SPECIAL PAPER

Why are Healthcare Workers so Resistant to the Acceptance of Influenza Vaccine? a Review of the Literature to Examine Factors that Influence Vaccine Acceptance

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Abstract

Influenza vaccination rates among healthcare workers (HCWs) remain low. The purpose of this paper was to examine the literature for factors that influence the acceptance of influenza vaccine by HCWs, 2) review the literature to examine knowledge that HCWs have of influenza disease and influenza vaccination and 3) and point to gaps in the research that may give guidance towards development of interventions to increase vaccine acceptance. By far the most common barrier noted in the studies was the misperception among HCWs, especially those in the nursing profession, that influenza vaccine causes severe side effects and/or causes influenza disease. In addition, there is lack of knowledge that HCWs can transmit influenza to their patients especially when the HCW come to work ill. There is a lack of understanding by many HCWs, especially nurses, that influenza is a serious and life-threatening disease. Although many HCWs are resistant to take an annual influenza shot, nurses have proven to be the most resistant. If patients are to be provided with the benefits of vaccination against influenza then HCWs and in particular nurses need to be convinced of the safety and effectiveness of the vaccine for their patients and themselves. Therefore it is imperative that we discover why these HCWs have proven to be so resistant to acceptance of influenza vaccine, in order to achieve the 2020 goal of 60% vaccination rate among HCWs.

Key words and phrases: Influenza, influenza vaccine, influenza transmission by healthcare workers, beliefs and attitudes towards influenza vaccine, and barriers to vaccine

Introduction

Influenza is a seasonal contagion that is of worldwide importance. It is usually self-limiting but may cause serious complications and death. Globally, severe influenza infections develop in 3-5 million people annually, resulting in approximately 250,000 – 500,000 deaths. Approximately 20% of children and 5% of adults worldwide develop symptomatic influenza each year. Usually the burden of suffering falls on two age groups; persons aged 65 years or older have the most morbidity and mortality followed by very young children ages 0-59 months of age. It is the fifth leading cause of death in the United States among those aged 65 years and older (Atkinson, Hamborsky, McIntyre, & Wolfe, 2007; Bartlett & Hayden, 2005; Kimura, Nguyen, Higa, Hurwitz, & Vugia, 2007; Nicholson, Wood, & Zambon, 2003; Norton, Scheifele, Bettinger, & West, 2008; Rangel, et al., 2005). There are approximately 36,000 deaths and 244,000 hospitalizations in the United States annually due to influenza (Atkinson, et al., 2007).

Healthcare workers (HCWs) are considered vectors of influenza as they can acquire influenza from their patients or the community and/or transmit influenza

to other patients and staff (Burls, et al., 2006; Carman, et al., 2000; Hofman, Ferracin, Marsh, & Dumas, 2006; McEwen & Farren, 2005; Pearson, Bridges, & Harper, 2006a; Toy, Janosky, & Laird, 2005; Wilde, et al., 1999). They often care for patients while they themselves are suffering with respiratory infections thus exposing their patients (Habib, Rishpon, & Rubin, 2000). The Centers for Disease Control defines HCWs as physicians, nurses, nursing assistants, HCW students, lab personnel, housekeepers and any other auxiliary personnel that may come in contact with patients (CDC, 2005).

The low vaccination rate of HCWs for influenza is particularly problematic because of their close contact with hospitalized children, with patients with debilitating diseases, and with residents of long-term care facilities (LTCF) whom are particularly vulnerable to influenza and influenza-related complications such as pneumonia (Burls, et al., 2006; Carman, et al., 2000; H. C. Maltezou & Drancourt, 2003; Pearson, et al., 2006a). Many HCWs come to work and care for their patients while sick with influenza because they do not want to overburden other staff by calling in sick (Weingarten et al 1989). Residents in long term care facilities (LTCFs) may experience attack rates as high as 60% and fatality rates of 55% (Atkinson, et al., 2007). In these facilities resident immunization is the cornerstone of primary prevention efforts. Although residents are routinely vaccinated, influenza outbreaks still occur even with optimal resident immunization rates; and these nosocomial outbreaks are a significant source of morbidity and mortality. Outbreaks occur because HCW vaccination is an often overlooked strategy for preventing the spread of the influenza virus (Nace, Hoffman, Resnick, & Handler, 2007).

Influenza vaccine administered to HCWs has proven to be effective in reducing the spread of disease from HCWs to vulnerable patient populations including residents of LTCFs, and patients in neonatal, pediatric and adult intensive care units (Pearson, Bridges, & Harper, 2006b). In a study conducted over three consecutive influenza seasons from 1992-1993 to 1994-1995, 13.4% of young healthy unvaccinated HCWs had serological evidence of influenza compared to 1.7% of vaccinated HCWs (Wilde, et al., 1999). Even so, the acceptance of the annual influenza vaccine by HCWs remains low world-wide (H. Maltezou, et al., 2008). One of the national health objectives of Healthy People 2010 was to achieve HCW vaccination coverage of at least 60% by 2010 (objective no. 14-29g) ("Healthy People 2010," 2000). This goal was not met; and the same objective has been carried it over in the 2020 national objectives of Healthy People ("Healthy People 2020," 2010).

The purpose of this paper is to: 1) review the literature for factors that influence the acceptance of influenza vaccine by HCWs, and 2) review the literature to examine the knowledge that HCWs have of influenza disease and influenza vaccination, and 3) point to gaps in the research that may provide guidance towards the development of interventions to increase vaccine acceptance.

Literature Review

An electronic review of the literature was conducted utilizing the following databases MEDLINE, PubMed, CINAHL (Cumulated Index of Nursing and Allied Health Literature) and EBSCO, to identify published studies that examined the relationship of factors that influence the HCWs acceptance of influenza vaccine. Key words and phrases were nurses, health care workers, influenza, influenza vaccine, acceptance of influenza vaccine, beliefs about influenza vaccine and attitudes towards influenza vaccine. Only articles in English were accepted. Acceptable dates were from 1981-current. The dates were chosen because most national health policies started to recommend that HCWs accept the influenza vaccine on an annual basis in the early 1980's.

The articles were examined for criteria that may influence the acceptance of influenza vaccine by HCWs. The criteria included examination of attitudes, knowledge, beliefs and organizational factors that could influence their acceptance of the influenza vaccine. In addition this review examines acceptance by different HCWs primarily physicians, nurses and other professional and support staff. Forty relevant articles from 1985-2009 met the criteria of noting specific factors that influence HCWs to accept influenza vaccine.

Overview of selected articles

Eighteen of the 40 studies had been conducted in the United States. Twenty-two of the studies

examined research conducted in Australia (n=1), Brazil (n=1), Canada (n=5), France (n=1), Greece (n=1), Germany (n=1), Israel (n=3), Italy (n=2), Netherlands (n=1), New Zealand (n=1), Slovakia (n=1) Switzerland (n=1), and the United Kingdom (n=3).

The studies took place in a variety of settings and so examined HCWs from a wide variety of specialties. The settings included acute care hospitals, teaching hospitals, psychiatric hospitals, long term care facilities (LTCF) and outpatient health clinics. In five studies, HCWs were recruited from a variety of databases without regard to practice settings.

Thirty-eight studies collected quantitative data by questionnaire surveys of nurses, physicians and/or HCWs. The knowledge, attitude, beliefs and other factors were usually reported using a researcher-developed questionnaire. The remaining two studies were focused group interviews of nurses only. Six studies focused on the nurses' acceptance of the influenza vaccine, 4 focused on physicians, 1focused on physicians and nurses and the rest focused on HCWs, as a whole, although many of the studies categorized HCWs into different groups such as physicians, nurses, allied health professionals and administrative staff.

Factors decreasing influenza vaccine acceptance by HCWs

Fear and mistrust of the vaccine. Myths and misperceptions have been associated with the HCWs not accepting the vaccine. Thirty-five out of the 40 articles reviewed reported that the HCWs had some concern regarding adverse reactions and safety of the influenza vaccine. Fifteen of those studies had it listed as the first reason why a HCW refused the vaccine (Table 1). The most common myths are perceptions that the influenza vaccine causes severe side effects and/or illnesses. These misperceptions and negative beliefs toward the vaccine act as a barrier for HCWs to take the influenza vaccine (McEwen, M. & Farren, E. 2005).

In a study, conducted at a large teaching hospital in the US, revealed that only 18.1% of employees had accepted the influenza vaccine during the 1990-1991 influenza vaccination campaign. A self-designed questionnaire to explore the attitudes of the HCWs was given to all full time and part time employees. Only 1203 (34.3%) out of 3,501employees returned the survey. The most common reason for not accepting the vaccine was "heard it had bad side effects"(Watanakunakorn, Ellis, & Gemmel, 1993).

In a large psychiatric hospital in New York State concern was expressed about the low number of HCWs accepting the influenza vaccine during a large out break at the hospital and therefore a study was conducted to explore why there was such a low uptake. Out of 1,293 employees, 922 (71.3%) volunteered to participate in the research. Even though 98% of the physicians and nurses knew that HCWs could transmit influenza to their patients, fewer than 20% of employees received the vaccine during the 1989-1990 influenza season. The primary reason given was the fear of side effects (Heimberger, et al., 1995).

In a 2005 study in the United Kingdom researchers invited 11,670 HCWs from six UK hospitals to participate in the study. Six thousand and two (54%) participants responded. Only 19% reported taking the influenza vaccine during the 2002/3 influenza season. Among the 3967 participants who refused the influenza vaccine, 1211 (31%) had concerns about side effects and the safety of the vaccine. Of the 1203 who were vaccinated 155 (13%) reported side effects including 24 (2%) had to take time off of work because of the side effects. Nurses were significantly more likely to report vaccine-related side effects than any other group (Smedley, et al., 2007).

In a cross-sectional, self-designed study based on the Health Belief Model (HBM) conducted on nurses in Texas in 2006, out of 1000 nurses invited to participate, only 246 (24.6%) questionnaires were returned. Sixty-nine percent of this group reported having been immunized during the last 4 years. The most common reason for refusing the vaccine was concern about the side effects. Side effects that were reported during this study included sore arm, body aches, fever, sore throat and cough. No one reported serious side effects such as seizure or paralysis (McEwen & Farren, 2005).

In a 2007 study, 8 focus groups were held with nurses from urban settings 4 in Birmingham, Alabama and 4 in Detroit, Michigan. Twelve nurses were recruited for each group; and each group had approximately 9 participants. In each city, 2 groups consisted of vaccinated and unvaccinated RNs. Nurses in both groups (vaccinated and unvaccinated) verbalized concerns regarding safety of vaccine. One nurse stated, "I took one [flu shot] a

couple of years ago and my whole family got the flu.
I didn't take it last year, and we never got it" (Willis & Wortley, 2007).
In a 2009 cross-sectional study conducted in four different states in the US (Colorado, Florida, Missouri and Pennsylvania) 2000 registered nurses (RNs) were invited to fill out a self-designed survey to analyze their knowledge, attitude and behavior (KAB) toward influenza acceptance. One thousand seventeen (69%) surveys satisfied the criteria for analysis. Four hundred and nineteen participants did not receive an influenza vaccine. Thirty-nine percent of this population expressed concerns about the adverse reactions as their primary reason for not taking the vaccine. Another 19% stated that their primary reason for refusal was a concern that they would get influenza from the vaccine. Both vaccinated and unvaccinated nurses thought that the influenza vaccine adverse effects were common (Clark, Cowan, & Wortley, 2009).
A study that examined the adverse events that occurred to hospital personnel after taking an influenza vaccine concluded that most complaints related to pain at the injection site, with pain persisting on average for 1.5 days. Systemic adverse effects were described by 49% of the recipients and included a cluster of at least two of the following symptoms: generalized aching, tiredness, nausea, chills or onset of fever within 12 hours after vaccination, headache, dizziness and lightheadedness (Scheifele, Bjornson, & Johnston, 1990). Norton et al. (2008) reported that 39% (116/298) of hospital-vaccinated respondents indicated at least one post-vaccine symptom. The most common side effect was a sore arm for more than 1 day. In addition, of those reporting an adverse event 42% rated these as minimal, 39% as mild, 17% as moderate or bothersome, 3% had symptoms lasting more than one day and no serious events occurred. Saluja et al. (2005) reported that although 28.3% of respondents believed that adverse effects were common, 76.8% of those vaccinated reported having had no adverse reactions. Experiencing post vaccine symptoms for more than one day reduced the willingness of HCWs to recommend the vaccine to their co-workers (Yassi, A. et al 1994).
Despite the report of mild side effects, one study reported that 56% of physicians, 57% of nurses and 76% of pharmacists were not planning to get the vaccine because of concern of post vaccination reactions (Ballada, et al., 1994). One author stated that "35.9% of physicians" believed that the vaccine caused influenza, although it did not prevent them from recommending it for others (Abramson, Z. & Orit, L. 2008). Another study noted that whether HCWs accepted the vaccine or not they were still split 50/50 as to whether the vaccine could cause disease (Piccirillo & Gaeta, 2006).
There also appears to be a lack of trust and outright fear of the influenza vaccine. In one study, African-American nurses in both vaccinated and unvaccinated groups brought up the historical mistrust that (African-Americans) have toward vaccination programs stemming from the Tuskegee syphilis experiment (Willis, B. & Wortley, P. 2007). A study done in Slovakia reported that medical students and nurses did not "trust" the vaccine. Researchers were also surprised when they realized that medical students and nurses were basing their opinions of the influenza vaccine on the mass media rather than from knowledge garnered from their medical and nursing studies (Madar, Repkova, Baska, & Straka, 2003).
Concerns regarding the effectiveness of the vaccine.
The second most common misperception about the influenza vaccine is that the vaccine does not work. Twenty-five out of the 40 studies had this listed as a reason for not obtaining an influenza vaccination.
Two long-term-care-facilities participated in a cross-sectional, self-administered survey of HCWs behavior with influenza vaccination in January 1999. This survey was augmented by a focus group to further examine attitudes toward vaccination. Non-vaccinated respondents were aware that they could spread the disease and did place value on the protective effects of vaccination, but they also commonly believed that the vaccine does not work (Manuel, Henry, Hockin, & Naus, 2002).
An early study conducted in the United States in 1989 on physicians and nursing personnel revealed that only 2.1% of staff had received the influenza vaccine during the 1986-1987 influenza season despite ACIP recommendations. Analysis of the reasons for declining vaccination concluded that nurses were more skeptical about the vaccine's efficacy (37.8% versus 8.2%, $p<0.05$) than were physicians (Weingarten et al 1989).
During the 1999-2000 influenza season researchers at the University of Wisconsin Hospitals and

Clinics conducted a survey on vaccine recipients and employees who refused the vaccine. Of the 445 unvaccinated participants 319 (72%) refused vaccination because of concern that multiple strains exist and the vaccine does not prevent influenza (Steiner et al 2002).

In a 2004 study on 48 medical residents' knowledge and attitudes towards influenza vaccine, researchers found that 11.1% of non vaccinated residents thought the influenza vaccine was non-effective (Toy, et al., 2005). This study was limited by the small sample size; but in a 2005 study on 205 of resident physicians at an urban teaching hospital found that more than one third had never been vaccinated and 38.3% did not intend to get vaccinated the following year. Twenty-four percent of the non-vaccinated residents had doubts about the influenza vaccine's effectiveness and 8.3% put it has the number one reason for refusal (Wodi, et al., 2005).

In a study conducted in Switzerland after the 2003-2004 influenza season a questionnaire was sent out to 538 HCWs at a children's hospital. Four-hundred-and-six (75%) returned the questionnaire. Despite the institution offering information and the influenza vaccination for free the immunization rate remained low. Among vaccine nonrecipients, doubts about efficacy and need were the reasons most often given for refusal. This occurred more often among nurses than medical staff (Tapiainen, Bar, Schaad, & Heininger, 2005). A study conducted in Italy revealed that OB/GYN physicians never recommended it to their patients because of doubts about its efficacy (Esposito, et al., 2007).

In a 2008 study undertaken in Greece, 4 focus groups were conducted among 30 nurses to explore the knowledge, attitudes and beliefs of nurses in Greece towards the influenza vaccination. Barriers identified included the perception that the vaccine lacked efficacy, as one nurse working in a public hospital commented, "…I believe the vaccine is 40% effective…" (Raftopoulos, 2008). Another study reported that nurses were concerned about the variability of influenza strains and the effectiveness the vaccine from year to year: "Every year there's a new strain of influenza; yearly it's a new vaccine, and I don't think that's enough time to have adequate research studies on the long-term effects" (Willis & Wortley, 2007).

Lack of knowledge regarding influenza and transmission.

A study conducted on the correlation between HCWs knowledge of the influenza vaccine and subsequent acceptance of vaccine revealed that deficits in general influenza acknowledge acted as a significant barrier for nurses and nursing assistants acceptance of the vaccine. A questionnaire asking 5 questions regarding knowledge of influenza itself was given to 215 HCWs working in a large urban hospital. Nursing staff that answered all five of the knowledge questions regarding influenza had a significantly higher vaccination rate. Nurses who had even one incorrect response to the knowledge questions were more likely to refuse the vaccine. This study found that deficits in general influenza vaccine knowledge acted as a significant barrier to acceptance of vaccine especially within the nursing groups (Martinello, R., Jones, L. & Topal, J. 2003).

In another study conducted in Italy in 2007 the fact the HCWs did not have enough knowledge about influenza and vaccination proved to be a barrier in making recommendations for vaccinations. Researchers noted that only a small number of respondents considered influenza a serious disease, although they were aware of the epidemiology and knew of preventive recommendations or measures. Poor knowledge of influenza and its vaccine acted as a barrier for the participants (Esposito, et al., 2007). A greater number of nurses reported being unaware of the severity of influenza as compared to physicians and pharmacists (Ballada, et al., 1994).

In addition there is pervasive lack of knowledge that HCWs are often sources of the spread of influenza among patient populations especially when they come to work with symptomatic or asymptomatic influenza. Saluja et al (2007) conducted a study on emergency department personnel in four teaching hospitals and revealed only 26.8% of staff believed that patients could get influenza from infected HCWs. However, researchers have concluded that health care workers have been implicated in the transmission of influenza in several healthcare settings. Authors examined the data from 1959-1999 from 14 hospitals in the Midwest and concluded that out of 13 outbreaks, 5 were traced to nosocomial transmission from infected HCWs (Evans, Hall, & Berry, 1997).

In a study conducted in Glasgow 518 HCWs were serologically tested for Type A & B influenza strains in February of the 1993-1994 influenza season. None of the participants had taken the influenza vaccine for that year. Twenty-three percent of unvaccinated HCWs in this study had serologic evidence of influenza during a relatively mild influenza season compared to 0.15-0.2% of the general population during the same period (Elder, O'Donnell, McCruden, Syminton, & Carman, 1996).

Other reasons why HCWs fail to be vaccinated.

Other barriers to influenza vaccination include organizational or institutional barriers, general vaccine inaccessibility, or lack of positive incentives for obtaining the vaccine (Nace, et al., 2007). A common barrier reported in the literature was the ease of obtaining the vaccines. Institutions which initiate an aggressive influenza vaccination campaign often report higher than average HCW acceptance of the vaccine (Hofmann, Ferracin, Marsh, & Dumas, 2006). Wodi et al. (2005) reported that inconvenience of accessing the vaccine program was a barrier to receiving the vaccine. Cannning, Philips & Allsup (2005) reported that vaccine acceptance was influenced by the availability of vaccine. For example, in one influenza campaign the vaccine was administered one day a week between the hours of 8:30-16:30. If an HCW staff worked different shifts or days they were not vaccinated. This suggests that institutions who do not make it readily available to all staff have less vaccinated HCWs. Another study reported that one reason for non-acceptance is that their institution never offered it to them (Yassi, Murdzak, Cheang, Tran, & Aoki, 1994).

Factors that increase influenza vaccine acceptance

Self protection. Twenty-three out of 40 studies stated that the most common reason given for accepting the vaccine was for self-protection or to protect the HCW's families. A survey of HCWs in Italy concluded that acceptance of the influenza vaccine for personal protection was the most common reason for taking influenza vaccine (Ballada, et al., 1994). A 2004 study the examined attitudes of HCWs working with high risk spinal cord injury patients also reported self protection as the most common reason for acceptance of influenza vaccine (LaVela, et al., 2004).

Increasing age. Thirteen studies mentioned that increasing age had a positive correlation toward influenza acceptance. In a study conducted in a large U.S. hospital emergency department revealed that for every 10-year incremental increase in age, staff were 1.4 times more likely to receive the vaccination (Piccirillo & Gaeta, 2006). Doebbling et al. 1997 noted that vaccine acceptance was significantly associated with advancing age among nurse clinicians and nonprofessional staff. The authors further went on to discuss whether this was due to the staff becoming aware of the increased risk from disease or understanding that the vaccine was effective. A study conducted in Brazil reported that older employees had a higher acceptance rate for influenza vaccine. Two of the reasons for this were attributed to the greater professional experience and scientific knowledge of older health professionals (Takayanagi, Cardoso, Costa, Araya, & Machado, 2006).

Chronic illness. Having a chronic illness such as asthma and diabetes can also be a predictor for obtaining the influenza vaccine (Saluja, I., Theakston, K. & Kaczorowski, J. 2005). Having had an influenza-like-illness (ILI) in the past was also a predictor of vaccine acceptance. A study that surveyed 1,718 HCWs in a large hospital in the Midwest reported that more than half who received the vaccine reported having an influenza-like-illness in the past and desired prevention (Steiner, Vermeulen, Mullaby, & Hayney, 2002). Another study conducted on 230 emergency room staff found that the number of participants that reported having had a febrile illness, severe illness, and febrile upper-respiratory-tract illness had a higher receipt of vaccine than among non-recipients (Piccirillo, B. & Gaeta, T. 2006).

Increased knowledge of influenza and influenza vaccine. Having knowledge that the vaccine was effective in preventing influenza was also a predictor for vaccine acceptance. For example Chapman and Coups (1999) concluded that healthy adults accepted the vaccine based on perceived effectiveness of the vaccine. These predictors were similar to predictors identified in studies of high-risk patient populations and HCWs acceptance of influenza vaccine.

Studies conducted on HCWs reveal that having a good understanding of the seriousness of influenza

and the benefits of vaccine versus any side effects may increase vaccine acceptance. Physicians in general had more knowledge than nurses about influenza and influenza vaccine (Martinello, Jones, & Topal, 2003). A survey of attitudes of residents regarding influenza vaccine revealed that knowledge led to higher vaccination rates (Nafziger, D. & Herwaldt, L. 1993). In another study of the medical residents' acceptance of the influenza vaccine, those with higher medical knowledge scores were significantly more likely to be immunized and recommend the vaccine to patients. The most common reasons given for obtaining the vaccine was because they felt they were personally at risk of getting influenza due to their work environment; and they did not want to transmit influenza to their patients (Toy, et al., 2005). Physicians who had a good understanding of influenza and its complications and understood that HCWs can spread disease were more likely to obtain the vaccine than those who did not (Cowan, Winston, Davis, Wortley, & Clark, 2006). Two studies noted that nurses who accepted the vaccine had a better knowledge of the seriousness of influenza than those who did not (Shahrabani, Benzion, & Yom Din, 2008; Willis & Wortley, 2007).

Discussion

Despite the wide variation of study sizes, dates, different types of health institutions and locations the studies were surprisingly consistent in their findings. By far the most common barrier to obtaining the vaccine noted in the studies was the misperception among HCWs, especially those in nursing that the influenza vaccine causes severe side effects and/or causes influenza disease. In addition, there is lack of knowledge that HCWs can transmit to their patients especially when they come to work ill (Pearson, et al., 2006b). There is a lack of understanding by many HCWs, especially nurses that influenza is a serious and life-threatening disease (Martinello, et al., 2003; Willis & Wortley, 2007). Although many HCWs are resistant to take an annual influenza shot, nurses have proven to be the most resistant. Nurses are considered front-line providers within the health care system and have the potential to reverse low HCW rates (Willis & Wortley, 2007). A nurse's recommendation is also a positive predictor of increasing patients' acceptance of the vaccine (Brunton, Weir, & Jennings, 2005). Nurses in one study admitted they had difficulty promoting the vaccine to their patients when they had not taken it themselves. Many nurses admitted that they had a lack of knowledge of influenza and the vaccination and wished they had more (Willis & Wortley 2007).

Although nurses as a group had one of the lowest acceptance rates of the influenza vaccine, it was not clear what many authors considered as a nurse. Some included nursing assistants, licensed practical nurses, associate degree nurses, bachelor degree nurses and graduate level nursing as belonging in one group. For example, types of nurses under the heading of "nursing" may mean anyone who does "nursing care" from transporters, nursing assistants to licensed nurses (Ballada, et al., 1994; Doebbling, Edmond, Davis, Woodin, & Zeitler, 1997; Shahrabani, et al., 2008). The use of broad occupational categories may mask differences between HCWs (King, et al., 2005). For example nurse aides or health aides often have the lowest rate of vaccination versus nurse practitioners but may be placed in the same occupational category. One recommendation would be to define nurses as individuals who have attained the competency and the necessary skills to be granted licensure to practice as a nurse in their individual country.

Nurses have not been studied by educational degree. Although "nurses" have been extensively studied there has never been a breakdown of nursing staff by education, degree or specialty. For example nurses with different educational degrees and professional licensure such as licensed practical nurses (LPNs), associate degree nurses (AD), bachelor degree nurses and even nurses with advanced degrees such as a Masters or PhD have been examined all together (Shahrabani, et al., 2008). Studies on physicians have indicated a different acceptance rate by education. In most cases the higher the education, the more acceptance of influenza vaccine there is (Toy, et al., 2005; Wodi, et al., 2005). Perhaps this outcome would translate to nurses as well. For example findings in a study conducted in Germany revealed that, once nurses had increased their education and were convinced of their risk and the efficacy of the vaccine, they converted from not accepting vaccine to acceptance (Leitmeyer, et al., 2006).

Nurses have in general not been studied by specialty. For example pediatric or public health

nurses may have a higher acceptance rate of influenza vaccine than nurses who work in other specialties (Esposito, et al., 2007). In examining factors that influence the nurses' decisions regarding influenza vaccination, it is important to separate nurses by specialty. Physician specialties too have proven to influence the acceptance of influenza vaccine by physicians. Pediatricians and internists have a higher acceptance than surgeons. Physicians who see high-risk patients are more likely to accept influenza vaccination (Cowan, et al., 2006).

Nursing faculty have not been examined for their attitudes and acceptance of influenza vaccine. Research in medical students and residents indicate that faculty, especially faculty who teach infectious disease courses, have a positive influence on the residents accepting the influenza vaccine (Nafziger & Herwaldt, 1994). It could be assumed that nursing faculty who have positive attitudes toward vaccination, and the influenza vaccine in particular, would have a positive influence on a future nurse's acceptance of influenza vaccine. Nursing faculty need to be examined because in general they have higher education and more knowledge of vaccines, influenza disease and influenza vaccine than the majority of staff nurses. Nursing curriculum should also be examined for concepts of vaccination, influenza vaccination and seriousness of the disease.

Conclusion

Influenza is the most preventable disease in the United States causing approximately 36,000 deaths and 240,000 hospitalizations annually. The influenza vaccine is a proven effective measure against getting influenza. However, HCW workers have been reluctant to obtain it. Since 1981 the Advisory Committee on Immunization Practices ACIP) in the United States has recommended that healthcare workers including physicians, nurses and other health professionals working closely with patients be vaccinated annually for influenza. In 2005 the ACIP recommended that during vaccine shortages healthcare workers be considered in the group that receives vaccine first (Atkinson, et al., 2007).

Despite this strong recommendation influenza vaccine uptake by HCWs has been low. It is currently around 39%. There have been numerous studies examining the HCWs beliefs, attitudes and barriers towards acceptance of vaccine. Barriers include misperceptions that the vaccine can cause influenza, concerns about the efficacy of the vaccine, being too busy or forgetting to take the vaccine, lack of understanding or knowledge that influenza is a serious threat. The most common reasons to receive the vaccine is a perceived susceptibility toward influenza and to protect patients whom they are caring for.

There is a gap in the research of the education and practice of nurses in understanding their acceptance of influenza vaccine. Since the majority of nurses work closely with patients and come in close contact with them while doing procedures such as dressing changes, medication administration, and assessments it is imperative that this group of HCWs be further studied, to find clues as to why this sub-group is so resistant to the annual influenza vaccination. If patients are to be provided with the benefits of vaccination against influenza then nurses need to be convinced of the safety and effectiveness of the vaccine for themselves. Therefore it is critical that we discover why this group has proven to be so resistant to acceptance of the influenza vaccine in order to achieve the 2020 goal of 60% vaccination rate among HCWs.

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