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Predictors of Influenza Vaccination Compliance Among Union and Nonunion Workers in a Pennsylvania Health Care System

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MPH, Drexel University, 2001

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Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Public Health-Epidemiology

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Abstract

To improve U.S. residents' health, advocates are focusing their efforts on workplace health. Researchers have found that unionization is a positive influence on workers' participation in health promotion programs relating to smoking and obesity prevention. However, the effect of union membership on other health promotion initiatives, such as influenza vaccination compliance among health care workers, has not been examined. The purpose of this quantitative study was to address this knowledge gap between a union and a nonunion health care facility in the U.S. state of Pennsylvania. The health belief model was used to determine if different domains of influenza vaccination perception predicted vaccination behaviors among union and nonunion health care workers. A secondary analysis was performed on the 2013-2014 Influenza Vaccination Survey, which was completed by 2,480 health care workers. While a chi-square analysis showed that vaccination compliance was not statistically different between facilities, a binary logistic regression revealed a significant difference in predicted vaccination behaviors for each domain of influenza vaccination perceptions. Among union health care workers, perceived barriers yielded the highest positive predictability of vaccination compliance, whereas perceived benefits were positively associated with vaccination compliance among nonunion workers. These study findings affect social change by identifying vaccine compliance predictors among union and nonunion health care workers. By focusing on these predictors, health care facilities may be able to improve levels of vaccination compliance and achieve the Joint Commissions' vaccination goal of 90% compliance amongst all healthcare workers.

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I can do all this through Him who gives me strength- Philippians 4:13 NIV. I give thanks to God for giving me continued strength and perseverance. Without it, I would have given up long ago. To my husband, Joe- Without your love, patience, and support, I could not have finished this long journey. I love you! To my daughter, Victoria- I hope that I have been a good role model for you. Remember, if something is worth doing, it is worth doing it well! Strive to always do your best! And, yes, I am finally finished doing my homework! To my son, Isaiah- Thank you for your patience and interest in my schoolwork. Always shoot for the moon! Now, let's play basketball! To my son, Josiah- Thank you for your humor and lively spirit. I appreciate you being patient with me as I completed my homework. I look forward to helping you with your kindergarten homework! To my daughter, Lydia- I am so grateful that God gave you to me! Thank you for your gentle snuggles, you are my soul medicine! To my Mom- If I could pick anyone in the world to be my Mom, I would pick you! Thank you for your unending love, guidance, and support. I would not be where I am today without you. I am your #1 fan! I love you! To my Dad- Thank you for your support. I may not be a geography wiz, but this might make up for it! Thank you for demonstrating the importance and value of education. I hope I made you and Mom proud! Thank you to my Committee Chair, Dr. David Segal and Committee Member, Dr. Chester Jones. I appreciate your guidance and support!

Table of Contents

List of Tables

Chapter 1: Introduction to the Study

Influenza vaccination among health care workers has been recommended by the Centers for Disease Control and Prevention (CDC) since 1984 (CDC, 2013a). Leading health care professional societies and health care facility accrediting agencies, such as The Joint Commission (TJC) promote influenza vaccination among health care workers (TJC, 2013). Federal governing bodies such as the Centers for Medicare and Medicaid consider influenza vaccination among health care workers to be an important and valid component to quality health care outcomes (DHHS, 2011).

Beyond the documented influence of accreditation bodies and federal governing requirements on health care workers influenza vaccination uptake, the influence of other entities, such as health care unions is less known, according to my research. This topic of research is important to address because more than 1.1 million health care workers in North America are members of an organized labor-union (SEIU, 2014c). Reynolds & Brady (2012) suggest that labor unions lead to improved health outcomes in unionized workers. Furthermore, from their research, they concluded that the unions' support of preventative health and wellness programs had positive influence on workers' health.

My study addressed the gap in the literature regarding whether a unionized workplace influences influenza vaccination compliance among health care workers. I compared the perceptions and knowledge toward influenza vaccination and vaccination behaviors between health care workers at a union and nonunion health care facility in the U.S. state of Pennsylvania. The conceptual domains for the study originate from the health belief model (HBM), which includes perceptions of influenza susceptibility and

severity, vaccination benefits and barriers, and knowledge of influenza. By increasing knowledge regarding the impact of a unionized workplace setting on vaccination compliance among this pivotal sector of the workforce, study findings may help advocates develop targeted educational curricula that increase vaccination rates, whereby ultimately improving public health by preventing influenza infection (CDC, 2013a) .

This chapter will review the background of the issue, define the problem and purpose of the study, and state my hypotheses. The scope of the study, which includes the assumptions, delimitations, and limitations will be addressed. Finally, the significance of the issue and the implications for positive social change will be discussed.

Background

Influenza infection is a seasonally occurring respiratory illness that contributes to significant morbidity and mortality ranging from 3,000 to 50,000 deaths and 200,000 hospitalizations each year in the United States (CDC, 2013b; Moore, 2009; National Vaccine Advisory Committee, 2013). The CDC's Advisory Committee on Immunization Practices (ACIP) recommends that every person who is 6 months or older receive an annual influenza vaccination, as it is the most effective way to prevent influenza infection (CDC, 2013b; National Vaccine Advisory Committee, 2013). The CDC recommendations are particularly detailed regarding individuals with chronic illness, since this population often suffers the most severe complications (including death) from influenza infection. Because patients with chronic illness are most susceptible to adverse outcomes from influenza, including a two to five-fold increase in influenza-related hospitalizations, the CDC recommends that persons caring for them in the health care

setting should receive influenza vaccination (National Vaccine Advisory Committee, 2013). The recommendation is based on the potential for transmission of influenza virus from health care workers to patients as previously identified in multiple health care facility outbreaks (Aujayeb, Russell & Walton, 2013; Cai & Temkin-Greene, 2011; MMWR, 2011; Taylor et al., 2014; Wicker & Marchmann, 2014).

Researchers studying influenza acquisition within health care settings have primarily focused on long-term care settings, such as nursing homes and group care settings. However, more recent studies have demonstrated the public health impact of health care-acquired influenza infection within acute care settings such as inpatient hospitals (Corace et al, 2013; Juhng et al, 2014; Talbot, 2014). Juhng et al. (2014) states that individuals with chronic medical conditions are significantly more likely to develop health care-acquired influenza. They also found that patients who contracted influenza in hospital settings are more likely to require intensive care or die than individuals who contract influenza within community settings. Furthermore, patients with health care-associated influenza were less likely to receive antiviral medication during the hospitalization compared to patients who developed influenza in the community setting, possibly contributing to the increase in morbidity and mortality.

In addition, outbreaks of influenza within health care settings adversely affect patients and increase the potential for health care workers' occupational exposure to influenza virus. Health care workers who develop influenza infection may compromise patient care by continuing to work while ill or by calling in sick (Corace et al, 2013; Pennsylvania Hospital Quality, n.d.; Talbot, 2014). In order to prevent compromised

health care quality conditions for patients, as well as promote health care safety and well-being of staff, experts recommend that health care facilities implement specific infection prevention policies for health care workers concerning influenza vaccination (Banach, Zhang, Factor, & Calfee, 2013; Jhung et al, 2014; National Vaccine Advisory Committee, 2013; TJC, 2014).

In July 2012, TJC, which accredits and recertifies more than 20,500 health care facilities, implemented standard IC. 02.04.01. The standard states that every health care agency accredited by TJC must provide an annual influenza vaccination program for all health care workers (TJC, 2014). Researchers have found that vaccinating staff improves overall health care quality by protecting patients and staff from influenza virus acquisition and transmission (Ahmed, Lindley, Allred, Weinbaum & Grohskopf, 2014; MMWR, 2010; Nichol, 2001; Poland, Tosh, & Jacobson, 2005). The TJC standard aligns with the CDC's vaccination recommendations for health care providers, which are widely publicized as the standard of care (CDC, 2013a).

Although the vaccine is 60-80% effective in protecting against influenza, only 40 - 60% of health care employees who work in facilities lacking a mandatory vaccination policy opt to receive the influenza vaccine (CDC, 2013a; Harris, Uscher-Pines, Han, Lindley & Lorick, 2014; Miller, Ahmed, Lindley, & Wortley, 2011; Rakita, Hagar, Crome, & Lammert, 2010). MMWR (2011) estimated that the vaccination rate among U.S. health care providers in the 2010-2011 influenza season was 63.5%. Although 74.2% of health care providers aged 60 and older received the vaccination, only 56.4% of those aged 18-29 and 57.8% of those aged 30-44 received it (National Vaccine Advisory

Committee, 2013). Several common motives for vaccination declination among health care workers include religious and philosophical objections, doubts that influenza is a serious illness, fear regarding side effects, and vaccine safety and effectiveness concerns (Douville, Myers, Jackson, & Lantos, 2010; Naleway et al, 2014). The low rate of influenza uptake among health care workers introduces the potential to spread influenza virus among health care workers, as well as to high-risk patients, which affects health care quality and patient safety (Jhung et al, 2014; TJC, 2014).

The positive influence of accreditation agencies on health care worker vaccination compliance is documented in the literature (Fricke, Gastanaduy, Klos, & Begue, 2013); however, a knowledge gap remains regarding the influence of other organizational entities, such as health care workers unions, on influenza vaccination outcomes. Reynolds and Brady (2012) conducted the first study on the relationship between union membership and workers' health; the authors concluded that the unions' support of preventative health and wellness programs had positive influence on workers' health. Other researchers have addressed the positive influence of a union environment on workers' participation in health promotion activities such as smoking cessation and obesity prevention (Moss & Kincl, 2006; Reynolds & Brady, 2012; Sorensen et al, 2007). Some researchers have indicated that a union environment associated with better employee self-rated health, elevated employee safety, and superior health care quality (Barbeau et al, 2005; Reynolds & Brady, 2012; SEIU, 2014b; Sojour, Town, Grabowski, & Chen, 2013).

However, based on my review of the literature, researchers have not examined the effect of union status on other preventative health behaviors, such as influenza vaccination compliance. In studying the impact of unionization on influenza vaccination compliance among health care workers, I will address this specific gap while also heeding the call of Reynolds and Brady (2012) for more research on the relationship between unionization and the health and well-being of unionized workers.

Problem Statement

Researchers address the positive influence of unionization on workers' participation in health promotion programs such as smoking cessation and obesity prevention (Moss & Kincl, 2006; Reynolds & Brady, 2012; Sorensen et al, 2007). However, no published research specifically pertains to the influence of union membership on the predictors of influenza vaccination compliance. Although the literature addresses several health care unions' vaccination positions regarding the ethics of mandatory vaccination policies among health care workers, the literature does not specifically address the effect of union status on vaccination perceptions and vaccination compliance among health care workers compared to nonunion health care workers (Gordon, 2006).

Other researchers have found evidence showing that working in a union environment is associated with increased self-ratings of health, elevated employee safety, and superior health care quality (Barbeau et al, 2005; Reynolds & Brady, 2012; Sojour, Town, Grabowski, & Chen, 2013). Because self-rated health is often an indicator of actual health status, I believe that union workers may be healthier and/or make better

health choices than nonunion workers specific to vaccination compliance. In examining whether union status is related to health care workers' perceptions of influenza vaccination and compliance with vaccination guidelines, I sought to address an understudied area in worker and public health.

Purpose of the Study

The purpose of this study was to address a knowledge gap in the literature concerning predictors of influenza vaccination compliance between a union and a nonunion health care facility. My study setting was two hospitals (union and nonunion) within a rural health care system in the U.S. state of Pennsylvania. I analyzed self-reported responses from an annual survey completed by employees at each facility. The survey includes key conceptual domains of the health belief model (HBM) (Glanz & Bishop, 2010). Vaccination compliance by employees was the dependent variable. Independent variables included workers' knowledge and perceptions of their susceptibility of acquiring influenza, the severity of influenza infection, the benefits of influenza vaccination, and barriers toward receiving vaccination. A comparison of the survey responses between the two facility types took place.

Research Questions and Hypotheses

RQ1: Is there a significant difference between influenza vaccination compliance among union and nonunion health care workers?

$H_0$1: There is no significant difference between influenza vaccination compliance among union and nonunion health care workers.

$H_1$1: There is a significant difference between influenza vaccination compliance among union and nonunion health care workers.

RQ2: Is there an association between perceived susceptibility of influenza and influenza vaccination compliance among union and nonunion health care workers?

$H_0$2: There is no association between perceived susceptibility of influenza and influenza vaccination compliance among union and nonunion health care workers.

$H_1$2: There is an association between perceived susceptibility of influenza and influenza vaccination compliance among union and nonunion health care workers.

RQ3: Is there an association between perceived severity of influenza and influenza vaccination compliance among union and nonunion health care workers?

$H_0$3: There is no association between perceived severity of influenza and influenza vaccination compliance among union and nonunion health care workers.

$H_1$3: There is an association between perceived severity of influenza and influenza vaccination compliance among union and nonunion health care workers.

RQ4: Is there an association between perceived benefits of influenza vaccine and influenza vaccination compliance among union and nonunion health care workers?

$H_0$4: There is no association between perceived benefits of influenza vaccine and influenza vaccination compliance among union and nonunion health care workers.

$H_1$4: There is an association between perceived benefits of influenza vaccine and influenza vaccination compliance among union and nonunion health care workers.

RQ5: Is there an association between perceived barriers of influenza vaccine and influenza vaccination compliance among union and nonunion health care workers?

$H_0$5: There is no association between perceived barriers of influenza vaccine and influenza vaccination compliance among union and nonunion health care workers.

$H_1$5: There is an association between perceived barriers of influenza vaccine and influenza vaccination compliance among union and nonunion health care workers.

RQ6: Is there an association between knowledge of influenza and influenza vaccination compliance among union and nonunion health care workers?

$H_0$6: There is no association between knowledge of influenza and influenza vaccination compliance among union and nonunion health care workers.

$H_1$6: There is an association between knowledge of influenza and influenza vaccination compliance among union and nonunion health care workers.

Theoretical Framework

The health belief model (HBM) is a common theory in social science used to explain the influence of individual health knowledge and perceptions on preventative health behaviors, such as vaccination compliance (Glanz & Bishop, 2010). The HBM is a theoretical framework that identifies the rationale for which individuals choose to partake in preventative behaviors (such as vaccinations). The first model domain is based on an individual's belief of the likelihood or susceptibility of developing an illness, such as influenza. The second domain is an individual's perception of disease (influenza) severity. The third domain is the perception of the benefits gained from participating in the preventative behavior, such as taking a vaccine (Siegel & Lotenberg, 2007). The final domain of the health belief model is based on the individual's perceived barriers that would interfere with completing the preventative health behavior (vaccination

compliance) (Siegel & Lotenberg, 2007). Additional information regarding the HBM theoretical framework will be further discussed in chapter 2.

The dissertation topic focused on the predictors of influenza vaccination compliance (i.e. perceived susceptibility of influenza, severity of influenza, benefits of influenza vaccination, barriers of influenza vaccination, and influenza education) between a unionized health care facility and a nonunionized health care facility in Pennsylvania. The application of the HBM was appropriate for the dissertation study since it aligns with previous research by Blue and Valley (2002), Corace et al. (2013), Erkin and Ozsoy (2012), and Ofstead, Tucker, Beebe, and Poland (2008) who similarly used this framework to evaluate the independent predictor variables of vaccination compliance among adult workers in the US and Turkish health care workers, respectively. While this framework was used in the aforementioned populations, this study sought to evaluate the independent predictor variables of vaccination compliance from a similar survey conducted on U.S. health care workers in a rural health care system to further understand the relationship between the domains of the health belief model and vaccination compliance (dependent variable) between union and nonunion health care workers.

A 46-question electronic survey, completed by all health care workers, was administered by a health care system's, department of Organizational Effectiveness and Performance (OPE) in 2013 (T. Diehl, personal communication, January 2014). The survey was a component of the health care facilities' annual employee influenza vaccination campaign and permission was granted to use the unpublished secondary data

via a Data Use Agreement (DUA) (see Appendix C). The survey was constructed based on the original conceptual domains of the health belief model. Survey items 1-7 are specific to perceived susceptibility of influenza, items 8-12 address perceived severity of influenza, items 13-18 relate to perceived benefits of influenza vaccination, items 19-27 are specific to perceived barriers of influenza vaccination, and general influenza virus knowledge (items 26-32). In addition, questions pertaining to cues to action (items 34-38), vaccine behavior (items 33, 47-48), and demographical information (items 41-46) were included in the survey.

Nature of the Study

The research design chosen for the dissertation study incorporated an anonymous secondary data analysis of a cross-sectional, self-administered electronic survey administered in 2013. The Organizational Performance and Effectiveness (OPE) department coordinated the administration of the survey at two rural health care facilities in Pennsylvania. Each hospital, operating within a single health care system, is accredited by TJC and follows all federal mandates from the Centers for Medicare and Medicaid; however one facility is unionized (Service Employees International Union) while the other facility is nonunion. Additional information regarding the study population will be discussed in Chapter 3.

The rationale for this design selection was based on previous research, in particular, Erkin and Ozsoy (2012) and Blue and Valley (2002), who administered a similar quantitative survey to Turkish health care workers and a group of service and clerical workers, respectively. Erkin and Ozsoy (2012) determined that the survey was a

reliable and valid tool to assess health care workers beliefs concerning influenza and influenza vaccination. Blue and Valley (2002), found that the predictor variables assessed in the survey (perceived benefits and barriers) were statistically significant in predicting vaccine acceptance. Quantitative research was an appropriate design to measure the relationship between predictive variables (independent variables) and outcome variables (dependent variables), which aligned with the research questions and study hypothesis (Field, 2009; Forthofer, Lee, & Hernandez, 2007; Sullivan, 2012).

Using the unpublished secondary dataset, survey results were accessed and analyzed using IBM SPSS Statistics 21 (T. Diehl, personal communication, January 2014). A chi-square test was applied to determine if the mean vaccination compliance between union and nonunion health care workers was significantly different from each other (Forthofer, Lee, & Hernandez, 2007). Binary logistic regression analysis was used to determine the association of union membership status between predictor variables (i.e. perceived susceptibility of influenza, severity of influenza, benefits of influenza vaccination, barriers of influenza vaccination, and influenza knowledge) and the dependent variable vaccination compliance.

Definitions

Health care-associated Influenza: The transmission of influenza virus to a patient within a health care setting that was not incubating or present upon admission to the facility (CDC, 2014).

Health care worker: A paid employee of the health care system.

Influenza: a contagious respiratory infection caused by influenza viruses (Influenza A and Influenza B) (CDC, 2013b).

Labor Union: an organization of wage earners or salaried employees for mutual aid and protection and for dealing collectively with employers; trade union (Dictionary.com, 2014).

Vaccination: The administration of weakened or killed microorganisms in order to produce an immunological response (Vaccines.gov, 2014).

Vaccination compliance: The uptake of a vaccine or the intent to be vaccinated. (Vaccines.gov, 2014).

Assumptions

In this cross-sectional study, anonymous data were analyzed from an electronic survey completed by all health care workers who were employed at the time of the survey administration from November 2013 through January 2014. It is assumed that the individuals completing the survey answered truthfully regarding perceptions of influenza infection and influenza vaccination. It is also assumed that the health care workers completing the survey provided accurate vaccination compliance status (vaccinated or not vaccinated). Further, it is assumed that the health care workers completing the survey correctly indicated their facility association, as facility association is an important differentiator regarding union status, as one health care facility is unionized and one facility is nonunion.

Scope and Delimitations

The survey was administered only to paid employees; therefore, the results may not be generalizable to other non-paid workers, such as volunteers, and non-employed physicians (private practice owned physicians). Further, the majority of paid health care workers at both facilities are female, which may affect the ability to generalize the results across the male population of health care workers. Since the data were collected from two hospitals within a single rural health care system, generalizability to urban health care settings may be limited.

Limitations

The study was conducted in conjunction with an annual mandatory influenza vaccination employee education campaign. The survey was conducted at the conclusion of a detailed influenza educational training session. It is possible that the information provided in the educational campaign may have influenced responders to answer questions based on the educational content versus personal reflections. A limitation of the study is that the survey required employees to provide employee identification numbers to verify completion status (only), as the completion of the survey was a mandatory component of the annual educational program. By requiring the employees to provide identification numbers to track completion status, it is possible that they may have doubted that the survey was anonymous; therefore, they may have failed to complete the survey based on actual personal perceptions. Consequently, it is possible that employees answered the questions in alignment with cultural and organizational expectations. Further, it is not possible to confirm that the vaccination status documented by the

employee reflected their actual vaccination status (or intent to receive vaccine). One method to address this limitation was to obtain influenza vaccination data from the employee health department to compare the compliance recorded to the survey responses.

Significance

Previous research has addressed the influence of TJC standards and federal guidance on influenza vaccination compliance among health care workers as an indicator of health care quality and improved worker safety, with facilities accredited by TJC having increased vaccination compliance and enhanced health care quality (Fricke, Gastanaduy, Klos, & Begue, 2013). Similar to TJC, SEIU, the largest union in North America with more than 1.1 million health care worker members supports quality health care and patient safety outcomes, as it relates to vaccination compliance. To date, no published research addresses the link between union membership and vaccination compliance (Banach, Zhang, Factor, & Calfee, 2013; Colace et al., 2013; Lewthwaite et al., 2014, SEIU, 2014a).

The purpose of this study was to address a knowledge gap in the literature concerning predictors of influenza vaccination compliance between a union and a nonunion health care facility. The perceptions and beliefs regarding influenza vaccination and vaccination compliance were compared between health care workers at a union and nonunion health care facility in Pennsylvania. These research findings contribute to positive social change by identifying predictors of influenza vaccination compliance specific to union and nonunion health care workers. By improving our understanding of vaccination behaviors and vaccination predictor variables specific to union and nonunion

health care employees, targeted educational curricula can be developed to improve vaccination compliance within a rural health care system.

Summary

Extensive research exists regarding the benefit of influenza vaccination among health care workers on promoting improved health care quality and positive patient outcomes. Based on the research, accrediting agencies such as TJC and federal bodies such as CMS fully support influenza vaccination compliance among health care workers (DHHS, 2011; TJC, 2014). However, based on my literature review, no information exists regarding the influence of other health care organizations such as SEIU on vaccination compliance among health care workers. More than 1.1 million health care workers are working within a SEIU labor agreement in North America (SEIU, 2014c).Therefore, it is important that more information is sought to understand the relationship between unionization and health care workers' vaccination perceptions and beliefs and vaccination compliance. I hope that my study findings may be useful in improving vaccination compliance by promoting education specifically tailored to health care workers in union and nonunionized environments. Chapter 2 will further expand upon the problem, literature search strategies, and theoretical foundations that support this study.

Chapter 2: Literature Review

Introduction

Influenza virus poses significant concerns for public health due to its infectivity and communicability (CDC, 2014b; Flu.gov, 2014). Risks for infection and morbidity and mortality are particularly great in individuals with chronic illness, since this population often suffers the most severe complications (including death) from influenza infection (Corace et al, 2013; Juhng et al, 2014; Talbot, 2014). Researchers have documented outbreaks from unvaccinated health care workers to vulnerable patients, leading to health care-associated influenza infections (Aujayeb, Russell & Walton, 2013; Cai & Temkin-Greene, 2011; MMWR, 2011; National Vaccine Advisory Committee, 2013; Taylor et al, 2014; Wicker & Marchmann, 2014). Therefore, CDC recommends that all health care workers receive influenza vaccination annually. In addition to the CDC, numerous health care professional societies and health care facility accrediting agencies, such as TJC promote influenza vaccination among health care workers (TJC; 2013). Federal governing bodies such as the Centers for Medicare and Medicaid consider influenza vaccination among health care workers to be an important component to quality health care outcomes (DHHS, 2011). However, the stance of health care unions and other entities regarding health care worker vaccination compliance is less known, according to my research. In order to address this gap, I compared the perceptions and knowledge of influenza vaccination and vaccination behaviors between health care workers at a union and nonunion health care facility in the U.S. state of Pennsylvania. My study findings

may be useful to those planning vaccination training and/or policy and developing vaccination campaigns for health care workers.

I begin this chapter with an overview of the library research strategies used to obtain historical information and supporting literature for my study. I then discuss the theoretical framework and epidemiological aspects of influenza pandemics (morbidity, mortality, and financial implications). Further, this chapter will discuss influenza vaccine, recommendations specific to health care workers, and the impact of influential forces within the health care sector, such as regulatory bodies, professional societies, accreditation agencies, and health care unions as it relates to vaccination compliance among health care workers. Chapter 2 will present a synthesis of peer-reviewed literature regarding vaccination barriers and predictors.

Literature Search Strategy

Although the peer review process sometimes limits the publication of sound research (see Peplow, 2014), I primarily relied on scholarly sources that had been peer-reviewed to better ensure the quality of my research. To obtain the most current literature on my topics, I primarily selected articles that had been published from 2010-2015. During my literature search, I became aware that a significant amount of pertinent information was published in the early 2000s on my topic areas. The decision to include a few articles greater than 5 years of age was based on whether the information provided was foundational to current practice and policy implementation and if the article provided theoretical foundations to current protocols.

I conducted literature searches in peer reviewed journals (published within the previous five years, unless a sentinel article was appropriate for inclusion) that was pivotal to health care epidemiology, infection prevention and control, occupational health, infectious disease practices, and ambulatory medicine. Information was sought from federal and international government sources (published/updated within the previous five years). The use of non-peer reviewed material included professional organization websites; however, this type of resource was used sparingly and only to provide a comprehensive understanding of the print material available on this subject. Online database sources included: Dynamed, Ebsco Host, Google Scholar, Medline, PubMed, and ProQuest. The search terms included: *health care workers, health care workers and influenza vaccination, health care workers and vaccination, health belief model and health care workers, health belief model and vaccination behavior, influenza, influenza risk factors, influenza vaccination and barriers, influenza vaccination and predictors, mandatory vaccination, health care workers, The Joint Commission and influenza vaccination standards, theoretical framework, vaccination, OSHA and infectious disease, union health care environment, unions and culture of health, unions and employee health, unions and health behavior, unions and health promotion (programs), unions and infectious disease, unions and self-rated health, and unions and occupational illness.*

Biology of Influenza

Influenza virus in humans is caused by influenza A and influenza B. The virus strain for influenza A is classified by the type of surface antigens: hemagglutinin and

neuraminidase (MMWR, 2010). Influenza B is not classified into subtypes, but is divided into two genetic lines (Victoria and Yamagata lineage). Since 1977, both influenza A and B have circulated the globe, but the most prevalent and serious strains include influenza A (H1N1) and influenza A (H3N2). Influenza A virus strains have been implicated in the most severe influenza outbreaks and pandemics, due to the ability of the surface antigens to shift and drift more quickly than the surface antigens of influenza B (MMWR, 2010). The rise of antigenic variants emerges from antigenic drifts, such as the case in the most commonly circulating influenza virus (H3N2) in 2014-2015 (CDC, 2015). An antigenic drift occurs in a subtle manner and is the reason influenza strains are annually evaluated and recommended for inclusion in the vaccine. Less frequently, a completely novel subtype of influenza emerges, created by an antigenic shift. This emergent virus has the potential to create pandemics since humans have no pre-existing immunity to the virus (MMWR, 2010).

Epidemiology of Influenza

Influenza virus is spread via infectious droplets from the respiratory tract and can transmit from person-to-person through coughing and sneezing (CDC, 2014b). The time from inoculation of the virus to symptom onset is typically two days, but can range from one to four days (CDC, 2014b). Symptoms of influenza include fever, sore throat, cough, congested nose, muscle aches, fatigue, vomiting, and diarrhea. A person is infectious one day prior to symptom onset, which provides an opportunity of transmission, even when asymptomatic. The shedding of virus prior to symptom onset facilitates the ease of

person-to-person transmission. Once symptoms present, a person is infectious for 5-7 days (CDC, 2014b).

Influenza virus annually circulates in North America, typically between October and March. In a typical influenza season, the virus infects nearly twenty-percent of the population, and causes 3,000 to 49,000 annual deaths in the United States (CDC, 2013b; CDC, 2014a; Moore, 2009; National Vaccine Advisory Committee, 2013). Influenza has the potential to cause the most significant morbidity and mortality among individuals with compromised immune systems (Derber & Shankran, 2012; CDC, 2012). Specifically, increased severity and complications occur in individuals with preexisting health conditions such as chronic pulmonary disease, cardiovascular disease, diabetes, pregnancy, extreme age (elderly and very young), and those who are receiving chemotherapy regimens (CDC, 2014b).

Historically, the first pandemic of influenza occurred in 1580. Since then, at least seven pandemics have been published in the literature, predominantly spanning the 19th and 20th centuries (CDC, 2014b). The most severe pandemic occurred in 1918-1919 and was responsible for 675,000 deaths in the United States and 21 million deaths across the globe (CDC, 2014b; Flu.gov, 2014). In 1957, another influenza pandemic took hold of the world and caused 69,800 deaths (Flu.gov, 2014). Eleven years later in 1968, a less severe pandemic influenza caused by Influenza A H3N2 was associated with 33,800 deaths. The last pandemic of the 20th Century, caused by the H1N1 influenza strain, occurred in 1977. This pandemic primarily affected persons less than 23 years old (Flu.gov, 2014). The only pandemic recorded the 21st century occurred in 2009-2010.

This pandemic, also caused by the H1N1 influenza strain, contributed to more than 270,000 hospitalizations and 12,500 deaths, particularly among persons younger than 65 years, with only ten percent of deaths occurring in persons greater than 65 years of age (CDC, 2014b p 4). The World Health Organization reports that the cost of influenza epidemics to the economy in the United States ranges between $71 and 167 billion per year (WHO, 2013).

Influenza Vaccine

The CDC states that influenza vaccination is the most effective method to prevent the acquisition and transmission of influenza; therefore, the CDC, as well as the Advisory Community on Immunization Practices (ACIP), recommend that every person aged greater than six months receive an influenza vaccine, with the exception of those who are severely allergic to eggs and those who developed Guillain-Barré syndrome within six weeks of a previous influenza vaccine (MMWR, 2013).

Health Care Workers and Influenza Vaccination

Although vaccination recommendations exist for the general population, the CDC offers specific recommendations to health care workers, to reinforce the importance of influenza vaccine. These specific recommendations exist because health care workers often work with susceptible and immunocompromised patients and numerous outbreaks of influenza have been documented as a result of unvaccinated health care workers spreading influenza to patients within the health care environment (Aujayeb, Russell & Walton, 2013; Cai & Temkin-Greene, 2011; Derber & Shankaran, 2012; MMWR, 2011; Moore, 2009; National Vaccine Advisory Committee, 2013; Taylor et al, 2014; Wicker &

Marchmann, 2014). Outbreaks due to influenza have contributed to excess morbidity and mortality among hospitalized patients. The detrimental result from influenza virus transmission is a public health and patient safety concern (MMWR, 2013; Poland, Jacobson, Tilburt, & Wicker, 2011).

Low acceptance of influenza vaccine among health care workers is as a public health issue (Corace et al, 2013; Llupia et al., 2010; Moore, 2009; Prematunge, 2013). Influenza vaccination rates among health care workers across the United States in health care facilities that lack a mandatory influenza immunization policy range between 40-60%. The Health Interview Survey from year 2004 through 2008 indicates that the types of health care workers most likely to receive influenza vaccine are nurses and physicians compared to other health care workers, such as ancillary staff. However, health care worker types in addition to nurses and physicians, such as ancillary staff members, students, and volunteers can likely spread influenza to patients through close contact while within a health care facility and should therefore be vaccinated (Ahmed, Lindley, Allred, Weinbaum, & Grohskop, 2014).

Currently, influenza vaccination is the most effective way to prevent influenza acquisition and transmission (CDC, 2014). A strategy to reduce influenza transmission and the health care-associated influenza infection costs within the health care system is to ensure that health care workers are vaccinated against influenza (Poland, 2009). TJC supports health care worker influenza vaccination and has developed a health care standard requiring all TJC accredited organizations to implement a facility-based vaccination program that will achieve a 90% vaccination compliance rate by 2020 (TJC,

2013). TJC's vaccination position has prompted many health care organizations to evaluate existing vaccination programs and policies. The rationale for TJC's position is that the implementation of an influenza immunization program improves vaccination compliance among health care workers by promoting the health and wellness of health care workers, which ultimately reduces the transmission of influenza to patients and coworkers (TJC, 2013). In agreement with TJC, the Infectious Disease Society of America (IDSA) also states that poor influenza vaccination rates among health care workers increases the likelihood of influenza acquisition and transmission to patients, visitors, and coworkers (Immunize.org, 2013). The IDSA supports mandatory influenza vaccination policies for health care workers as the most effective method to reduce the morbidity and mortality from influenza transmission within the health care environment (IDSA, 2013). In addition to the IDSA, other professional health care organizations support influenza vaccination programs such as the American Academy of Family Physicians, American Academy of Pediatrics, American College of Physicians, American Hospital Association, Association for Professionals in Infection Control and Epidemiology, American Public Health Association, National Patient Safety Foundation, and Society for Health care Epidemiology of America (Immunize.org, 2013). The aforementioned organizations have each published position statements indicating that vaccination policies aid in reducing morbidity and mortality resulting from influenza infection and as well as facility-associated financial burdens.

Previous research studies have addressed the influence of TJC standards, professional societies, and federal guidance on influenza vaccination compliance among

health care workers as an indicator of health care quality and improved worker safety. The research findings reveal that facilities accredited by TJC have increased influenza vaccination compliance and enhanced health care quality (Fricke, Gastanaduy, Klos, & Begue, 2013). Although the positive influence of accreditation agencies, such as TJC, on health care worker vaccination compliance is documented in the literature; a knowledge gap remains regarding the influence of other organizational entities on influenza vaccination outcomes among health care workers, such as the presence of a health care union.

Similar to TJC, The Service International Union (SEIU), the largest union in North America with more than 1.1 million healthcare worker members supports quality health care and patient safety outcomes, as it relates to vaccination compliance, but no published research has addressed the link between union membership and predictors of vaccination compliance (Banach, Zhang, Factor, & Calfee, 2013; Colace et al., 2013; Lewthwaite et al., 2014, SEIU, 2014a). Reynolds and Brady (2012) suggest that unionization is a strong, positive influence on the health of workers and that further research needs devoted to advancing the understanding of the relationship between unionization and the health and well-being of unionized workers. In addition, some researchers indicate that a union environment is associated with better employee self-rated health, elevated employee safety, and superior health care quality (Barbeau et al, 2005; Reynolds & Brady, 2012; Sojour, Town, Grabowski, & Chen, 2013). Building upon previous research, this study evaluated the relationship between union status and perceptions of influenza vaccination and compared vaccination compliance between a

union and nonunion health care facility within a rural Pennsylvania health care system. The research methodological approach and specific construct variables will be discussed later in this chapter.

Theoretical Foundation

The Health Belief Model (HBM) theory provides a framework focusing on individual health behaviors as a result of the influence of personal perceptions and beliefs. The HBM is one of the most commonly used theories in current practice (Glanz & Bishop, 2010). Assari (2011) documented that the HBM theory is the most commonly published health behavior model compared to other health behavior models including Social Cognitive Theory and Theory of Planned Behavior. The model, first developed by a group of social psychologists in the 1950s, was initially used to understand the rationale for which individuals did not participate in preventative health behaviors (Janz & Beckner, 1984). The HBM is one of the oldest theories used today to explain why people may or may not participate in preventative services such as immunizations or health screenings (Glanz, Rimer, & Viswanth, 2008). The HBM provides a framework that focuses on health behaviors and explains how personal beliefs may influence participation in preventative behaviors, actions, or services.

The model focuses on defined concepts or domains of personal perceptions and the influence of those domains on behavioral outcomes (Glanz, Rimer, & Viswanth, 2008). The domains concentrate on perceived risks and benefits. The first domain addresses an individual's perception of their susceptibility or likelihood of developing an illness or condition. The second domain of the model focuses on an individual's

perception of illness severity. The third concept focuses on an individual's perception of the benefits of preventative behaviors or actions as a way to prevent the illness (Siegel & Lotenberg, 2007). Finally, the model focuses on perceived barriers of making the desired behavior change. An important consideration of this model is that the desired behavior may not be achieved if the current behavior is perceived crucial to personal well-being or survival. In addition to the four original constructs, Hochbaun, in 1958, introduced the concept of "cues to action". Cues to action are described as events or activities that stimulate behavioral action. The theory was further expanded in1977 when Bandura introduced the concept of self-efficacy, defined as the level of confidence of one's ability to successfully carryout a behavioral action (Glanz, Rimer, & Viswanth, 2008).

The HBM model is an appropriate theoretical framework for this study since it has been used widely to understand why health care workers either accept or refuse influenza vaccine (Prematung et al., 2012). Researchers Banach, Zhang, Factor, and Calfee (2013) focused on the HBM in their study that administered a cross-sectional, self-administered, survey to more than 415 health care workers. Their research sought to determine the types of health care workers most likely to accept influenza vaccine and most likely to support mandatory influenza vaccination programs. The study survey contained specific questions regarding health care workers' perceptions of influenza severity, the effectiveness of the vaccine, and perception of the benefit of a mandatory vaccination program. The study findings supported that beliefs play an integral role in vaccination behaviors and vaccination education programs should be tailored to address

specific beliefs as a means to improve vaccination compliance among health care workers.

Jennings and Burant (2013) administered a survey to 203 nurses at a Veteran's Health Administration Medical Center (VAMC) concentrating on influenza vaccination knowledge and perceptions, using the HBM as the survey theoretical framework. The survey results indicated that personal beliefs of influenza affected preventative health behaviors. Nurses who reported heightened fear of becoming ill from receiving vaccine were less likely to participate in vaccination behaviors. Nurses who participated in vaccination behaviors were more likely to demonstrate more knowledge about influenza compared to unvaccinated nurses. The research findings support the importance and relevance of personal beliefs on preventative health behaviors, such as vaccination. The authors concluded that the components of the HBM should be considered when discussing vaccination compliance among nurses.

In addition to Jennings and Burant (2013), research by Canning, Phillips and Allsup (2005) sought to determine reasons for refusing influenza vaccine by incorporating the health belief model concepts, using a cross-sectional survey. The authors based the survey on perceived barriers and perceived benefits of influenza vaccination. Using this model, the authors concluded that the perceived barriers included perceived lack of need (for vaccine), unfamiliarity with vaccine, perceived detrimental side effects of vaccine, and the perception that vaccine is unnecessary. In this study, the

perceived benefit of vaccine acceptance was reduction in sick time use (at work) and personal protection.

Research conducted by Blue and Valley (2002) is foundational regarding the relationship between the domains of the HBM and vaccination compliance. Blue and Valley used a quantitative survey methodology to obtain information from U.S. adult workers regarding their beliefs concerning influenza and vaccination. The beliefs were measured using a Likert Scale (completely agree to completely disagree). A benefit to this research approach is the convenience of administering an electronic survey to multiple individuals in a short time-period. The survey originally used by Blue and Valley (2002) was adapted for use on health care workers in Turkey by Erkin and Ozsoy (2012). In 2012, Erkin and Ozsoy expanded upon the work of Blue and Valley by further validating the survey, which was used to assess barriers of vaccination compliance among Turkish health care workers. In 2013, the validated survey content used to assess influenza and vaccination beliefs, attitudes, and influenza knowledge among Turkish health care workers was adapted to assess influenza vaccination perceptions and influenza knowledge among union and nonunion health care workers in Pennsylvania.

Key Variables and Concepts

The constructs of interest in this study are the domains of the HBM. The domains of the model include susceptibility of influenza, severity of influenza, benefits of influenza vaccination, barriers of influenza vaccination, and influenza knowledge. Self-reported independent variables including susceptibility of acquiring influenza, severity of

influenza infection, influenza vaccination benefits, barriers of vaccination, and knowledge of influenza were compared between the two facility types within a rural Pennsylvania health care system. The independent variables were examined to determine associations with health care worker vaccination compliance.

The majority of research reviewed assesses the constructs of the health belief model using a quantitative survey approach (Banach, Zhang, Factor, & Calfee, 2013; Blue & Valley, 2002; Canning, Phillips, & Allsup, 2005; Douville, Myers, Jackson, & Lantos, 2010; Erkin & Ozsoy, 2012; Jennings & Burant, 2013; Prematunge et al, 2012). The benefit of using this methodology is the ability to obtain robust information in a short time-frame, typically with less cost. Further, this design provides structure and control. This methodology is compatible with hypothesis testing. A weakness of this methodology is that in the majority of surveys administered, participants were not given the opportunity to ask questions or provide "free-text" responses; rather responses were obtained using a structured Likert-scale format.

In comparison to the aforementioned quantitative research studies, researchers have studied the influence of the health belief model constructs within the health care setting, specific to influenza vaccination, by applying a differing methodology to answer similar research questions. Bean and Catania (2013) incorporated a qualitative approach to assess vaccine perceptions among Oregon health care workers. The researchers implemented a semi-structured interview of 15 volunteer health care providers, concentrating specifically on the constructs of the health belief model. The interview

content was recorded and transcribed. Themes were created from the qualitative approach and individuals were classified by their vaccine perspectives (vaccine opposers, vaccine supporters, and conditional vaccine supporters), which was derived from the self-reported perspectives of benefits and barriers of vaccination. The benefit of a qualitative methodology is the ability to obtain actual feedback from the participant's perspective. This research methodology provides flexibility and discovery. A weakness of this methodology is the potential for interview bias, interpretation bias, and less structure.

Constructs

Susceptibility and Severity of Influenza

Perceived susceptibility of influenza has been documented as a predictor of vaccination behaviors with vaccination compliance higher among person who perceive themselves to be more susceptible to developing influenza (Chor, Pada, & Stevenson, 2011; Nowalk, Lin, and Zimmerman, 2008; Rubin, Potts, & Michie, 2011). In contrast declination of influenza vaccine was more frequent when health care workers do not feel at risk for developing influenza (Derber & Shankaran, 2012; Prematung et al, 2012).

Benefits and Barriers of Influenza Vaccination

While many reasons are given for vaccination declination, the most common reasons given to accepting vaccine includes protection of self, protection of family, protection of co-workers, and ethical duty (Corace et al, 20013; Derber & Shankaran, 2012; Prematinge et al, 2012, Wicker & Marckmann, 2014). The findings from the meta-analysis conducted by Vasilevska, Ku, & Fisman (2014) indicated that perceived vaccination benefits including self-protection, protection of family were significantly

associated with vaccination compliance. Studies conducted by Jennings & Burant (2013), Nicol & Hauge (1997), and O'Reilly, Cran & Stevens (2005) indicated that perceived protection of patients from vaccine compliance was significantly associated with vaccine uptake among health care workers. However, Douville, Myers, Jackson, and Lantos (2010) concluded from their study that patient safety was not among the most commonly stated reasons for health care worker influenza vaccination compliance. Research by Prematunge et al (2012) found that predictors of vaccination compliance were significantly associated with the perceived safety and perceived effectiveness of the vaccine, with persons having more favorable perceptions being more likely to accept vaccine.

Multiple studies have sought to determine the most common barriers of influenza vaccination acceptance among health care providers. The most common reasons health care workers decline vaccine is fear of adverse side effects from the vaccine, belief that the vaccine lacks effectiveness, or belief that vaccination is inconvenient (Canning, Phillips & Allsup, 2005; Derber & Shankaran, 2012; Godin, Vezina, & Naccache, 2010; Jennings & Burant, 2013; Moore, 2009; Prematung et al, 2012). In addition, a common concern documented is the fear of developing Guillain-Barré from the vaccine.

Guillain-Barré is a neurological disease that affects 3,000-6,000 individuals in the United States annually. The perceived association of this disease to influenza vaccine originates from the National Influenza vaccination Program in 1976 (CDC, 2012). Within a few weeks of the program onset, cases of neurological sequel developed in several vaccinated persons. The cluster of cases commanded a closer look at the association

between influenza vaccine and detrimental neurological outcomes. The Institute of Medicine conducted a thorough review of the cases and later concluded that the attributable risk for developing Guillain-Barré was an excess of 1.6 cases of Guillain-Barré per 1,000,000 persons vaccinated. To this day, many health care workers are hesitant to receive influenza vaccine, due to the perceived risk of developing Guillain-Barré syndrome from the influenza vaccine (MMWR, 2013 p 17; Salmon et al, 2013).

Summary

Influenza is a potentially serious virus that circulates annually in the United States. The CDC, as well as numerous professional organizations and societies, and TJC support influenza vaccination as the best method to reduce health care-associated influenza infection among patients and health care workers. Similar to TJC, SEIU, supports quality health care and patient safety outcomes, but no published research exists to address the link between union membership and vaccination compliance (Banach, Zhang, Factor, & Calfee, 2013; Colace et al., 2013; Lewthwaite et al., 2014; SEIU, 2014a). This study expanded upon published literature that supports the claim that a union environment is associated with better employee self-rated health, elevated employee safety, and superior health care quality (Barbeau et al, 2005; Reynolds & Brady, 2012; Sojour, Town, Grabowski, & Chen, 2013). Self-rated health is identified as an indicator of actual health status, which may suggest that unionized workers are healthier, or make better health choices, than nonunion workers; therefore, this study will expand identifying the relationship between union status and perceptions of preventative health actions, such as influenza vaccination.

Conclusions

Influenza vaccination among health care workers is a public health issue since unvaccinated health care workers can spread influenza to patients and coworkers, leading to poor patient health outcomes and financial burdens. The CDC states that influenza vaccination is the most effective method to protect patients and coworkers from influenza transmission within the health care environment. Although vaccination is strongly encouraged and recommended, many health care workers decline vaccination. In the literature, researchers describe the influence of accreditation bodies on vaccination compliance among health care workers, but no study has examined the influence of a health care union, that similarly supports employee safety and quality patient outcomes on health care worker vaccination behaviors. This study sought to address the identified gap in the literature.

This chapter addressed the historical impact and epidemiology of influenza as well as the current influenza vaccination recommendations specific to health care workers. In addition, the health belief model was introduced and examined as an appropriate theoretical framework to address vaccination behaviors among health care workers. Further, this chapter presented a synthesis of peer-reviewed literature regarding vaccination barriers and predictors and the various research strategies used to address these constructs. Finally, this chapter identified the knowledge gap in the literature pertinent to this research study.

In order to address the gap in the literature, a well-designed research study is required; therefore, Chapter 3 will discuss the research design and methodology including

study population, sampling strategies and procedures, instrumentation and operationalization of constructs, and data analysis plan.

Chapter 3: Research Method

Introduction

The purpose of this study was to address a knowledge gap in the literature concerning predictors of influenza vaccination compliance between a union and a nonunion health care facility. I analyzed self-reported survey data completed by employees working at two facility types (union and nonunion) within a rural health care system in the U.S. state of Pennsylvania. The dependent variable was influenza vaccination compliance. Independent variables included perceptions regarding susceptibility of acquiring influenza, severity of influenza infection, influenza vaccination benefits, barriers of vaccination, and influenza knowledge.

In this chapter, I will discuss my research design and rationale and methodology including my study population and sampling strategies and procedures. I will also discuss my instrumentation, operationalization of constructs, and procedures for data analysis. Threats to validity and ethical considerations will also be addressed. I conclude the chapter with a summary.

Research Design and Rationale

I performed a secondary data analysis of a cross-sectional, self-administered electronic influenza vaccination survey conducted at two rural health care facilities in Pennsylvania. I selected a quantitative research design and method based on my research questions and hypotheses and desire to measure the relationship between predictive and outcome variables (see Field, 2009; Forthofer, Lee, & Hernandez, 2007; Sullivan, 2012).

The survey method is consistent with published studies on my topic (Banach, Zhang, Factor, & Calfee, 2013; Blue & Valley, 2002; Canning, Phillips, & Allsup, 2005; Douville, Myers, Jackson, & Lantos, 2010; Erkin & Ozsoy, 2012; Jennings & Burant, 2013; Prematunge et al, 2012). This survey method provided a cost-effective, convenient manner of accessing the perceptions and beliefs of health care workers regarding vaccination predictors and vaccination behaviors.

Methodology

Population

The population of interest includes all health care personnel who were employed within a single health care system (comprised of two acute-care hospitals), from November 2013 through January 2014 (T. Diehl, personal communication, January 2014). The total study population includes 2480 health care workers within the health care system.

Setting

The two acute care health care facilities are located in Pennsylvania and are owned and operated by a single health care system. Within the health care system, a unionized hospital (Hospital U), employs approximately 1900 health care workers and a nonunionized hospital (Hospital NU), employs approximately 550 health care workers. The hospitals are located approximately 15 miles apart.

Sampling and Sampling Procedures

My sample included all 2480 health care workers (paid employees of the health care system) who were employed by the health care system between November 2013 and

January 2014. All health care workers completed an electronic survey in conjunction with their respective facility's annual employee continuing education requirements. No health care workers were excluded.

In addition to sample selection, sample size calculations are important to consider. Three considerations, statistical power, alpha, and effect size are important in calculating an appropriate sample size (Frankfort-Nachmias & Nachmias, 2007). Statistical power is defined as the probability that a statistical test will detect a real treatment effect or a real difference between variables (Frankfort-Nachmias & Nachmias, 2007). In the field of social science, a commonly accepted value for statistical power is 0.80, which means that the probability of detecting a true relationship by the test is 80%. The level of significance, or alpha value, is typically set at 0.05. An alpha set at 0.05 indicates that there is only a 5% random chance that the null hypotheses will be incorrectly rejected (Frankfort-Nachmias & Nachmias, 2007). Effect size indicates the strength of a relationship. If a treatment or intervention has a large effect, a smaller sample size is needed to observe the effect. In contrast, a smaller effect size requires a larger sample size in order to detect an effect (Ellis, 2010). I reviewed similar studies pertaining to vaccination compliance specifically to determine appropriate effect size; however, the reviewed publications did not indicate effect size. Since specific the effect size used in similar research was not obtainable, the traditional value for a medium effect size, 0.5 was used (Ellis, 2010).

For RQ1, a chi- square test was applied to determine if the mean vaccination compliance between union and nonunion health care workers was significantly different

from each other. I completed a priori power calculation using software, G*Power 3.1 (Faul, Erdfelder, Lang, & Buchner, 2013). Using the G*Power software, Chi square: Goodness-of-fit test was selected. The effect size, which describes the strength of the relationship, was set at 0.05, which is a medium effect size (Ellis, 2010). The alpha value was set at 0.05, and statistical power was set at 0.80. The output parameters indicated that 52 is the minimum sample size to achieve sufficient power and effect size. The sample size in this study was large enough to satisfy this parameter.

For RQs 2-6, a binary logistic regression analysis was used to determine the association of each independent variable (conceptual domains from the HBM: perceived susceptibility, perceived severity, perceived benefit, perceived barriers, and influenza knowledge) on vaccination compliance among union and nonunion health care workers. Using G*Power 3.1.7 software, logistic regression was selected as the statistical test. Input parameters selected included two-tail (which assumes that the effect, if any, has no direction), alpha = 0.05, effect size = 0.5, and power = 0.80 (Faul, Erdfelder, Lang, & Buchner, 2013). The output parameters indicate that the minimum sample size needed to achieve adequate power is 721 (Faul, Erdfelder, Lang, & Buchner, 2013). The sample size was sufficient to achieve adequate power.

Recruitment and Sampling

The procedure for recruitment of participants in the online survey consisted of a mandatory annual education competency pertaining to influenza and influenza vaccination, sponsored by the health care system's Organizational Performance and Education Department (OPE), which serves both health care facilities. The survey was a

component of the influenza education competency. The OPE department facilitated the annual competency and verified employee participation. The OPE education coordinator governed the online survey database and associated links. The anonymous secondary dataset was provided by the OPE education coordinator to the author of this study.

Instrumentation

The electronic survey (see Appendix A) was created specifically for the annual influenza vaccination education competency in 2013. The survey content specifically addressed components of the health belief model and was adapted from the scales originally used by Valley and Blue (2002) and Erkin and Ozsoy (2012), which were based on the health belief model constructs. Valley and Blue (2002) administered their original survey to 400 adult workers (service and clerical) in a Midwestern university setting. The researchers calculated the Cronbach's alpha coefficient for each of the survey constructs: "susceptibility, .78, seriousness, .77, benefits, .91, and barriers, .97" (Blue& Valley, 2002 p 230). To ascertain test-retest reliabilities of the survey, Pearson correlations were applied to determine test-retest correlation coefficients. The results of the test retest correlation coefficients: "susceptibility, 0.36 (p=.05); seriousness, .067 (p=.01); benefits, .54 (p=.01); barriers, .50 (p=.01)" (Blue & Valley, 2002 p 23). Erkin and Ozsoy (2012) translated, tested, and validated the scale specifically to obtain information regarding Turkish health care workers' beliefs and attitudes regarding influenza vaccine. The scale was tested for construct validity using factor analysis with varimax rotation. Cronbach's alpha and item-total subscale correlations were calculated to interpret reliability. According to Field (2009), the optimal value for Cronbach's alpha

typically ranges between 0.7 and 0.8. After evaluating the homogeneity of the survey items, all questions with a correlation coefficient less than 0.25 were removed from the survey, which increased the Cronbach's alpha coefficient to 0.91 and the acceptable range for correlational coefficients were 0.25-0.60, per item.

The content validity index for the scale was 0.92 and the internal consistency reliability spanned 0.97 to 0.99, and the scale's test-retest reliability was 0.94. The results of these reliability and validity tests provided support for use of this instrument for use on health care workers (Erkin & Ozsoy, 2012). Since the survey administered in this study was similar to the surveys conducted by Blue and Valley (2002) and Erkin and Ozsoy (2012), with the exception of the demographic items, it was assumed that the similar items specifically pertaining to the independent and dependent variables were reliable and valid, based on the reliability and validity tests performed in prior studies. It is important to note that the surveys administered by Blue and Valley and Erkin and Ozsoy were conducted on healthy adult workers and Turkish health care workers, respectively. The survey has never been administered to adult U.S. health care workers, and therefore it is possible that limitations may exist due to applying the survey to this population type. However, it is important to note that the English version of the survey is similar to the Turkish version in terms of face validity. Further, the demographic questions added to the survey by the organization were not tested for validity, which may also present as a possible limitation of this study.

The survey instrument in this study was constructed by the health care system's Department of Organizational Effectiveness and Performance (OPE) based on the

original surveys tested and validated by Blue and Valley (2002) and Erkin and Ozsoy (2012). Additional survey items, specific to demographics were added by OPE. Final survey modifications and upload to the internal intranet system was completed as well as completion status was verified by the OPE staff.

The survey was constructed based on the conceptual domains of the health belief model (Glanz, Rimer, & Viswanth, 2008). Each conceptual domain served as an independent variable in this study. Survey items 1-7 were specific to perceived susceptibility of influenza, items 8-12 addressed perceived severity of influenza, items 13-18 related to perceived benefits of influenza vaccination, and items 19-27 were specific to perceived barriers of influenza vaccination. The remaining survey items pertained to general influenza virus knowledge (items 26-32), cues to action (items 34-38), vaccine behavior (items 33, 47-48), and demographical information (items 41-46) (see Appendix A).

Operationalization

Independent Variables: The independent variables: perceived susceptibility, perceived severity, perceived benefit, perceived risk, and influenza knowledge were scored in a Likert-scale format (1=strongly disagree to 5=strongly agree). These independent variables were analyzed to determine associations with the dichotomous dependent variable, vaccination compliance. The independent variables and the associated survey items are displayed in Table 1.

Table 1

Health Belief Model Independent Variables and Associated Variable Items.

Constructs	Perceived Susceptibility	Perceived Severity	Perceived Benefits	Perceived Barriers	Knowledge
Survey Items	1-7	8-12	13-18	19-27	26-32

Dependent Variable: The dependent variable was vaccination compliance. Specifically, the survey item asks, Did you get your flu shot yet this fall?

If the response to the dependent variable item was *Yes* or *I have not gotten a flu shot yet, but plan to do so this year*, the response was considered as "vaccine compliance" and cues to action items were automatically addressed. It is assumed that either of these responses indicated that the flu vaccine was already received or that the participant's intent was to receive vaccine in the 2013 influenza season. If the response is *No*, the response was considered "vaccine non-compliance" and cues to action items were not addressed; instead, vaccine Behavior, comprised of two-items was assessed**.**

This study sought to answer the research questions specific to the domains of the health belief model, susceptibility and severity of influenza infection, influenza vaccination benefits and barriers, and influenza knowledge.

Analysis Plan

Data Management: The data were accessed via internet link provided from the OPE department. Data were exported from the online database to a Microsoft Excel database. The data were sorted and evaluated for missing items and/or misclassified items. All

missing items were excluded from final data analysis. The data were imported into SPSS 21.0 software for analysis.

Statistical Analysis

RQ1: Is there a significant difference between influenza vaccination compliance among union and nonunion health care workers?

H_0: There is no significant difference between influenza vaccination compliance among union and nonunion health care workers.

H_1: There is a significant difference between influenza vaccination compliance among union and nonunion health care workers.

RQ2: Is there an association between perceived susceptibility of influenza and influenza vaccination compliance among union and nonunion health care workers?

H_0: There is no association between perceived susceptibility of influenza and influenza vaccination compliance among union and nonunion health care workers.

H_1: There is an association between perceived susceptibility of influenza and influenza vaccination compliance among union and nonunion health care workers.

RQ3: Is there an association between perceived severity of influenza and influenza vaccination compliance among union and nonunion health care workers?

H_0: There is no association between perceived severity of influenza and influenza vaccination compliance among union and nonunion health care workers.

H_1: There is an association between perceived severity of influenza and influenza vaccination compliance among union and nonunion health care workers.

RQ4: Is there an association between perceived benefits of influenza vaccine and influenza vaccination compliance among union and nonunion health care workers?

H_0: There is no association between perceived benefits of influenza vaccine and influenza vaccination compliance among union and nonunion health care workers.

H_1: There is an association between perceived benefits of influenza vaccine and influenza vaccination compliance among union and nonunion health care workers.

RQ5: Is there an association between perceived barriers of influenza vaccine and influenza vaccination compliance among union and nonunion health care workers?

H_0: There is no association between perceived barriers of influenza vaccine and influenza vaccination compliance among union and nonunion health care workers.

H_1: There is an association between perceived barriers of influenza vaccine and influenza vaccination compliance among union and nonunion health care workers.

RQ6: Is there an association between knowledge of influenza and influenza vaccination compliance among union and nonunion health care workers?

H_0: There is no association between knowledge of influenza and influenza vaccination compliance among union and nonunion health care workers.

H_1: There is an association between knowledge of influenza and influenza vaccination compliance among union and nonunion health care workers

Descriptive statistics were performed on demographic variables, such as gender, age, and education level. Frequency calculations for dichotomous, categorical variables, such as gender, age, and education level are displayed in tables for easy identification.

For research question (RQ) 1 H_1, a chi- square test was applied to determine if the mean vaccination compliance between union and nonunion health care workers was significantly different from each other (Forthofer, Lee, & Hernandez, 2007).

For RQ2, 3, 4, 5 and 6 $H_{1,}$ a binary logistic regression analysis was used to determine the effect of union status on the association of each predictor variable on vaccination compliance (Field, 2009).

Threats to Validity

Random selection of participants for study inclusion is an important component in quantitative research in order to generalize the results to a larger population (Field, 2009). Lack of randomization may introduce bias into the study, such as threats to external validity. External validity pertains to subject selection factors that may occur prior to the study onset. The survey administered in November 2013 to January 2014 to all health care workers was a mandatory component of each facility's annual influenza vaccination program. All health care workers were required to complete the survey as a mandatory education competency requirement. This study included all anonymous survey data from all health care workers who were employed by the health care system in November 2013to January 2014. Since survey data were included from all health care workers,

randomization of study participants for study inclusion did not occur. The inclusion of the total population reduced the influence of external validity.

Threats to internal validity included history. History can influence internal validity due to the influence of participants' past experience or a current event, such as an influenza pandemic or newly implemented policy. The events may influence participants' responses to the questions in the survey (Shadish, Cook, & Campbell, 2002). The impact of history was a threat to internal validity of this study since the health care system was in the process of creating a mandatory vaccination policy for health care workers at the time of the survey administration. Although the vaccination policy was not fully implemented until November 2014, health care workers were aware of the upcoming policy and many health care workers were not in agreement with the upcoming policy. Another potential threat to internal validity was self-reporting. Participants completing the anonymous survey may not have remembered if they received the influenza vaccine or may not have wanted to report that they did not receive, or intended to receive the vaccine due to the impending vaccination policy. Since the survey was anonymous, it was not possible to verify actual vaccination status.

Ambiguous temporal precedence was another threat to internal validity. Ambiguous temporal precedence is the inability to conclude a directional cause-effect relationship (Sadish, Cook, & Campbell, 2002). The survey administered in 2013 addressed personal beliefs/attitudes regarding influenza and influenza vaccination. In addition, the survey also addressed items regarding the benefit and barriers of

vaccination. It is possible that a directional cause-effect relationship was not clear since the act of taking or not taking influenza vaccine may influence certain personal beliefs/attitudes and vice versa. It is important to address ambiguous temporal precedence since it was a possible limitation of the study.

The basis of the survey was constructed to reflect the health belief model framework. The majority of the survey items (with the exception of certain demographic items) administered were used in previous research and had been validated in other settings (Blue & Valley, 2002; Erkin & Ozsoy. 2012). Since the survey items pertaining to the independent and dependent variables had been used previously, the threat to construct validity was reduced (Frankfort-Nachmias & Nachmias, 2008). However, the final version of the survey administered in November 2013 included additional demographic questions that had not been validated through previous studies and the threat of construct validity exists for those specific questions. The specific items novel to this survey included only demographic items; however, since the organization did not conduct validity studies on these questions, limitations concerning use of this questionnaire in this particular population type may exist.

Ethical Procedures

Issues pertaining to ethics and protection of subjects arise when research design includes human participants. The original intent of the survey was a component of the 2013 mandatory employee education program about influenza vaccination among health care workers. The survey was a convenient method of quickly capturing vaccination statuses for future policy considerations, such as a mandatory vaccination program (TJC,

2011). Since this study was based on anonymous secondary data from an electronic survey administered in November 2013to January 2014, no human involvement took place. Further, all data from the survey were anonymous, which prevented associating personal responses to individual participants. All data were stored on a password-protected network within the health care system. Per the DUA (see Appendix C), all privacy of subjects and institutions was protected and no attempt was made to identify any person. Approval by the Walden University Institutional Review Board was obtained according to Walden University protocol (approval number 06-30-15-0323360).

Other ethical considerations to address include conducting this study within my work environment. To address this consideration, I conducted the secondary analysis of only anonymous data. I accessed the data via a web-link supplied by the OPE staff. I did not have access to the original completed surveys or have the ability to link the survey responses to specific individuals.

Summary

The research design was a secondary data analysis of an anonymous, cross-sectional, electronic survey, administered to all health care workers at two rural health care facilities in Pennsylvania in November 2013 to January 2014. The survey instrument was constructed based on the conceptual domains of the health belief model, similar to previous surveys conducted by Blue and Valley (2002) and Erkin and Ozsoy (2012). Additional survey items, specific to demographics items were added to the survey to capture facility-specific information. Self-reported perceptions regarding independent

variables including susceptibility of acquiring influenza, severity of influenza infection, influenza vaccination benefits, barriers of vaccination, and influenza knowledge were compared between the two facility types within a rural Pennsylvania health care system. The independent variables were analyzed to determine associations with vaccination compliance (dependent variable). The results of the data analyses and answers to the research questions will be addressed in Chapter 4.

Chapter 4: Results

Introduction

The purpose of this quantitative secondary data analysis was to investigate whether the unionization of a health care setting would significantly change the level of influenza vaccination compliance among health care workers and, if so, what factors predicted compliance rates. Specific factors studied included the domains of the health belief model: perceptions of susceptibility and severity of influenza infection, perceptions of influenza vaccination benefits and barriers, and influenza knowledge.

Research Questions and Hypotheses

RQ1: Is there a significant difference between influenza vaccination compliance among union and nonunion health care workers?

$H_0$1: There is no significant difference between influenza vaccination compliance among union and nonunion health care workers.

$H_1$1: There is a significant difference between influenza vaccination compliance among union and nonunion health care workers.

RQ2: Is there an association between perceived susceptibility of influenza and influenza vaccination compliance among union and nonunion health care workers?

$H_0$2: There is no association between perceived susceptibility of influenza and influenza vaccination compliance among union and nonunion health care workers.

$H_1$2: There is an association between perceived susceptibility of influenza and influenza vaccination compliance among union and nonunion health care workers.

RQ3: Is there an association between perceived severity of influenza and influenza vaccination compliance among union and nonunion health care workers?

$H_0$3: There is no association between perceived severity of influenza and influenza vaccination compliance among union and nonunion health care workers.

$H_1$3: There is an association between perceived severity of influenza and influenza vaccination compliance among union and nonunion health care workers.

RQ4: Is there an association between perceived benefits of influenza vaccine and influenza vaccination compliance among union and nonunion health care workers?

$H_0$4: There is no association between perceived benefits of influenza vaccine and influenza vaccination compliance among union and nonunion health care workers.

$H_1$4: There is an association between perceived benefits of influenza vaccine and influenza vaccination compliance among union and nonunion health care workers.

RQ5: Is there an association between perceived barriers of influenza vaccine and influenza vaccination compliance among union and nonunion health care workers?

$H_0$5: There is no association between perceived barriers of influenza vaccine and influenza vaccination compliance among union and nonunion health care workers.

$H_1$5: There is an association between perceived barriers of influenza vaccine and influenza vaccination compliance among union and nonunion health care workers.

RQ6: Is there an association between knowledge of influenza and influenza vaccination compliance among union and nonunion health care workers?

$H_0$6: There is no association between knowledge of influenza and influenza vaccination compliance among union and nonunion health care workers.

$H_1$6: There is an association between knowledge of influenza and influenza vaccination compliance among union and nonunion health care workers.

In this chapter, I review key findings from my investigation. I will discuss data collection, data analysis, results and provide a summary.

Data Collection

The sample included 2,481 health care workers at Hospital U and Hospital NU who completed the 2013-2014 Influenza Vaccination Survey (see Appendix A; T. Diehl, personal communication, January 2014). Because completion of the survey was required for all workers at both facilities as part of their continuing education requirements, the response rate was 100%. All health care workers were required to complete the survey; therefore, information regarding gender distribution, education level, and age groups is the actual representation of the entire health care worker population for both the union and nonunion facility, which were compared throughout the analysis.

Data were exported from the health care system's online education portal as a Microsoft Excel spreadsheet. Data from each facility were sorted and evaluated for missing items and/or misclassified items. After confirming that no data were misclassified or missing, data were imported into SPSS 21.0 software for analysis.

Table 2 presents the results of chi- square analyses of demographic variables gender, age, and education level for each hospital. More than 80% of the employees at both sites were female (X^2 = 3.937, df = 2, p = .140). A significant difference in employee age distribution between Hospital U and Hospital NU was observed (X^2 = 25.401, df =4, p = <.001). Age groups 18-24 and age 55+ were statistically different

between Hospital U and Hospital NU (p =.002 and p<.001, respectively). The majority of health care workers at Hospital U were younger than those at Hospital NU. Fifty-five percent of Hospital U health care workers were less than 45 years of age versus 45% at Hospital NU; however, this difference was not statistically significant. The overall health care workers' education levels at both facilities were statistically different (X^2=14.778, df = 5, p =.011). Education levels of high school, associate/bachelor, master, and doctorate level were similar between facilities. However, education level response, "*None of the above*" was statistically different between facilities (p=.008).

Table 2

Inter-facility Comparison of Hospital U and Hospital NU Health Care Workers' Genders, Ages, and Education Levels.

Demographic variable	X^2	*Df*	*p* value
Gender	3.937	2	.140
Age (overall)	25.401	4	<.001
18-24	9.716	1	.002
25-34	2.525	1	.112
35-44	.140	1	.708
45-54	0.682	1	.409
55 +	17.322	1	<.001
Education level (overall)	14.778	5	.011
High school	1.204	1	.273
Associate/Bachelors	0.912	1	.340
Masters	3.381	1	.066

Doctorate	0.041	1	.840
None of the above	6.959	1	.008

Results

The first RQ asked, Is there a significant difference between influenza vaccination compliance among union and nonunion health care workers? In the overall sample (N=2,481), 1,568 (63%) of health care workers responded that they had already or planned to receive influenza vaccine with Hospital U and Hospital NU having a 63.4% and 62.6% vaccination compliance rate, respectively. The vaccination compliance descriptive statistics are presented in Table 3.

Table 3

Age, Gender, Education Level, and Vaccination Compliance Among Hospital U and Hospital NU Health Care Workers.

	Hospital U (n=1,943), %	Hospital U Vaccination Compliance	Hospital NU (n=537), %	Hospital NU Vaccination Compliance
Facility level age group	1943	1231 (63.4%)	537	337 (62.8%)
18-24	151 (7.8%)	93 (61.6%)	21 (3.9%)	15 (71.4%)
25-34	469 (24.1%)	285 (60.8%)	112 (20.8%)	73 (65.2%)
35-44	441 (22.7%)	273 (61.9%)	126 (23.4%)	63 (50%)

45-54	523 (26.9%)	329 (62.9%)	135 (25.1%)	75 (55.6%)
55+	359 (18.5%)	251 (69.9%)	143 (26.6%)	111 (77.6%)
Gender				
Male	320 (16%)	203 (63.4%)	94 (17%)	64 (68%)
Female	1623 (84%)	1028 (63.3%)	443 (83%)	273 (61.7%)
Education level				
High school	642 (33%)	386 (60.1%)	191(36%)	130 (68%)
Associates or Bachelors	1105 (57%)	703 (63.6%)	293 (55.5%)	176 (60%)
Masters	133 (7%)	104 (21.9%)	25 (4.6%)	19 (76%)
Doctorate	20 (1%)	9 (45%)	5 (<1%)	4 (80)
None of the above	43 (2.2%)	29 (67.4%)	23 (4%)	8 (34.8%)

The overall vaccination compliance rate (Hospital U 63.4% and Hospital NU 62.6%) was compared using a chi-square test and no significant difference between the facilities was found (X^2 =.093, df =1, p =.760). Since no statistical significance was found (p =.760), the null hypothesis for research question 1 was accepted.

In addition to the inter-facility vaccination compliance comparison, further exploration of the data included an intra-facility demographic analysis of gender, age, and

education level to determine if any significant differences exist relating to vaccination compliance. A chi-square test revealed that no significant gender difference in vaccination compliance was found within either facility population (Hospital U p =.973 and Hospital NU p =.216).

Hospital U vaccination compliance was similar among all age groups (p=.070), except for a statistically significant difference in age group 55+ (p<.001). Hospital NU had a significant difference in vaccination compliance by age groups 34-55 (p =.001), 45-54 (p =.045), and age group 55+ (p<.001) was identified. This suggests that vaccination compliance is different based on age group for Hospital NU health care workers. The Hospital NU age group with the highest vaccination compliance was age group 55+, which had 77% vaccination compliance among those 55 years of age and older. The Hospital NU age group 35-44 had the lowest vaccination compliance (50%).

A significant difference in vaccination compliance by education level was found within each facility (Hospital U = p<.001, Hospital NU p =.010), suggesting that vaccination compliance is different based on education level within each facility. Vaccination compliance was significantly different among Hospital U health care workers with a High School and Master level of education (p =.038 and p<.001, respectively). This finding was not observed for Hospital NU, in which the only education level response, "None of the above" was found to be significantly different in terms of vaccination compliance. Table 4 presents the results of the chi-square analysis statistics.

Table 4

Intra-facility Comparison of Hospital U and Hospital NU Health Care Workers' Genders, Ages, and Education Levels.

Demographic Variable	X^2	*df*	*p*-value
Gender			
Hospital U	.001	1	.973
Hospital NU	3.062	1	.216
Age			
Hospital U (all ages)	8.657	4	.070
18-24	.220	1	.639
25-34	1.784	1	.182
35-44	.517	1	.472
45-54	0.62	1	.803
55 +	8.165	1	.004
Hospital NU (all ages)	26.245	4	<.001
18-24	.703	1	.402
25-34	0.355	1	.551
35-44	11.461	1	.001
45-54	4.0	1	.045
55 +	18.429	1	<.001
Education Level			
Hospital U (all levels)	18.748	4	<.001

High School	4.311	1	.038
Associate/Bachelors	.077	1	.781
Masters	13.543	1	<.001
Doctorate	2.933	1	.087
None of the Above	.316	1	.574
Hospital NU (all levels)	15.082	5	.010
High School	3.572	1	0.59
Associate/Bachelors	1.993	1	.158
Masters	1.968	1	.161
Doctorate	.642	1	.423
None of the Above	8.045	1	.005

Level of statistical significance, $p < .05$

Data Analysis: Research Questions 2-6

RQ2: Is there an association between perceived susceptibility of influenza and influenza vaccination compliance among union and nonunion health care workers?

RQ3: Is there an association between perceived severity of influenza and influenza vaccination compliance among union and nonunion health care workers?

RQ4: Is there an association between perceived benefits of influenza vaccine and influenza vaccination compliance among union and nonunion health care workers?

RQ5: Is there an association between perceived barriers of influenza vaccine and influenza vaccination compliance among union and nonunion health care workers?

RQ6: Is there an association between knowledge of influenza and influenza vaccination compliance among union and nonunion health care workers?

For research questions 2, 3, 4, 5, and 6, a binary logistic regression analysis was used to determine the association of each independent variable (conceptual domains from the HBM: perceived susceptibility, perceived severity, perceived benefit, perceived barriers, and influenza knowledge) on vaccination compliance among union and nonunion health care workers. Binary logistic regression was an appropriate test since the outcome variable (vaccination compliance) has exactly two categories.

To address research question 2 (Is there an association between perceived susceptibility of influenza and influenza vaccination compliance among union and nonunion health care workers?), a construct model was created using the 7 survey questions specific to perceived susceptibility of influenza. The specific survey questions of the perceived susceptibility construct model are listed in Table 5.

Table 5

Constructs of the Perceived Susceptibility Model

Working with multiple people increases chance of flu
People over 65 get the flu
My chances of getting the flu are good

Healthy people can get the flu
Chances of getting flu in future are good
I worry a lot about getting the flu
I could get the flu next year

Each factor was entered into the binary logistic regression model. In the null model, which does not contain the predictor variables in the equation, the percent of dependent variable cases that were correctly classified (vaccination or no vaccination) was 63.4% and 62.6% for Hospital U and Hospital NU, respectively. However, when the predictor variables were included (full model), there was an increase in the capacity to correctly predict the classification of the dependent variable, 65.6% (Hospital U) (X^2 = 184.407, df = 7, p<.001) and 64.5% (Hospital NU) (X^2 = 34.213, df = 7, p<.001).

By adding the predictor variables in the equation, the full model improved the percentage correct classification of the dependent variable by 2.2% for Hospital U and 1.9% for Hospital NU. The binary regression statistics are presented in Table 10. Odds ratios (OR) with 95% Confidence Intervals (CI) were estimated and p values less than 0.05 were considered statistically significant. Statistical significance of individual factors included in the models is presented in Table 11.

Specific factors within the *perceived susceptibility construct* were found to be statistically significant predictors of vaccination behavior. For Hospital U, four factors within the 7-factor *perceived susceptibility construct* were statistically significant in predicting vaccine compliance among unionized health care workers: (1) *Only people*

over 65 get the flu (p<.001, OR =.64, 95% CI [.553, .745]), (2) *My chances of getting the flu are good* (p = .009, OR = 1.2, 95% CI [1.1, 1.4]), (3) *I feel my chances of getting flu in the future are good* (p = .002, OR = 1.3, 95% CI [1.1, 1.5]), and (4) *I worry a lot about getting the flu* (p<.001, OR = 1.3, 95% CI [1.2, 1.5]).

For Hospital NU, only one factor within the 7-factor *perceived susceptibility construct*, '*I worry a lot about getting the flu'*, was statistically significant in predicting influenza vaccine compliance in nonunion health care workers (p <.001, OR =1.4, 95% CI [1.157-1.824]), which indicates that the odds of health care workers at Hospital NU who 'worry about getting the flu' were 40% more likely to be vaccinated compared to those who did not 'worry about getting the flu'.

To address research question 3 (Is there an association between perceived severity of influenza and influenza vaccination compliance among union and nonunion health care workers?), a model was created that consisted of the five survey questions pertaining to perceived severity of influenza: The specific survey questions related to perceived severity of influenza are listed in Table 6.

Table 6

Constructs of the Perceived Severity Model

The thought of getting the flu scares me
Getting the flu would disrupt my family life
Having the flu would make activities more difficult
If I got the flu, it would be more serious than other diseases
Flu can be a serious disease

Each factor was entered into the binary regression model. In the null model, which does not contain the predictor variables in the equation, the percent of dependent variable cases that were correctly classified (vaccination or no vaccination) was 63.4% and 62.6% for Hospital U and Hospital NU, respectively. However, when the predictor variables were included (full model), there was an increase in the capacity to correctly predict the classification of the dependent variable, 64.1% (Hospital U) ($X^2 = 145.673$, $df = 5$, $p<.001$) and 63.2% (Hospital NU) ($X^2 = 35.470$, $df = 5$, $p<.001$).

By adding the predictor variables in the equation, the full model improved the percentage correct classification of the dependent variable by 0.7% for Hospital U and 0.6% for Hospital NU. The binary regression statistics are presented in Table 10. Odds ratios (OR) with 95% Confidence Intervals (CI) were estimated and *p* values less than 0.05 were considered statistically significant. Statistical significance of individual factors included in the models is presented in Table 11.

Specific factors within the *perceived severity construct* were statistically significant predictors of influenza vaccination. For Hospital U, four of the factors within the 5-factor *perceived severity construct* were statistically significant in predicting vaccine compliance among unionized health care workers: (1) *The thought of getting the flu scares me* ($p = .028$, OR = 1.2, 95% CI [1.014,1.274]), (2) *Getting the flu would disrupt my family life* ($p <.001$, OR = 1.4, 95% CI [1.202,1.544]), (3) *Having the flu would make activities more difficult* ($p =.022$, OR = 1.2, 95% CI [1.029,1.430]), and (4) *Flu can be a serious disease* ($p <.001$, OR = 1.3, 95% CI [1.126,1.555]).

For Hospital NU, three factors within the 5-factor *Perceived Severity Model* were statistically significant in predicting vaccine compliance among nonunion health care workers, (1) *The thought of the flu scares me* (p =.003, OR=1.4, 95% CI [1.122, 1.767]), (2) *Having the flu would make activities more difficult* (p = .029, OR = 1.5, 95% CI [1.039, 2.072]), and (3) *Flu can be a serious disease* (p = .043, OR = 1.4, 95% CI [1.009,1.765]).

To answer research question 4 (Is there an association between perceived benefits of influenza vaccine and influenza vaccination compliance among union and nonunion health care workers?), a model was created that consisted of 6 survey questions regarding perceived benefits. The specific survey questions of the perceived benefits construct model are listed in Table 7.

Table 7

Constructs of the Perceived Benefits Model

A flu shot will prevent me from getting the flu
A flu shot will protect others in my household from getting the flu
A flu shot will prevent me from being absent from work
I have a lot to gain by getting a flu shot
I would not be afraid of getting the flu if I got a flu shot
Having a chronic illness is a reason for getting the flu shot.

Each factor was entered into the binary regression model. In the null model, which does not contain the predictor variables in the equation, the percent of dependent

variable cases that were correctly classified (vaccination or no vaccination) was 63.4% and 62.6% for Hospital U and Hospital NU, respectively. However, when the predictor variables were included (full model), there was an increase in the capacity to correctly predict the classification of the dependent variable, 78.2% (Hospital U) (X^2 = 903.423, *df* = 6, p<.001) and 78.3% (Hospital NU) (X^2 = 252.660, *d f*= 6, p<.001). By adding the predictor variables in the equation, the full model improved the percentage correct classification of the dependent variable by 14.8% for Hospital U and 15.7% for Hospital NU. The binary regression statistics are presented in Table 10. Odds ratios (OR) with 95% Confidence Intervals (CI) were estimated and *p* values less than 0.05 were considered statistically significant. Statistical significance of individual factors included in the models is presented in Table 11.

Specific factors within the *perceived benefits construct* were statistically significant predictors of influenza vaccination. For Hospital U, three of the factors within the 6-factor *perceived benefits construct* were statistically significant in predicting vaccine compliance among unionized health care workers: (1) *A flu shot will prevent me from getting the flu* (p =.016, OR = 1.3, 95% CI [1.046,1.551]), (2) *I have a lot to gain by getting the flu shot* (p <.001, OR = 4.9, 95% CI [3.997,5.883]), (3) *I would not be afraid of getting the flu if I got a flu shot* (p<.001, OR = 1.6, 95% CI [1.345,1.851]).

For Hospital NU, two of the 6-factor *Perceived Benefits Model*, (1) *I have a lot to gain by getting the flu shot* (p <.001, OR = 6.0, 95% CI [4.126, 8.908]), (2) *I would not be afraid of getting the flu if I got a flu shot* (p = .025, OR = 1.4, 95% CI [1.046, 1.929])

were statistically significant in predicting vaccine compliance among nonunion health care workers.

To address research question 5 (Is there an association between perceived barriers of influenza vaccine and influenza vaccination compliance among union and nonunion health care workers?), a model was created that consisted of 8 survey questions pertaining to perceived barriers. The specific survey questions of the perceived barriers construct model are listed in Table 8.

Table 8

Constructs of the Perceived Barriers Model

Getting a flu shot is not convenient for me
ln order to get a flu shot, I would have to give up quite a bit
Getting a flu shot can be painful
Getting a flu shot is time consuming
Getting a flu shot interferes with my daily activities
There are too many risks in getting a flu shot
It costs too much to get a flu shot
I am concerned about having a bad reaction to the flu shot

Each factor was entered into the binary regression model. In the null model, which does not contain the predictor variables in the equation, the percent of dependent variable cases that were correctly classified (vaccination or no vaccination) was 63.4% and 62.6% for Hospital U and Hospital NU, respectively. However, when the predictor

variables were included (full model), there was an increase in the capacity to correctly predict the classification of the dependent variable, 81.5% (Hospital U) (X^2 = 921.740, *df* = 8, *p*<.001) and 74.2% (Hospital NU) (X^2 = 175.433, *df* = 8, *p*<.001). By adding the predictor variables in the equation, the full model improved the percentage correct classification of the dependent variable by 18.1% for Hospital U and 11.6% for Hospital NU. The binary regression statistics are presented in Table 10. Odds ratios (OR) with 95% Confidence Intervals (CI) were estimated and *p* values less than 0.05 were considered statistically significant. Statistical significance of individual factors included in the models is presented in Table 11.

Specific factors within the *perceived barriers construct* were statistically significant predictors of influenza vaccination. For Hospital U, seven factors within the 8-factor *perceived barriers construct* were statistically significant in predicting vaccination behaviors among unionized health care workers: (1) *Getting a flu shot is not convenient for me* (*p* <.001, OR =.48, 95%, CI [.400, .564]), (2) *ln order to get a flu shot, I would have to give up quite a bit* (*p* = .005, OR = .728, 95% CI [.584, .909]), (3) *Getting a flu shot can be painful* (*p* =.005, OR = 1.3, 95% CI [1.070, 1.449]), (4) *Getting a flu shot is time consuming* (*p* =.023, OR = 1.4, 95% CI [1.049,1.898]), (5) *There are too many risks in getting a flu shot* (*p* <.001, OR = .36, 95% CI [.298, .422]), (6) *It costs too much to get a flu shot* (*p* <.001, OR = .68, 95% CI [.536, .849]), (7) *I am concerned about having a bad reaction to the flu shot* (*p* <.001, OR = .59, 95% CI [.507, .684]).

For Hospital NU, four factors within the 8-factor *perceived barriers construct* were statistically significant in predicting vaccination behaviors among nonunion health

care workers: (1) *Getting a flu shot is not convenient for me* (p = .013, OR = .65, 95%, CI [.460, .912]), (2) *Getting a flu shot is time consuming* (p = .050, OR = 1.9, 95% CI [1.002, 3.619]), (3) *There are too many risks in getting a flu shot* (p<.001, OR=.35, 95% CI [.247, .485]), (4) *I am concerned about having a bad reaction to the flu shot* (p =.018, OR = .71, 95% CI [.537, .944]).

To answer research question 6 (Is there an association between knowledge of influenza and influenza vaccination compliance among union and nonunion health care workers?) a model was created using 6 survey questions that pertained to knowledge of influenza. The specific survey questions of the knowledge of influenza construct model are listed in Table 9.

Table 9

Constructs of Knowledge of Influenza Model

People get the flu from eating after other people with the flu
People get the flu from breathing the air of others people who have the flu
The flu lasts three to five days
Getting the flu can cause more severe illness such as pneumonia
One can get the flu from the flu shot
People often get sick from flu injections

Each factor was entered into the binary regression model. In the null model, which does not contain the predictor variables in the equation, the percent of dependent variable cases that were correctly classified (vaccination or no vaccination) was 63.4%

and 62.6% for Hospital U and Hospital NU, respectively. However, when the predictor variables were included (full model), there was an increase in the capacity to correctly predict the classification of the dependent variable, 69.1% (Hospital U) (X^2 = 384.904, *df* = 6, *p*<.001) and 69.9% (Hospital NU) (X^2 = 104.631, *df* = 6, *p*<.001). By adding the predictor variables in the equation, the full model improved the percentage correct classification of the dependent variable by 5.7% for Hospital U and 7.3% for Hospital NU. The binary regression statistics are presented in Table 10. Odds ratios (OR) with 95% Confidence Intervals (CI) were estimated and *p* values less than 0.05 were considered statistically significant. Statistical significance of individual factors included in the models is presented in Table 11.

Specific factors within the *Influenza Knowledge Construct* were statistically significant predictors of influenza vaccination outcomes. For Hospital U, three factors within the 6-factor *Influenza Knowledge Construct* were statistically significant in predicting vaccination outcomes among unionized health care workers: (1) *Getting the flu can cause more severe illness such as pneumonia* (*p* =.013, OR = 1.3, 95% CI [1.045, 1.458]), (2) *One can get the flu from the flu shot* (*p* <.001, OR = .67, 95% CI [.585, .764]), and (3) *People often get sick from flu injections* (*p* <.001, OR = .45, 95% CI [.385, .513]).

For Hospital NU, two factors of the 6-factor *Knowledge Construct* were statistically significant in predicting vaccination behaviors among nonunion health care workers: (1) *One can get the flu from the flu shot* (*p* <.012, OR =.72, 95% CI [.555,

.929]), and (2) *People often get sick from flu injections* (p <.001, OR =.47, 95% CI [.355, .612]).

Table 10

Binary Regression Analysis-Hospital U and Hospital NU Employees.

Construct	Overall X^2	*df*	*p*-value
Perceived Susceptibility			
Hospital U	184.407	7	<.001
Hospital NU	34.213	7	<.001
Perceived Severity			
Hospital U	145.673	5	<.001
Hospital NU	35.470	5	<.001
Perceived Benefits			
Hospital U	903.423	6	<.001
Hospital NU	252.660	6	<.001
Perceived Barriers			
Hospital U	921.740	8	<.001
Hospital NU	175.433	8	<.001
Knowledge of Influenza			
Hospital U	384.904	6	<.001
Hospital NU	104.631	6	<.001

Table 11

Intra-facility Predictors of Influenza Vaccination Among Hospital U and Hospital NU Employees.

Construct	Hospital U OR [95% CI]	*p* (two-sided)	Hospital NU OR [95% CI]	*p* (two-sided)
Perceived Susceptibility				
Working with multiple people increases chance of flu	.996 [.890,1.114]	.940	1.110 [.901,1.367]	.328
Only people over 65 get the flu	.642 [.553,.745]	<.001	.907 [.696,1.182]	.469
My chances of getting the flu are good	1.225 [1.053,1.424]	.009	1.145 [.861,1.524]	.351
Healthy people can get the flu	1.070 [.909,1.258]	.417	1.269 [.912,1.765]	.157
Chances of getting flu in future are good	1.281 [1.099,1.492]	.002	1.016 [.765,1.349]	.912
I worry a lot about getting the flu	1.324 [1.173,1.494]	<.001	1.453 [1.157,1.824]	.001
I could get the flu next year	1.113 [.961,1.288]	.153	1.154 [.870,1.530]	.322
Perceived Severity				
The thought of getting the flu scares me	1.137 [1.014,1.274]	.028	1.408 [1.122,1.767]	.003
Getting the flu would disrupt my family life	1.362 [1.202,1.544]	<.001	.942 [.751,1.182]	.607
Having the flu would make activities more difficult	1.213 [1.029,1.430]	.022	1.468 [1.039,2.072]	.029
If I got the flu, it would be more serious than other diseases	1.083 [.944,1.242]	.257	1.084 [.833,1.410]	.549
Flu can be a serious disease	1.323 [1.126,1.555]	.001	1.335 [1.009,1.765]	.043
Perceived Benefits				
A flu shot will prevent me from getting the flu	1.274 [1.046,1.551]	.016	.870 [.600,1.261]	.461
A flu shot will protect others in my household from getting the flu	1.080 [.898,1.300]	.414	.979 [.679,1.413]	.912
A flu shot will prevent me from being absent from work	1.003 [.812,1.238]	.980	1.064 [.716,1.582]	.759
I have a lot to gain by getting a flu shot	4.849 [3.997,5.883]	<.001	6.063 [4.126,8.908]	<.001
I would not be afraid of getting the flu if I got a flu shot	1.583 [1.345,1.851]	<.001	1.420 [1.046,1.929]	.025
Having a chronic illness is a reason for getting the flu shot	1.089 [.939,1.263]	.258	1.298 [.974,1.730]	0.75
Perceived Barriers				
Getting a flu shot is not convenient for me	.475 [.400,.564]	<.001	.648 [.460,.912]	.013
ln order to get a flu shot, I would have to give up quite a bit	.728 [.584,.909]	.005	.716 [.475,1.081]	.112
Getting a flu shot can be painful	1.245 [1.070,1.449]	.005	1.144 [.873,1.500]	.329
Getting a flu shot is time consuming	1.411 [1.049,1.898]	.023	1.905 [1.002,3.619]	.049
Getting a flu shot interferes with my daily activities	1.007 [.754,1.344]	.963	.596 [.299,1.188]	.141
There are too many risks in getting a flu shot	.355 [.298,.422]	<.001	.346 [.247,.485]	<.001
It costs too much to get a flu shot	.675 [.536,.849]	<.001	1.472 [.968,2.238]	.071

I am concerned about having a bad reaction to the flu shot	.589 [.507,.684]	<.001	.712 [.537,.944]	.018
Knowledge				
People get the flu from eating after other people with the flu	1.028 [.915,1.156]	.638	.821 [.648,1.041]	.103
People get the flu from breathing the air of others people who have the flu	1.176 [1.027,1.346]	0.19	1.326 [.999,1.759]	.051
The flu lasts three to five days	1.021 [.900,1.159]	.745	.945 [.734,1.217]	.661
Getting the flu can cause more severe illness such as pneumonia	1.235 [1.045,1.458]	.013	1.335 [.978,1.823]	.069
One can get the flu from the flu shot	.669 [.585,.764]	<.001	.718 [.555,.929]	.012
People often get sick from flu injections	.445 [.385,.513]	<.001	.466 [.355,.612]	<.001

Note. OR=odds ratio, CI= confidence interval
*p<.05 is threshold of statistical significance

Summary

The results of the descriptive analysis reveal that the two facilities share a similar gender distribution, but are dissimilar regarding age and education distribution. The results of the study accepted the null hypothesis for research question 1, indicating that there is not a significant difference in vaccination compliance between a union and nonunion health care facility. The results of the binary logistic regression analysis for research questions 2-6 support the rejection of the null hypotheses for each research question. The independent variable constructs were statistically significant in predicting vaccination compliance among union and nonunion health care workers. Although statistical significance was determined in the overall construct models, some statistical variation occurred at the factor level within the models.

Interpretation of the results and further discussion of the study findings will be presented in Chapter 5. In addition, limitations of the study, recommendations for future research, and social change implications will be discussed in detail.

Chapter 5: Discussion, Conclusion, and Recommendations

A knowledge gap remains regarding the influence of organizational entities such as health care workers unions on influenza vaccination outcomes. The purpose of this quantitative secondary data analysis was to investigate whether the unionization of a health care setting significantly changes the level of influenza vaccination compliance among health care workers and, if so, what vaccination predictors exist. I performed a secondary data analysis of a cross-sectional electronic survey that was administered in 2013 to health care personnel at two rural health care facilities in the U.S. state of Pennsylvania. RQ 1 was assessed using a chi-square analysis while RQs 2-6 were addressed using a binary logistic regression test. I will discuss the interpretation of study findings, limitations, and recommendations in this chapter.

Interpretation of the Findings

Extensive research exists regarding the benefit of influenza vaccination among health care workers and the promotion of improved health care quality and positive patient outcomes (Corace et al, 2013; Pennsylvania Hospital Quality, n.d.; Talbot, 2014). Based on published research, accrediting agencies, such as TJC and federal institutions, such as Centers for Medicare and Medicaid fully support influenza vaccination compliance among health care workers (DHHS, 2011; TJC, 2013). However, based on my literature review, no information exists regarding the influence of other health care organizations such as SEIU on vaccination compliance among health care workers. Therefore, more information is needed to understand the relationship between unionization and health care workers' vaccination perceptions and beliefs and vaccination

compliance. This study sought to identify those differences and serve as a platform to improve vaccination compliance by promoting education specifically tailored to health care workers in a union or nonunionized environment.

The results of the descriptive analysis revealed that the two facilities, Hospital U and Hospital NU had a similar gender distribution but had a statistically different age and education level distribution. There was not a significant difference in vaccination compliance between the unionized and nonunionized health care workers. Because no statistical significance was found ($p = .760$), the null hypothesis for RQ 1 was accepted. For RQs 2-6, the independent variable constructs (models) were statistically significant in predicting vaccination compliance among union and nonunion health care workers.

The perceived susceptibility construct was a statistically significant model to predict vaccination compliance among union and nonunion health care workers, which is in agreement with results from prior research that supports perceived susceptibility as a predictor of vaccination behavior (see Bean & Catania, 2013; Chor, Pada, & Stevenson, 2011; Corace et al, 2013; Lehmann, Ruiter, Dam, Wicker, & Kok, 2015; Rubin, Potts, & Michie, 2011). In general, union workers and nonunion workers who perceived influenza susceptibility had increased odds of being vaccinated. Interestingly, the presence of statistical significance of two similar factors within the construct differed among union workers. The factor "*I feel the chances of getting the flu in the future are good*" was a statistically significant predictor of influenza vaccination among union health care workers while the factor "*I could get the flu next year*" was not a significant predictor of vaccination. These results suggest that union health care workers may not perceive an

immediate susceptibility to influenza acquisition; that is, they may not perceive that they are likely to acquire the virus within the next year. However, sometime in the future, susceptibility is likely; therefore, union health care workers are more likely to be vaccinated based on perception of susceptibility in the unknown future.

Neither aforementioned factor was statistically significant in nonunion health care workers, which may indicate that the perceived possibility of future influenza infection is not a motivating factor to get vaccinated. This result, however, differs from the results of the question, "*I worry a lot about getting the flu*, which was statistically significant in predicting vaccination among nonunion health care workers. In other words, these results suggest that, the "worry" about getting the flu is a predictor of vaccination for nonunion health care workers even though nonunion health care workers do not necessarily feel that they are susceptible to getting flu in the future. The decrease in perceived susceptibility may lead to a decrease the likelihood of getting vaccinated. This finding is consistent with previous observations that support heightened perceived susceptibility as a motivating factor to getting vaccinated (Bean & Catania, 2013; Chor, Pada, & Stevenson, 2011; Corace et al, 2013; Lehmann, Ruiter, Dam, Wicker, & Kok, 2015; Rubin, Potts, & Michie, 2011).

The factor "*Only people over 65 get the flu*" was statistically significant in predicting which union health care workers did not receive the influenza vaccine. Union health care workers who agreed that the flu only affects persons over 65 were 36% less likely to be vaccinated. Given that the majority (82%) of the union health care workers were less than 65 may have played a role in their response (i.e. if they had never

experienced an influenza infection, they may be more persuaded to believe that influenza occurs only in the older population). Ariza-Heredia et al (2015), Daughtery, Blake, Grosholz, Omer, Polivka-West, and Howard (2015), Lewthwaite, Campio, Blackburn, Kemp, and Sarangi (2014) found that older age was associated with a greater willingness to accept the influenza vaccine. Although this information was not sought out in the survey, it would have been helpful to assess personal experience with influenza in health care workers aged less than 65 to determine if having influenza at an age younger than 65 would influence their response to this factor. Shahrabani and Benzion (2012) indicated in their research that those with personal experience of influenza infection were more likely to favor vaccination in the future.

The *perceived severity construct* was a statistically significant model to predict vaccination behavior among both union and nonunion health care workers ($p<.001$). Although the majority of construct factors were statistically significant predictors of influenza vaccination among both union and nonunionized health care workers, the specific factor, "*Getting the flu would disrupt my family life*" was a significant predictor of influenza vaccine uptake for union health care workers only. This finding is similar to research by Shahrabani and Benzion (2012) that suggested nurses who had personal experience of influenza infection were more likely to favor vaccination in the future, which may suggest that individuals with previous infection of influenza may perceived it as severe; and therefore, support vaccination behaviors. Unfortunately, previous influenza infection information was not accessible in this study. This information may be an important consideration in future research regarding predictors of vaccination.

The *perceived benefits construct* was a statistically significant model to predict vaccination behavior among union and nonunion health care workers. Of the six factors in the construct, two factors were statistically significant in predicting vaccination among both union and nonunion health care workers: *"I have a lot to gain by getting a flu shot"* and *"I would not be afraid of getting the flu if I got a flu shot"*. Of the *perceived benefits construct* factors, the specific factor, *"I have a lot to gain by getting a flu shot"* was the most predictive of vaccination uptake. Union health care workers who agreed to this factor were nearly five times more likely to be vaccinated, while nonunion employees agreeing that there was a lot to gain from a flu shot were six times more likely to be vaccinated. These results are similar to previous studies and may suggest that the perception of personal gain is a very important factor in health behaviors, such as vaccination (Corace et al, 2013; Ryser & Heininger, 2015).

The overall model was statistically significant; however, statistical significance varied by factor between the union and nonunion health care worker group. Union health care workers were 20% more likely to get a flu shot if they perceived that the flu shot would prevent the flu. In contrast, this association was not observed in the nonunion group. No statistical significance was detected in either group regarding vaccination behaviors based on perceptions that the flu shot would protect others in the household, prevent work absenteeism, or benefit those with a chronic illness. This finding is not consistent with previous research that indicated that household protection was a motivator of health care worker influenza vaccination (Corace et al, 2013; Lewthwaite,

Campio, Blackburn, Kemp, & Sarangi, 2014; Ryser & Heininger, 2015; Vasolevska, Ku, & Fisman, 2014).

The *perceived barriers construct* was able to predict 81.5% and 74.2% of vaccination behaviors at Hospital U and Hospital NU, respectively. Perceptions that the flu shot is inconvenient, painful, risky, costs too much, may cause a bad reaction, or requires one to "give up quite a bit" were associated with a decreased odds of vaccination acceptance among union employees. In comparison, only three factors relating to perceptions of inconvenience, risk, and concerns regarding a bad reaction from the shot were associated with decreased vaccination acceptance among nonunion employees. The results suggest that the perceived barriers relating to influenza vaccine among, particularly among union health care workers are an important influence on vaccination noncompliance. These findings are established in previous research that demonstrates attitudes towards vaccination, specific to the aforementioned barriers are statistically significant in predicting vaccination behaviors (Corace et al, 2013; Ryser & Heininger, 2015).

The *Influenza Knowledge Construct* was a statistically significant model to predict influenza vaccination behaviors among union and nonunion health care workers. The findings differ from a previous study by Blue and Valley (2002) in which influenza knowledge was not supported as a statistically significant predictor of influenza vaccination uptake. Among the union health care workers, having knowledge that the flu can cause a more severe illness such as pneumonia was a statistically significant predictor of vaccine acceptance. The belief that influenza vaccine causes influenza infection and

other sickness was associated with decreased odds in vaccination compliance among both union and nonunion health care workers. When perceptions existed that supported the idea that the flu shot can cause the flu, union health care workers were nearly 33% less likely to take a flu shot compared to nonunion health care workers, who were 28% less likely to take a flu shot. Similarly, union health care workers who believed that a person can get sick from the flu shot were 56% less likely to be vaccinated compared to nonunion health care workers who were 53% less likely to accept vaccine if they believed that people often get sick from them. These results support that both knowledge of influenza and influenza vaccine are strong predictors of vaccination behaviors (Dubov & Phung, 2015; Tracey, Regan, Mak, Effler, 2015). These findings further support information in the literature regarding predictors and barriers of influenza vaccine (Bean & Catania, 2013; Corace et al, 2013; Daughtery, Blake, Grosholz, Omer, Polivka-West, & Howard 2015; Jennings & Burant, 2013;Lehmann, Ruiter, van Dam, Wicker & Kok, 2015; Shahrabani & Benzion, 2012; Schult et al, 2012) .

Limitations of the Study

The data were collected from two hospitals within a single rural health care system, which may limit the generalizability to urban health care settings. The survey was administered only to paid employees who were required to participate in the annual vaccination education program; therefore, the results may not be generalizable to other non-paid workers, such as volunteers, and non-employed physicians (private practice owned physicians). Further, the vast majority of paid health care workers at each facility were female, which may affect the generalizability of the results across the male

population of health care workers. Further, it is not possible to confirm that the vaccination status documented by the employee reflected their actual vaccination status (or intent to receive vaccine).

Another limitation of the study is that it was not possible to identify the type of health care worker (i.e. nurse, physician, ancillary staff, non-professional staff, etc.). Previous research has indicated that position type may impact vaccination compliance (Banach, Zhang, Factor, & Calfee, 2013; Lewthwaite, Campio, Blackburn, Kemp, & Sarangi, 2014; Podczervinski et al, 2015; Ryser & Heininger, 2015; Schult et al, 2012). Lewthwaite, Campio, Blackburn, Kemp, & Sarangi (2014) found that senior doctors were more likely to receive vaccines compared to nurses and junior doctors (residents). Seniority in job function was not assessed in this study.

Another limitation of the study is that it is not known if a declination form program (DFP) was a component of the vaccination program. LeVela et al (2015) found that influenza vaccination programs that contain a DFP resulted in increased vaccination rates among health care workers. LeVela et al determined that a DFP involved leadership engagement and accountability, which may have contributed to the increase in vaccination. Since it is not known if a DFP was a component of the program, it is not possible to determine if a DFP influenced the vaccination rate in the current study.

An additional limitation of the study concerns the survey response choices of vaccination status (dependent variable).In the survey, if the response to the dependent variable item (Did you get your flu shot yet this fall?) was "*Yes"* or "*I have not gotten a flu shot yet, but plan to do so this year"*, the response was considered as "vaccine

compliance" (It is assumed either response indicated vaccination compliance). However, it was not possible to determine if *intent* to become vaccinated is a reliable proxy for actual vaccination compliance. If the response selected was "*No* (and I am not planning to get one)", the response was considered "vaccine non-compliance"**.**

Finally, the research methodology may have limited the study results. A weakness of this quantitative survey is that participants were not given the opportunity to ask questions or provide "free-text" responses; rather, responses were confined to a Likert-scale format.

Recommendations

The overall constructs of the health belief model: susceptibility of influenza, severity of influenza, benefits and barriers of influenza vaccination, and influenza knowledge were each statistically significant ($p<.001$) predictors of influenza vaccine compliance (independent variable) among both union and nonunion health care workers. Although the overall models were statistically significant, specific factors within the models had varying statistical significance between union and nonunion health care workers. To further investigate the predictors of influenza vaccine among union and nonunion health care workers, future studies should assess individuals' previous experience with influenza infection. Numerous studies have found that personal experience with influenza infection may influence perceptions of the virus and vaccine and may impact the likelihood to receive vaccination (Bean & Catania, 2013; Lewthwaite, Campio, Blackburn, Kemp, & Sarangi, 2014; Jennings & Burant, 2014). In addition, future research may benefit from a focus-group format. Bean and Catania

(2013) incorporated a qualitative approach to assess vaccine perceptions among Oregon health care workers. The benefit of a qualitative methodology is the ability to obtain actual feedback from the participants' perspective. This research methodology provides flexibility and discovery, which may provide detailed information specific to personal experience regarding influenza and how that personal experience may influence future vaccination behaviors.

Implications

The purpose of this study was to address a knowledge gap in the literature concerning predictors of influenza vaccination compliance between a union and a nonunion health care facility. The perceptions and beliefs regarding influenza vaccination and vaccination compliance were compared between health care workers at a union and nonunion health care facility in Pennsylvania. The overall model constructs of the health belief model: susceptibility of influenza, severity of influenza, benefits and barriers of influenza vaccination, and influenza knowledge were each statistically significant ($p<.001$) predictors of influenza vaccine compliance among both union and nonunion health care workers, although some factors within the models varied in significance between facility types. Among union workers, perceived barriers yielded the highest predictability of vaccination behaviors. Perceived benefits were positively associated with vaccination compliance among nonunion workers. The study affects social change by identifying vaccine perceptions and predictors among union and nonunion health care workers. By focusing on vaccination predictors specific to union and nonunion healthcare workers, health care facilities may improve vaccination compliance. Improved vaccination

compliance will enable health care facilities to meet The Joint Commissions' vaccination goal of 90% compliance among health workers.

Daughtery, Blake, Grosholz, Omer, Polivka-West, and Howard (2015) and Lewthwaite, Campio, Blackburn, Kemp, & Sarangi (2014) stated that targeted educational strategies may be needed to improve influenza vaccination rates among health care workers. Further, Lynch, Armistead, Vinson and Howard (2015) suggest that research regarding the variability in specific educational approaches on the association with changes in vaccination perceptions and subsequent vaccination rates among health care workers may be of value. Therefore, by improving the understanding of vaccination predictor variables and vaccination behaviors specific to union and nonunion health care employees, targeted public health education can be developed to improve vaccination compliance within a rural health care system.

Education curricula within a vaccination program could be tailored to address the unique education needs among union and nonunion health care workers regarding influenza vaccination. For example, the curricula, via vaccination promotion scripting, advertising, and education could capitalize on the predictors of influenza vaccine among union health care workers since union health care workers were more likely than nonunion health care workers to receive a flu shot if they perceived one or more of the following: their *chances of getting flu are good*, *getting the flu would disrupt family life*, *a flu shot would prevent them from getting the flu*, and *getting the flu could cause a more severe illness such as pneumonia*.

Further, specific education could be tailored to address the unique barriers of vaccination uptake among union health care workers, based on the results of this study. Union health care workers were less likely to receive influenza vaccine if they believed one or more of the following: *only persons over the age of 65 get the flu*, they *would have to give up quite a bit if they got a flu shot, perceived too many risks in getting a flu shot*, *one can get the flu from the flu shot, people often get sick from flu injections,* and *flu shots cost too much*. Education and vaccination campaigns could be created to specifically to address these barriers concerning vaccine safety and provide support to staff as a means to improve vaccination compliance.

Education curricula specific to nonunion health care workers could include education regarding influenza severity and vaccine effectiveness, since factors among nonunion health care workers such as, *one can get the flu from the flu shot and people often get sick from flu injections* were predictors of not being vaccinated. Meanwhile, knowledge factors including, *a flu shot will prevent me from getting the flu*, *my chances of getting the flu are good,* and *getting the flu can cause more severe illness such as pneumonia* were not statistically significant predictors of influenza vaccination among nonunion health care workers, but are established findings in the literature. Perceptions concerning influenza severity, vaccine effectiveness, and influenza knowledge were important predictors of vaccination compliance among nonunion health care workers; therefore, is important to consider these specific factors when designing vaccination compliance education curricula specific among nonunion healthcare workers.

Conclusion

This study supports the use of the health belief model as an appropriate framework to address the knowledge gap in the literature concerning predictors of influenza vaccination compliance between a union and a nonunion health care facility. Although the perceptions of susceptibility of influenza, severity of influenza, benefits and barriers of influenza vaccination, and influenza knowledge were statistically significant predictors of influenza vaccination among union and nonunion health care workers, vaccination behaviors were not statistically different. The results of this study indicate that specific factors within the HBM constructs differed between union and nonunion health care workers, which provides further support of previous research by Schult, et al (2012) and Lehmann, Ruiter, van Dam, Wicker, & Kok (2015) that demonstrated the need to tailor influenza and influenza vaccination educational curricula specific the target audience. By incorporating education and information specific to the predictors and barriers of vaccination among union and nonunion health care workers, influenza vaccination programs may provide more applicable information and educational support to staff. Programs that provide applicable and tailored education may aid in promoting vaccination compliance specific to union and nonunion health care workers in order to achieve The Joint Commission's health care workers vaccination goal of 90% compliance.

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Appendix A: Survey Instrument Questions

For each item, indicate:
1=strongly disagree, 2=disagree, 3=neither agree or disagree, 4=agree, 5=strongly agree

Perceived Susceptibility

1. Working with multiple people each day increases my chances of getting the flu.
2. Only people over 65 years of age get the flu.
3. My chances of getting the flu are good.
4. Healthy people can get the flu.
5. I feel the chances of getting the flu in the future are good.
6. I worry a lot about getting the flu.
7. I could get the flu next year.

Perceived Severity

1. The thought of the getting the flu scares me.
2. Getting the flu would disrupt my family life.
3. Having the flu would make daily activities more difficult.
4. If I got the flu, it would be more serious than other diseases.
5. Flu can be a serious disease.

Perceived Benefits

1. Getting a flu shot will prevent me from getting the flu.
2. Getting a flu shot will protect others in my household from getting the flu.
3. Getting a flu shot will prevent me from being absent from work.
4. I have a lot to gain by getting a flu shot.
5. I would not be afraid of getting the flu if I got a flu shot.
6. Having a chronic illness (such as diabetes, heart disease, or asthma) is a reason for getting the flu shot.

Perceived Barriers

1. Getting a flu shot is not convenient for me.
2. In order to get a flu shot, I would have to give up quite a bit.
3. Getting a flu shot can be painful.
4. Getting a flu shot is time consuming.
5. Getting a flu shot interferes with my daily activities.
6. There are too many risks in getting a flu shot.
7. It costs too much to get a flu shot.
8. I am concerned about having a bad reaction to the flu shot

Vaccination Compliance

1. Did you get your flu shot yet this fall? Select
    - Yes
    - No (and I am not planning to get one)
    - I have not gotten a flu shot yet, but plan to do so this year.

Cues to Action

1. I got (or will get) a flu shot because my doctor or nurse told me it was good.
2. I got the flu vaccine because my supervisor thought it was a good idea.
3. I got the flu vaccine after hearing an announcement of benefits on the radio or television.
4. I got the flu vaccine to protect myself.
5. I got the flu vaccine to protect my coworkers.
6. I got the flu vaccine to protect my family.
7. Where did you receive your flu shot (or where do you plan to receive your flu shot) this year?

Knowledge

8. People get the flu from eating after other people with the flu.
9. People get the flu from breathing the air of other people who have the flu.
10. The flu lasts three to five days.
11. Getting the flu can cause more severe illness such as pneumonia.
12. One can get the flu from the flu shot.
13. People often get sick from flu injections.

Vaccine Behavior

1. Have you ever received a flu shot in the past? Select *Yes* or *No*
2. If *No*, what is the main reason for declining the flu shot this year?
    - *Medical contraindication (i.e. allergy, medical complication, or adverse reaction)*
    - *Religious or Philosophical reasons*
    - *I am not interested*

Demographics

1. Which describes your relation to XX Health?
    - *Employee*
    - *Medical Staff Provider*
    - *Student*
    - *Volunteer*
    - *Contractor*
2. Which entity within XX Health are you affiliated with?
    - *Hospital U*
    - *Hospital NU*

- *Physician Services*
- *XX Health Services*

3. Do you provide direct patient care?
    - *Yes*
    - *No*
4. Age Group:
    - *18-24*
    - *25-34*
    - *35-44*
    - *55 and higher*
5. Gender:
    - *Male*
    - *Female*
6. Highest level of education completed:
    - *High School*
    - *Bachelor/Associate*
    - *Master*
    - *Doctorate*
    - *None of the above*

Appendix B: 2013-2014 Influenza Vaccination Survey

The following survey will be used to assess perceptions regarding influenza and vaccination. The survey should take 5-10 minutes to complete.

*1. Working with multiple people each day increases my chances of getting the flu.

Strongly disagree | Disagree | Neither agree or disagree | Agree | Strongly agree

*2. Only people over 65 years of age get the flu.

Strongly disagree | Disagree | Neither agree or disagree | Agree | Strongly agree

*3. My chances of getting the flu are good.

Strongly disagree | Disagree | Neither agree or disagree | Agree | Strongly agree

*4. Healthy people can get the flu.

Strongly disagree | Disagree | Neither agree or disagree | Agree | Strongly agree

*5. I feel the chances of getting the flu in the future are good.

Strongly disagree | Disagree | Neither agree or disagree | Agree | Strongly agree

*6. I worry a lot about getting the flu.

Strongly disagree | Disagree | Neither agree or disagree | Agree | Strongly agree

*7. I could get the flu next year.

Strongly disagree | Disagree | Neither agree or disagree | Agree | Strongly agree

*8. The thought of getting the flu scares me.

Strongly disagree | Disagree | Neither agree or disagree | Agree | Strongly agree

*9. Getting the flu would disrupt my family life.

Strongly disagree | Disagree | Neither agree or disagree | Agree | Strongly agree

*10. Having the flu would make daily activities more difficult.

Strongly disagree | Disagree | Neither agree or disagree | Agree | Strongly agree

*11. If I got the flu, it would be more serious than other diseases.

Strongly disagree Disagree Neither agree or disagree Agree Strongly agree

*12. Flu can be a serious disease.

Strongly disagree Disagree Neither agree or disagree Agree Strongly agree

*13. Getting a flu shot will prevent me from getting the flu.

Strongly disagree Disagree Neither agree or disagree Agree Strongly agree

*14. Getting a flu shot will protect others in my household from getting the flu.

Strongly disagree Disagree Neither agree or disagree Agree Strongly agree

*15. Getting a flu shot will prevent me from being absent from work.

Strongly disagree Disagree Neither agree or disagree Agree Strongly agree

*16. I have a lot to gain by getting a flu shot.

Strongly disagree | Disagree | Neither agree or disagree | Agree | Strongly agree

*17. I would not be afraid of getting the flu if I got a flu shot.

Strongly disagree | Disagree | Neither agree or disagree | Agree | Strongly agree

*18. Having a chronic illness (such as diabetes, heart disease, or asthma) is a reason for getting the flu vaccine.

Strongly disagree | Disagree | Neither agree or disagree | Agree | Strongly agree

*19. Getting a flu shot is not convenient for me.

Strongly disagree | Disagree | Neither agree or disagree | Agree | Strongly agree

*20. In order to get a flu shot, I would have to give up quite a bit.

Strongly disagree | Disagree | Neither agree or disagree | Agree | Strongly agree

*21. Getting a flu shot can be painful.

Strongly disagree | Disagree | Neither agree or disagree | Agree | Strongly agree

*22. Getting a flu shot is time consuming.

Strongly disagree | Disagree | Neither agree or disagree | Agree | Strongly agree

*23. Getting a flu shot interferes with my daily activities.

Strongly disagree | Disagree | Neither agree or disagree | Agree | Strongly agree

*24. There are too many risks in getting a flu shot.

Strongly disagree | Disagree | Neither agree or disagree | Agree | Strongly agree

*25. It costs too much to get a flu shot.

Strongly disagree | Disagree | Neither agree or disagree | Agree | Strongly agree

*26. I am concerned about having a bad reaction to the flu shot.

Strongly disagree Disagree Neither agree or disagree Agree Strongly agree

*27. People get the flu from eating after other people with the flu.

Strongly disagree Disagree Neither agree or disagree Agree Strongly agree

*28. People get the flu from breathing the air of other people who have the flu.

Strongly disagree Disagree Neither agree or disagree Agree Strongly agree

*29. The flu lasts three to five days.

Strongly disagree Disagree Neither agree or disagree Agree Strongly agree

*30. Getting the flu can cause more severe illness such as pneumonia.

Strongly disagree Disagree Neither agree or disagree Agree Strongly agree

*31. One can get the flu from the flu vaccine.

Strongly disagree Disagree Neither agree or disagree Agree Strongly agree

*32. People often get sick from flu injections.

Strongly disagree Disagree Neither agree Agree Strongly agree

*33. Did you get your flu shot yet this fall?

C" Yes GO to Questions 34

(" No (and I am not planning to get one) Go to Question 47

(" I have not gotten a flu shot yet, but plan to do so this year GO to Question 34

*34. I got the flu vaccine because my doctor or nurse told me it was good.

Strongly disagree | Disagree | Neither agree or disagree | Agree | Strongly agree

*35. I got the flu vaccine because my supervisor thought it was a good idea.

Strongly disagree | Disagree | Neither agree or disagree | Agree | Strongly agree

*36. I got the flu vaccine after hearing an announcement of benefits on the radio or television.

Strongly disagree | Disagree | Neither agree or disagree | Agree | Strongly agree

*37. I got the flu vaccine to protect myself.

Strongly disagree | Disagree | Neither agree or disagree | Agree | Strongly agree

*38. I got the flu vaccine to protect my coworkers.

Strongly disagree | Disagree | Neither agree or disagree | Agree | Strongly agree

*39. I got the flu vaccine to protect my family.

Strongly disagree | Disagree | Neither agree or disagree | Agree | Strongly agree

*40. Where did you receive your flu shot (or where do you plan to receive your flu shot) this year?

- Hospital (Chambersburg or Waynesboro)
- Doctor's Office
- Pharmacy
- Urgent Care Center

Other (please specify)

*41. Which best describes your relation to Summit Health?

- Employee
- Medical Staff Provider
- Student
- Volunteer
- Contractor

*42. Which entity within Summit Health are you affiliated with?

- Chambersburg Hospital
- Waynesboro Hospital
- Physician Services
- Chambersburg Health Services

*43. Do you provide Direct Patient Care?

- Yes
- No

* 44. Age Group:

- 18-24
- 25-34
- 35-44
- 45-54
- 55 and higher

* 45. Gender:

- Male
- Female

* 46. Highest level of education completed:

- High school
- Bachelor/Associate
- Master
- Doctorate
- None of the above

***47. Have you ever received a flu shot in the past?**

- Yes
- No

***48. What is the main reason for declining the flu shot this year?**

- Medical Contraindication, i.e. allergy or medical complication or adverse reaction
- Religious or Philosophical reasons
- I am not interested

Appendix C: Data Use Agreement

DATA USE AGREEMENT

This Data Use Agreement ("Agreement"), effective as of February 23, 2015 ("Effective Date"), is entered into by and between Ericka Kalp ("Data Recipient") and Dr. Tom Anderson , on behalf of Summit Health ("Data Provider"). The purpose of this Agreement is to provide Data Recipient with access to a Limited Data Set ("LDS") for use in research **in accord with laws and regulations of the governing bodies associated with the Data Provider, Data Recipient, and Data Recipient's educational program.** In the case of a discrepancy among laws, the agreement shall follow whichever law is more strict.

1. Definitions. Due to the study's affiliation with Laureate, a USA-based company, unless otherwise specified in this Agreement, all capitalized terms used in this Agreement not otherwise defined have the meaning established for purposes of the USA "HIPAA Regulations" and/or "FERPA Regulations" codified in the United States Code of Federal Regulations, as amended from time to time.

2. Preparation of the LDS. Data Provider shall prepare and furnish to Data Recipient a LDS in accord with any applicable laws and regulations of the governing bodies associated with the Data Provider, Data Recipient, and Data Recipient's educational program.

3. Data Fields in the LDS. **No direct identifiers such as names may be included in the Limited Data Set (LDS).** In preparing the LDS, Data Provider shall include the **data fields specified as follows**, which are the minimum necessary to accomplish the research:

Complete anonymous survey data points from 2013 Annual Employee CBT Influenza Survey.

Perceived Susceptibility

- Working with multiple people each day increases my chances of getting the flu.
- Only people over 65 years of age get the flu.
- My chances of getting the flu are good.
- Healthy people can get the flu.
- I feel the chances of getting the flu in the future are good.
- I worry a lot about getting the flu.
- I could get the flu next year.

Perceived Seriousness

- The thought of getting the flu scares me.
- Getting the flu would disrupt my family life.
- Having the flu would make daily activities more difficult.
- If I got the flu, it would be more serious than other diseases.
- Flu can be a serious disease.

Perceived Benefits

- Getting a flu shot will prevent me from getting the flu.

- Getting a flu shot will protect others in my household from getting the flu.
- Getting a flu shot will prevent me from being absent from work.
- I have a lot to gain by getting a flu shot.
- I would not be afraid of getting the flu if I got a flu shot.
- Having a chronic illness (such as diabetes, heart disease, or asthma) is a reason for getting the flu vaccine.

Perceived Barriers

- Getting a flu shot is not convenient for me.
- In order to get a flu shot, I would have to give up quite a bit.
- Getting a flu shot can be painful.
- Getting a flu shot is time consuming.
- Getting a flu shot interferes with my daily activities.
- There are too many risks in getting a flu shot.
- It costs too much to get a flu shot.
- I am concerned about having a bad reaction to the flu shot.

Knowledge

- People get the flu from eating after other people with the flu.
- People get the flu from breathing the air of other people who have the flu.
- The flu lasts three to five days.
- Getting the flu can cause more severe illness such as pneumonia.
- One can get the flu from the flu vaccine.
- People often get sick from flu injections.

Cues to Action

- I got the flu vaccine because my doctor or nurse told me it was good.
- I got the flu vaccine because my supervisor thought it was a good idea.
- I got the flu vaccine after hearing an announcement of benefits on the radio or television.
- I got the flu vaccine to protect myself.
- I got the flu vaccine to protect my coworkers.
- I got the flu vaccine to protect my family.

Demographic data points:

- Which best describes your relation to Summit Health?
- Which entity within Summit Health are you affiliated with?
- Do you provide Direct Patient Care?
- Age Group
- Gender
- Highest level of education completed.

Vaccination behavior:

- Did you get your flu shot this season, (2013/2014)?
- Have you ever received a flu shot in the past?
- Where did you receive your flu shot (or where do you plan to receive your flu shot) this year?
- Where did you receive your flu shot (or where do you plan to receive your flu shot) this year? Other (please specify).

4. Responsibilities of Data Recipient. Data Recipient agrees to:

a. Use or disclose the LDS only as permitted by this Agreement or as required by law;

b. Use appropriate safeguards to prevent use or disclosure of the LDS other than as permitted by this Agreement or required by law;

c. Report to Data Provider any use or disclosure of the LDS of which it becomes aware that is not permitted by this Agreement or required by law;

d. Require any of its subcontractors or agents that receive or have access to the LDS to agree to the same restrictions and conditions on the use and/or disclosure of the LDS that apply to Data Recipient under this Agreement; and

e. Not use the information in the LDS to identify or contact the individuals who are data subjects.

5. Permitted Uses and Disclosures of the LDS. Data Recipient may use and/or disclose the LDS **for its Research activities only (dissertation and subsequent manuscript publication(s)).**

6. Term and Termination.

a. Term. The term of this Agreement shall commence as of the Effective Date and shall continue for so long as Data Recipient retains the LDS, unless sooner terminated as set forth in this Agreement.

b. Termination by Data Recipient. Data Recipient may terminate this agreement at any time by notifying the Data Provider and returning or destroying the LDS.

c. Termination by Data Provider. Data Provider may terminate this agreement at any time by providing thirty (30) days prior written notice to Data Recipient.

d. For Breach. Data Provider shall provide written notice to Data Recipient within ten (10) days of any determination that Data Recipient has breached a material term of this Agreement. Data Provider shall afford Data Recipient an opportunity to cure said alleged material breach upon mutually agreeable terms. Failure to agree on mutually agreeable terms for cure within thirty (30) days shall be grounds for the immediate termination of this Agreement by Data Provider.

e. Effect of Termination. Sections 1, 4, 5, 6(e) and 7 of this Agreement shall survive any termination of this Agreement under subsections c or d.

7. Miscellaneous.

a. Change in Law. The parties agree to negotiate in good faith to amend this Agreement to comport with changes in federal law that materially alter either or both parties' obligations under this Agreement. Provided however, that if the parties are unable to agree to mutually acceptable amendment(s) by the compliance date of the change in applicable law or regulations, either Party may terminate this Agreement as provided in section 6.

b. Construction of Terms. The terms of this Agreement shall be construed to give effect to applicable federal interpretative guidance regarding the HIPAA Regulations.

c. No Third Party Beneficiaries. Nothing in this Agreement shall confer upon any person other than the parties and their respective successors or assigns, any rights, remedies, obligations, or liabilities whatsoever.

d. Counterparts. This Agreement may be executed in one or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument.

e. Headings. The headings and other captions in this Agreement are for convenience and reference only and shall not be used in interpreting, construing or enforcing any of the provisions of this Agreement.

IN WITNESS WHEREOF, each of the undersigned has caused this Agreement to be duly executed in its name and on its behalf.

DATA PROVIDER

Signed: [signature] 2/25/15

Print Name: Thomas Anderson

Print Title: VPMA/CMO

DATA RECIPIENT

Signed: [signature]

Print Name: Ericka Kalp

Print Title: Doctoral Candidate
Walden University

Appendix D: Letter of Permission

March 28, 2016

Dear Dissertation Committee,

I give permission for Ericka Kalp, Walden University Doctoral Candidate to preprint the original 2013-2014 Influenza Vaccination Survey questions, administered to healthcare workers at Chambersburg Hospital and Waynesboro Hospital (November 2013 -January 2014) in her dissertation manuscript.

Thank you,

Thomas Anderson, MD, MBA
VPMA/CMO
Summit Health