Risk Characteristics of Healthcare Workers That Decline Voluntary Influenza Vaccination

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ABSTRACT

Influenza, also known as the flu, is one of the most common seasonal illnesses with outbreaks occurring each year. Transmission of the influenza virus in a hospital setting is a significant concern, because although most cases of influenza are mild, up to 25% require outpatient medical care, as many as 4% require inpatient care, and 1% require intensive care. One way to prevent influenza is through vaccination of those deemed to be high risk for contracting and spreading the disease, such as healthcare workers. The purpose of this study was to identify personal, demographic and professional characteristics of healthcare workers who decline influenza vaccination in a Southeastern United States teaching hospital. Characteristics examined in this study included gender, ethnicity, number of years employed at the hospital, personnel role and level of patient contact. The method for this research involved the utilization of existing (secondary) data from the 2010-2011 flu vaccination program gained from the employee database of the hospital. A population consisting of 22,845 healthcare workers was observed. Findings included identification of African Americans as the ethnic group with the highest declination rate. Healthcare workers with little patient contact also had high rates of declination. While physicians and nurses had relatively low rates of declination, environmental service workers had a high rate of declination. This study concluded that although specific groups were identified with high rates of declination, further research is needed to determine the reason behind declination amongst these groups and if any relationship can be made with regard to education level or job title that affects declination of the influenza vaccine. Future research is needed to understand why healthcare workers decline vaccination and how to improve vaccination rates in this population.

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CHAPTER 1

INTRODUCTION

Influenza is a common respiratory disease found in mammals and birds caused by RNA viruses of the family Orthomyxoviridae (Van Tam & Sellwood, 2009). Influenza viruses are classified in three types (A, B, and C) depending on characteristics of the illness caused (Van Tam & Sellwood, 2009). C-type influenza viruses are commonly asymptomatic or causative of symptoms classified as a common cold, while B-type influenza viruses are most commonly implicated in minor seasonal outbreaks (Van Tam & Sellwood, 2009). A-type influenza viruses, which have a biological reservoir in birds, have been most commonly associated with pandemic influenza (Van Tam & Sellwood, 2009). Specific virus isolates or strains are named based on their antigenic characteristics, leading to nomenclatures such as H1N1 or the "swine flu", which was the most common pandemic virus in 2009 (Van Tam & Sellwood, 2009). Some strains of influenza are zoonotic; that is, they can be transmitted from animals (such as birds, pigs, and horses) and vice versa (Van Tam & Sellwood, 2009).

Influenza is most commonly diagnosed by symptomatic expression which is inadequate for preventing transmission, since viral shedding, which is the contagious mechanism of the disease, may begin one day before the onset of symptoms and continue for five to ten days following symptom cessation (McLennan, Gillett, & Celi, 2008). The most common symptoms of influenza are respiratory symptoms, including coughing and congestion, as well as a fever (Van Tam & Sellwood, 2009). Less common symptoms include neurological, abdominal, and muscular effects (Van Tam & Sellwood, 2009). Although these common symptoms are relatively

mild, in populations that are susceptible (including children, the elderly, and the immunosuppressed) they may be more aggressive. Additionally, secondary bacterial infection such as pneumonia may complicate treatment and increase the danger of infection (Van Tam & Sellwood, 2009). Estimates indicate that between 17% and 25% of influenza sufferers will seek outpatient medical treatment, with 0.7% to 4% requiring inpatient treatment and as many as 1% requiring intensive care (Van Tam & Sellwood, 2009). Both the symptoms and severity of a given strain of influenza vary depending on its individual characteristics (Van Tam & Sellwood, 2009). Mortality rates also vary depending on the strain of the virus; for example, mortality for the 2009 A/H1N1 (swine flu) outbreak is estimated at an average 26 per 100,000, with a total of 138 confirmed deaths associated with this pandemic (on an estimated 540,000 infections) (Donaldson, Rutter, Ellis, Greaves, Mytton, Pebody, 2009).

Influenza has a variety of transmission methods, including direct contact, indirect contact (such as transfer through improper hand washing techniques), droplet transmission (such as that transferred by coughing or sneezing) and aerosol transmission (Brankston, Gitterman, Hirji, Lemieux, & Gardam, 2007). In low levels of humidity, the influenza virus may live up to 24 hours in aerosol form, while in high humidity the virus may remain viable for up to 60 minutes (Brankston et al., 2007). Furthermore, it has been documented that the virus can survive on surfaces, including porous and non-porous surfaces (Brankston et al., 2007). However, the most frequent route of transmission is the droplet or direct contact route.

Influenza is relatively infectious, with a review of studies finding infection rates between 0% and 37% in vaccinated populations and 33% to 55% in unvaccinated populations (Brankston et al., 2007). Influenza tends to come in waves or epidemiological outbreaks centered on a specific area, such as a hospital ward or daycare center (Brankston et al., 2007). More

problematically, influenza is frequently seen in large-scale outbreaks, characterized by "a shift in the virus sub-type shifts of the highest death rates to younger populations, successive pandemic waves, higher transmissibility than that of seasonal influenza, and differences in impact in different geographic regions" (Miller, Viboud, Balinska, & Simonsen, 2009, p. 2595). These characteristics commonly are not taken into account in public emergency planning, but can have serious consequences. For example, the three major influenza pandemics of the twentieth century all increased mortality for between two and five years following the initial outbreak (Miller et al., 2009). Not all seasonal influenza variants or novel types will result in significant pandemics, but novel types such as H5N1 (swine flu) or H1N1 (bird flu) have been of concern in recent years (Miller et al., 2009).

One of the main defenses against influenza is vaccination, in which a killed (inert) virus is injected. The process of vaccination is not perfect, and vaccine creators need to correctly predict the dominant forms of influenza for a given season. In addition, they also need to produce the vaccine in sufficient quantities to provide for everyone that requires a vaccine (Miller et al., 2009). However, the vaccine does provide significant (though not perfect) protection against influenza infection, with a 70% to 90% reduction in influenza infection (McLennan, Gillett, & Celi, 2008). There are other approaches that can be used, including antiviral medications such as Tamiflu, but these medications are variably effective and may not provide the degree of protection required for vulnerable populations (Miller et al., 2009). Non-medical approaches like isolation can also be used to prevent transmission, although these approaches will not result in improvement of the individual influenza patient's outcomes (Miller et al., 2009).

Statement of the Problem

One of the major routes of transmission for influenza is hospital settings. For example, one study that sampled air in a hospital emergency department found that airborne influenza virus was present in 53% of respirable samples (that is, those that could be inhaled by people in the area) (Blachere, Lindsley, Pearce, Anderson, Fisher and Khakoo, 2009). Although there are a number of other factors that could change the outcome of transmission in the hospital environment, this poses a significant risk for in-hospital transmission (Blachere et al., 2009). This transmission endangers both the hospital worker and the patient, who may be more vulnerable to disease due to existing illness or immune system weakness (Blachere et al., 2009).

Vaccination against influenza achieves a reduction in illness between 70% and 90%, though it is not as effective in immunocompromised or elderly people (McLennan, Gillett, & Celi, 2008). However, the degree to which hospital workers are infected with influenza (or any other minor illness) is often not tracked actively or may be overlooked because of tendencies to underreport illness or ignore minor illnesses (Drumwright & Holmes, 2011). Thus, estimating the impact of influenza on healthcare workers and their role in spreading influenza is difficult (Drumwright & Holmes, 2011).

Many, if not most, healthcare settings offer workers the opportunity for free influenza vaccinations on a seasonal basis, dramatically reducing the potential for infection (McLennan, Gillett, & Celi, 2008). However, despite this offer, and despite presumed knowledge regarding the benefits of the vaccine and the dangers of influenza (especially for those in the healthcare setting), uptake of influenza vaccination is exceptionally poor, with some voluntary programs only achieving 4% to 40% vaccination rates (McLennan, Gillett, & Celi, 2008). Furthermore, there have been no signs that voluntary vaccination programs have been improving in terms of

their individual uptake (McLennan & Wicker, 2010). In order to improve uptake of influenza vaccination, programs including mandatory vaccination and opt-out declination forms (which force those who decline to explain their reasons for doing so) have been suggested (McLennan & Wicker, 2010). However, neither of these has proved to be fully effective on their own (McLennan & Wicker, 2010). In order to achieve a better response to influenza vaccination programs for healthcare workers, it is necessary to understand what the characteristics are of those who decline vaccination.

Aims and Objectives

The aim of this research was to identify demographic and professional characteristics of healthcare workers who decline influenza vaccination in a major academic and teaching hospital in the Southeast United States. Information was utilized from declination forms including demographic and professional characteristics provided. Specifically this research sought to identify potential issues in vaccine refusal and characteristics of those that refuse influenza vaccination and to determine whether there is any relationship between their demographic, positional, and other characteristics and their vaccine refusal.

Purpose of the Study

The purpose of this study was to examine influenza vaccination rates at a hospital in the Southeastern United States. This study also examined demographic and professional characteristics to see if they have any impact on whether or not employees decline vaccination.

Limitations

1. One issue this research was not able to account for is the difference in cultural norms and values that may inform the decision to accept or decline the influenza vaccine or personal beliefs regarding this refusal. These issues could make a significant difference in

Southeastern hospitals as compared to the average hospital, but the precise effect will not be able to be determined.

2. This research was not designed to identify changes in declination rates of the flu vaccine over time. It is possible that employees may accept the vaccine one year and choose to decline in subsequent years.

Delimitations

Delimitations are the boundaries set by the researcher. The study was characterized by the following delimitations:

1. Participants are from one hospital in the Southeastern United States.

2. Participants were at least 18 years of age.

3. Data collection was limited to available data from 2010-2011 flu vaccination program.

4. Although participants are given four reasons for declination, only two were addressed.

Operational Definitions

The following refer to operational definitions used in this study.

1. Professional characteristics-refer to the employee's identified profession (see coding chart) and length of employment at the given institution.

2. Compliance rate-refers to number of employees that either received vaccination or completed a declination form.

3. Exemption status-refers to employees who declined flu vaccination for any of the following reasons:

   a. Religious reason

   b. Allergy to eggs

c. Vaccinated at another facility

d. Medical reasons

4. Declination-refers to non-exempt employees who declined vaccination for one of the following reasons:

a. I've never had the flu and don't need the vaccine.

b. I'm afraid I will get the flu from the vaccine.

Assumptions

The following assumptions were made for this study:

1. Participants' self-reports were accurate and honest and reflect their true reason for declining influenza vaccination.

2. The declination statement form was valid and reliable.

Research Questions

The research questions that were examined within this study included the following:

1. What are the stated reasons (of the four included in the standard declination form) that healthcare workers at this hospital decline the voluntary vaccination program?

2. What are the demographic characteristics of those that decline, and are these demographic characteristics associated with reasons for declination?

3. What are the professional characteristics of those that decline, and are these professional characteristics associated with declination?

4. Is there a significant difference in the demographic and professional characteristics of those that decline the influenza vaccine and those that accept the influenza vaccine?

Importance of the Research

This research was deemed important from both the professional and academic points of view. There has been relatively little research done on vaccine declination in hospitals in the Southeastern United States. This study was performed with the intent to help to fill this gap in this knowledge base and provide further information for prospective studies and experimentation. In terms of professional impact, this research was intended to provide support for the development of improved influenza vaccination programs in this hospital and around the Southeast, which could improve overall influenza vaccination rates and reduce the potential impact of a future pandemic.

Summary

As a whole, healthcare workers are aware that the influenza virus is a serious cause of death and illness in this country and a threat to both patients and healthcare workers. Steps should be taken to ensure that all eligible healthcare workers receive influenza vaccination, especially those involved in direct patient care and those working with vulnerable populations. This study was performed in order to provide information concerning the demographic and professional characteristics of those who decline voluntary influenza vaccination by analyzing data from the 2010-2011 influenza vaccination campaign at a major academic teaching hospital in the Southeastern United States. The findings from this research are intended to be used to improve the current influenza vaccination program and to encourage greater numbers healthcare workers to accept vaccination.

CHAPTER 2

LITERATURE REVIEW

The research topics addressed are summarized under various topics, including hospital vaccination program uptake, factors in acceptance of declination of vaccines, demographic and professional characteristics, the ethics and cost of vaccination, mandatory vaccination programs and declination statements.

Hospital Vaccination Program Uptake

There are a variety of different statistics that have been identified for the uptake of influenza vaccines. One study reports that 40% of healthcare workers accept influenza vaccination on a yearly basis (Doratotaj, Macknin, & Worley, 2008). However, studies in particular hospitals may yield higher rates of participation. For example, a study by Mehta, Pastor & Shah that took place in an urban teaching hospital found that 56.3% of the staff were vaccinated against influenza, based on a sample size of n = 570 (Mehta, Pastor, & Shah, 2008).

A study performed by Loulergue et al., compared overall knowledge of vaccines and their importance among varying groups of hospital staff (Loulergue, Moulin, Vidal-Trecan, Absi, Demontpion, Menager et al., 2009). This study found that overall knowledge concerning required occupational vaccinations (including HBV, Varicella, and influenza vaccines) was low in most categories of respondents (Loulergue et al., 2009). However, there were varying levels of awareness depending on different levels of involvement. This study also showed varying levels of vaccination. While there was a 93% vaccination rate against HBV and a 63% knowledge rate of immune status (as HBV is commonly tested for immune status using a titer test following the

vaccination), only 30% of respondents in this hospital system had been vaccinated against influenza (Loulergue et al., 2009). Thus, not only are influenza vaccination rates low, they are so low that they are significantly out of line with other required occupational vaccinations.

The lack of uptake of influenza vaccine extends to specialist healthcare units devoted to high-risk and vulnerable patient populations. A study by Bryant et al., examined influenza vaccination rates in hospital workers caring for high-risk pediatric patients in neonatal intensive care units (NICUs), pediatric intensive care units (PICUs), and pediatric oncology units (Bryant, Stover, Cain, Levine, Siegel, & Jarvis, 2004). This study found that during the 2000-2001 vaccination season, only seven of 19 hospitals surveyed had vaccination rates exceeding the National Association of Children's Hospitals and Related Institutions standard of 50% vaccination rates (Bryant et al, 2004). The overall median rate of vaccination for all programs was 43%, with a range of 12% to 63% (Bryant et al., 2004). In a second study by Norton et al., similar findings were demonstrated in a study that examined the use of influenza vaccine in a pediatrics unit (Norton, Schefele, Bettinger, & West, 2008).

Factors in Acceptance or Declination of Vaccines

Healthcare worker acceptance or rejection of vaccines is likely to be driven by their own beliefs towards vaccination. A study by Esposito et al., compared the beliefs of healthcare workers working with women and children, including 340 obstetrics and gynecology workers, 123 neonatology workers, and 244 pediatric healthcare workers in order to determine their beliefs toward the influenza vaccine (Esposito, Tremolati, Bellasio, Chiarelli, Marchisio & Tiso, 2007). These findings indicated low levels of knowledge regarding influenza recommendations as evidenced by surveys, as well as a low level of personal vaccination among healthcare workers (Esposito et al., 2007). This study did not draw a direct causal link between personal

knowledge and recommendation of vaccination for patients with personal vaccination choices, but this link is implied by the consistency of relationship between personal vaccination and vaccine recommendation. This study showed that a healthcare worker's personal beliefs regarding influenza vaccine are likely to affect treatment recommendations for patients.

Knowledge and beliefs about vaccination were also found to be in evidence in a French study of healthcare workers involved in care for elderly patients (Gavazzi et al., 2011). This study examined the attitudes toward influenza vaccination of 2,485 healthcare workers from 53 different geriatric healthcare provision settings (Gavazzi et al., 2011). The study found that healthcare workers that believed the influenza vaccine was likely to be useful were more likely to receive the vaccine (Gavazzi et al., 2011).

One program highlights some of the main attitudes behind acceptance of the vaccine (Hakim, Gaur, & McCullers, 2011). This program examines the St. Jude's Children's Research Hospital, a specialist pediatric oncology research institution in which over 90% of healthcare workers received the annual influenza vaccine (Hakim, Gaur, & McCullers, 2011). The biggest reason cited for receipt of the vaccine by healthcare workers during the 2009 seasonal influenza vaccination program was in order to reduce risk of transmission to the healthcare provider (83.5% of respondents) and the risk of transmission to the patients (78.3%) (Hakim, Gaur, & McCullers, 2011). This highlights the main reasons why the influenza vaccination may be accepted or rejected, as well as offering insight into potential designs for intervention programs.

There have been a number of studies that identify reasons why participants in the healthcare system may accept or reject vaccines. A review of studies conducted recently indicates that the most common reasons for refusal include lack of knowledge or misconceptions about the vaccine and a lack of access to the vaccination program (Hollmeyer, Hayden, Poland,

& Buchholz, 2009). This study, which reviewed 25 studies focused on self-reported reasons for vaccine refusal from 1980 to 2008, found that reasons including fear of side effects, lack of concern about the individual risk, inconvenience of program, and not perceiving individual risk had the most impact on refusal of vaccines within this study (Hollmeyer, Hayden, Poland, & Buchholz, 2009). Similarly, choice of the vaccine for self-protection, patient protection, protection of friends and family, and being able to conveniently access the vaccination program accounted for the majority of reasons stated for choosing the vaccination (Hollmeyer, Hayden, Poland, & Buchholz, 2009). These findings are largely echoed in the summary of responses listed below.

Tables 1 and 2 summarize rationales given for acceptance or declination of influenza vaccine and are broken down by specific research. In general, reasons for acceptance of vaccine are based largely on belief that influenza vaccination is beneficial to both the employee and patient populations served. Employees feel that it is their responsibility to vaccinate themselves to protect against illness and infection. Reason that employees decline vaccination are largely due to personal beliefs regarding the need for vaccine and its effectiveness in preventing disease.

Table 1. Reasons Found for Acceptance of Influenza Vaccines through Healthcare Workers Vaccination Programs

Reasons for Acceptance of Vaccine	Studies
Perception of vulnerability to disease	(Ballestaas, McEvoy, & Doyle, 2009)
Understanding severity of influenza infection	(Ballestaas, McEvoy, & Doyle, 2009)
Knowing about safety and efficacy of vaccine	(Mehta, Pastor, & Shah, 2008)
Participant is older	(Ballestaas, McEvoy, & Doyle, 2009)
Participant has been vaccinated before	(Mehta, Pastor, & Shah, 2008) (Ballestaas, McEvoy, & Doyle, 2009) (Maltezou, et al., 2008) (Ballestaas, McEvoy, & Doyle, 2009) (Maltezou, et al., 2008)

Participant works with high-risk patients or in a high-risk specialty	(deSante, Caplan, Shofer, & Behrman, 2010) (deSante, Caplan, Shofer, & Behrman, 2010) (Looijmans-vandenAkker, et al., 2009)
Participant believes that it is their responsibility to reduce patient exposure to disease	(Maltezou, et al., 2008) (Mehta, Pastor, & Shah, 2008)
High levels of patient contact	(deSante, Caplan, Shofer, & Behrman, 2010)
Social influences (such as acceptance by peers, colleagues, and friends)	(Looijmans-vandenAkker, et al., 2009)
Receiving information about the influenza vaccine or active educational support	(Looijmans-vandenAkker, et al., 2009) (Mehta, Pastor, & Shah, 2008)
Management support for vaccinations and encouragement of participation in vaccinations	(Mehta, Pastor, & Shah, 2008)
Previously had been vaccinated	(Maltezou, et al., 2008) (Norton, Schefele, Bettinger, & West, 2008)

Table 2. Reasons Found for Declination of Influenza Vaccines through Healthcare Workers Vaccination Programs

Reasons for Declination of Vaccine	Studies
No need (perception of personal good health, not at personal risk because of personal characteristics)	(Ballestaas, McEvoy, & Doyle, 2009) (Maltezou, et al., 2008) (Mehta, Pastor, & Shah, 2008) (Norton, Schefele, Bettinger, & West, 2008)
Side effects or lack of safety, fear of getting sick from the vaccine	(Ballestaas, McEvoy, & Doyle, 2009) (Maltezou, et al., 2008) (Mehta, Pastor, & Shah, 2008) (Norton, Schefele, Bettinger, & West, 2008)
Previously had experienced sickness or attributed sickness to the vaccine	(Norton, Schefele, Bettinger, & West, 2008)
Did not consider to be important, did not have the time to complete the vaccination process	(Ballestaas, McEvoy, & Doyle, 2009) (Mehta, Pastor, & Shah, 2008)
The vaccination program was not readily accessible or the participant did not know about or was not offered the vaccine	(Ballestaas, McEvoy, & Doyle, 2009) (Mehta, Pastor, & Shah, 2008)
Pregnancy or other health reason	(Ballestaas, McEvoy, & Doyle, 2009)
Low or no patient contact	(deSante, Caplan, Shofer, & Behrman, 2010)
Belief in alternative methods that are as effective for preventing influenza (homeopathy or herbal remedies, vitamins, maintaining diet and physical fitness)	(Gavazzi, et al., 2011)

Lack of knowledge about clinical recommendations for treatment and control of influenza	(Gavazzi, et al., 2011)
Belief that the vaccine should only be used for at-risk people (such as the elderly)	(Gavazzi, et al., 2011)
Belief that the vaccine is not effective or will not be effective for them	(Maltezou, et al., 2008)

Demographic Characteristics

There have been differences in demographic characteristics that have been found for participants in influenza vaccination programs, but these results are contradictory. One study of an American program found that 74.7% of participants in the program were female (Ballestaas, McEvoy, & Doyle, 2009). However, a Spanish study found that only 34% of female healthcare workers were vaccinated compared to 40.8% of male workers (Llupia et al., 2010). A study in the French geriatric care setting found that the majority of those who refuse vaccination were women (Gavazzi et al., 2011). Another study did not find any difference in gender, but did find that older workers, those with more education, and those with more years of experience in healthcare were more likely to accept the vaccination (Looijmans-vandenAkker et al., 2009).

The results in age group are similarly contradictory, with findings indicating that younger participants were more likely to refuse the vaccine, but some studies also indicating that older respondents were more likely to refuse (Ballestaas, McEvoy, & Doyle, 2009; Gavazzi, et al., 2011; Llupia, et al., 2010; Looijmans-vandenAkker, et al., 2009). Given the inconsistency of age-related findings, it is difficult to make any specific conclusions about the likelihood of respondents to accept or refuse a given vaccine, and thus there is no significant difference.

Professional Characteristics

While there are some professional specialty characteristics that have been identified as significant differences in attitudes or acceptance of the influenza vaccine, there are also some differences that have not been identified to be significant. For example, there has been no difference in acceptance of the influenza vaccine between emergency medicine and internal medicine physicians (deSante, Caplan, Shofer, & Behrman, 2010). However, another study did not find any statistically significant difference in occupational groups (when grouped by professional staff, physicians, registered nurses, and licensed practical nurses) (Doratotaj, Macknin, & Worley, 2008). A third study also found that physicians and registered nurses were more likely to be vaccinated than other workers such as nursing assistants (Looijmans-vanden Akker et al., 2009). A fourth study was conducted in a tertiary-care hospital in Germany, which surveyed 1,504 of the employees and medical students working in the hospital (Wicker & Rabenau, 2011). This study found that 76.2% of physicians were vaccinated against influenza, as compared to only 32.1% of nurses (Wicker & Rabenau, 2011). The authors determined that the main difference between these two populations was that physicians had a higher level of knowledge regarding immunization, its effectiveness, and its uses, and were more aware of the potential harm that could be caused by failing to immunize (Wicker & Rabenau, 2011). This demonstrates that one of the main differences between the various occupational groups may be the level of information available. However, not all studies have upheld these findings. In particular, one study of a hospital that achieved a higher than 50% vaccination rate through improved education did not find that there was a significant difference between physicians and nurses (Mehta, Pastor, & Shah, 2008). As previously discussed, it is also likely that some specialist units, like high-risk or even general care pediatrics units, will have a higher rate of

vaccination than other units where the risk to patients may not be perceived to be as high risk (Bryant, Stover, Cain, Levine, Siegel, & Jarvis, 2004; Norton, Schefele, Bettinger, & West, 2008).

The Ethics and Cost of Vaccination

There are a variety of discussions regarding the ethics of vaccination, particularly the problem of mandatory vaccination programs. One group of authors promotes the notion of vaccination as part of the ethical requirement of the healthcare worker. "Nonmaleficence reflects the traditional maxim primum non nocere: ''Above all do no harm.'' The principle expresses an obligation to not inflict harm or risks of harm on others (McLennan, Gillett, & Celi, 2008, p. 2)." According to McLennan, Gillett and Celi (2008). The acceptance of the influenza vaccine is a basic ethical requirement for the healthcare worker under the principle of nonmaleficence, since it represents avoidance of harm; this is more important, according to the authors, than the principle of autonomy that requires that healthcare workers be given the choice to accept the vaccine.

The economic cost of vaccination is another issue that has also been addressed by the literature. A study in the United Kingdom examined the cost-benefit ratio of the influenza vaccine, finding that it was effective in preventing influenza infections and further deaths (Burls et al., 2006). This study found that the vaccine cost £12 per vaccine accepter in the base scenario, and in the worst-case scenario the cost of the vaccine was £405 per year of life (Burls et al., 2006). The authors concluded that under these conditions, vaccinating healthcare workers against influenza was cost-effective and resulted in positive savings for both treatment costs from further infections and in lives saved (Burls et al., 2006).

Another major question along this line is whether the use of the influenza vaccine for healthcare workers is the best choice given that the vaccine is frequently limited and may not be readily available. An answer for this question comes from an epidemiological modeling program, which examines the points of control that are most effective at preventing a pandemic outbreak of influenza (Nuno, Chowell, & Gumel, 2007). This model shows that the points that are most effective include reducing hospital transmission rates as well as using antiviral medications and vaccines in the general population to reduce the burden of illness and reduce potential transmission (Nuno, Chowell, & Gumel, 2007). This modeling process clearly indicates that the use of hospital healthcare worker influenza vaccination is an important element in reducing transmission, and thus demonstrates that it is an effective use of limited vaccine supplies.

Mandatory Vaccination Programs

Although the majority of vaccination programs identified are voluntary, there are also some mandatory programs. These programs have been called for in cases where there is not significant adoption of voluntary programs (van Delden, Ashcroft, Dawson, Marckmann, Upshur, & Verweij, 2008). According to the research performed, the use of mandatory programs is relatively rare. However, if the voluntary vaccination programs continue to be ineffective, this may change over time, and so the ethics and acceptability of the mandatory program is worth considering.

A survey of 227 physicians in academic departments in 2009 found high support for the use of mandatory vaccination programs, with 84.6% of physicians supporting mandatory vaccination programs (deSante, Caplan, Shofer, & Behrman, 2010). More internal medicine physicians (88%) supported mandatory vaccination than emergency medicine physicians (62.5%) (deSante, Caplan, Shofer, & Behrman, 2010). Another study also surveyed physicians

and other healthcare workers in the hospital setting to determine the overall level of support for the use of a mandatory vaccination program (Feemster et al., 2011). This study, which surveyed 1,388 clinical and non-clinical healthcare workers in a pediatric healthcare network, found that 75.2% agreed with a mandatory influenza vaccination policy proposal (Feemster et al., 2011). Furthermore, this study did not find any difference between clinical and non-clinical staff in their acceptance of this proposal. Interestingly, this study went one step further than other studies that examined support, and asked specific questions about whether the program was coercive or necessary. The findings indicated that 72% of the respondents did find that the program was coercive; that is, that it infringed on their right to self-determine whether or not they would have the vaccine. However, the overriding consideration, expressed by more than 90% of the respondents, indicated that they believed the vaccine was necessary to protect patients and healthcare workers from infection. This clearly indicates that there is room in the healthcare system for mandatory vaccination programs, even though they may be coercive in nature.

Another study found that there was growing support for mandatory programs where the use of voluntary programs is not high enough, and that there were valid ethical reasons for the use of mandatory programs (van Delden, Ashcroft, Dawson, Marckmann, Upshur, & Verweij, 2008). There are clear ethical and practice-based reasons to require vaccination of healthcare workers, including the duty to avoid harm to others (which is a basic duty of the medical practice); the special obligation of the healthcare worker to avoid harming patients and provide a safe care environment; and consistency in treatment and obligations between healthcare workers and the patients they care for (van Delden et al., 2008). There are also arguments against mandatory programs, including the right of free choice of medical treatments and alternatives such as improved hygiene programs that could result in the same improvements in transmission

(van Delden et al., 2008). However, these arguments do not negate the power of the argument for the use of mandatory programs in cases where voluntary programs do not work effectively.

One relatively rare study by Seale et al., 2009 did examine the use of a mandatory vaccination program in New South Wales, which implemented a requirement in 2007 that healthcare workers should be vaccinated against influenza among other potentially communicable diseases (Seale, Leask, & MacIntyre, 2009). The rules of the directive indicated that healthcare work environments needed to:

> (1) Vaccinate all consenting HCWs without contraindications who are non-immune and otherwise at risk of acquiring and transmitting infection with vaccine-preventable diseases in the course of their work; and (2) Enforce work restrictions for staff that do not have the required evidence of protection against vaccine-preventable diseases (Seale, Leask, & MacIntyre, 2009, p. 3022).

Prior to this directive, Australian healthcare workers had an exceptionally poor record of immunization, with only 39% of healthcare work environments even keeping track of immunization records. In the study conducted by Seale, Leask and MacIntyre (2009), a total of 1,079 participants, including adult and pediatric hospital staff members were examined. Only 60% of the respondents indicated that they were aware of the directive from the New South Wales government, and only 13% could identify the specific requirements of the directive. However, 78% of the staff members (following information that the directive was in place) indicated that they supported the directive, with only 3.6% of respondents indicating that they opposed it. This study, which was conducted early in the process of implementing the mandatory program, did show strong support. It is also worth noting that although the policy directive faced

significant opposition from consumer lobbying groups prior to its implementation, there was no strong rejection of the program seen in the medical community.

Declination Statements

The voluntary influenza program in use in the program that has been selected for the currently proposed research uses a declination statement as part of the conditions for refusing the vaccination. As such, research on the effectiveness of this declination statement is of particular interest to this research; however, there was only a small amount of research identified on this topic.

One study examined the impact of declination statements for hepatitis B and influenza vaccines (Talbot, 2009). This study found in the case of hepatitis B, the imposition of declination statements did result in a fall in the number of unvaccinated staff in the hospitals that imposed it, although this was against a background of generally falling rates of unvaccinated workers driven by increasing requirements for hepatitis B vaccination during medical training (Talbot, 2009). However, the situation with vaccination for influenza is somewhat different, given that hepatitis B is a multi-stage persistent vaccine that is good for life, while the influenza vaccine must be repeated each year. Talbot's (2009) review of declination statements and their impact on healthcare worker vaccination rates did find that they resulted in an increase of between 11% to 22%. However, this was not as successful as other common interventions including mandatory vaccination (28% to 68%), education and promotion (24% to 38%), or mobile carts (25% to 41%) (Talbot, 2009). This indicates that there could be serious issues with assuming that declination statements provide an intervention that is significant enough to achieve rates of vaccination that are high enough to prevent transmission in the hospital setting through healthcare workers (Talbot, 2009).

There are also a number of pitfalls identified with the use of declination statements. One type of pitfall is with the design of the declination program, where the specifics of how the program is implemented (such as how information is collected and when workers must specify their refusal) may increase or otherwise affect healthcare worker rejection of the vaccine (Talbot, 2009). The use of declination statements might also have additional problems, specifically that "collection of these forms may be identified as a primary goal, diverting resources toward statement collection and away from improving availability of vaccine, campaign promotion, and education" (Talbot, 2009, p. 776). In extreme cases, a focus on statement collection rather than on vaccination promotion could lead to a reduction in vaccination rates (Talbot, 2009). There can also be inaccuracies in reporting figures associated with the combination of declination and vaccination rates, which can confuse or inflate the institution's uptake of vaccination (Talbot, 2009). Given these provisions, the use of declination statements should not be considered to be sufficient to encourage participation in voluntary vaccination programs.

Summary

The review of literature was conducted to identify what is currently available as far as research pertinent to this research study. Although there has been much research concerning healthcare workers attitudes and reasons for acceptance or declination of influenza vaccination, little was found in the literature with regards to their demographic and professional characteristics, and the research that was found was shown to be contradictory. Programs that encourage participation in influenza vaccination have also been researched, but no method of promotion has shown to be exclusively effective in improving vaccination rates. It was concluded after the review that this study can provide valuable information with identifying the demographic characteristics of those who decline voluntary influenza vaccination.

CHAPTER 3

METHODOLOGY

This chapter describes the research methodology that was used in this study and discusses reasons for the choice of this particular research approach as compared to other potential approaches that could have been made. This chapter includes the approach to research, data collections and methods and information concerning participants.

Research Design

This study utilized secondary data previously collected by the occupational health department of the hospital and was available for analysis.

Site Selection Process and Site Description

The site for this research was selected based on existing connections to the teaching hospital by the researcher and availability of the site for research, as well as acceptance of the research project by hospital officials (see Appendix A). The site that was chosen for this research was a large tertiary care hospital located in the Southeastern region of the United States.

Population and Sample

The population of this study included healthcare workers employed at the selected hospital, including (but not limited to) doctors, nurses and nursing assistants, specialists (such as radiologists, medical technologists, and phlebotomists), transporters and direct care specialists. The population utilized in this research consisted of the employees of a large teaching hospital in the Southeast who were at least 18 years of age.

Data Collection

This research involved the use of secondary data that was already available within the hospital setting. Data was analyzed regarding information provided on the declination form given to each employee (see Appendix B) accessed from a hospital database. Data for addressing research questions 1 through 4 was collected using existing records from employees provided from a hospital database. Within the hospital, the influenza vaccination program is voluntary, and healthcare workers are allowed to refuse the vaccination on an annual basis. However, each time a worker refuses the vaccination (which changes each year), the worker must fill out a form that identifies the worker as having refused the vaccine and specifies one of four reasons for refusing the vaccine (see Appendix B). The hospital also keeps records for each employee paired with these vaccination refusals, including demographic and professional information. This information includes demographic data (gender and ethnicity), as well as professional data (professional role, specialty and number of years within the hospital setting) and data regarding the specific reasons for refusal. Data that was available for the most recent year on file for each employee within the hospital (2010-2011) was used. Employees that are determined to be "exempt" were not included in the data analysis. Data was coded appropriately and entered into a spreadsheet for data analysis purposes.

Data Analysis

Review of Research Questions

As previously stated in Chapter 1, the specific research questions are below. Questions 1 through 4 were examined using quantitative research methods.

1. What are the stated reasons (of the four included in the standard declination form) that healthcare workers at this hospital decline the voluntary vaccination program?

2. What are the demographic characteristics of those that refuse, and are these demographic characteristics associated with reasons for refusal?

3. What are the professional characteristics of those that refuse, and are these professional characteristics associated with refusal?

4. What differences in the demographic and professional characteristics exist in those that refuse the influenza vaccine and those that accept the influenza vaccine?

Table 3 outlines the operationalized variables that were used within each of the quantitative research questions (Questions 1 through 4).

Table 3. Operational Variables for use in Quantitative Research

Variable	Description	Measurement (Number Code)
Vaccine acceptance (dependent variable)	Did the research participant accept or decline the vaccine?	Categorical variable (Yes/No) Yes-1 No-2
Vaccine rejection reason Demographic Variables	In cases where the vaccine was rejected, what was the reason for declination?	Categorical variable (one of four reasons for rejection of the vaccine) I've never had the flu and don't need the vaccine-1 I'm afraid I'll get the flu from the flu vaccine-2

Gender	Gender of the worker	Categorical variable Male-1 Female-2
Ethnicity	Ethnicity of the worker as self-reported	Categorical variable (As described by the hospital ethnicity reporting system) Caucasian-1 African-American-2 Hispanic-3 Asian/Pacific Islander-4 Native American/Alaskan Native-5 Other-6
Professional Characteristics Patient Contact Risk Exposure	Perceived level of patient contact of each job category	Low Risk-1 High Risk-2
Position	Position within the hospital	Categorical (based on hospital characteristics) Physician (MD)-1 Nurse (RN, LPN)-2 Nurse Assistant (NA, CNA)-3 Environmental Services (EVS)-4 Hospital Unit Coordinator (HUC)-5 Advanced Practice Nurse-6 (CNS, FNP, MSN, Nurse Manager) Allied Health-7 Administration and Management-8 Therapy and Social Services-9
Years of Experience	Years of experience in selected hospital	Years calculated from date of hire 1-5 years-1 6-10 years-2 11-15 years-3 16-20 years-4 20+ years-5

Given that the majority of characteristics were categorical and ordinal in nature, appropriately chosen statistical approaches were used to analyze these findings. Descriptive

statistics were primarily based on frequency tables (using counts and percentages), which described the overall shape of the data. Cross-tabulations and conditional probabilities were also used to compare differences in outcomes (for example, between age or gender categories) to determine whether significant differences existed in the percentage of vaccine refusals or reasons for vaccine declination in these areas. These calculations determined which of the demographic and professional categories (if any) were more likely to decline vaccinations. Odds ratios were used to determine the chances of each participant category declining a vaccination.

Institutional Review Board (IRB) Approval

IRB approval was sought to allow research to take place. A status of "exempt" was given to this study and all appropriate information was provided to the IRB.

Summary

This chapter discussed the methods that were utilized in order to perform this study. Advantages and disadvantages of the research method, participant selection, data collection, and data analysis were included in Chapter 3. The methodology of this research included analysis of previously recorded data acquired from occupational health records. Permission was sought to allow the researcher access to this data as well as human resources records to acquire demographic and professional characteristics. Various quantitative data analysis methods such as chi-square ratio, odds ratio and contingency tables were utilized to analyze data and identify any relationships that may exist between demographic and professional characteristics of healthcare workers and vaccine declination.

CHAPTER 4

RESULTS AND ANALYSIS

This chapter presents the results of the data analysis as well as a general discussion of the outcomes and their consistency with the existing literature. Following a brief presentation of the data profile, the odds ratios and contingency tables are presented (including discussion of how data was collapsed in some cases for analysis); followed by a discussion of the findings in light of the existing literature.

Descriptive Statistics (Data Profile)

The population derived from the chosen hospital was an extremely large data set (n = 22,845). Respondents were 74.6% female (n = 16,046) and 25.4% male (n = 5,799). Table 4 shows the frequency distribution of individuals across the six ethnic groups identified in the data set.

Table 4. Ethnicity of Respondents (Frequency Table)

Ethnicity	Frequency	Percent	Cumulative Percent
Caucasian			
African American	11010	48.2	48.2
Hispanic	4755	20.8	69.0
Asian/Pacific Islander	300	1.3	70.3
Native American/Alaskan Native	1245	5.4	75.8
Other	69	0.3	76.1
Total	5466	23.9	100.0
	22845	100.0	

The participants were also classified by the number of years employed at the hospital. This was calculated from the date of hire at the hospital and does not reflect total years of professional experience. Table 5 shows the distribution of these years. As the table shows, the

years of experience at the hospital is heavily weighted to under 5 years.

Table 5. Years of Experience at Hospital

	Frequency	Percent	Cumulative Percent
1-5 years	10608	46.4	46.4
6-10 years	4644	20.3	66.8
11-15 years	2541	11.1	77.9
16-20 years	1344	5.9	83.8
20+ years	3708	16.2	100.0
Total	22845	100.0	

There were over 350 different job titles represented in the data set, and inclusion of all of these was clearly impractical. In response to this problem, employee functions were collapsed into nine distinct categories that share characteristics. These include patient contact, responsibility level, and task nature. Table 6 shows the distribution of employees across these categories, showing that the largest group was nursing, followed by allied health and physicians.

Table 6. Field of Practice (Frequency Table)

Field of Practice	Frequency	Percent	Cumulative Percent
Physician	2877	12.6	12.6
Nurse (RN, LPN)	7866	34.4	47.0
Nurse Assistant (NA, CNA, Aide)	1284	5.6	52.6
Environmental Services Worker	1890	8.3	60.9
Hospital Unit Coordinator	837	3.7	64.6
Advanced Practice Nurse (Nurse Manager, Nurse Practitioner, Specialist)	1239	5.4	70.0
Allied Health	4060	17.8	87.8
Administration and Management	2019	8.8	96.6
Therapy and Social Services	773	3.4	100.0
Total	22845	100.0	

In addition to these task-oriented roles, employees were also classified by the degree of patient contact they were expected to have. This was based on general job characteristics, and any given employee may have more or less patient contact. These categories included Low Risk

(little or no patient contact) and High Risk (routinely involving patient contact). Table 7 shows that the majority of employees included in this data set fall under high risk.

Table 7. Patient Contact Risk Exposure (Frequency Table)

	Frequency	Percent	Valid Percent	Cumulative Percent
Low Contact/Risk	5519	24.2	24.2	24.2
High Contact/Risk	17326	75.8	75.8	100.0

The main variable was the outcome of the flu vaccination attempt. Table 8 shows a detailed overview of the outcomes including all reasons for potential vaccine declination (the "Other" category includes religious objections and fear of needles). Most participants either accepted the vaccine (51.6%) or were vaccinated elsewhere (29.1%). Of the reasons for declination, the most common (8.9%) was that the participant did not receive the flu vaccine and did not need it.

Table 8. Flu Vaccination Outcomes

	Frequency	Percent
Accepted Vaccine	11794	51.6
Vaccinated Elsewhere	6643	29.1
Medical Refusal	867	3.8
"I'm afraid I'll get the flu from the vaccine"	876	3.8
"I've never had the flu and don't need the vaccine"	2043	8.9
Other	622	2.7

These responses were further collapsed into two categories to facilitate odds ratio analysis. These categories included Acceptance/Valid Declination and Attitude-based declination (including "I'm afraid I'll get the flu" and "I've never had the flu"). Table 9 shows the relative frequencies of these responses, demonstrating that about 13% of the sample showed attitude-based declination.

Table 9. Acceptance or Declination of Vaccine

	Frequency	Percent
Acceptance or Medical/Religious Declination	19926	87.2
Attitude-based Declination	2919	12.8
Total	22845	100.0

Analysis of Characteristics of Those Who Decline Influenza Vaccination

The main goal of this study was to analyze the characteristics of those that decline influenza vaccination. This analysis included contingency tables, chi-square analysis, and odds ratios. The characteristics that were examined as risk variables for refusal included Ethnicity, Gender, Personnel Role Category, and Patient Contact Risk. The outcome variable was Vaccine Refusal. For chi-square and odds ratio, this variable was collapsed to two categories (Non-Refusal or unavoidable declination, avoidable declination). The outcomes of each of these analyses are shown below.

Ethnicity

The first demographic comparison was ethnicity. Table 10 shows the results of outcomes based on ethnicity. This shows that Hispanic respondents had the lowest rate of attitude-based refusal (7%), while African Americans had the highest rate of attitude-based refusal (25.6%). The chi-square test results ($\chi^2 = 908.297$, df = 5, $p = .000$) indicates that there was a significant difference in categories based on ethnicity.

Table 10. Ethnicity Acceptance or Declination of Vaccine

		Acceptance or Declination of Vaccine		
		Acceptance and Medical or Religious Declination	Attitude-based Declination	Total
Caucasian	Count	10062	948	11010
	%Ethnicity	91.4%	8.6%	100.0%
African American	Count	3537	1218	4755

	%Ethnicity	74.4%	25.6%	100.0%
Hispanic	Count	279	21	300
	%Ethnicity	93.0%	7.0%	100.0%
Asian/Pacific Islander	Count	1104	141	1245
	%Ethnicity	88.7%	11.3%	100.0%
Native	Count	60	9	69
American/Alaskan	%Ethnicity	87.0%	13.0%	100.0%
Native				
Other	Count	4884	582	5466
	%Ethnicity	89.4%	10.6%	100.0%
Total	Count	19926	2919	22845
	%Ethnicity	87.2%	12.8%	100.0%

To further examine this issue, the data set was filtered and tests broken down to determine which attitude was dominant. Table 11 shows the relative frequency of the two identified attitudes based on ethnicity. The most common attitude in all cases was that the respondent never had the flu and did not need the vaccine.

Table 11. Relative Frequencies of Attitude Based Declination by Ethnicity

		Flu Vaccination Outcome		
		"I'm afraid I'll get the flu from the vaccine."	"I've never had the flu and don't need the vaccine."	Total
Caucasian	Count	258	690	948
	%Ethnicity	27.2%	72.8%	100.0%
African American	Count	390	828	1218
	%Ethnicity	32.0%	68.0%	100.0%
Hispanic	Count	6	15	21
	%Ethnicity	28.6%	71.4%	100.0%
Asian/Pacific Islander	Count	57	84	141
	%Ethnicity	40.4%	59.6%	100.0%
Native	Count	3	6	9
American/Alaskan	%Ethnicity	33.3%	66.7%	100.0%
Native				
Other	Count	162	420	582
	%Ethnicity	27.8%	72.2%	100.0%
Total	Count	876	2043	2919
	%Ethnicity	30.0%	70.0%	100.0%

Gender

The second demographic comparison that was made was gender. In this case, both chi-square and odds ratios were used to determine the role of gender in vaccine declination. Table 12 shows the cross-tabulation of this response and shows the rates are similar for both groups. Chi-square analysis ($\chi^2 = 1.862$, df = 1, $p = .172$) shows that there is no significant difference in acceptance or rejection between genders. This is also shown in the odds ratio, with .939 odds of acceptance based on gender. Thus, gender is not a significant factor in this discussion.

Table 12. Acceptance or Declination of Vaccine by Gender

		Acceptance and Medical or Religious Refusal	Attitude-based Refusal	Total
Female	Count	14838	2208	17046
	%Gender	87.0%	13.0%	100.0%
Male	Count	5088	711	5799
	%Gender	87.7%	12.3%	100.0%
	Count	19926	2919	22845
	%Gender	87.2%	12.8%	100.0%

Years of Service

The first professional category to be examined was years of service at the hospital which was calculated using date of hire. Table 13 shows the cross tabulation for this category, which was also examined using chi-square analysis. This does show some differences, with those with employed between 1-5 years having a lower rate of attitude-based declination (11.5%) than those with other experience terms. The chi-square outcomes $\chi^2 = 35.711$, df = 4, $p = .000$) supports a statistically significant difference in distribution between the groups. However, there is no clear pattern that would suggest those with higher lengths of service at the hospital have higher rates of vaccination. For example, while those between 6 and 15 years show the highest rates of attitude-based declination, those at 16-20 years are actually below the average rate. This is an

opportunity for further analysis, but the data available will not support a causal analysis at this time.

Table 13. Years at Hospital Acceptance or Declination of Vaccine

		Acceptance or Declination of Vaccine		
		Acceptance and Medical or Religious Declination	Attitude-based Declination	Total
1-5 years	Count	9390	1218	10608
	%Years at Hospital	88.5%	11.5%	100.0%
6-10 years	Count	3969	675	4644
	%Years at Hospital	85.5%	14.5%	100.0%
11-15 years	Count	2193	348	2541
	%Years at Hospital	86.3%	13.7%	100.0%
16-20 years	Count	1182	162	1344
	%Years at Hospital	87.9%	12.1%	100.0%
20+ years	Count	3192	516	3708
	%Years at Hospital	86.1%	13.9%	100.0%
Total	Count	19926	2919	22845
	%Years at Hospital	87.2%	12.8%	100.0%

Personnel Role Category

The second professional category was the personnel role category, which was examined using cross tabulations and chi-square. Table 14 shows the cross tabulation results for this analysis. As table 14 shows, there is a wide disparity between attitude-based declinations among different professional role groups. While physicians have only a 1.1% rate of attitude-based declination, environmental service workers have a 27.5% rate of attitude-based declination. Other groups with high influenza vaccine declination rates include Nurse Assistants, Hospital Unit Coordinators, and Allied Health workers. The chi-square analysis ($\chi^2 = 943.293$, df = 8, p= .000) confirms that there is a significant difference in distribution of attitude-based declinations between these categories.

Table 14. Field of Practice Acceptance or Declination of Vaccine (Crosstabulation)

		Acceptance and Medical or Religious Declination	Attitude-based Declination	Total
Physician	Count	2844	33	2877
	%Field of Practice	98.9%	1.1%	100.0%
Nurse (RN, LPN)	Count	6957	909	7866
	%Field of Practice	88.4%	11.6%	100.0%
Nurse Assistant (NA, CNA, Aide)	Count	999	285	1284
	%Field of Practice	77.8%	22.2%	100.0%
Environmental Services Worker	Count	1371	519	1890
	%Field of Practice	72.5%	27.5%	100.0%
Hospital Unit Coordinator	Count	690	147	837
	%Field of Practice	82.4%	17.6%	100.0%
Advanced Practice Nurse (Nurse Manager, Nurse Practitioner, Specialist)	Count	1158	81	1239
	%Field of Practice	93.5%	6.5%	100.0%
Allied Health	Count	3441	619	4060
	%Field of Practice	84.8%	15.2%	100.0%
Administration and Management	Count	1740	279	2019
	%Field of Practice	86.2%	13.8%	100.0%
Therapy and Social Services	Count	726	47	773
	%Field of Practice	93.9%	6.1%	100.0%
Total	Count	19926	2919	22845
	%Field of Practice	87.2%	12.8%	100.0%

Patient Contact Risk Level

A final analysis examined patient contact risk level as a determining factor in attitude-based declination. In this analysis, Physicians, Nurses, Nurse Assistants, Advanced Practice Nurses, and Allied Health workers were classified as High-Risk, while all others were classified as Low-Risk. (Note that the actual degree of patient contact would vary depending on job duties.) Table 15 displays the results of this analysis and clearly shows a significant difference between low contact/risk workers (18% attitude-based declination) and high contact/risk workers (11.1% attitude-based declination). The chi-square results ($\chi^2 = 176.345$, df = 1, $p = .000$) supports that there is a statistically significant difference in distribution between these two risk categories. The odds ratio of .571 also indicates that low-risk workers are significantly more likely to use attitude-based declinations.

Table 15. Patient Contact Risk Exposure Acceptance or Declination of Vaccine (Crosstabulation)

		Acceptance and Medical or Religious Declination	Attitude-based Declination	Total
Low Contact/Risk	Count	4527	992	5519
	%Patient Contact Risk Exposure	82.0%	18.0%	100.0%
High Contact/Risk	Count	15399	1927	17326
	% Patient Contact Risk Exposure	88.9%	11.1%	100.0%
Total	Count	19926	2919	22845
	%Patient Contact Risk Exposure	87.2%	12.8%	100.0%

Summary

The main significant factors that were identified in this study included ethnicity, professional job role, years experience, and level of patient contact, which were largely consistent with existing research. Overall, the rate of vaccine uptake (80.7%) was substantially

higher than in previous studies (Doratotaj, McKnin & Worley, 2008; Mehta, Pastor & Shah, 2008). The findings concerning the connection between clinical knowledge and vaccine uptake is suggested in the results, which showed groups with high levels of patient contact, such as doctors and nurses, having a higher rate of uptake than those that do not deal directly with patients. Additionally, as in most other studies, the majority of rejections for vaccines were not religious or medical, but were driven by existing attitudes and beliefs about the vaccines, particularly about side effects and lack of need (Esposito et al., 2007; Gavazzi et al., 2011; Hollmeyer et al, 2009). In contrast to Doratataj et al's (2008) findings, there were differences between groups; this is more consistent with the findings of Wicken and Rabenau (2011), who suggested that physicians, with their greater experience of the effects of failure to immunize, may be more likely to do so. However, like Mehta et al (2008), this research did not support a big difference in physicians and nurses.

Demographic factors found in the research were not as well supported. For example, the lack of difference based on gender is inconsistent with Llupia et al (2010), and the findings regarding experience (with workers with fewer years experience being less likely to reject the vaccine based on attitudes) is also inconsistent with existing research (LooijmansvandenAkker et al., 2009). However, the age and experience evidence in the research is generally conflicted (Ballestaas, McEvoy, & Doyle, 2009; Gavazzi, et al., 2011; Llupia, et al., 2010; LooijmansvandenAkker, et al., 2009), so this study only reinforces the state of the research.

Although there is a higher than average rate of vaccination at the chosen hospital, there is still room for improvement, particularly in attitude-based outcomes. These areas for improvement include mobile carts and educational campaigns, which have been shown to increase immunization rates substantially (Bryant, Stover, Cain, Levine, Siegel, & Jarvis, 2004).

It cannot be presumed that the declination statement program itself will improve vaccination rates (Talbot, 2009). As Talbot (2009) points out, there are a number of problems that can occur that reduce the ability of these programs to improve immunization rates. One possible solution is simply mandating vaccination; although controversial, this approach has proved effective in a number of cases (Offit, 2010). However, this is also an approach that requires additional analysis.

CHAPTER 5

CONCLUSION

Introduction

This study was performed by analyzing existing data available from the 2010-2011 flu vaccination program at a large teaching hospital to determine if the professional and demographic characteristics of healthcare workers had any impact on their acceptance or declination of the influenza vaccination. This data was collected from declination forms distributed to employees and from records made available from human resources regarding demographic characteristics. A summary of the study, limitation, areas for future research, suggestions for improvements to this study and recommendations for practice are included in Chapter 5.

Limitations

This study did have some inherent limitations that could not be overcome by study design. In particular, there was no way to determine any information beyond that contained in the declination forms, and so there was a limited capacity to understand the root causes of declination in terms of underlying risk assessments and attitudes. As a cross-sectional study, this research also does not reflect the changes that might be seen over time with an ongoing educational program. This could be particularly important given that influenza vaccinations happen annually, giving current employees that decline vaccination the opportunity to change their minds over time. This data was gained during one vaccination year and at one given hospital, which is also a limitation.

Areas for Further Research

There are some areas that proved to be of interest within the study that could offer further information. One issue was the pattern of attitude-based refusals in terms of the number of years of service at the hospital. This pattern peaked between 6 and 15 years, but was lower both at under five and over 16 years. This suggests that there could be training or other programmatic reasons for this refusal, but this information was not available. Understanding the reason for this pattern could involve a case study approach that would allow the researcher to identify specific factors in vaccine rejection at the hospital. Another area for future study is the examination of flu vaccination refusals over time; in particular, identifying how the employees change their responses over time, or in response to an educational intervention addressing the attitude-based refusal reasons. This study could provide useful information in determining how likely individuals are to change their minds and if so what convinces them to do so.

Improvements to the Study

There are numerous improvements and changes that could be made to this study if it were to be implemented again in the future. First, it would be interesting to conduct real time interviews with employees to see if their reasons for refusal were indeed what they indicated on their declination forms. It would also be interesting to explore other reasons for declination other than those listed on the declination form. Performing this research on other area hospitals would also add to findings and provide the opportunity to compare compliance rates among healthcare workers in the chosen hospital among others in the same demographic area.

Recommendations for Practice

The following are recommendations for health educators and healthcare workers gathered from the results of this study to improve overall compliance of influenza vaccination:

1. Flu vaccination programs should be targeted to specific groups shown to have lower vaccination rates.

2. Declination forms should be formatted so that respondents can write in a reason for declination to better understand the employee's reasoning behind declining influenza vaccination.

3. Flu vaccination campaigns should include education regarding the importance of receiving influenza vaccine as a healthcare employee.

Summary

In conclusion, this research found that attitude-based declinations account for 12.7% or about one out of every eight cases of influenza vaccine declination in the chosen hospital. Ethnicity is a significant factor, particularly for African Americans, who have a very high rate of attitude-based response. Gender, however, does not make a significant difference. The biggest differences seen are based on professional characteristics. There is no clear pattern that emerges from the years of experience (although there are significant differences between groups). However, professional job roles have strong differences in attitude-based declinations. Physicians (the lowest-refusing group) have only a 1.1% attitude-based declination rate, while environmental services workers (the highest-refusing group) have a 27.4% declination rate. There is little insight that can be gained into why these gaps occur (though the research suggests that education and organizational focus on education could explain these gaps). However, one factor that stands out is that workers in high-risk or high patient exposure roles tend to have lower rates of attitude-based declination than those that are in low-risk positions with minimal patient contact. These findings suggest that the main determinant for whether an employee refuses a flu vaccine could be due to perceived risk.

REFERENCES

Andrew, S., & Halcolm, E. (2009). *Mixed methods research for nursing and the health sciences*. London: John Wiley and Sons.

Ballestaas, T., McEvoy, S. P., & Doyle, J. (2009). Co-ordinated approach to healthcare worker influenza vaccination in an area health service. *Journal of Hospital Infection, 73*, 203-209.

Blachere, F. M., Lindsley, W. G., Pearce, T. A., Anderson, S. E., Fisher, M., Khakoo, R., et al. (2009). Measurement of airborne influenza virus in a hospital emergency department. *Clinical Infectious Diseases, 48*, 438-440.

BLS. (2010, February 12). *Career guide to industries, 2010-11 Edition*. Retrieved from Bureau of Labor Statistics: http://www.bls.gov/oco/cg/cgs035.htm

Brankston, G., Gitterman, L., Hirji, Z., Lemieux, C., & Gardam, M. (2007). Transmission of influenza A in human beings. *The Lancet , 7*, 257-265.

Bruce, N., Pope, D., & Stanistreet, D. (2008). *Quantitative methods for health research: A practical interactive guide to epidemiology and statistics*. Hoboken, NJ: John Wiley and Sons.

Bryant, K. A., Stover, B., Cain, L., Levine, G. L., Siegel, J., & Jarvis, W. R. (2004). Improving influenza immunization rates among healthcare workers caring for high-risk pediatric patients. *Infection Control and Hospital Epidemiology, 25*(11), 912-917.

Burls, A., Jordan, R., Barton, P., Olowokure, B., Wake, B., Albon, E., et al. (2006). Vaccinating healthcare workers against influenza to protect the vulnerable—Is it a good use of healthcare resources? A systematic review of the evidence and an economic evaluation. *Vaccine, 24,* 4212-4221.

deSante, J. E., Caplan, A., Shofer, F., & Behrman, A. J. (2010). Physician attitudes towards influenza immunization and vaccine mandates. *Vaccine, 28*, 2517-2521.

Donaldson, L. J., Rutter, P. D., Ellis, B. M., Greaves, F. E., Mytton, O. T., Pebody, R. G., et al. (2009). Mortality from pandemic A/H1N1 2009 influenza in England: Public health surveillance study. *British Medical Journal, 339*.

Doratotaj, S., Macknin, M. L., & Worley, S. (2008). A novel approach to improve influenza vaccination rates among health care professionals: A prospective randomized controlled trial. *American Journal of Infection Control, 36*(4), 301-303.

Drumwright, L. N., & Holmes, A. H. (2011). Monitoring major illness in health care workers and hospital staff. *Clinical Infectious Diseases, 53*(3), 284-286.

Eckstein, S. (2003). *Manual for research ethics committees.* Cambridge, England: Cambridge University Press.

Esposito, S., Tremolati, E., Bellasio, M., Chiarelli, G., Marchisio, P., Tiso, B., et al. (2007). Attitudes and knowledge regarding influenza vaccination among hospital health workers caring for women and children. *Vaccine, 25*, 5283-5289.

Feemster, K. A., Prasad, P., Smith, M. J., Feudtner, C., Caplan, A., Offit, P., et al. (2011). Employee designation and health care worker support of an influenza vaccine mandate at a large pediatric tertiary care hospital. *Vaccine, 29*, 1762-1769.

Gavazzi, G., Filali-Zegzouti, Y., Guyo, A., De Wazieres, B., Lejeune, B., Golmard, J., et al. (2011). French healthcare workers in geriatric healthcare settings staunchly opposed to influenza vaccination: The VESTA study. *Vaccine, 29,* 1611-1616.

Greene, J. C., Caracelli, V. J., & Graham, W. D. (1989). Toward a conceptual framework for mixed-method evaluation designs. *Educational Evaluation and Policy Analysis, 11* (3), 255-274.

Hakim, H., Gaur, A. H., & McCullers, J. A. (2011). Motivating factors for high rates of influenza vaccination among healthcare workers. *Vaccine, 29*, 5963-5969.

Hollmeyer, H. G., Hayden, F., Poland, G., & Buchholz, U. (2009). Influenza vaccination of health care workers in hospitals—A review of studies on attitudes and predictors. *Vaccine , 27*, 3934-3944.

Kok, G., van Essen, G. A., Wicker, S., Llupia, A., Mena, G., Correia, R., et al. (2011). Planning for influenza vaccination in health care workers: An Intervention Mapping approach. *Vaccine, 29,* 8512-8519.

Llupia, A., Garcia-Basteiro, A. L., Olivé, V., Costas, L., Rios, J., Quesada, S., et al. (2010). New interventions to increase influenza vaccination rates in health care workers. *American Journal of Infection Control, 38*, 476-481.

Looijmans-van den Akker, I., Van Delden, J. J., Verheij, T. J., van Essen, G. A., van der Sande, M., Hulscher, M., et al. (2009). Which determinants should be targeted to increase influenza vaccination uptake among health care workers in nursing homes? *Vaccine, 27*, 4724-4730.

Loulergue, P., Moulin, F., Vidal-Trecan, G., Absi, Z., Demontpion, C., Menager, C., et al. (2009). Knowledge, attitudes and vaccination coverage of healthcare workers regarding occupational vaccinations. *Vaccine, 27*, 4240-4243.

Maltezou, H. C., Maragos, A., Katerelos, P., Paisi, A., Karageorgou, K., Papadimitriou, T., et al. (2008). Influenza vaccination acceptance among health-care workers: A nationwide survey. *Vaccine, 26*, 1408-1410.

McLennan, S., & Wicker, S. (2010). Reflections on the influenza vaccination of healthcare workers. *Vaccine, 28*, 8061-8064.

McLennan, S., Gillett, G., & Celi, L. A. (2008). Healer, heal thyself: Health care workers and the influenza vaccination. *American Journal of Infection Control, 36*, 1-4.

McNeill, P., & Chapman, S. (2005). *Research methods*. London: Routledge.

Mehta, M., Pastor, C. A., & Shah, B. (2008). Achieving optimal influenza vaccination rates: a survey-based study of healthcare workers in an urban hospital. *Journal of Hospital Infection, 70*, 76-79.

Miller, M. A., Viboud, C., Balinska, M., & Simonsen, L. (2009). The signature features of influenza pandemics - implications for policy. *New England Journal of Medicine, 360* (25), 2595-2598.

Norton, S. P., Schefele, D. W., Bettinger, J. A., & West, R. M. (2008). Influenza vaccination in paediatric nurses: Cross-sectional study of coverage, refusal, and factors in acceptance. *Vaccine, 26*, 2942-2948.

Nuno, M., Chowell, G., & Gumel, A. B. (2007). Assessing the role of basic control measures, antivirals and vaccine in curtailing pandemic influenza: scenarios for the US, UK and the Netherlands. *Journal of the Royal Society Interface, 4*, 505-521.

Offit, P. A. (2010, September 13). *Mandating influenza vaccine: One hospital's experience*. Retrieved from MedScape: http://www.medscape.com/viewarticle/728352

Pope, C., & Mays, N. (2006). *Qualitative research in healthcare* (3rd ed.). New York: Wiley-Blackwell.

Russell, M. L., & Henderson, E. A. (2003). The measurement of influenza vaccine coverage among health care workers. *American Journal of Infection Control, 31*(8), 457-461.

Seale, H., Leask, J., & MacIntyre, C. R. (2009). Do they accept compulsory vaccination? Awareness, attitudes and behaviour of hospital health care workers following a new vaccination directive. *Vaccine, 27*, 3022-3025.

Talbot, T. R. (2009). Do declination statements increase health care worker influenza vaccination rates? *Clinical Infectious Diseases, 49*, 773-779.

Van Delden, J., Ashcroft, R., Dawson, A., Marckmann, G., Upshur, R., & Verweij, M. F. (2008). The ethics of mandatory vaccination against influenza for health care workers. *Vaccine, 26*, 5562-5566.

Van Tam, J., & Sellwood, C. (2009). *Introduction to pandemic influenza*. New York: CABI.

Wicker, S., & Rabenau, H. F. (2011). Vaccination rates of healthcare workers vary according to their occupational group. *Procedia in Vaccinology, 4*, 14-18.

APPENDIX A. Letter of Support

DUKE UNIVERSITY
Employee Occupational Health and Wellness

December 5, 2011

Caroline Epler
2300 Surgical Unit
Box 100200 Medical Center
Duke University Medical Center
Durham, NC 27705

Dear Ms. Epler,

I am writing to support your MPH thesis proposal for Indiana State University concerning characteristics of healthcare employees who decline influenza vaccination. I am happy to serve as a contributor to this project. As Co-Director of Employee Occupational Health and Wellness, I am very interested in identifying determinants for declination of flu vaccination among healthcare workers. With IRB approval you will have access to de-identified data for Duke University Hospital employees who received or declined flu vaccination during the 2010-2011 season. I am interested in the findings of the proposed research and enthusiastically support your effort.

Sincerely,

Carol Epling, MD, MSPH
Assistant Professor
Duke Occupational & Environmental Medicine
Co-Director Duke Employee Occupational Health and Wellness
Duke University Medical Center

Department of Community and Family Medicine • Division of Occupational and Environmental Medicine
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APPENDIX B. Declination Form

Duke University Employee Occupational Health & Wellness
IMMUNIZATION EXEMPTION/DECLINATION FORM FOR **INFLUENZA** VACCINE

Employer *Please Check* Duke: [ ] Contract Agency: [ ] Agency_____

Name: (print) _____ Duke ID _____

Work Area:_____ Position: _____

Although I understand the importance of flu vaccination in preventing influenza in (Duke) hospital patients decline the following :

	EOHW Only
O Exemptions	
o I am allergic to eggs.	(F)
o I have a history of Guillan Barre/anaphylactic reaction to the vaccine	(R)
o I have a other medical conditions with a doctor's statement	(X)
o I have religious objections	(?)
o Your records are incorrect I was vaccinated by EOHW.	(C)
o I have been vaccinated elsewhere.	(A)

I decline the season flu vaccine for the reason checked below:

o I've never had the flu and don't need the vaccine.	(B)
o I'm afraid I'll get the flu from the vaccine.	(D)
o I'm afraid of needles.	(E)
o I didn't have time.	(G)

Signature _____ Date_____

EOHW FAX: *681-0555*

Flu Declination 11/09;11/10
EOHW