor was the mean number of years employed at each site, F (2, 199) = 1.486, $p = .229$. In addition, the majority of respondents across all three sites were white (97.5%; *n*

= 197), female (94.6%; *n* = 191), and married (76.7%; *n* = 155). Thus, there was no need to stratify the analysis by site since the demographic characteristics were largely uniform in all three sites.

The mean age of the overall sample was 43 years, ranging from 21 - 63 years, with 60.4% (*n* = 122) that reported having children (mode = 2 children). As well, 67.3% (*n* = 136) of the sample reported having two adults living in the household (range, 1 – 4 adults), with only 4% (*n* = 8) of the adults in the household over the age of 65 years. Nurses who had received or intended to receive the influenza vaccination in the current flu season comprised 55.4% (*n* = 112) of the total sample, and were classified as the vaccinated group. Nurses who did not receive the influenza vaccine in the current flu season and did not intend to receive the vaccine comprised 44.6% (*n* = 90) of the total sample and were classified as the unvaccinated group. Across both the vaccinated and unvaccinated groups, nurses reported a mean work experience of 19.64 years in nursing and 13.81 years at their current hospital. The majority of respondents were registered nurses (91.1%; *n* = 184) and more than half had a college diploma. Most respondents (63.9%; *n* = 129) were employed full time and provided direct patient care (84.2%; *n* = 170). More than one third of respondents (39.1%; *n* = 79) reported working on a medical, surgical, or oncology unit. Most respondents reported having no contraindications to receiving the seasonal influenza vaccine (94.6%; *n* = 191) or chronic medical conditions (86.6%; *n* = 175), and were non smokers (89.1%; *n* = 180). In addition, the majority of respondents also reported having received the: (a) seasonal influenza vaccine in the past (85.6%; *n* = 173), (b) vaccine in the past influenza season (63.9%; *n* = 129), and (c) H1N1 vaccine (80.2%; *n* = 162) during the 2009 outbreak.

Univariate Analysis

The vaccinated and unvaccinated groups were compared using *t*-tests and chi-square comparisons. Table 3 shows the *t*- test and Mann-Whitney U statistics, suggesting that there was no significant difference between the vaccinated and unvaccinated groups with respect to *age* ($p = .886$), *number of children* ($p = .250$), *total years nursing* ($p = .234$), and *years at current hospital* ($p = .484$).

Table 3

Comparison of Vaccinated and Unvaccinated Nurses: Continuous Variables

Variable (N=202) Vaccination status (Vaccinated = 112 Unvaccinated = 90)	*M* ± *SE*	Range	*t* (df = 200)	*p*
Age			-.14	.886
Vaccinated	43.38 ± 1.09	21 – 63		
Unvaccinated	43.60 ± 1.11	23 – 62		
Total	43.48 ± 0.78	21 – 63		
No. children in household			- 1.15	.250
Vaccinated	1.07 ± .107	0 – 4		
Unvaccinated	1.26 ± .119	0 – 4		
Total	1.15 ± .079	0 – 4		
No. adults in household			4350.50*	.044
Vaccinated	1.95 ± .068	0 – 4		
Unvaccinated	2.14 ± .093	0 – 4		
Total	2.03 ± .056	0 – 4		
Total years nursing			- 1.19	.234
Vaccinated	18.76 ± 1.17	0 – 40		
Unvaccinated	20.74 ± 1.15	1 – 40		
Total	19.64 ± .827	0 – 40		
Yrs. at current hospital			- .70	.484
Vaccinated	13.31 ± 1.09	0 – 37		
Unvaccinated	14.43 ± 1.16	1 – 37		

Total	13.81 ± .794	0 – 37

* Mann-Whitney test used due to lack of normal distribution in the variable *number of adults*

Table 4 displays the comparison between the vaccinated and unvaccinated nurses with regard to categorical variables and shows that the two groups differed with respect to the unit on which they worked. The percentage of vaccinated nurses (42.9%) who worked on a medical, surgical, or oncology unit was higher than the percentage of unvaccinated nurses (34.4%) on those units ($p = .007$). As well, the percentage of vaccinated nurse with no contraindications to receiving the vaccine was greater than the unvaccinated group with no contraindications (98.2% and 90%, respectively, $p = .013$). There was a higher percentage of vaccinated nurses who reported having been vaccinated with seasonal influenza in the past as compared to the unvaccinated group (99.1% and 68.9%, respectively, $p < .001$). In addition, more vaccinated nurses reported having been vaccinated with seasonal influenza in the past flu season as compared to the unvaccinated group (93.8% and 26.7%, respectively, $p < .001$). There was also a higher percentage of vaccinated nurses who reported having received the H1N1 vaccine during the 2009 H1N1 pandemic than unvaccinated nurses who also reported being vaccinated for H1N1 (95.5% and 61.1%, respectively, $p < .001$). Vaccinated and unvaccinated nurses did not differ with respect to gender ($p = 1.000$), ethnicity ($p = .685$), marital status ($p = .222$), living with adults over the age of 65 years ($p = 1.000$), professional designation ($p = .805$), education ($p = .266$), hospital ($p = .597$), employment status ($p = .768$), patient care ($p = .052$), smoking status ($p = .499$), and having a chronic medical condition ($p = .221$).

Table 4

Comparison of Vaccinated and Unvaccinated Nurses: Categorical Variables

Variable	Vaccinated (n = 112)	Unvaccinated (n = 90)	Total sample (N = 202)	χ^2	p
Gender					
Male	6 (5.4%)	5 (5.6%)	11 (5.4%)	.00	1.000
Female	106 (94.6%)	85 (94.4%)	191 (94.6%)		
Ethnicity					
White	110 (98.2%)	87 (96.7%)	197 (97.5%)	.50	.658
Other	2 (1.8%)	3 (3.3%)	5 (2.5%)		
Marital Status					
Married/Common	83 (74.1%)	72 (80.0%)	155 (76.7%)		
Single	13 (11.6%)	12 (13.3%)	25 (12.4%)	3.01	.222
Other	16 (14.3%)	6 (6.7%)	22 (10.9%)		
Adults > 65					
Yes	4 (3.6%)	4 (4.4%)	8 (4.0%)	.10	1.000
No	108 (96.4%)	86 (95.6%)	194 (96.0%)		
Professional designation					
RN	101 (90.2%)	83 (92.2%)	184 (91.1%)	.26	.805
Other	11 (9.8%)	7 (7.8%)	18 (8.9%)		
Education					
Hospital trained	9 (8.0%)	8 (8.9%)	17 (8.4%)		
College	53 (47.3%)	54 (60.0%)	107 (53.0%)	3.96	.266
University	42 (37.5%)	24 (26.7%)	66 (32.7%)		
Masters	8 (7.1%)	4 (4.4%)	12 (5.9%)		
Hospital					
HDGH	38 (34.0%)	32 (35.6%)	70 (34.7%)		
WRH-Main	56 (50.0%)	48 (53.3%)	104 (51.5%)	1.03	.597
WRH-Western	18 (16.1%)	10 (11.1%)	28 (13.9%)		
Employment status					
Full time	73 (65.2%)	56 (62.2%)	129 (63.9%)	.19	.768
Part time	39 (34.8%)	34 (37.8%)	73 (36.1%)		
Patient care					
Direct Patient Care	89 (79.5%)	81 (90.0%)	170 (84.2%)	4.16	.052
Indirect Patient Care	23 (20.5%)	9 (10.0%)	32 (15.8%)		

Variable	Vaccinated (n = 112)	Unvaccinated (n = 90)	Total sample (N = 202)	χ^2	p
Unit					
MedSurg/Oncology	48 (42.9%)	31 (34.4%)	79 (39.1%)		
ICU	15 (13.4%)	20 (22.2%)	35 (17.3%)		
OB, L&D	7 (6.3%)	17 (18.9%)	24 (11.9%)	13.99	.007
OR	16 (14.3%)	12 (13.3%)	28 (13.9%)		
Other	26 (23.2%)	10 (11.1%)	36 (17.8%)		
Contraindications					
Yes	2 (1.8%)	9 (10.0%)	11 (5.4%)	6.54	.013
No	110 (98.2%)	81 (90.0%)	191 (94.6%)		
Smoker					
Yes	14 (12.5%)	8 (8.9%)	22 (10.9%)	.67	.499
No	98 (87.5%)	82 (91.1%)	180 (89.1%)		
Chronic Medical Condition					
Yes	18 (16.1%)	9 (10.0%)	27 (13.4%)	1.59	.221
No	94 (84.0%)	81 (90.0%)	175 (86.6%)		
Seasonal vaccine in the past					
Yes	111 (99.1%)	62 (68.9%)	173 (85.6%)	37.06	<.001
No	1 (0.9%)	28 (31.1%)	29 (14.4%)		
Seasonal vaccine in past season					
Yes	105 (93.8%)	24 (26.7%)	129 (63.9%)	97.30	<.001
No	7 (6.3%)	66 (73.3%)	73 (36.1%)		
H1N1 vaccine					
Yes	107 (95.5%)	55 (61.1%)	162 (80.2%)	37.24	<.001
No	5 (4.5%)	35 (38.9%)	40 (19.8%)		
Age Categorical					
20-30	23 (20.5%)	12 (13.3%)	35 (1.3%)		
31-40	16 (14.3%)	20 (22.2%)	36 (17.8%)		
41-50	31 (27.7%)	28 (31.1%)	59 (29.2%)	3.76	.439
51-60	41 (36.6%)	29 (32.2%)	70 (34.7%)		
>61	1 (0.9%)	1 (1.1%)	2 (1.0%)		
# Total years nursing (Categorical)					
0-10	38 (33.9%)	22 (24.4%)	60 (29.7%)		
11-20	19 (17.0%)	16 (17.8%)	35 (17.3%)	5.24	.155
21-30	28 (25.0%)	35 (38.9%)	63 (31.2%)		
31-40	27 (24.1%)	17 (18.9%)	44 (21.8%)		

Variable	Vaccinated (n = 112)	Unvaccinated (n = 90)	Total sample (N = 202)	χ^2	p
# Years at current hospital (Categorical)					
0-10	61 (54.5%)	47 (52.2%)	108 (53.5%)		
11-20	15 (13.4%)	11 (12.2%)	26 (12.9%)	.54	.911
21-30	25 (22.3%)	24 (26.7%)	49 (24.3%)		
31-40	11 (9.8%)	8 (8.9%)	19 (9.4%)		

Pearson chi-square test was used to determine if there was an association between vaccination status and the nurses' responses to statements related to the following variables: knowledge of the seasonal influenza vaccine, perceptions of susceptibility to contracting influenza, perceptions of the seriousness of the illness, the benefits and barriers of receiving the vaccine, and cues to action. Table 5 shows the results of the chi-square comparisons using the categorical reference of agree and disagree to Section B of the survey.

The first set of six statements comprised the knowledge component of the survey. The two groups were significantly different with regard to one of the six knowledge questions. Specifically, the groups differed in their responses regarding the ability of the vaccine to actually cause the flu or flu-like illness. A higher percentage of vaccinated nurses disagreed that the vaccine caused the flu as compared to the unvaccinated nurses (68% and 50 %, respectively, p = .010). Based on the odds ratio, nurses were 2.1 times more likely to be vaccinated if they did not believe that the vaccine caused the flu. The two groups did not significantly differ in their responses to questions pertaining to safety in pregnancy, common symptoms of the flu, and the seasonal influenza vaccine providing protection against H1N1. It is interesting to note that 85.1% of all respondents were correctly aware that the seasonal vaccine did not provide protection against H1N1.

The next five statements dealt with perceptions of being susceptible to contracting influenza. There was a significant association between vaccination status and all five statements regarding perceived susceptibility to contracting influenza. A higher percentage of vaccinated nurses agreed that their job put them at greater risk for getting seasonal influenza as compared to the unvaccinated group (98.2% and 84.4%, respectively, $p < .001$). In addition, a greater percentage of unvaccinated nurses believed that their immune system would protect them from contracting seasonal influenza as compared to the vaccinated group (88% and 51%, respectively, $p < .001$). As well, a higher percentage of unvaccinated nurses agreed that handwashing was more important than vaccination in preventing the flu as compared to vaccinated nurses (87% and 67% respectively, $p = .001$).

Four statements explored the perceived seriousness of contracting influenza. There was a significant association between vaccination status and three statements that examined the perceived seriousness of the illness. A higher percentage of vaccinated nurses disagreed that "influenza is not a serious illness" than the unvaccinated group (86% and 68% respectively, $p < .001$). Next, there was no significant difference between the vaccinated and unvaccinated groups regarding the ability to spread influenza if asymptomatic.

Groups differed on all statements related to the benefits of receiving the vaccination. In chi-square comparisons, the vaccinated group was more likely to agree that "the seasonal influenza vaccine is effective in preventing seasonal influenza" (96% and 82% respectively, $p = .001$). As well, a greater percentage of vaccinated nurses versus unvaccinated nurses agreed that they were protecting their patients (100% and

80% respectively, $p < .001$), their family (99% and 78%, respectively, $p < .001$) and their coworkers (99% and 79% respectively, $p < .001$) by getting vaccinated.

Groups also differed on three out of four statements related to perceived barriers to receiving the vaccine. A higher percentage of unvaccinated nurses agreed that unpleasant side effects were associated with obtaining the vaccine than the vaccinated group (56.7% vs. 33.9%, $p < .001$).

Seven statements dealt specifically with cues to actions to receiving the vaccine. The two groups differed in their responses to three of the seven statements. More vaccinated nurses than unvaccinated nurses reported that their decision to receive/not receive the vaccine was influenced by workplace clinics and campaigns (77.7% and 54.4% respectively, $p = .002$) and by the Ministry of Health's recommendations (73.2 % and 51.1% respectively, $p = .001$). As well, having been sick with influenza or an influenza-like illness in the past influenced the vaccinated group more than in the unvaccinated group (60.7% and 31.1% respectively, $p < .001$).

The groups were also significantly different in their practice of recommending the vaccination for patients and family members. A greater percentage of those vaccinated than unvaccinated would recommend the vaccine to their patients (96% and 84% respectively, $p = .007$) and family (96% and 70% respectively, $p < .001$).

Table 5

Chi-square Comparisons on Categorical Reference

Variable	Vaccinated (n = 112)	Unvaccinated (n = 90)	Total sample (N=202)	χ^2	P
Knowledge					
The seasonal influenza vaccine can cause the flu or flu like symptoms.					
Agree	36 (32.1%)	45 (50.0%)	81 (40.1%)	6.63	.010
Disagree	76 (67.9%)	45 (50.0%)	121 (59.9%)		
Seasonal influenza vaccination is recommended for healthcare workers.					
Agree	111 (99.1%)	88 (97.8%)	199 (98.5%)	-	-
Disagree	1 (0.9%)	2 (2.2%)	3 (1.5%)		
Seasonal influenza is not contraindicated in pregnancy.					
Agree	97 (86.6%)	76 (84.4%)	173 (85.6%)	0.19	.663
Disagree	15 (13.4%)	14 (15.6%)	29 (14.4%)		
Fever, headache and body aches are symptoms of influenza.					
Agree	107 (95.5%)	89 (98.9%)	196 (97.0%)	-	-
Disagree	5 (4.5%)	1 (1.1%)	6 (3.0%)		
Seasonal influenza vaccination is recommended annually.					
Agree	112 (100%)	86 (95.6%)	198 (98.0%)	-	-
Disagree	0 (0%)	4 (4.4%)	4 (2.0%)		
Seasonal influenza vaccination will provide protection against the H1N1 virus.					
Agree	14 (12.5)	16 (17.8%)	30 (14.9%)	1.10	.294
Disagree	98 (87.5%)	74 (82.2%)	172 (85.1%)		
Susceptibility					
I am at risk of getting seasonal influenza if I am not vaccinated.					
Agree	106 (94.6%)	73 (81.1%)	179 (88.6%)	9.06	.003
Disagree	6 (5.4%)	17 (18.9%)	23 (11.4%)		
My job puts me at greater risk for getting seasonal influenza.					
Agree	110 (98.2%)	76 (84.4%)	186 (92.1%)	12.97	< .001
Disagree	2 (1.8%)	14 (15.6%)	16 (7.9%)		
My immune system will protect me from getting seasonal influenza.					
Agree	57 (50.9%)	79 (87.8%)	136 (67.3%)	30.86	<.001
Disagree	55 (49.1%)	11 (12.2%)	66 (32.7%)		

Variable	Vaccinated (n = 112)	Unvaccinated (n = 90)	Total sample (N=202)	χ^2	P
Handwashing is more important that vaccination in the prevention of seasonal influenza.					
Agree	75 (67.0%)	78 (86.7%)	153 (75.7%)	10.54	.001
Disagree	37 (33.0%)	12 (13.3%)	49 (24.3%)		
I have never had seasonal influenza or an influenza-like illness.					
Agree	25 (22.3%)	35 (38.9%)	60 (29.7%)	6.56	.010
Disagree	87 (77.7%)	55 (61.1%)	142 (70.3%)		
Seriousness					
Seasonal influenza is not a serious illness.					
Agree	15 (13.4%)	29 (32.2%)	44 (21.8%)	10.38	.001
Disagree	97 (86.6%)	61 (67.8%)	158 (78.2%)		
I would still be able to work if I was sick with seasonal influenza.					
Agree	13 (11.6%)	18 (20.0%)	31 (15.3%)	2.71	.100
Disagree	99 (88.4%)	72 (80.0%)	171 (84.7%)		
I would still be able to fulfill my family and social obligations if I was sick with influenza.					
Agree	13 (11.6%)	18 (28.9%)	39 (19.3%)	9.57	.002
Disagree	99 (88.4%)	64 (71.1%)	163 (80.7%)		
I cannot spread influenza if I am asymptomatic.					
Agree	11 (9.8%)	15 (16.7%)	26 (12.9%)	2.09	.149
Disagree	101 (90.2%)	75 (83.3%)	176 (87.1%)		
Benefits					
The seasonal influenza is safe.					
Agree	112 (100%)	82 (91.1%)	194 (96%)	10.37	.001
Disagree	0 (0%)	8 (8.9%)	8 (4.0%)		
The seasonal influenza vaccine is effective in preventing seasonal influenza.					
Agree	108 (96.4%)	74 (82.2%)	182 (90.1%)	11.29	.001
Disagree	4 (3.6%)	16 (17.8%)	20 (9.9%)		
By getting vaccinated against the flu, I am protecting my patients.					
Agree	112 (100%)	72 (80.0%)	184 (91.1%)	24.59	< .001
Disagree	0 (0.0%)	18 (20.0%)	18 (8.9%)		
By getting vaccinated against the flu, I am protecting my family.					
Agree	111 (99.1%)	70 (77.8%)	181 (89.6%)	24.37	< .001
Disagree	1 (0.9%)	20 (22.2%)	21 (10.4%)		

Variable	Vaccinated (n = 112)	Unvaccinated (n = 90)	Total sample (N=202)	χ^2	P
By getting vaccinated against the flu, I am protecting my coworkers.					
Agree	111 (99.1%)	71 (78.9%)	182 (90.1%)	22.87	.000
Disagree	1 (0.9%)	19 (21.1%)	20 (9,9%)		
Barriers					
A dislike of needles prevents me from getting the flu shot.					
Agree	5 (4.5%)	6 (6.7%)	11 (5.4%)	0.47	.493
Disagree	107 (95.5%)	84 (93.3%)	191 (94.6%)		
The seasonal influenza vaccination has unpleasant side effects.					
Agree	38 (33.9%)	51 (56.7%)	89 (44.1%)	10.47	.001
Disagree	74 (66.1%)	39 (43.3%)	113 (55.9%)		
It is inconvenient getting the seasonal influenza vaccination.					
Agree	11 (9.8%)	23 (25.6%)	34 (16.8%)	8.83	.003
Disagree	101 (90.2%)	67 (74.4%)	168 (83.2%)		
I am too busy to fit the seasonal influenza vaccination into my schedule.					
Agree	6 (5.4%)	12 (13.3%)	18 (8.9%)	3.91	.048
Disagree	106 (94.6%)	78 (86.7%)	184 (91.1%)		
Cues to Action					
Local and provincial media campaigns influence my decision to receive/not receive the seasonal influenza vaccine.					
Agree	39 (34.8%)	30 (33.3%)	69 (34.2%)	0.05	.825
Disagree	73 (65.2%)	60 (66.7%)	133 (65.8%)		
Workplace vaccination clinics and campaigns influence my decision to receive/not receive the seasonal influenza vaccine.					
Agree	87 (77.7%)	49 (54.4%)	136 (67.3%)	12.25	< .001
Disagree	25 (22.3%)	41 (45.6%)	66 (32.7%)		
Ministry of Health recommendations influence my decision to receive/not receive the seasonal influenza vaccine.					
Agree	82 (73.2%)	46 (51.1%)	128 (63.4%)	10.50	.001
Disagree	30 (26.8%)	44 (48.9%)	74 (36.6%)		
Recommendations by coworkers influence my decision to receive/not receive the seasonal influenza vaccine.					
Agree	40 (35.7%)	35 (38.9%)	75 (37.1%)	0.22	.643
Disagree	72 (64.3%)	55 (61.1%)	127(62.9%)		

Variable	Vaccinated (n = 112)	Unvaccinated (n = 90)	Total sample (N=202)	χ^2	P
Having known a family member/patient who had influenza influenced my decision to receive/not receive the vaccine.					
Agree	33 (29.5%)	23 (25.6%)	56 (27.7%)	0.38	.537
Disagree	79 (70.5%)	67 (74.4%)	146 (72.3%)		
Having been sick with influenza or an influenza-like illness in the past influenced my decision to receive/not receive the seasonal vaccine.					
Agree	68 (60.7%)	28 (31.1%)	96 (47.5%)	17.54	< .001
Disagree	44 (39.3%)	62 (68.9%)	106 (52.5%)		
Media news stories about the H1N1 virus have influenced my decision to receive/not receive the seasonal influenza vaccine.					
Agree	75 (67.0%)	46 (51.1%)	121 (59.9%)	5.22	.022
Disagree	37 (33.0%)	44 (48.9%)	81 (40.1%)		
Recommendations					
I would recommend the seasonal influenza vaccination for my patients.					
Agree	107 (95.5%)	76 (84.4%)	183 (90.6%)	7.20	.007
Disagree	5 (4.5%)	14 (15.6%)	19 (9.4%)		
I would recommend the seasonal influenza vaccination for my family.					
Agree	108 (96.4%)	63 (70.0%)	171 (84.7%)	26.83	< .001
Disagree	4 (3.6%)	27 (30.0%)	31 (15.3%)		

Multivariate Analysis

Variables that had a $p \leq 0.25$ in the univariate analysis were included in the multivariate analysis. Variables from Section A of the survey included number of children, number of adults in household, total years nursing, marital status, patient care, unit, contraindications, chronic medical condition, receipt of the seasonal influenza vaccination in the past, receipt of the seasonal influenza vaccination in the past season, and receipt of H1N1 vaccine. Categorical variables with more than two groups (marital status and unit of practice) were dummy coded to meet the assumptions of binary logistic regression analysis. Twenty-four variables in the univariate analysis for Section B that had a $p \leq 0.25$ were also included in the multivariate analysis. These variables included

Items 1, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 22, 23, 24, 26, 27, 30, 31, 32, and 33. Thus, a total of 39 variables were used in the multivariate analysis.

Screening for multivariate outliers was done using Mahalanobis distance, while Cook's distance was used to determine whether or not a multivariate outlier case was an influential data point (Tabachnick & Fidell, 2007). Using 39 predictor variables in the analysis as the number of degrees of freedom, the critical value for Mahalonobis distance was calculated as $\chi^2 = 72.06$, $p = .001$. The Mahalonobis distance for all cases ranged from 1.91 – 22.19 and therefore no cases exceeded the chi-square distribution. The Cook's distance for all cases ranged from 0.0 - .061. Therefore, it was determined that there were no multivariate outliers for this analysis.

Multicollinearity

Multicollinearity results from a high correlation between two or more independent variables (Tabachnick & Fidell, 2007). Spearman's rho was conducted to identify bivariate correlations among the 39 independent variables. All variables had bivariate correlation values less than 0.70, with the exception of five. Item 13, "I would still be able to work if I was sick with seasonal influenza" (0.766) and Item 14, "I would still be able to fulfill my family and social obligations if I was sick with influenza" (0.766) were highly correlated. Item 14 was deleted from further analysis to avoid redundancy. This decision was based on the focus of the research as it pertains to nurses in the workplace. However, the tolerance factor for this variable was < .5 and was removed from further analysis. An additional three variables had bivariate correlations > .70. Items 18 "vaccination for the protection of patients", 19 "vaccination for the protection of family" and 20 "vaccination for the protection of coworkers" were correlated. Vaccination for

the "protection of family" (Item 19) and "vaccination for the protection of coworkers" (Item 20) were deleted from the analysis. The variable "protection of patients" (Item 18) remained in the analysis due to the focus of the study. Collinearity statistics showed the tolerance value of three variables (medical surgical unit, single marital status, and married) were < 0.5 and were deleted from further analysis. The variance inflation factor was < 10 across all variables and the condition index was < 15, suggesting that multicollinearity was not an issue among the remaining 32 variables.

Binary Logistic Regression

The status of being vaccinated or unvaccinated was treated as the dependent variable for the regression analysis. The predictor variables included: number of adults in household (adultscat), total years nursing (yrsdich), number of children (childdich), unit OR, unit OB, unit ICU, H1N1, vaccinated in past season, vaccinated in the past, chronic medical condition, contraindications, type of patient care, and Items 1, 7, 8, 9, 10, 11, 12, 15, 16, 17, 18, 22, 23, 24, 26, 27, 30, 31, 32, and 33 from Section B.

A forward stepwise likelihood ratio approach was conducted. The omnibus tests of model coefficients was significant ($p < .001$), indicating that the model was different from the constant only model. The Hosmer and Lemeshow goodness of fit was insignificant, $\chi^2 (6) = 5.26$, $p = .511$ after five iterations, suggesting that the model was a good fit with the data. The Cox & Snell R Square was 0.48 and the Nagelkerke R Square was 0.66, indicating that the five predictor variables explained 48% to 66% of the total variance of seasonal influenza vaccination status. The results of the regression model as displayed in Table 6 showed that five variables were independent predictors of vaccination in the current flu season. The variables included: (a) Item 8 "my job puts me

at greater risk for getting seasonal influenza", *OR* = 12.14, 95% CI [1.89 – 78.08]; (b) Item 9 " my immune system will protect me from getting seasonal influenza", *OR* = 0.29, 95% CI [0.11 – 0.77]; (c) Item 23 "it is inconvenient getting the seasonal influenza vaccination, *OR* = 0.22, 95% CI [0.07 – 0.67]; (d) Item 26 "workplace vaccination clinics and campaigns influence my decision to receive/not receive the seasonal influenza vaccine", *OR* = 2.88, 95% CI [1.12 – 7.38]; and (e) "vaccination in the previous season", *OR* = 34.80, 95% CI [12.99 – 93.28].

Table 6

Predictors of Influenza Vaccination

Independent Predictor	*B*	*S.E.*	*OR* [95% CI]
Vaccination in previous season	3.55	.50	34.81 [12.99, 93.28]
Job risk	2.50	.95	12.14 [1.87, 78.08]
Immune system	-1.24	.50	.29 [0.11, 0.77]
Inconvenient	-1.50	.56	.22 [0.07, 0.67]
Workplace clinics	1.06	.48	2.88 [1.12, 7.38]

Vaccination in the previous season was the strongest independent predictor of vaccination or intention to vaccinate in the current season whereby nurses who received the vaccine in the previous season were nearly 35 times more likely to obtain the vaccine in the current season. As well, nurses who believed that their job put them at risk of contracting influenza were 12 times more likely to get vaccinated. In addition, the results showed nurses were twice as likely to be vaccinated if they were exposed to workplace clinics and campaigns. The results showed that nurses who were less likely to believe that their immune system protected them from influenza, were more likely to be

vaccinated in the current season. As well, nurses who did not believe it was inconvenient to get the vaccine, were more likely to be vaccinated.

Table 7 provides the classification of the observed and predicted values based on a cut-off point of 0.5. The model's specificity of 78.9% (TN/TN+FP = 78.9%) describes the percentage of nurses who were not vaccinated for seasonal influenza and were correctly classified by the model as unvaccinated. Alternately, the sensitivity of the model (TP/TP+FN) predicts those who are classified as vaccinated and are actually vaccinated. In this case, 92.0% who were classified as vaccinated by the model actually were vaccinated. The positive predictive value (PPV) of the model determines if the nurse who is predicted to be vaccinated actually is vaccinated (TP/TP+FP) = 84.4%. The negative predictive value (NPV) of the model is able to identify the unvaccinated nurse as being unvaccinated (TN/TN+FN) = 88.6%. The overall precision of the model, defined as the ability of the model to correctly classify a nurse as vaccinated or unvaccinated, was 86.1%.

Table 7

Classification Table for Seasonal Influenza Vaccination

Observed	Predicted		
	No	Yes	% Correct
No	71 (TN)	19 (FP)	78.9
Yes	9 (FN)	103 (TP)	92.0
Overall Percentage			86.1

TN=true negative, FP=false positive, FN=false negative, TP=true positive

Analysis Summary

Univariate analysis of the demographic variables in Section A of the study indicated that eleven variables met the criteria for multivariate analysis. Following recoding of two of the variables in preparation for binary logistic regression, it was found that receiving the seasonal influenza vaccine in the previous flu season was the only statistically significant predictor of influenza vaccination among hospital based nurses. However, by including variables from Section B of the survey that met the criteria for multivariate analysis, four additional variables were seen as independent predictors of influenza vaccination in the current season. Those variables included the belief that their job put them at increased risk of contracting influenza, the availability of workplace clinics and campaigns, the belief that their immune system would not provide protection from influenza, and that obtaining vaccination was not perceived as inconvenient.

CHAPTER V

DISCUSSION AND CONCLUSIONS

Despite recommendations for annual influenza immunization and the availability of safe and effective influenza vaccines, coverage rates for HCWs remains low, with nurses being among the lowest vaccinated group (Public Health Agency of Canada, 2007). This study examined the demographic factors and other predictors of influenza vaccination among hospital based nurses. As well, the study explored relationships of vaccination status with the following constructs from the HBM: knowledge, perceived seriousness and severity of contracting influenza, perceived benefits and barriers to vaccination, and cues to action. The following is a discussion of the study findings within the context of the literature review. Implications and recommendations for practice, theory, and research are also presented, as well as limitations of the present study.

The study was conducted in three hospitals across Windsor, Ontario. Overall, 202 nurses completed the online survey for a response rate of 11%. This sample size is similar to other studies. The results showed that 55% of nurses in the study intended to receive or had received immunization for influenza in the 2009/2010 flu season. Typically, nurses have been identified as one of the lowest vaccinated groups among HCWs (Bautista et al., 2006; Christini et al., 2007; Trivalle et al., 2006). The majority of nurses who completed the survey provided direct care to patients and almost half of these nurses were not vaccinated for seasonal influenza. The vaccination coverage rate would be considered less than optimal for this group.

The unforeseen H1N1 pandemic introduced a second vaccine to the population during the 2009/2010 flu season. Overall, more than 80% of nurses who completed the study reported being vaccinated for H1N1. In contrast, only 55% of respondents received or intended to receive the seasonal vaccination. This finding may be attributed to the success of the government's aggressive H1N1 vaccination campaign and the extensive high profile media stories regarding H1N1 related deaths in the province and around the world. The present study found the H1N1 media news stories were more likely to impact those nurses who had been vaccinated or intended to be vaccinated for seasonal influenza. In addition, the majority of all nurses surveyed were aware that the H1N1 vaccine would not protect them from seasonal influenza. While this study did not specifically examine the reasons for H1N1 vaccination, and without other available studies in the literature, it is possible that the epidemic and its extensive media coverage may have affected the uptake of the seasonal influenza during this flu season.

Demographics

This study found that the vaccinated and unvaccinated nurses were not statistically different with regard to most of the demographic variables: age, ethnicity, number of children and adults living in the household, marital status, education, smoking status, and history of chronic medical conditions. Furthermore, the groups did not differ with regard to the total number of years worked as a nurse or the number of years at their current hospital. One previous study (Walker et al., 2006) suggested that HCWs who had worked more than 10 years were more likely to be vaccinated. Previous studies have also shown that females, those older than 40 years of age, and those with a chronic medical condition were more likely to be vaccinated (Kwong et al., 2007; Saluja, Theakston, &

Kaczorowski, 2005). More than two-thirds of respondents in the current study were over the age of 40 and had been nursing more than 10 years. According to the College of Nurses of Ontario (2002), the average age of a registered nurse practicing in Ontario in 2002 was 44.3 years. This may account for the age of the respondents in the current study. Another possible explanation for the higher response rate among this age group may be a greater possibility of having experienced influenza and being familiar with other influenza outbreaks in the past. However, there was no significant difference in age between the vaccinated and unvaccinated groups in this study. A larger sample size may be needed to determine significant differences between age groups.

An interesting finding, although not found to be statistically significant in the multivariate analysis, was that the majority of respondents worked on medical surgical units and were the highest vaccinated group in this study, followed by nurses who worked in the intensive care unit and the operating room. The lowest responding group were those nurses who worked in the nursery and neonatal intensive care unit. This information must be interpreted with caution as it stresses the importance of adjusting for other variables. The lack of response by these nurses may be related to low vaccination rates which could put their patients at increased risk for contracting influenza in the event of an outbreak.

Predictors of Influenza Vaccination

Results of the present study showed that five variables were independent predictors of influenza vaccination or intent to vaccinate in the current season; having been immunized for seasonal influenza in the previous flu season, nurses' beliefs that their job put them at greater risk for influenza, their immune system would not protect

them from influenza, the availability of workplace vaccination clinics/campaigns, and obtaining vaccination was convenient.

Vaccination in the previous season. Based on this study, nurses who received the vaccine in the previous season were 35 times more likely to obtain the vaccine in the current season than nurses who did not receive the vaccine in the previous season. This finding was consistent with previous research done by Abramson & Levi (2008) and Fernandez et al. (2008), who found that HCWs were more likely to obtain the flu vaccine if they had been vaccinated in the previous season. The importance of this finding may suggest that the most recent experience the nurse has with influenza vaccination establishes a pattern for vaccination in the future. With the literature supporting the safety and effectiveness of the vaccine, in all likelihood the experience of vaccination was a positive one, free from illness and thus, deemed a worthwhile investment in the prevention of influenza. However, the low vaccination rate among nurses in this study supports the need for mandated vaccination to increase overall influenza vaccination rates among hospital nurses.

Perceived susceptibility. The belief by nurses that their hospital job put them at greater risk for contracting influenza was another predictor of vaccination. In fact, nurses who believed they were at increased risk for influenza due to their occupation were 12 times more likely to obtain influenza vaccination than nurses who did not believe their job put them at increased risk for influenza. This finding addresses the construct of perceived susceptibility, which was referred to as self protection in other studies. Self protection can be interpreted as a benefit of vaccination and was identified as a motivator for nurses' vaccination in several studies (Christini et al., 2007; LaVela et al., 2004; Toy

et al., 2005). Hospital administrators may be able to use this information to promote vaccination in the workplace as a necessary step in the prevention of contracting influenza. Increasing vaccination rates among nursing staff, provides increased protection for patients and coworkers as well.

Immune system. Nurses who believed their immune system would protect them from contracting influenza were less likely to be vaccinated than nurses who believed their immune system would not protect them from influenza. In the present study, the role of the immune system was shown to be another independent predictor of seasonal influenza vaccination in the current season. Only three studies (Manuel et al. 2002; Trivalle et al., 2006; Willis & Wortley, 2007) explored the concept of the immune system providing influenza protection. Manuel et al. (2002) found that unvaccinated nurses were two times more likely to believe that other preventive measures were more effective than vaccination. All three studies found that unvaccinated HCWs were more likely to identify handwashing and other preventive measures as more important than vaccination. This may speak to the success of handwashing campaigns in hospital settings. However, a more concerted effort highlighting the importance of vaccination in the prevention of influenza seems necessary to correct misconceptions pertaining to immunity and vaccination.

Inconvenience. Nurses who believed that obtaining the vaccination was inconvenient were less likely to be vaccinated than nurses who did not believe it was inconvenient. Convenience related to influenza vaccination was shown to be an independent predictor of vaccination in the current study. More than one quarter of the

unvaccinated nurses in this study reported that getting the vaccine was inconvenient, despite the availability of vaccination at the workplace.

Workplace vaccination clinics. In the present study, nurses who were influenced by workplace vaccination clinics and campaigns were nearly three times more likely to be vaccinated than nurses who were not affected by workplace clinics or campaigns. All sites offered access to influenza vaccination through mobile vaccine stations or through their employee health services department. Throughout the literature, it was evident that hospital administrators have made the availability of influenza immunization both accessible and minimally disruptive in the workplace (Ong, A. K. Y. et al., 2000; Steiner et al., 2002; Weingarten, 1989; Wells, Faris, Abell, Sweigert, & Stephens, 2008; Willis & Wortley, 2007). The use of a mobile cart improved vaccination rates in several studies (Christini et al., 2007; Kuntz et al., 2008; Ong, A. K. Y. et al., 2000; Steiner et al., 2002; and Weingarten, 1989). It is possible that nurses who are already overworked and stressed find the additional task of being immunized another burden in their busy workday. However, this finding supports the use of workplace vaccination clinics and campaigns in efforts to increase overall vaccination rates in hospitals. However, more innovative influenza campaigns may reach those not currently influenced by this health promotion strategy.

Benefits and Barriers to Vaccination

The theoretical framework used for this study was the Health Belief Model (Pender, 1996), which attempts to explain why some people adopt preventive health practices to protect themselves from illness and others do not. Section B of the survey examined the perceived barriers and benefits to receiving the influenza vaccination based

on specific statements that addressed knowledge, perceived susceptibility to influenza, perceived seriousness of influenza, and cues to actions.

Knowledge. The most consistent misconception cited in the literature was the belief that the influenza vaccine can cause the flu or flu like symptoms (Abramson & Levi, 2008; Bryant et al., 2004; Gornick et al., 2007; Manuel et al., 2002; Martinello et al, 2003; Ofstead et al., 2008; Piccirillo & Gaeta, 2006; Weingarten, 1989). This was also apparent in the present study, in which 32.1% of vaccinated nurses and 50.0% of unvaccinated nurses believed that the vaccination could cause the flu or flu-like symptoms. There continues to be a lack of knowledge regarding this, despite the fact that Canadian vaccines contain the inactivated influenza virus. This misconception may be due to the proximity of Windsor to the United States, where both live and inactivated influenza vaccines are available. The associated confusion that is generated by such variation in vaccines may partially explain this finding. However, this misconception was consistent throughout the literature in both Canada and the United States. Previous studies indicated that increased knowledge about influenza and the vaccine lead to increased vaccination rates (Martinello et al., 2003; Toy et al., 2005). This was not the case in this study. Overall, the majority of total respondents answered the remaining knowledge related questions correctly with no significant difference in responses between the vaccinated and unvaccinated nurses.

Perceived seriousness. Items that addressed the perceived seriousness of contracting influenza showed that a higher percentage of vaccinated nurses than unvaccinated nurses perceived influenza as being serious in the unadjusted analysis. Similarly, a higher percentage of vaccinated nurses reported they would not be able to

fulfill their family obligations if ill with influenza. No previous studies could be found that specifically addressed family obligations, and thus it is difficult to compare this finding with previous research. However, the current study suggests that vaccinated nurses were more likely to consider influenza a serious illness that would negatively impact their roles and responsibilities within the family. Interestingly, there was no significant difference between the vaccinated and unvaccinated groups regarding their ability to work if ill, as the majority of nurses in both groups reported that they would not be able to work if ill with influenza. This was somewhat inconsistent with other studies (Christini et al., 2007; Lester et al., 2003; Ofstead et al., 2008; Piccirillo & Gaeta, 2006; Takayanagi et al., 2007; Willis & Wortley, 2007) in which HCWs reported coming to work and caring for patients while ill with influenza. This finding may be attributed to sick benefits allotted to unionized nurses without loss of wages in Canada as opposed to the United States. It is also possible that it reflects a recent change in behaviour as a result of consistent messaging that encourages workers who are ill with the flu to stay home.

Perceived barriers. Barriers to vaccination, such as unpleasant side effects, inconvenience, and being too busy, were all significantly different between the unvaccinated and vaccinated nurses in the unadjusted analysis study. However, convenience and workplace clinics were independent predictors of vaccination in the multivariate analysis. Although side effects to vaccination have been deemed mild and short lasting, this remains a significant barrier for those who choose to remain unvaccinated (Christini et al., 2007; Ong et al., 2000; Steiner et al., 2002; Weingarten, 1989). Previous studies, including the current study, did not specifically measure the

degree of severity of side effects reported. Due to the subjective nature of pain, it may be that unvaccinated nurses have a lower tolerance for discomfort.

Another perceived barrier to vaccination was the questionable safety and effectiveness of the influenza vaccine. In comparison to unvaccinated nurses, a higher percentage of vaccinated nurses believed that the vaccine was both safe and effective; however this finding was not significant in the multivariate analysis. Fernandez et al. (2008), Goldstein et al. (2004), LaVela et al. (2004), Manuel et al. (2002), and Ofstead et al. (2008) found that unvaccinated HCWs were more likely to cite vaccine safety and effectiveness as barriers to vaccination. Previous studies support the need for increased awareness about the safety and effectiveness of the vaccine during hospital campaigns, as it appears that existing strategies have not satisfied the lingering doubts of the unvaccinated group.

Perceived benefits. Vaccination for the protection of patients, family members, and coworkers was significantly different between the vaccinated and unvaccinated groups in the unadjusted analysis only. One hundred percent of vaccinated nurses believed that the vaccine could protect their patients as compared to 80% of unvaccinated nurses. Several studies (Bryant et al., 2004; Christini et al., 2007; Tapiainen, Bär, Schaad, & Heininger, 2005; Toy et al., 2005; Trivalle et al., 2006) suggested that nurses were less likely to report protection of patients as a motivator for vaccination when compared to other HCWs. However, Esposito et al. (2007) found that protection of patients was identified as important to the nursing secotr. While previous studies explored patient and personal protection issues, they did not specifically address the protection of coworkers and family members as possible reasons for vaccination. The

present study showed that nearly all of the vaccinated nurses believed they were protecting their family members and coworkers by getting vaccinated, whereas approximately 78% of unvaccinated nurses believed that vaccination would protect family members and coworkers. These findings were significant in the unadjusted analysis only.

When asked if nurses would recommend the influenza vaccination to their patients and family members, a greater percentage of vaccinated nurses reported that they would make this recommendation. Unvaccinated nurses were less likely to recommend the vaccination to patients and family members, suggesting that their personal beliefs influence their professional practice. While not significant, this is an interesting finding as nurses are in a position to educate patients and provide the vaccine during the hospital stay.

Cues to action. According to the HBM, "cues to action are statements, warnings, comments, or other external signals that initiate or perpetuate a person's realization that he or she is at health risk" (Burns, 1992). This study showed that vaccinated nurses were more likely to be influenced by workplace clinics and campaigns as compared to the unvaccinated nurses. This study did not specifically measure the effectiveness of worksite clinics and campaigns; however, these types of health promotion strategies existed at all sites. Further studies on coverage rates before and after targeted flu campaigns would be needed to assess the overall effectiveness of these campaigns.

Ministry of Health recommendations and media news stories about H1N1 were not found to be statistically different between vaccinated and unvaccinated nurses. No previous Canadian studies explored the impact of the Ministry of Health's

recommendations on the uptake of vaccination among HCWs. Another cue to vaccination was the media awareness public service announcements related to the H1N1 pandemic. There were no prior studies related to the H1N1 media influence on seasonal vaccination uptake due to the unique and isolated nature of the pandemic. However 80% of all nurses in the present study received the H1N1 vaccine. It is possible that the media played a role in H1N1 vaccination uptake for both the vaccinated and unvaccinated nurses in the current study. Over 60% of seasonally unvaccinated nurses and over 95% of vaccinated nurses actually received the H1N1 vaccination in this study. Based on the present study, immunization in the previous season was a strong predictor of influenza vaccination and thus, the Ministry of Health public service announcements and media campaigns should incorporate the benefits of H1N1 protection in future seasonal influenza promotions since the seasonal influenza vaccine now includes protection against H1N1 as well.

Implications and Recommendations for Practice

Based on the findings of this study and the existing literature, there appears to be some ongoing misconceptions regarding the effectiveness of the flu vaccine. This study found that nurses who believed their immune system would protect them from influenza illness were less likely to be vaccinated. Efforts by hospital administrators and supervisors should focus on educating nurses on influenza and the protection offered through annual vaccination. Hospital administrators have invested in campaigns that promote the importance of handwashing as one strategy to reduce the spread of infectious diseases. However, promotional campaigns should also accurately inform nurses of the protection provided by the influenza vaccine. This study found that workplace clinics

and campaigns and convenience were all independent predictors of vaccination. This strongly supports the need for increased campaigns targeting nurses in the workplace. This study also found that vaccination in the previous season was the strongest predictor of vaccination in the current flu season. Based on this information, it is recommended that annual education and communication campaigns be held to assist in increasing overall vaccination rates for the facility and that previously unvaccinated nurses be specifically targeted. As well, education of new staff regarding influenza should be included in orientation programs to ensure nurses have accurate and complete information regarding the illness and the vaccine.

This study may guide the process for hospital administrators to reassess existing policies and create new policies regarding influenza vaccination that will increase vaccination rates, thereby reducing the risk of transmission to patients and coworkers and decreasing absenteeism among nursing staff. Increasing vaccination rates among nursing staff will also preserve valuable human resources and ensure a healthy workforce in the event of an outbreak.

This study identified a lack of knowledge regarding the influenza vaccine and its ability to cause influenza, as well as the perceived safety and effectiveness of the vaccine. Nurse educators are in a position to educate students about influenza and the vaccine. Based on this study, it is recommended that schools of nursing provide their nursing students with information on influenza on an annual basis for all years of study. Likewise, in hospitals, annual education campaigns should be implemented to ensure accurate information is relayed to both new and experienced HCWs. Findings of this

study could be incorporated into staff development and nursing orientations across education and health institutions.

The study also has implications for policy development at a provincial level. Based on continued low vaccination rates, the Ministry of Health and Long Term Care may deem it necessary to mandate influenza vaccination for HCWs who provide direct patient care. This study supports the need for increased efforts on the government's part to be informed of the current profile of our HCWs who choose to remain unvaccinated. A larger study would be warranted to confirm the vaccination status of nurses across the province.

Implications for Theory

Findings from this study identified perceived barriers and benefits to receiving the influenza vaccination. This study used the HBM as the theoretical framework for vaccination acceptance or rejection. Using the constructs of the HBM, nurse educators will be able to use a concrete example of this theoretical framework as it applies to influenza vaccination and consider its application for the adoption of other health behaviours. Figure 2 shows the HBM using the predictors of influenza vaccination for hospital based nurses found in this study. Using the constructs of the HBM, two variables that dealt with HCW perception and perceived susceptibility; "my job puts me at greater risk of getting seasonal influenza" and "my immune system will protect me from getting seasonal influenza" were found to be independent predictors of vaccination or intent to vaccinate in the current season. Using the HBM, modifying factors included "cues to action". In this study, workplace clinics and influenza campaigns were independent predictors of vaccination. No demographic variables produced significant

results in the current study. Convenience was also a predictor of vaccination, and based on the HBM, would be included under perceived barriers to receiving the vaccine. Overall, the best predictor of vaccination and the one that would most likely lead to action was influenza vaccination in the previous season. While the current model in this study does not fit all the constructs of the HBM, it serves as a starting point from which to examine other variables that could be explored in future studies.

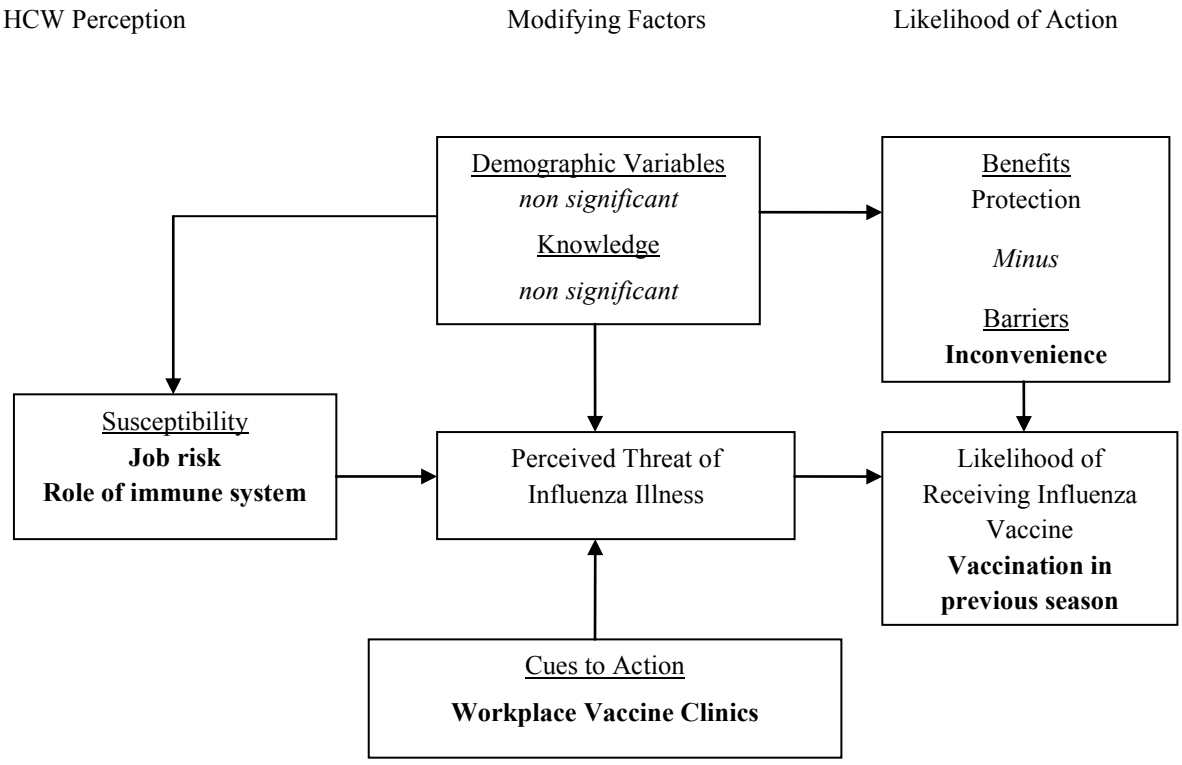

***Figure 2*. The Health Belief Model using Predictors of Influenza Vaccination for Hospital Based Nurses**

(From Becker, Haefner, Kasel et al. as cited in Pender, 1996 and Janz and Becker, 1984)

Implications for Research

This study attributed 48% - 66% of the total variance of seasonal influenza vaccination status to being immunized in the previous season, perceived job risk, role of the immune system, workplace clinics, and convenience. Further research is needed to determine additional predictors of vaccination in order to increase vaccination rates among nurses. An expansion of the study to other nurses in other facilities may facilitate this process and add to the generalizability of the study findings.

Due to the small sample size from each unit, differences between unit nurses could not be examined. Further studies targeting nurses on each unit would be beneficial in determining if vaccination status is associated with the type of unit. Information gathered could be used to increase vaccination rates on specific units. This approach may increase overall vaccination rates for the facility.

This study showed that a higher percentage of unvaccinated nurses questioned the safety and effectiveness of the influenza vaccine and were more likely to believe the vaccine caused the flu. While this finding was not significant in the multivariate analysis, it is important. The responsibility to dispel these misconceptions lies with the manufacturers of the vaccine. This study found that inconvenience was a barrier to vaccination; therefore more studies regarding perceived barriers are warranted to account for other significant variables that prevent nurses from being vaccinated.

Another implication for future research is examining the impact of the H1N1 pandemic on the uptake of the seasonal influenza vaccination. While the present study was able to examine two variables related to H1N1 and seasonal vaccination, there will be opportunities for new and innovative research in upcoming flu seasons that examine

acceptance for a seasonal influenza vaccine that includes protection against the H1N1 virus.

Limitations

Like most self-report research studies, this study is not without limitations. The online survey produced a response rate of 11% of nurses employed at the three sites combined. This percentage reflects a response rate typical of other similar studies and may suggest selection and/or response bias. It is also possible that the online survey method may not have been accessible for nurses as many nurses may not have had the time or ability to access a computer during their workday. The survey was based on self-report and there was no way of verifying actual vaccination rates. As well, there may have been a selection bias in that only the most motivated nurses or those who were interested in the research topic participated.

Another limitation identified in the present study was the use of a newly developed questionnaire. The questions were developed for the purpose of the study; however validity and reliability tests were beyond the scope of this study. Therefore, all items were treated as independent variables and thus, total scores for items related to perceived susceptibility, perceived seriousness, barriers and benefits to vaccination and cues to action were not possible. While every attempt was made to design a concise survey tool, future surveys of this kind may provide valuable information with a shorter scale of agree or disagree, rather than the likert scale used in the second half of the survey.

The overall sample size may have compromised the generalizability of the study findings to hospital based nurses. A further limitation may have been the timing of the

study with regards to the actual flu season. The survey was implemented during the influenza season while the vaccine was still available. Therefore it was necessary to classify the vaccinated group as those nurses who had already received the vaccine and those nurses who intended to receive the vaccine. It could be argued that not all nurses who intended to receive the vaccine actually received it. As well, the study did not differentiate between the absolute vaccinated group and the intended to vaccinate group. These subgroups may have provided important information not captured in the current analysis. As well, there was no way to verify actual numbers of vaccinated nurses in this study as data available reflected coverage rates for all healthcare workers.

Finally, the H1N1 outbreak during the research study could have influenced responses to the survey. With the emphasis on H1N1 vaccination, along with staggered H1N1 vaccination for those at risk and the delay of the seasonal influenza vaccine, the focus was on H1N1 immunization, which may have inadvertently minimized the importance of the seasonal influenza vaccination.

Conclusion

In conclusion, the findings of this study suggest that immunization of nurses in the previous influenza season, perception of increased job risk, perception of poor influenza protection provided by the immune system, workplace clinics and campaigns, and the convenience of obtaining vaccination were all independent predictors of influenza immunization in the current season. Thirty-two other variables that were associated with immunization in the crude analysis were not found to be independent predictors of influenza vaccination in this study. This is an important finding as few studies actually examined the predictors of influenza immunization; however in those

that did, influenza vaccination in the past was found to be a predictor for immunization (Bautista et al., 2006; Trivalle et al., 2006). This study suggests the need to target nurses at an early stage in their education and careers to adopt influenza vaccination as an annual health behaviour in the prevention of influenza. This study also supports the existing literature as it pertains to common misconceptions around the vaccine and the need for educators and hospital administrators to provide annual accurate information during seasonal influenza seasons in order to increase overall vaccination rates for HCWs. Strategies that promote the influenza vaccination by implementing workplace clinics and campaigns and making the vaccination convenient for the nursing staff are supported through this study.

In this study, influenza vaccination in the previous season was the strongest predictor of vaccination. This finding is perhaps most significant for policy makers. Ministry of Health mandates and hospital policy makers are in a position to make sustainable changes to existing recommendations for influenza immunization by making the annual vaccination for HCWs a requirement. Based on this study and the implications for practice and theory, this may be a necessary next step in addressing low vaccination rates among nurses and minimizing the spread of influenza in the future.

Appendix A

LETTER OF INFORMATION FOR CONSENT TO PARTICIPATE IN RESEARCH

Title of Study: Exploring the Predictors of Influenza Vaccination among Hospital Based Nurses

You are being asked to participate in the above titled thesis research study that is being conducted by Theresa Marentette as part of the Master's of Nursing Science degree. If you have any questions or concerns about the research, please feel free to contact me by telephone at 519-735-1529 or by email at marentb@uwindsor.ca; or my thesis advisor, Dr. Maher El-Masri, at 519-253-3000 ext. 2400.

PURPOSE OF THE STUDY

The purpose of this study is to explore the attitudes and beliefs of hospital based nurses regarding the seasonal influenza vaccine.

PROCEDURES

If you volunteer to participate in this study, you will be asked to:

1. Login to the survey using the user ID and password.
2. Enter your unique identifier code using the prompts given.
3. Complete all sections of the influenza vaccination questionnaire. You will provide demographic information and answer 33 questions regarding seasonal influenza vaccination.
4. Complete a second survey two weeks later.
5. It is expected that it will take approximately 10-15 minutes to complete the questionnaire.

POTENTIAL RISKS AND DISCOMFORTS

There are no foreseeable physical risks. It is however possible that there may be a very minimal risk of discomfort, or inconvenience associated with participation in this study.

POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY

Your participation in this study may help identify the benefits and barriers of seasonal influenza vaccination as perceived by nurses working in hospital settings. It also presents you with the opportunity to contribute to research relevant to the nursing profession. The findings will provide additional information regarding vaccination of healthcare workers in Ontario.

PAYMENT FOR PARTICIPATION

Upon completion of the second survey, you will have the opportunity to be entered into a draw and win one of fifteen $100 gift certificates to Devonshire Mall. You will be notified by email or telephone if you are a prize winner.

CONFIDENTIALITY

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission.
To ensure the confidentiality of your responses, you will be assigned a unique identifier code that will be identifiable by only you. This code will allow matching of the two questionnaires without allowing the researcher to know who you are. Upon completion of the second survey you will have the opportunity to be entered into a draw. If you choose to provide your contact information (name, phone/email), this information will be stored in a separate database and will not be linked to your survey in any way. The contact information will be deleted following the draw. Your participation in the draw will be kept confidential.
Data from the online questionnaire submissions will be stored at the University of Windsor and entered into a computerized data file that will be assigned a secure password. To prevent the researcher or others knowing nurse's identities, the surveys and computerized data entries will be identified only by their assigned codes.

PARTICIPATION AND WITHDRAWAL

Participation in this study is completely voluntary. You may choose to withdraw from the study at any time with no consequence. You may also refuse to answer specific questions and still remain in the study. The investigator may withdraw you from this research if circumstances arise which warrant doing so.

FEEDBACK OF THE RESULTS OF THIS STUDY TO THE SUBJECTS

A summary of the initial research findings will be made available on the website.
Web address: www.uwindsor.ca/flusurvey
Date when results are available: _____

SUBSEQUENT USE OF DATA

This data may be used in subsequent studies.

RIGHTS OF RESEARCH SUBJECTS

Please be informed that your consent is implied in completing and submitting the survey. You may withdraw your consent at any time and discontinue participation without penalty. This study has been reviewed and received ethics clearance from the University of Windsor Research Ethics Board and your hospital's Ethic Board. If you have any questions or concerns resulting from your participation in the study, contact: Research Ethics Coordinator, University of Windsor, Windsor, Ontario, N9B 3P4; Telephone: 519-253-3000, ext. 3948; e-mail: ethics@uwindsor.ca .

SIGNATURE OF INVESTIGATOR

These are the terms under which I will conduct research.

_____ _____

Signature of Investigator Date

Please print this form for your records.

Appendix B

Seasonal Influenza Survey
Section A *– Demographics*
This survey is designed to assess the knowledge and perceptions of nurses regarding Seasonal Influenza vaccination.

Age in years	Gender ☐Female ☐Male ☐Other	Ethnicity ☐White ☐Black ☐Asian ☐Aboriginal ☐Other

Marital Status
☐ Married/Common law ☐ Single ☐ Separated/Divorced ☐ Widowed

How many children are presently living in your household?
☐ None Number of children ____ Ages: 0-2 yrs ____ 3-12 yrs ____ 13-18 yrs ____ >19 yrs ____

How many adults, including yourself, are living in your household?
Number of adults ____ Is anyone over the age of 65? ☐ Yes ☐ No

What is your current nursing designation?
☐ RN ☐ RN (EC) ☐ RPN ☐ Other

What is your highest level of education?
☐ Hospital Graduate ☐ College Diploma ☐ University Degree ☐ Master's Degree ☐ Other

What is your total number of years of service as a nurse? ____

What hospital do you currently work at?
☐ Hotel Dieu-Grace ☐ Windsor Regional-Met Campus ☐ Windsor Regional-Western Campus

What is the total number of years working at your current hospital? ____

What is your current employment status?
☐ Full time ☐ Part time ☐ Casual

In your current position, do you provide direct or indirect patient care?
☐ Direct patient care ☐ Indirect patient care

Do you have any contraindications to receiving the seasonal influenza vaccination?
☐ Yes ☐ No

Are you a smoker? □ Yes □ No
Do you have a chronic medical condition? □ Yes □ No
Have you ever received the seasonal influenza vaccination in the past? □ Yes □ No
Did you receive the seasonal influenza vaccination this past flu season (last year)? □ Yes □ No
Do you plan to be or have you been immunized against seasonal influenza in the current flu season? □ Yes □ No
Do you plan to be or have you been immunized against H1N1 in the current flu season? □ Yes □ No

Section B

To best answer each question, please rate how strongly you agree or disagree with each of the following statements.

	Strongly Agree	Agree	Somewhat Agree	Disagree	Strongly Disagree
1. The seasonal influenza vaccine can cause the flu or flu like symptoms.					
2. Seasonal influenza vaccination is recommended for healthcare workers.					
3. Seasonal influenza vaccination is not contraindicated in pregnancy.					
4. Fever, headache and body aches are symptoms of influenza.					
5. Seasonal influenza vaccination is recommended annually.					
6. Seasonal influenza vaccination will provide protection against the H1N1 virus.					

7. I am at risk of getting seasonal influenza if I am not vaccinated.					
8. My job puts me at greater risk for getting seasonal influenza.					
9. My immune system will protect me from getting seasonal influenza.					
10. Handwashing is more important than vaccination in the prevention of seasonal influenza.					
11. I have never had seasonal influenza or an influenza-like illness.					
12. Seasonal influenza is not a serious illness.					
13. I would still be able to work if I was sick with seasonal influenza.					
14. I would still be able to fulfill my family and social obligations if I was sick with seasonal influenza.					
15. I cannot spread seasonal influenza if I am asymptomatic.					
16. The seasonal influenza vaccine is safe.					
17. The seasonal influenza vaccine is effective in preventing seasonal influenza.					
18. By getting vaccinated against the flu, I am protecting my patients.					
19. By getting vaccinated against the flu, I am protecting my family.					
20. By getting vaccinated against the flu, I am protecting my coworkers.					
21. A dislike of needles prevents me from getting the flu shot.					
22. The seasonal influenza vaccination has unpleasant side effects.					
23. It is inconvenient getting the seasonal influenza vaccination.					
24. I am too busy to fit the seasonal influenza vaccination into my schedule.					

7. I am at risk of getting seasonal influenza if I am not vaccinated.					
25. Local and provincial media campaigns influence my decision to receive/not receive the seasonal influenza vaccine.					
26. Workplace vaccination clinics and campaigns influence my decision to receive/not receive the seasonal influenza vaccine.					
27. Ministry of Health recommendations influence my decision to receive/not receive the seasonal influenza vaccine.					
28. Recommendations by coworkers influence my decision to receive/not receive the seasonal influenza vaccine.					
29. Having known a family member/patient who had influenza influenced my decision to receive/not receive the vaccine.					
30. Having been sick with influenza or an influenza-like illness in the past influenced my decision to receive/not receive the seasonal vaccine.					
31. Media news stories about the H1N1 virus have influenced my decision to receive/not receive the seasonal influenza vaccine.					
32. I would recommend the seasonal influenza vaccination for my patients.					
33. I would recommend the seasonal influenza vaccination for my family.					

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VITA AUCTORIS

Theresa Marentette was born in Windsor, Ontario. She attended Tilbury District High School and graduated from Kennedy Collegiate Institute in 1979. From there she went on to the University of Windsor where she obtained a B.Sc. in Nursing in 1983. She has been working in the healthcare field since graduating. She enrolled in the M.Sc in Nursing in 2007 and will graduate in Spring, 2011.