VALIDATION OF AN INSTRUMENT TO MEASURE FACILITATORS AND BARRIERS FOR INFLUENZA VACCINATION AMONG NURSE EDUCATORS

A DISSERTATION SUBMITTED TO THE GRADUATE DIVISION OF THE UNIVERSITY OF HAWAI‘I AT MĀNOA IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR

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By

Denise L. Cohen

University of Hawai‘i, Mānoa

Dissertation Committee:

John Casken, Chairperson
Kristine Qureshi
Joyce Vogler
Joseph Mobley
Herbert Ziegler

UMI # xxxxx

DEDICATION

This work is dedicated

To my family

Bruce Cohen, Scott Cohen,

Bill, Angela, Tiare and Leila Terry

To my Dad, David L. Dobson

and

To my late Aunt, Diane Dobson Aragon

Thank you for your love and support during this journey

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ABSTRACT

Purpose: The purpose of this research is to develop and evaluate the reliability and validity of a survey tool to assess nurse educators' knowledge, attitudes, beliefs, and barriers towards influenza vaccine.

Background: There have been multiple studies of influenza vaccine by healthcare workers (HCWs) that reveal that nurses are reluctant to accept an annual influenza vaccine. There have been no studies on nurse educators. Nurse educators have the potential to influence future generations of nurses' acceptance of influenza vaccine therefore it is important that we evaluate their knowledge, attitudes, beliefs and practices toward influenza vaccine.

Methods: A 36-item scale based on constructs from the Health Belief Model (HBM) and Theory of Reasoned Action (TRA) was psychometrically tested for reliability and validity on N=191 nurse educators recruited from Hawai'i, California, and Oregon. Reliability testing was utilized using Cronbach's alpha and Spearman-Brown prophecy formula to measure internal consistency. Scale validity was assessed by content validity, construct validity using factor analysis, and criterion validity using logistic regression. All procedures were done using the Statistical Package for Social Sciences for the Mac.

Conclusion: The original 36-item scale was reduced to a 26-item scale that consisted of 3-components reflecting (1) Attitudes and Beliefs Towards Influenza Vaccine; (2) Knowledge and Beliefs of Influenza Disease; and (3) Barriers Towards Influenza Vaccine. The item performance was satisfactory. The model was successful in predicting 91.6% of participants who refused the vaccine and 91.5% of participants who took the vaccine. Items 37, 38, and 39 were open-ended questions

and were reviewed for themes to allow for further revisions of the scale in the future.

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CHAPTER 1: INTRODUCTION TO THE STUDY

Background

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

Nosocomial outbreaks of influenza are a significant source of morbidity and mortality in vulnerable patient populations such as those in long-term care facilities; and neonatal, pediatric and adult intensive care units (Atkinson, Wolfe, & Hamborsky, 2011). Many Healthcare workers (HCWs) especially nurses come to work and care for their patients while sick with influenza because they do not want to overburden other staff by calling in sick (Weingarten et al 1989). Healthcare workers are considered vectors of influenza as they can acquire influenza from their patients or the community and transmit the disease to other patients and staff while they themselves are suffering with respiratory infections (Habib, Rishpon, & Rubin, 2000). The Centers for Disease Control defines HCWs as physicians, nurses, nursing assistants, HCW students, lab personnel,

housekeepers and any other auxiliary personnel that may come in contact with patients (CDC, 2005).

Influenza vaccine has proven to be an effective method of reducing influenza among HCWs and thereby reducing nosocomial transmission to patients and other staff (Atkinson, Hamborsky, McIntyre, & Wolfe, 2010). Historically HCWs acceptance of an annual influenza vaccine has been low ranging from 10%- 60% worldwide. The low vaccination rate of HCWs for influenza is problematic because of their close contact with hospitalized children, patients with debilitating diseases, and residents of long-term care facilities (LTCF) who are particularly vulnerable to influenza and influenza-related complications such as pneumonia (Burls et al., 2006; Carman et al., 2000; H. C. Maltezou & Drancourt, 2003; Pearson, Bridges, & Harper, 2006).

Residents in long term care facilities (LTCFs) may experience attack rates as high as 60% and fatality rates of 55% (Atkinson et al., 2007). In these facilities, resident immunization is the cornerstone of primary prevention efforts. However, even though residents are routinely vaccinated, influenza outbreaks still occur because influenza vaccine is not as effective in the elderly due to the waning of the immune system. These nosocomial outbreaks are a significant source of morbidity and mortality. It is theorized that these influenza outbreaks would decrease if HCWs are vaccinated as well (Nace, Hoffman, Resnick, & Handler, 2007).

Influenza vaccine administered to HCWs has proven to be effective in reducing the spread of disease from HCWs to vulnerable patient populations including residents of LTCFs, and patients in neonatal, pediatric and adult intensive care units (Pearson et al., 2006). In a study conducted over three consecutive influenza seasons from 1992-1993 to

1994-1995, 13.4% of young healthy unvaccinated HCWs had serological evidence of influenza compared to 1.7% of vaccinated HCWs. In addition, influenza vaccinees reported less sick days for febrile respiratory illness than those who had not received the vaccine (Wilde et al., 1999). Elder et al. (1996) investigated 602 HCWs at four acute hospitals during the 1993-1994 influenza season. Twenty-three percent of unvaccinated HCWs in acute care hospitals had serological evidence of influenza infection during a mild epidemic season. It was estimated that between 28% -59% of influenza cases were subclinical meaning that they came to work with no symptoms but were infectious.

Despite this evidence, the acceptance of the annual influenza vaccine by HCWs remains low world-wide (H. Maltezou et al., 2008). One of the national health objectives of Healthy People 2010 was to achieve HCW vaccination coverage of at least 60% by 2010 (objective no. 14-29g) (2010, 2000). The same objective was kept but the goal was increased to 90% in the 2020 national objectives of Healthy People (2020, 2010).

By far the most common barrier to obtaining the vaccine is the misperception among HCWs, especially nurses that the influenza vaccine causes severe adverse side effects and/or causes influenza disease. In addition, there is lack of knowledge that HCWs can transmit influenza to their patients especially when they come to work ill. Similarly there is a lack of understanding by many HCWs, especially nurses, that influenza is a serious and life-threatening disease (Martinello, Jones, & Topal, 2003; Willis & Wortley, 2007). According to the literature review although many HCWs are resistant to taking an annual influenza shot, nurses have proven to be the most resistant as will be demonstrated in chapter two. Nurses are considered front-line providers within the health care system and have the potential to reverse low HCW immunization rates

(Willis & Wortley, 2007). A nurse's recommendation is a positive predictor of increasing patients' acceptance of the vaccine (Brunton, Weir, & Jennings, 2005). Nurses in one study admitted they had difficulty promoting the vaccine to their patients when they had not taken it themselves. Many nurses admitted that they had a lack of knowledge of influenza and the vaccination and wished they had more (Willis & Wortley 2007). In a study conducted in Canada, 8 out of 11 nurses stated that they had not studied influenza or its vaccine during their formal education (Gallant, 2009). Nurses in another study questioned that if obtaining a flu shot is so important why is not emphasized in nursing school, role modeled by nursing faculty and tested on the NCLEX (Rhudy, Tucker, Ofstead, & Poland, 2010).

Nursing faculty should be examined for their attitudes and acceptance of influenza vaccine. Research on medical students and medical residents indicate that their medical faculty who take influenza vaccine, especially faculty who teach infectious disease courses, have a positive influence on the students and residents accepting the influenza vaccine (Nafziger & Herwaldt, 1994). It could be assumed that nursing faculty who have positive attitudes toward vaccination, especially influenza vaccine, would have a positive influence on future nurses' acceptance of influenza vaccine. There is a paucity of research regarding nursing faculty attitudes, beliefs, knowledge, and barriers toward influenza vaccine. Nursing faculty's attitudes toward vaccination may effect decisions made by future nurses based on what was role-modeled and taught in their nursing curriculum. A questionnaire specific to this population may provide better information on how to increase the overall acceptance of influenza vaccine by nurses.

Conceptual Background

A number of theories have been developed to help explain individual health behavior. A theory is a set of interrelated concepts that present a systemic view of a behavior by specifying relationships among variables in order to explain or predict health behavior. Theories provide the conceptual underpinnings to research and practice (Glanz, Rimer, & Lewis, 2002; Glanz, Rimer, & Viswanath, 2008). This study is based on two conceptual frameworks; the Health Belief Model (HBM) and the Theory of Reasoned Action (TRA) first proposed by Fishbein and Ajzen (1975). Both models attempt to explain individual behavior based on value construct and finding ways to implement positive behavior change. Value-expectancy theories view behavior as a function of the subjective value of an outcome and the probability, or expectation, that a particular action will achieve that outcome (Glanz et al., 2002; Glanz et al., 2008). Because there are limitations in both models in explaining health behavior, a construct with both elements of the HBM and TRA was developed and utilized in this survey instrument. Both theories provide a clear theoretical framework that guide researchers in selecting, defining, and measuring variables. Currently there is no consensus that one theory is better than the other in predicting behavior. There are limitations in both models in explaining health behavior, therefore an instrument was developed utilizing constructs from both the HBM and TRA.

Health Belief Model

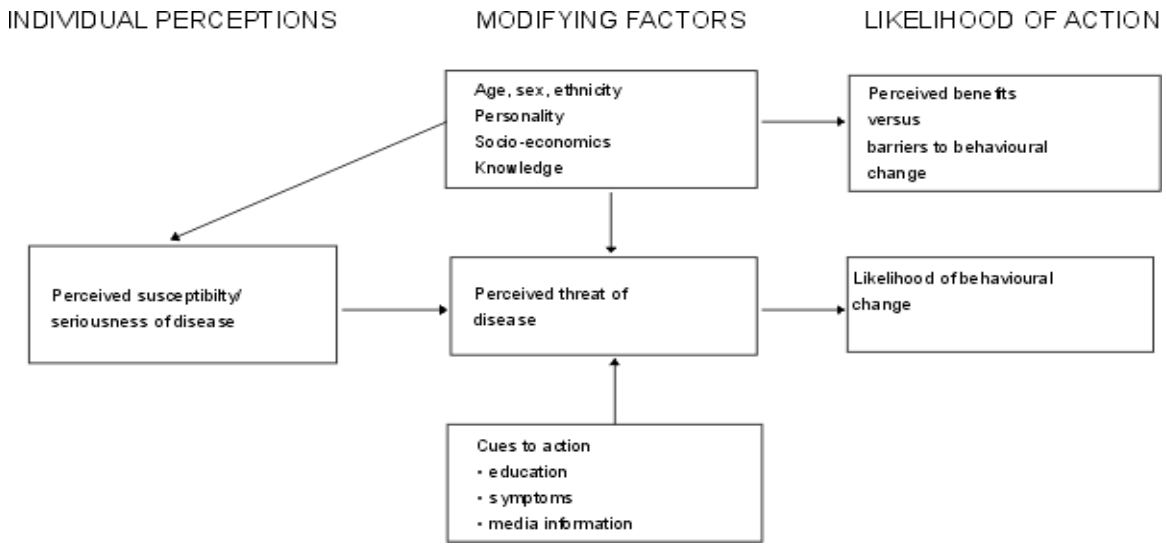
The HBM has been the framework for explaining and predicting health and medical recommendations for the past 50 years. The HBM was developed in the 1950s by a group of social psychologists to explain why individuals would not participate in

programs to prevent and detect disease. It has been since expanded and clarified to include preventive actions, illness behaviors, and sick-role behavior (Glanz et al., 2002). The key constructs are: (1) perceived susceptibility, (2) perceived seriousness or severity, (3) perceived benefits, (4) perceived barriers toward influencing a behavior (5) cues to action, and (6) self efficacy (Glanz et al., 2008).

According to the HBM, perceived susceptibility refers to beliefs about the likelihood of getting the disease. Perceived severity is feelings about how serious it would be in contracting a disease or condition and possible social consequences toward family, work or friends. Perceived benefits are based on perceived personal susceptibility and the belief that the intervention will reduce disease threat. Perceived barriers refer to the potential negative aspects of doing the intervention for example it may help but I may get side effects is it worth it? Cues to action refer, to readiness to take action that can be potentiated by bodily events, environmental events or other factors outside of the individual. Self-efficacy is defined as the ability to do the positive intervention desired. This is different from perceived benefits in that it incorporates initiation and maintenance of the behavioral change (Glanz et al., 2002; Glanz et al., 2008).

For example if a nurse educator regard themselves as susceptible to influenza and believed that the disease could have serious consequences to themselves or to patients under their care, believed that influenza vaccine could prevent those consequences, believed that the anticipated benefits such as no disease and not spreading disease, their workplace encouraged and expected them to take an annual influenza vaccine, and they were convicted that they could successfully achieve it then likely that individual would obtain an influenza vaccination.

FIGURE 1.2 SCHEMATIC PRESENTATION OF HBM (GLANZ 2002 PG 52.)



A perceived barrier is considered the construct within the model that is considered the most powerful predictor of behavior and perceived severity is the least powerful predictor (Glanz et al., 2008).

Limitations to the HBM include difficulty in defining perceived threat. Traditionally the perceived threat should be the disease that the health behavior is preventing. However, the literature review reveals that often HCWs perceive the health behavior influenza vaccine as the real threat and diminish the potential severity of influenza itself. This has not been clearly clarified within the HBM. A major limitation of the HMB is the variability in measurement of the central HBM constructs. The constructs should be as originally conceptualized and specific to behavior (Glanz et al., 2008). For example barriers to influenza vaccine may be quite different to barriers to human papillomavirus vaccine. Since most studies utilizing the HBM have failed to establish validity and reliability of measures prior to full scale testing, validity and reliability should be reexamined every time the model is tested utilizing constructs with

different behavior especially with different cultures or special populations. Cues to action are difficult to study, as they have not been well quantified or defined. For example what will trigger an individual to commit to a behavior such as obtaining an annual influenza vaccine will be different for individuals depending on beliefs, socioeconomics, time, and other factors.

The HBM has been utilized to explain a variety of health behaviors including self breast examination, mammography, and influenza vaccination acceptance (Glanz et al., 2008). Limitations to the construct are that knowledge is not fully developed in or incorporated into the model. Although knowledge may not predict behavior it can help in formulating or changing beliefs toward the behavior. Therefore knowledge regarding influenza vaccine and disease was incorporated into the development of this survey

The Theory of Reasoned Action

The Theory of Reasoned Action (TRA) is a family of theories that assumes that attitudes are a function of beliefs and beliefs influence behavior. Originally based on theories developed by Fishbein & Azjen in the 70s and refined over the last 40 years. It is based on the assumption that human beings make decisions based on information available to them. That individuals consider the implications of their actions before making informed decisions and the goal of TRA is to predict and understand an individual's behavior(Ajzen & Fishbein, 1980; Fishbein & Ajzen, 2010). It is important to note that the theory of reasoned action explains that there is a reason for every behavior but that does not mean there is rational behavior for that reason (Glanz et al., 2002; Glanz et al., 2008).

Predicting behavior consists of 3 basic components 1) the individual's positive or negative evaluation of performing the behavior termed attitude toward belief; 2) the individual's perception of the social pressures to perform/not perform the behavior termed subjective norm; and 3) the individual's personal and environmental factors also termed efficacy that can help or deter their attempts to carry out the behavior termed behavioral control.

According to the first component, attitudes are a function of beliefs. Individuals hold beliefs about positive or negative consequences they may experience if they performed the behavior. These behavioral beliefs are assumed to determine individuals attitude toward personally performing the behavior (Fishbein & Ajzen, 2010). For example, if a nursing faculty believes that obtaining an influenza vaccine will:

- Reduce the chance of getting ill for the next year.
- Reduces the risk to patient populations under their care from getting sick.
- Role model for nursing students that obtaining a flu shot is one aspect of protecting their patients from disease.

Then that faculty member will most likely have a positive attitude toward obtaining an influenza vaccination and may have a positive influence on future nurses' acceptance of influenza vaccine.

If, however, the nursing faculty believes that influenza vaccine will:

- Make them ill
- Does not work
- Provides little to no protection against influenza for them or their patients
- Does not role model getting an annual flu shot for their nursing students

Then that faculty member will have a negative attitude towards obtaining an influenza vaccine and may have a negative impact on future nurses' acceptance of influenza vaccine.

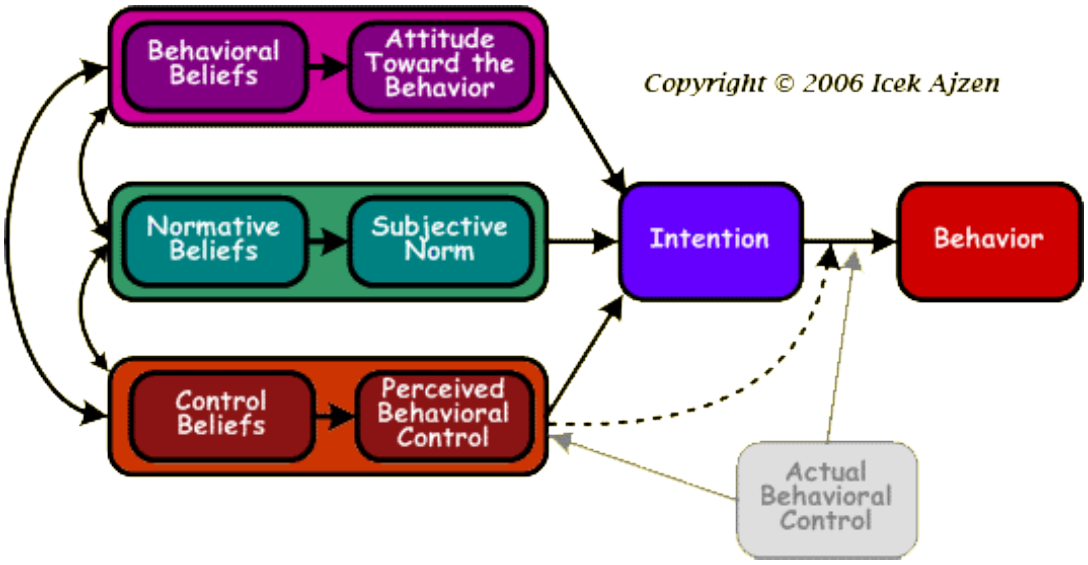
The second component of the TRA examines the influences that the social environment or the normative component of the theory has in regards to the performance of the behavior. According to this theory the more an individual perceives what others believe about the behavior will ultimately influence their performance toward the behavior. This is called perceived norm (Fishbein & Ajzen, 2010). For example, a student nurse may decide to take the vaccine:

- If the majority of student nurses in their cohort are taking it.
- Faculty are role modeling it.
- It is emphasized in their formal nursing education.

These elements may, although not always, counter a negative personal belief in obtaining an influenza vaccine.

Finally the third part of the theory examines factors that control beliefs. According to this part of the theory the desire to do the behavior is there but environmental constraints such as time, finances or workplace issues prevent individuals from acting on their beliefs. For example if nurses believe that they have no time to obtain an influenza vaccine, this will deter them from doing so (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 2010).

FIGURE 1.2. DIAGRAM OF THEORY OF PLANNED BEHAVIOR



Limitations to the TRA include: The model work best when the behaviors under examination are under the individual's control. When the behavior is a cooperative one the model may see the partner who is unfavorable to the behavior as an obstacle (Manstead, 2011).

The individual may have intentions to do something such as obtain a flu shot but if they are not in the habit of getting one, may not follow through with the intention (Manstead, 2011). Azjen and Fishbein were aware of these limitations and have revised the model to add these constructs to their theory (Fishbein & Ajzen, 2010).

Statement of the Problem

There is a plethora of literature on attitudes, beliefs, knowledge and barriers toward influenza vaccine by HCWs. There is a paucity of literature regarding Nurse educators' attitudes, beliefs, knowledge and barriers toward influenza vaccine. Most of the instruments used in the studies were researcher-written and were not evaluated for psychometric properties. The problem is there is no psychometrically evaluated

instrument to evaluate nurse educators' attitudes, beliefs, knowledge and barriers toward influenza vaccine.

Purpose of the Study

The purpose of this paper is to develop and evaluate for reliability and validity a survey tool to assess nurse educators' attitudes, beliefs, knowledge and barriers toward influenza vaccine. For this study a nurse educator is defined as an individual who has completed at a minimum a BS or higher educational degree and is teaching in an accredited nursing program.

The specific aims of the study

- To examine construct validity of the instrument utilizing principle components analysis.
- To examine criterion validity by examining the predictive relationship of the instrument using logistic regression.
- To evaluate internal consistency by calculating Cronbach's alpha, Spearman-Brown's corrected split-half coefficient and inter-item correlations.
- To evaluate the relationship between scale scores and participants' acceptance or non-acceptance of influenza vaccine using logistic regression.

Goals

1. The survey instrument is a construct valid instrument for measuring attitudes, beliefs, knowledge and barriers towards influenza vaccine.
2. The survey instrument is a reliable tool in measuring attitudes, beliefs, knowledge and barriers towards influenza vaccine.

3. The survey instrument items performance are satisfactory.
4. The survey instrument is able to predict acceptance or non-acceptance of influenza vaccine by examination of the relationship between participants and their scores.

Significance

Nurses in general have been reluctant to accept an annual influenza vaccination. Nurse educators influence future generations of nurses. Nurse educators have not been well studied in their attitudes and behavior toward influenza vaccine. Although there have many questionnaires in the literature regarding HCWs attitudes and barriers toward influenza vaccination there have not been any instruments that have been psychometrically tested for reliability and validity (Niederhauser, 2009). There is a need to create a valid and reliable instrument to identify attitudes, knowledge, and barriers toward influenza vaccine by nurse educators. This survey instrument will make an important contribution to the knowledge of influenza vaccine acceptance by nurse educators. This tool may suggest key issues that will allow for development of interventions to increase use of influenza vaccine by nurse educators.

Assumptions/Limitations

It is assumed that nurses' acceptance of influenza vaccine is not fully understood. It is further assumed that nurse educators fall into this group. It is also assumed that nurse educators may influence future generations of nurses' acceptance of influenza vaccine. An essential step to the process is to develop a valid and reliable tool to measure beliefs, attitudes, knowledge and barriers towards influenza vaccination.

Summary

This chapter introduced the background to the development of this study. Influenza vaccine has proven to be effective in reducing disease and spread of disease when taken by HCWs. Studies on decision-making by HCWs reveal that beliefs and attitudes towards influenza vaccine is in general negative. There is a paucity of research regarding nurse educators' attitudes toward influenza vaccination. The purpose of this research is to evaluate the reliability and validity of a survey instrument specific toward examining attitudes, beliefs, knowledge, and barriers towards influenza vaccine by nursing faculty.

This chapter also identified the conceptual framework, research questions, and assumptions.

CHAPTER 2: LITERATURE REVIEW

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

The articles were examined for criteria that may influence the acceptance of influenza vaccine by HCWs. The criteria included examination of attitudes, knowledge, beliefs and organizational factors that could influence their acceptance of the influenza vaccine. In addition this review examines acceptance by different HCWs, primarily physicians, nurses and other professional and support staff. Forty-five relevant articles from 1985-2011 met the criteria of noting specific factors that influence HCWs to accept influenza vaccine.

Overview of selected articles

Twenty of the 45 studies had been conducted in the United States. Twenty-five of the studies examined research conducted in Australia (n=2), Brazil (n=1), Canada (n=6), China (n=1) France (n=1), Greece (n=1), Germany (n=1), Israel (n=3), Italy (n=2),

Netherlands (n=1), New Zealand (n=1), Slovakia (n=1) Switzerland (n=1), and the United Kingdom (n=3).

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

Nine studies focused on the nurses' acceptance of the influenza vaccine, four focused on physicians, one focused on physicians and nurses, and the rest focused on HCWs, as a whole, although many of the studies categorized HCWs into different groups such as physicians, nurses, allied health professionals and administrative staff.

Factors decreasing influenza vaccine acceptance

Fear and mistrust of the vaccine. Myths and misperceptions have been associated with the HCWs not accepting the vaccine. Thirty-six out of the 45 articles reviewed reported that the HCWs had some concern regarding adverse reactions and safety of the influenza vaccine. Fifteen of those studies had it listed as the first reason why a HCW refused the vaccine (Table 1). The most common myths are perceptions that the influenza vaccine causes severe side effects and/or illnesses. These misperceptions and negative beliefs toward the vaccine act as a barrier for HCWs to take the influenza vaccine (McEwen, M. & Farren, E. 2005).

A study, conducted at a large teaching hospital in the US, revealed that only 18.1% of employees had accepted the influenza vaccine during the 1990-1991 influenza vaccination campaign. A self-designed questionnaire to explore the attitudes of the

HCWs was given to all full time and part time employees. Only 1203 (34.3%) out of 3,501employees returned the survey. The most common reason for not accepting the vaccine was "heard it had bad side effects"(Watanakunakorn, Ellis, & Gemmel, 1993). In a large psychiatric hospital in New York State, concern was expressed about the low number of HCWs accepting the influenza vaccine during a large outbreak at the hospital and therefore a study was conducted to explore why there was such a low uptake. Out of 1,293 employees, 922 (71.3%) volunteered to participate in the research. Even though 98% of the physicians and nurses knew that HCWs could transmit influenza to their patients, fewer than 20% of employees received the vaccine during the 1989-1990 influenza season. The primary reason given was the fear of side effects (Heimberger et al., 1995).

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

In a cross-sectional, self-designed study based on the Health Belief Model (HBM) conducted on nurses in Texas in 2006, out of 1000 nurses invited to participate, only 246 (24.6%) questionnaires were returned. Sixty-nine percent of this group reported having been immunized during the last four years. The most common reason for refusing the

vaccine was concern about the side effects. Side effects that were reported during this study included sore arm, body aches, fever, sore throat and cough. No one reported serious side effects such as seizure or paralysis (McEwen & Farren, 2005).

In a 2007 study, eight focus groups were held with nurses from urban settings four in Birmingham, Alabama and four in Detroit, Michigan. Twelve nurses were recruited for each group; and each group had approximately nine participants. In each city, two groups consisted of vaccinated and unvaccinated RNs. Nurses in both groups (vaccinated and unvaccinated) verbalized concerns regarding vaccine safety. One nurse stated, "I took one [flu shot] a couple of years ago and my whole family got the flu. I didn't take it last year, and we never got it" (Willis & Wortley, 2007).

In a study to examine nurses' decision-making about acceptance of influenza vaccine participants described personal experiences thought to be vaccine reactions and their fears of long-term consequences. One nurse stated, "I worked in neuro too and I took care of some people with that (Guillian-Barre). What if it happens to me? What if some of these diseases are caused by vaccinations and why are all these kids getting autism and ADHD and you know it's like it is caused by the vaccinations they are getting…" (Rhudy et al., 2010).

In a 2009 cross-sectional study conducted in four different states in the US (Colorado, Florida, Missouri and Pennsylvania) 2000 registered nurses (RNs) were invited to fill out a self-designed survey to analyze their knowledge, attitude and behavior toward influenza acceptance. One thousand seventeen (69%) surveys satisfied the criteria for analysis. Four hundred and nineteen participants did not receive an influenza vaccine. Thirty-nine percent of this population expressed concerns about the adverse

reactions as their primary reason for not taking the vaccine. Another 19% stated that their primary reason for refusal was a concern that they would get influenza from the vaccine. Both vaccinated and unvaccinated nurses thought that influenza vaccine adverse effects were common (Clark, Cowan, & Wortley, 2009).

A study that examined the adverse events that occurred to hospital personnel after taking an influenza vaccine concluded that most complaints related to pain at the injection site, with pain persisting on average for 1.5 days. Systemic adverse effects were described by 49% of the recipients and included a cluster of at least two of the following symptoms: generalized aching, tiredness, nausea, chills or onset of fever within 12 hours after vaccination, headache, dizziness and lightheadedness (Scheifele, Bjornson, & Johnston, 1990). Norton et al. (2008) reported that 39% (116/298) of hospital-vaccinated respondents indicated at least one post-vaccine symptom. The most common side effect was a sore arm for more than one day. In addition, of those reporting an adverse event 42% rated these as minimal, 39% as mild, 17% as moderate or bothersome, 3% had symptoms lasting more than one day and no serious events occurred. Saluja et al. (2005) reported that although 28.3% of respondents believed that adverse effects were common, 76.8% of those vaccinated reported having had no adverse reactions. Experiencing post vaccine symptoms for more than one day reduced the willingness of HCWs to recommend the vaccine to their co-workers (Yassi, A. et al 1994).

Despite the report of mild side effects, one study reported that 56% of physicians, 57% of nurses and 76% of pharmacists were not planning to get the vaccine because of concern of post vaccination reactions (Ballada et al., 1994). One author stated that "35.9% of physicians" believed that the vaccine caused influenza, although it did not

prevent them from recommending it for others (Abramson, Z. & Orit, L. 2008). Another study noted that whether HCWs accepted the vaccine or not they were still split 50/50 as to whether the vaccine could cause disease (Piccirillo & Gaeta, 2006).

There also appears to be a lack of trust and outright fear of the influenza vaccine. In one study, African-American nurses in both vaccinated and unvaccinated groups brought up the historical mistrust that (African-Americans) have toward vaccination programs stemming from the Tuskegee syphilis experiment (Willis, B. & Wortley, P. 2007). A study done in Slovakia reported that medical students and nurses did not "trust" the vaccine. Researchers were also surprised when they realized that medical students and nurses were basing their opinions of the influenza vaccine on the mass media rather than from knowledge garnered from their medical and nursing studies (Madar, Repkova, Baska, & Straka, 2003).

Concerns regarding the effectiveness of the vaccine. The second most common misperception about the influenza vaccine is that the vaccine does not work. Twenty-six out of the 45 studies had this listed as a reason for not obtaining an influenza vaccination.

Two long-term-care-facilities participated in a cross-sectional, self-administered survey of HCWs behavior with influenza vaccination in January 1999. This survey was augmented by a focus group to further examine attitudes toward vaccination. Non-vaccinated respondents were aware that they could spread the disease and did place value on the protective effects of vaccination, but they also commonly believed that the vaccine does not work (Manuel, Henry, Hockin, & Naus, 2002).

An early study conducted in the United States in 1989 on physicians and nursing personnel revealed that only 2.1% of staff had received the influenza vaccine during the

1986-1987 influenza season despite ACIP recommendations. Analysis of the reasons for declining vaccination concluded that nurses were more skeptical about the vaccine's efficacy (37.8% versus 8.2%, $p<0.05$) than were physicians (Weingarten et al 1989). During the 1999-2000 influenza season researchers at the University of Wisconsin Hospitals and Clinics conducted a survey on vaccine recipients and employees who refused the vaccine. Of the 445 unvaccinated participants 319 (72%) refused vaccination because of concern that multiple strains exist and the vaccine does not prevent influenza (Steiner et al 2002).

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

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

recommended it to their patients because of doubts about its efficacy (Esposito et al., 2007).

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

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

In a focused group study of nurses working at the Mayo Clinic, Rochester nurses choosing not to take the vaccine had skepticism of the value of the vaccine. Some participants did not think the symptoms of influenza were bothersome enough to warrant vaccination. Quotes included, "You know if I get the flu, what is the worst that can happen? I will be off work for a couple of weeks, is that really a big deal?" (Rhudy et al., 2010).

Two studies reported nurses reporting that they did not learn about influenza or vaccination in their formal nursing education. A study conducted in Canada reported that only three in eleven nurses received information regarding influenza vaccination in their formal education. A typical response to participants learning about influenza vaccine in nursing school consisted of, "No. Nothing. Not anything formal." Most stated that they were instructed on general immunization principles only (Gallant, 2009). Nurses at the Mayo Clinic asked that, "if obtaining a flu shot is so important why is not emphasized in nursing school, role modeled by nursing faculty and tested on the NCLEX," (Rhudy et al., 2010).

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

In addition there is pervasive lack of knowledge that HCWs are often sources of the spread of influenza among patient populations especially when they come to work with symptomatic or asymptomatic influenza. Saluja et al (2007) conducted a study on emergency department personnel in four teaching hospitals and revealed only 26.8% of staff believed that patients could get influenza from infected HCWs. However, researchers have concluded that health care workers have been implicated in the transmission of influenza in several healthcare settings. Authors examined the data from 1959-1999 from 14 hospitals in the Midwest and concluded that out of 13 outbreaks, five were traced to nosocomial transmission from infected HCWs (Evans, Hall, & Berry, 1997) (Evans et al., 1997). In a study conducted in Glasgow 518 HCWs were serologically tested for Type A & B influenza strains in February of the 1993-1994 influenza season. None of the participants had taken the influenza vaccine for that year. Twenty-three percent of unvaccinated HCWs in this study had serologic evidence of influenza during a relatively mild influenza season compared to 0.15-0.2% of the general population during the same period (Elder, O'Donnell, McCruden, Syminton, & Carman, 1996).

Other reasons why HCWs fail to be vaccinated. Other barriers to influenza vaccination include organizational or institutional barriers, general vaccine inaccessibility, or lack of positive incentives for obtaining the vaccine (Nace et al., 2007). A common barrier reported in the literature was the ease of obtaining the vaccines. Institutions which initiate an aggressive influenza vaccination campaign often report higher than average HCW acceptance of the vaccine (Hofmann, Ferracin, Marsh, & Dumas, 2006). Wodi et al. (2005) reported that inconvenience of accessing the vaccine

program was a barrier to receiving the vaccine. Cannning, Phililips & Allsup (2005) reported that vaccine acceptance was influenced by the availability of vaccine. For example, in one influenza campaign the vaccine was administered one day a week between the hours of 8:30-4:30. If an HCW staff worked different shifts or days they were not vaccinated. This suggests that institutions who do not make it readily available to all staff have less vaccinated HCWs. Another study reported that one reason for non-acceptance is that their institution never offered it to them (Yassi, Murdzak, Cheang, Tran, & Aoki, 1994)

Factors that increase influenza vaccine acceptance

Self protection. Twenty-three out of the 45 studies stated that the most common reason given for accepting the vaccine was for self-protection or to protect the HCW's families. A survey of HCWs in Italy concluded that acceptance of the influenza vaccine for personal protection was the most common reason for taking influenza vaccine (Ballada et al., 1994). A 2004 study the examined attitudes of HCWs working with high risk spinal cord injury patients also reported self-protection as the most common reason for acceptance of influenza vaccine (LaVela et al., 2004).

Increasing age. Thirteen studies mentioned that increasing age had a positive correlation toward influenza acceptance. In a study conducted in a large U.S. hospital emergency department revealed that for every 10-year incremental increase in age, staff were 1.4 times more likely to receive the vaccination (Piccirillo & Gaeta, 2006). Doebbling et al. 1997 noted that vaccine acceptance was significantly associated with advancing age among nurse clinicians and nonprofessional staff. The authors further went on to discuss whether this was due to the staff becoming aware of the increased risk

from disease or understanding that the vaccine was effective. A study conducted in Brazil reported that older employees had a higher acceptance rate for influenza vaccine. Two of the reasons for this were attributed to the greater professional experience and scientific knowledge of older health professionals (Takayanagi, Cardoso, Costa, Araya, & Machado, 2006).

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

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

Studies conducted on HCWs reveal that having a good understanding of the seriousness of influenza and the benefits of vaccine versus any side effects may increase

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

Having had the vaccine in the past. HCWs who reported having had previous vaccination were more receptive to continuing to receive it on an annual basis (Abramson & Levi, 2008; Halliday, Thomson, Roberts, Bowen, & Mead, 2002; Nafziger & Herwaldt, 1994; Trivalle, Okenge, B., Taillandier, & Falissard, 2006; Watanakunakorn et al., 1993; Yassi et al., 1994) Abramson and Levi, 2008 examined associations between having had the influenza immunization for the last season and revealed positive association with having been immunized in the previous season (rate ratio = 15.47, $p < 0.001$) and with having been immunized anytime in the past (RR = 5.49, $p < 0.001$). However, this last association lost its significance ($p = 0.423$) when limited the

examination to those who had not been immunized in the previous season (Abramson & Levi, 2008). Halliday et. al., 2003 reported that 53% of those HCWs who accepted the influenza vaccine had it the previous year. Both Nafizger and Ort (1994) and Trivalle (2006) noted that physicians with previous history of having received an influenza vaccine were more likely to continue to receive it on an annual basis.

Mandatory vaccination. HCWs who report working in a facility where influenza vaccination is mandated approximately 98% of staff were vaccinated. In addition facilities who offered aggressive vaccine coverage with reminders had a higher rate of vaccination than employers who did not remind HCWs to obtain their vaccination (Harris et al., 2011). In a five-year study conducted at the Virginia Mason Medical Center in Seattle, Washington requiring all employees to obtain an influenza vaccination, an average of 98% vaccination coverage has been maintained. If an accommodation was given for medical or religious reasons and granted the HCW was required to wear a surgical mask while at work during the entire influenza season. This undertaking took a large amount of human and financial resources for this effort. This included over 500 hours of nursing and medical assistant time and approximately $70,000 just in vaccine cost alone (Rakita, Hagar, Crome, & Lammert, 2010).

Measures of knowledge, attitudes, beliefs and acceptance of influenza vaccine

Forty-one studies collected quantitative data by questionnaire surveys of nurses, physicians and/or HCWs. The knowledge, attitude, beliefs and other factors were usually reported using a researcher-developed questionnaire based on knowledge, attitude and practice (KAP) surveys. Most if not all of these studies utilized the instrument once.

Four studies were focused group interviews of nurses only. In general, focus groups are utilized during the formative phase of intervention planning. They consist of a small sample of members from the target population to explore thoughts, feelings, experiences, assumptions, enabling and constraining factors in regard to behavior (Glanz et al., 2002).

Summary

Despite the wide variation of study sizes, dates, different types of health institutions and international populations the studies were surprisingly consistent in their findings. By far the most common barrier to obtaining an annual influenza vaccine by HCWs, especially those in nursing, was the misperception among HCWs that influenza vaccine causes severe side effects and/or influenza disease. In addition, there is lack of understanding by many HCWs that influenza is a serious and life-threatening disease and finally there is lack of knowledge that HCWs can spread the disease even if they are not experiencing any symptoms (Cohen & Casken, 2012). Nurses are considered to have the most resistance to acceptance of influenza vaccine. Although several authors noted that nursing faculty may influence acceptance of vaccine by students nurses and future nurses no published studies were found on nursing faculty beliefs, attitudes, and barriers toward influenza vaccine. Nursing faculty have the potential to change nurses' knowledge and acceptance of influenza vaccine. Given the little information of nursing faculty's attitudes toward influenza vaccine it was decided to develop and pilot an instrument specific to this population.

CHAPTER 3: METHODOLOGY

Purpose

The need for an instrument to measure attitudes, beliefs, knowledge and barriers toward acceptance of influenza vaccine by nursing faculty leads to this study. The purpose of this study is to develop and evaluate the reliability and validity of a researcher developed questionnaire based on the Health Belief Model (HBM) and Theory of Reasoned Action (TRA) theories for predicting health behavior of nursing faculty to assess attitudes, beliefs, knowledge and barriers toward influenza vaccine.

Goals

1. The survey instrument is a construct valid instrument for measuring attitudes, beliefs, knowledge and barriers toward influenza vaccine.
2. The survey instrument is a reliable tool in measuring attitudes, beliefs, knowledge and barriers toward influenza vaccine.
3. The survey instrument items' performance are satisfactory.
4. The survey instrument was able to predict acceptance or non-acceptance by examination of the relationship between participants and their scores.

Population and Sample

This study surveyed a convenience sample of nursing faculty within the State of Hawai'i and schools of nursing in Oregon and California. Initially this population was chosen primarily because the researcher lives in Hawai'i. Inclusion criteria required that each participant be: (1) a registered nurse, (2) either a part-time or full-time nursing faculty in an accredited nursing program, and (3) able to speak and write English.

Exclusion criteria consisted of: (1) anyone who is not a nurse, (2) and is not a nurse educator, and (3) anyone who does not wish to participate. Recruitment started in May 2012. In August 2012 it was evident that there were not enough participants were obtained in Hawai'i to evaluate the tool so the decision was made to open the survey to a convenience sample of schools of nursing on the mainland. Nurse educators from Oregon and California were invited to participate in the study (Appendix C).

A written script was used as recruiting tool, stating purpose of study, risk and benefits to the participant, and the approximate time to answer the survey. Participation was voluntary.

Protection of Human Subjects

Human subjects protection was addressed by obtaining an institutional review board (IRB) approval by the University of Hawai'i Committee on Human Subjects. Approval was obtained prior to data collection (Appendix B). IRB requirements for disclosure, consenting, confidentiality and data storage and aggregation were adhered to. To protect confidentiality no informed consent was asked for. A written script was used as a recruiting tool, stating purpose of study, risk and benefits to the participant, and the approximate time to answer the survey. Consent to participate in the survey was given by participating in an electronic survey (SurveyMonkey®). Instructions to complete the survey were given in writing. Participation was voluntary and participants could choose to not participate at any time (Appendix C). No personal information was used for data collection, research analysis or publication. Data was collected by electronic survey (SurveyMonkey®) and kept anonymous.

Theoretical Construct

This study is based on constructs of two different theories, the Health Belief Model (HBM) and the Theory of Reasoned Action (TRA). The Health Belief model is based on the following constructs: (1) perceived susceptibility, (2) perceived seriousness or severity, (3) perceived benefits, (4) perceived barriers toward influencing a behavior (5) cues to action, and (6) self efficacy (Glanz et al., 2008). The TRA is based on three assumptions 1) the individual's positive or negative evaluation of performing the behavior termed attitude toward belief; 2) the individual's perception of the social pressures to perform/not perform the behavior termed subjective norm; and the beliefs that are perceived to be outside an individual's control termed control beliefs (Fishbein & Ajzen, 2010).

Instrument

The instrument consists of five subscales without identifiers. The first subscale consists of a 31-item questionnaire examining nurse educators' attitudes, beliefs, knowledge and barriers toward influenza vaccine, the second subscale consists of five items from the Niederhauser Searching for Hardships and Obstacles to Shots Survey (SHOTS), the third subscale has three open-ended questions, the fourth subscale consists of six demographic questions, and the fifth subscale consists of five categorical question.

The instrument was initially developed in a survey instrument course conducted by Dr. J. Mobley. Themes were identified from the literature review and a list of items, were developed based on those themes. Wording of the instrument was established at the 7th grade reading level (Flesch-Kincaid, Microsoft ©). Content and face validity were built in by expert consultation with five University of Hawaii Maui College (UHMC)

nursing faculty. The resulting instrument was pilot tested on a convenience sample of 25 nurse educators. The instrument was further revised based on reliability and validity results. After revisions the instrument was further reviewed by two UHMC nursing faculty who read the survey for content, clarity, appropriateness, readability, and conciseness. Further revisions were performed. The finalized instrument consists of 50 items.

Subscale one: Researcher Developed Items

Thirty-one of these items were researcher-developed and elicited information from nurse educators regarding attitudes, beliefs, knowledge, and barriers towards influenza disease and influenza vaccine.

Subscale two: Searching for Hardships and Obstacles to Shots Survey (SHOTS)

The five items in subscale two were from the SHOTS survey questionnaire. Dr. V. Niederhauser's SHOTS survey is a published survey tool used to assess parental barriers toward childhood immunization. This scale consists of 23 items from the Searching for Hardships and Obstacles to Shots Survey (SHOTS) of which five were used in this survey. It has been tested on over 600 participants including Hmong parents for reliability and validity (Niederhauser, 2009). Internal consistency was supported in two studies with a Cronbach's alpha of .93. Temporal reliability support for stability across time was demonstrated with a Pearson's r of .851 (Niederhauser, 2010). Permission was obtained from Dr. Niederhauser for use of the questions from the SHOTS instrument (Appendix D).

Subscale three: Open-Ended Questions

The third subscale of the instrument consists of three open-ended questions (1) if you received an influenza vaccine this year what was the most important reason for doing so? (2) If you did NOT obtain an influenza vaccine this year what was the most important reason for not taking it? (3) If you put that you had a "bad reaction" to the influenza vaccine please describe.

Subscale four: Vaccine Use Scale

Five items seek a categorical answer (Yes/No) regarding history of past influenza vaccine use, and whether the participant would recommend the vaccine to other nurses, student nurses, or patients.

Subscale five: Demographic Questions

The demographic items consist of six items that include questions about gender, age, ethnicity, marital status, education level, and primary teaching areas.

Scoring

A 5-point Likert scale (1- strongly agree, 2- agree, 3- neutral, 4-disagree, and 5 strongly disagree) is used. The scoring format is based on the inference that high scores are reflective of increased resistance to acceptance of influenza vaccine while low scores indicate an acceptance of influenza vaccine and basic knowledge of influenza. Reverse scoring was done on items 8, 13, 14, 16, 22, 24, 27, 31, 32, 34, and 36 to detect position set (Appendix A). The five categorical questions in subscale four are score 0 for no and 1 for yes.

Data Collection

Four hundred and fifty-seven invitations were sent out by email utilizing SurveyMonkey® during May-October 2012 to a convenience sample of nursing faculty from University of Hawai'i, Manoa; University of Hawai'i Maui College; University of Hawai'i, Hilo; Hawai'i Community College, Kauai Community College, Kapiolani Community College, University of the Pacific, Phoenix University in Hawai'i, and Chaminade University in Hawai'i. In August 2012 it was evident that not enough responses were collected to conduct the study. Therefore, the IRB was amended to include faculty from schools of nursing from the mainland in the United States. The amended IRB was approved August 27, 2012. Invitations were sent to a convenience sample of nursing faculty at University of Oregon; Lane Community College; Southwestern Oregon Community College; University of California, Davis; University of California, San Francisco; and San Francisco State University.

Data Analysis

Data was analyzed using the of SPSS for Mac version 20 (Chicago, Ill). Descriptive statistics were used to calculate demographic data including age; marital status; gender; educational level; ethnicity; history of influenza vaccine use; and if the participant would recommend to another nurse, nursing student, or patient.

Reliability

Reliability was initially conducted on subscale one and subscale two. Reliability was calculated utilizing Cronbach's alpha and corrected split-half using the Spearman-Brown prophecy formula to confirm internal consistency. Item-total correlations were calculated between individual items and total scale scores (DeVellis, 2003; Field, 2005;

Munro, 2005; Pallant, 2010). Corrected item total correlations are the correlations between each item and the total score of the scale minus the item. If any of these values are below .30 it may mean that it is measuring something different from the scale. Items below .30 should be considered for deletion especially if it decreases the alpha substantially (Field, 2005; Pallant, 2010).

Validity

Scale validity was assessed by examining three types 1) content validity, 2) construct validity, and 3) criterion-related validity. Content validity was determined by having items reviewed by five expert nurse educators with backgrounds in public health, gerontology, family nurse practice, and health policy from University of Hawai'i Maui College. These nurses also reviewed the scale for relevance and item appropriateness. Construct validity was examined in part by conducting a factor analysis. Factor analysis will assist in doing three things 1) help in understanding the underlying structure of a set of variables, 2) assist in constructing a questionnaire to measure an underlying variable, and 3) help reduce a large dataset to a more manageable size while retaining as much of the original information as possible (Field, 2005; Munro, 2005; Pallant, 2010; Tabachnick & Fidell, 2007). Criterion-related validity was examined by using logistic regression. Logistic regression is useful in predicting an outcome of a group membership from a set of variables (Tabachnick & Fidell, 2007). According to DeVellis (2003) the most important aspect of criterion-related validity not the timing of the prediction but the strength of the empirical relationship between the two variables. Criterion-related validity determines an empirical association between the scale and some other criterion. For this reason criterion-related validity is often referred to as predictive validity

(DeVellis, 2003). For this study three categorical variables were used. Questions 43,44,and 45 asked if the participant take the influenza vaccine in 2011, 2010 and 2009 respectively.

Statistical Analysis -Rationale

Construct validity was tested by factor analysis, a statistical method to analyze relationships among large numbers of variables. Factor analysis is a data reduction technique that takes a large set of variables and reduces them to factors or components (Pallant, 2010). A combination of the test items that are believed to belong together is called a factor. Factor analysis is most commonly used during the development of questionnaires (Field, 2005; Pallant, 2010; Tabachnick & Fidell, 2007). In order to conduct a factor analysis there are two main issues to address. The strength of intercorrelations among the items and the overall sample size (Pallant, 2010; Tabachnick & Fidell, 2007). Three statistical measures were used to determine the strength of intercorrelations, the Kaiser-Meyer-Olkin (KMO); a correlation matrix; and Bartlett's Test of Sphericity. The KMO measure of sampling was conducted to determine if patterns of correlations are compact and factor analysis will yield distinct and reliable factors. Any number above .7 from the KMO analysis is considered adequate and above .8 excellent (Field, 2005; Pallant, 2010). Tabachnick and Fidell (2007) recommend that a factor correlation matrix be examined for pattern loadings over 0.30. If only a few correlations above this level are found conducting a factor analysis may not be appropriate (Pallant, 2010; Tabachnick & Fidell, 2007). Bartlett's Test of Sphericity is conducted to determine whether the correlation matrix is suitable for factor analysis by rejecting the hypothesis of identity matrix indicating that there are some relationships

between variables that measure similar things and that they can be placed in clusters (Field, 2005; Munro, 2005; Pallant, 2010). Factor analysis was performed using principal component analysis with oblique (direct oblimin) and then repeated with varimax rotation. If components were strongly correlated there may be discrepancies between the two approaches and it is recommended in that case to report the oblimin rotation (Pallant, 2010). The number of components was initially determined by utilizing Kaiser's criterion or eigenvalues of greater than one. Eigenvalues of a factor represents how much variance that factor explains (Pallant, 2010; Tabachnick & Fidell, 2007). The scree plot, which is the plotting of eigenvalues, was also analyzed. Analysis consists of inspecting the plot to find the point of the curve that changes direction and becomes horizontal "scree" (Field, 2005; Munro, 2005; Pallant, 2010; Tabachnick & Fidell, 2007). One of the problems with using a Scree plot is that each researcher may have a different interpretation of what constitutes the "bend" and what constitutes the "scree" (Pallant, 2010; Tabachnick & Fidell, 2007). Finally, parallel analysis was conducted. Parallel analysis compares the size of the eigenvalues with eigenvalues from a randomly generated dataset of the same size. Only those eigenvalues that exceed the corresponding values from the random set were kept for analysis (Pallant, 2010). This approach has often been recommended as the best method to assess the true number of factors (Garson, 2013).

The other main issue in determining whether to conduct a factor analysis is sample size. This is because factors from small samples tend not to generalize as well as those from larger sets. Tabachnick and Fidell suggest that a minimum of 300 cases is needed to conduct a factor analysis although other authors suggest a sample size of 150

may be adequate. Other experts have argued that it is not sample size but ratio of participants to items. Although some authors recommend 1:10 others suggest that 1:5 is adequate (Field, 2005; Garson, 2013; Pallant, 2010; Tabachnick & Fidell, 2007). There were a total of 36 items, 31 from subscale one and five items from subscale two (SHOTS) in the factor analysis (5x36=180), making 191 participants an adequate sample size. After conducting a factor analysis, reliability was performed on the subsequent components to determine internal consistency of the factors extracted (Tabachnick & Fidell, 2007).

Logistic Regression

To assess criterion validity logistic regression was used. Logistic regression is multiple regression except that the outcome variable is categorical rather than continuous (Field, 2005; Tabachnick & Fidell, 2007). In this case the dependent or predictor variables included whether or not the participant had the influenza vaccine in 2009, 2010, and 2011. Logistic regression may be used to estimate how accurate the tool is in making predictions and identifying factors that have a relationship in those who choose to take the vaccine or not (Field, 2005; Pallant, 2010; Tabachnick & Fidell, 2007).

Summary

This study provided evidence of good reliability and validity of the survey instrument designed to elicit attitudes, knowledge, and behavior of nurse educators in regards towards acceptance of influenza vaccine. This study conducted internal consistency measures of Cronbach's alpha coefficients and Spearman Brown split half reliability measures to confirm reliability. Factor analysis provided evidence of construct

validity from a sample size of 191 participants. Logistic regression provided evidence of criterion-related validity.

CHAPTER 4: RESULTS

Participant Characteristics

Four hundred and fifty-seven questionnaires were distributed electronically to nursing faculty teaching at the University of Hawai‘i, Mānoa; University of Hawai‘i, Maui College; University of Hawai‘i, Hilo; Hawai‘i Community College, Kauai Community College, Kapiolani Community College, University of the Pacific, Phoenix University in Hawai‘i, Chaminade University in Hawai‘i, University of Oregon, Lane Community College, Southwestern Oregon Community College, University of California, Davis, University of California, San Francisco and San Francisco State University. Two-hundred-and-one participants returned the survey for a 44% return rate (201/457 = .439). The convenience sample consisted of 18 (9.4%) males and 173 (90.6%) females. Ages ranged from 30 to greater than 60 years. The majority of respondents were Caucasian, female, had a master's degree and were older than 50 years and had taken the influenza vaccine in the past three years and planned to do so for the 2012-2013 influenza season. (Appendix E Tables E.1 E.2, AND E.3).

TABLE 4.1 PARTICIPANT CHARACTERISTICS

Characteristics		N	Percentage
Gender	Male	18	9.4%
	Female	173	90.6%
Age	18-29	0	0
	30-39	12	6.3%
	40-49	33	17.3%
	50-59	89	46.6%
	> 60	57	29.8%

Characteristics		N	Percentage
Marital Status	Single	33	17.3%
	Married	130	68.1%
	Separated	1	0.5%
	Divorced	19	9.9%
	Widowed	8	4.2%
	Other	4	2.1%
Highest Degree	BS/BSN	14	7.4%
	MS/MSN	121	63.7%
	PhD/DrPH	40	21.1%
	DrNP/DNP	10	5.3%
	Ed.D/D.Ed	5	2.6%
Area primarily teaches in	Fundamentals	24	12.6%
	Adult Health	52	27.4%
	Geriatrics	6	3.2%
	Pediatrics	11	5.8%
	OB/GYN	23	12.1%
	Public Health	13	6.8%
	Psych/Mental Health	13	6.8%
	Other	44	23.2%
Ethnicity	African-American	2	1.1%
	Chinese	5	2.7%
	Filipino	8	4.3%
	Japanese	8	4.3%
	Hawaiian	2	1.1%
	Hispanic/Latino/Chicano	3	1.6%
	Other Asian	1	0.5%
	Pacific Islander	3	1.6%
	White (non-hispanic)	142	76.3%
	Other	12	6.5%

Initial Item Reduction Procedures

Prior to analysis all data were examined through various SPSS procedures for accuracy of data entry, missing values and fit between their distributions and the assumptions analysis. The variables were examined separately for the 201 nurse educators that responded to the survey. The data were screened for missing data both visually and using SPSS missing values analysis (MVA). Ten surveys were not completed and were deleted from further analysis. The remaining 191 surveys were examined using SPSS missing value analysis. The results were chi-square = 28.406, DF = 36 and was significant at (p=.812) meaning that missing values were random. There were no variables with 5% or more missing values. Items 47 and 48 were missing 2.1% of data and were handled by replacing their mean with SPSS (Tabachnick & Fidell, 2007).

Univariate outliers were screened by examining histograms for normalcy and transforming the variables into z-scores. According to Tabachnick and Fidell (2007) any z-score greater than 3.29 should be considered an outlier. Outliers can cause problems in an analysis if not dealt with. Univariate outliers were identified on items 6, 7, 8, 10, 12, 22, 24, and 32 and were handled by changing the raw score by one unit larger, this reduces the impact the outlier will have on an analysis without having to delete the case (Tabachnick & Fidell, 2007). The minimum sample size for factor analysis was satisfied with a final sample size of 191, at 6.5 cases per item which exceeds the minimum criterion of 5 cases per item (DeVellis, 2003; Field, 2005).

Reliability

The initial 31-item scale plus the five items from SHOTS were examined for internal reliability by calculating Cronbach's alpha = 0.94 and Spearman-Brown split-half coefficient = 0.93 which indicated good internal consistency for the scale (Appendix E Table 2). The total-scale statistics indicated item means of 3.98, a variance of 1.065, inter-item covariances of .313, and inter-item correlations of .289 for the 36 items. The corrected item-scale correlations were examined for values below significance. The corrected item-scale correlation refers to how each item correlates to the total score minus the item. The uncorrected item-scale correlation includes the item being studied. This is not recommended as this may inflate the correlation coefficient. It is better to use the corrected item-scale correlation (Pallant, 2010). Any item with a value below significance should be considered for deletion (Field, 2005; Pallant, 2010). The corrected item-scale correlations for the 36-item scale ranged from (.135-.841). Items 3, 5, 6, 7, 13, 15, 20, 26 and 33 were less than .30 indicating they were measuring something different from the scale (Field, 2005; Pallant, 2010; Tabachnick & Fidell, 2007). They were subsequently removed from further analysis (Appendix E Table E.3 and E.4).

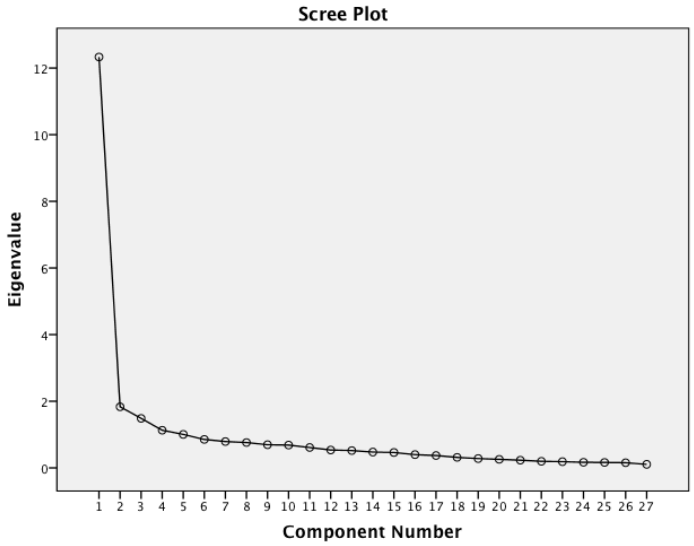
Construct Validity

Validity: Principal Components Analysis. Exploration was done with the resulting 27-item scale with principal components analysis (PCA) using both varimax and oblique rotations. The goal of conducting a PCA is to extract maximum variance from the data of each component and have them transformed into a smaller set of linear combinations (Field, 2005; Pallant, 2010; Tabachnick & Fidell, 2007). The correlation matrix should be analyzed for several sizable correlations exceeding r = .30. This

indicates the strength of the intercorrelations. If there are not any correlations exceeding r =.30 then the use factor analysis or principle components analysis should not be considered (Pallant, 2010; Tabachnick & Fidell, 2007). The correlation matrix revealed that at least some of the correlations were r =.3 or greater. The communalities for all items ranged from (.47-.81), indicating that most items had a common variance with the other items. The Kaiser-Meyer-Olkin measure of sampling adequacy was .922 indicating pattern of correlations were small and compact and would result in factors that were correlated (Field, 2005; Tabachnick & Fidell, 2007). Bartlett's test of sphericity was significant at (p =.05) indicating that there are reliable relationships between variables (Field, 2005; Munro, 2005; Pallant, 2010; Tabachnick & Fidell, 2007).

Principal components analysis revealed, five components with eigenvalues exceeding one (Appendix E. Table E.4). According to Field (2005) eigenvalues represent the amount of variation by factors and those with eigenvalues above one should be retained and examined. The Scree plot revealed 2-3 factors at the bend. Parallel analysis utilizing Watkins statistical program showed only two components with eigenvalues exceeding or equal to the corresponding criterion values for a randomly generated data matrix of the same size (27 variables x 191 participants) (Appendix E Table E.5).

FIGURE 4.1 SCREE PLOT



An exploration of solutions with five components using both orthogonal (varimax) and oblique (direct oblique) revealed no major differences in values and the oblique rotation was chosen for the final solution and ease of reporting. In the initial solution of five components, component #4 and #5 loaded negative variables indicating difficulties with the solution (Tabachnick & Fidell, 2007). Exploration was then conducted by examining forced extraction of two, three, and four components at factor loading of .40. According to Tabachinick & Fidell (2007) choice of cutoff for size of variable is matter of researcher preference, although they recommend anything above .32, and characterizing a component is as much art as science. A 3-component solution appeared to be the solution and reflected underlying theory from both the HBM and TRA theories. Item 19 loaded on component #1 and #3 and was subsequently removed from analysis leaving a 26-item scale.

The final solution consisted of three components that assisted in explaining the underlying theory. The three components explained 58% of the variance. Component 1's eigenvalue was 11.9 and explained 46% of the variance items 2 and 3 were 1.8 and 1.5 respectively and explained 6.8% and 5.8% of variance respectively. The three subscales

were named (1) “Attitudes, and Control Beliefs Towards Influenza Vaccine” (ATTIV) and included items 36, 31,14, 24, 4, 27, 34, 2, 21,16, 28, 9, 32, 25, 17, and 30; (2) “Beliefs and Knowledge Towards Influenza Disease” (BELIEFID) and included items 8, 12, and 22; and (3) “Barriers and Fears Towards Influenza Vaccine ”(BARRIERIV) and included 35, 23, 29, 1, 10, and 11. The pattern loading matrix, structure matrix, and communalities for this solution are presented in Table 4.2.

TABLE 4.2: FACTOR LOADINGS AND COMMUNALITIES BASED ON PCA WITH DIRECT OBLIMIN ROTATION OF 27-ITEM (N=191)

Item number	Item	Pattern			Structure			Communalities
		1	2	3	1	2	3	
36	I would get it if my worksite offered it	**.836**			.781			.621
31	Nursing programs should mandate that all student nurses get an annual influenza vaccine	**.822**			.828			.689
14	I plan to get the influenza vaccine for the 2012-2013 influenza season	**.795**			.877			.790
24	It is important for nurses to get an annual influenza vaccine	**.777**			.880			.813

Item number	Item	Pattern			Structure			Communalities
		1	2	3	1	2	3	
4	Hospitals and other healthcare institutions should NOT require that all employees get an annual influenza vaccine	**.772**			.803			.652
27	I would get it if it was free	**.770**			.728			.539
34	Getting an annual influenza vaccine provides personal protection against influenza	**.714**			.804			.716
2	Getting an influenza shot is a personal decision made by the individual nurse	**.702**			.590			.382
21	I do not believe in getting influenza vaccine	**.661**			.818			.750
16	Getting an annual influenza vaccine prevents the spread of influenza from me to my patients and other healthcare workers	**.658**			.741			.386
28	I never get flu so I do not need an annual vaccine	**.644**			.743			.581
9	I do not think the vaccine works to prevent getting	**.593**			.737			.616

Item number	Item	Pattern			Structure			Communalities
		1	2	3	1	2	3	
	the flu							
32	It is important for the elderly to get an annual influenza vaccine	**.569**			.651			.464
25	My family does NOT believe that the flu vaccine works	**.563**			.668			.526
17	I choose to use alternative health care (like homeopathy)	**.503**			.613			.458
30	It is NOT important for children 5 and younger to get an annual influenza vaccination	**.438**			.582			.403
8	Influenza is a serious disease		**.848**			.872		.778
12	I do NOT think influenza is a serious disease		**.783**			.848		.756
22	Flu causes many deaths every year		**.576**			.624		.413
35	I have had a bad reaction when I have got the vaccine			**.707**			.484	.633
23	The influenza vaccine makes me sick			**.684**			.530	.653
29	I'm scared of the side effects of the influenza vaccine			**.641**			.543	.623
1	The influenza shot hurts too much			**.601**			.532	.359

Item number	Item	Pattern			Structure			Communalities
		1	2	3	1	2	3	
10	My healthcare provider told me not to get the vaccine			**.571**			.549	.362
11	I think influenza vaccine makes the body weak			**.516**			.548	.514
18	I worry about how safe the influenza vaccine is			**.494**			.583	.591

Reliability was calculated on the revised 26-item scale using Cronbach's alpha and Spearman-Brown split half coefficient measure on the whole scale and the three subscales. Cronbach's alpha for the 26-item scale was .95 and Spearman-Brown split-half coefficient was .95 indicating good reliability of the revised scale. Inter-item correlations on the 26-item scale ranged from r =.31-.88. Component 1 had 16 items and Cronbach's alpha of .93 with a split-half coefficient of .93. For Components 2 and 3 Cronbach's alpha were .73, and .83 respectively. Spearman-Brown split-half coefficients were .76, .81 respectively. These indicate acceptable reliability for a new scale (Munro, 2005).

For the 26-item scale, item performance was satisfactory. A summary of internal consistency measure and total scale statistics are in Table 4.3 and 4.4.

TABLE 4.3 SUMMARY RELIABILITY STATISTICS FOR THE 3 26-ITEM SUBSCALES (N=191)

Subscales	No. of items	Cronbach's Alpha	Spearman-Brown

			split-half Coefficient
Component 1	16	.95	.93
Component 2	3	.73	.76
Component 3	7	.83	.81
Total Scale	26	.95	.95

TABLE 4.4 SUMMARY OF TOTAL SCALE STATISTICS

	Mean	Min	Max	Range	Max/ Min	Variance	N of items
Item Means	3.97	2.6	4.6	1.9	1.8	.169	26
Item variances	1.1	.466	2.1	1.6	4.4	.226	26
Inter-item Covariances	.460	.033	1.5	1.4	44.1	.064	26
Inter-item Correlations	.417	.035	.807	.7772	22.9	.029	26

Criterion-related validity: Logistic Regression.

Direct logistic regression was performed to assess the impact of the scale and the three subscales on being able to estimate the likelihood that respondents would report that they had taken the influenza vaccine for the years 2011, 2010 and 2009. Analysis was performed using SPSS Binary Logistic (Pallant, 2010; Tabachnick & Fidell, 2007). The model contained three independent subscales "Attitudes and Control Beliefs Towards Influenza Vaccine" (ATTIV), "Beliefs and Attitudes Towards Influenza Disease" (BELIEFID), and "Barriers and Fears Towards Influenza Vaccine "(BARRIERIV). The full model containing all the predictors were statistically significant, chi-squared x^2 was (3, N = 191) = 134.409 and was significant at $p < .05$ indicating that the subscales were able to distinguish between respondents who took the influenza vaccine or not for 2011. The model as a whole explained between 48.8% (Cox & Snell R square) and 69.9% (Nagelkerke R Square) of the variance of influenza acceptance, and was able to correctly identify 91.6% of cases.

According to Pallant (2010) the sensitivity of the model is the percentage of participants who took the vaccine and specificity is the percentage of the respondents that did not. The positive predictive value is calculated by dividing the number of cases in the predicted yes, observed yes cell (132) by the total number in the predicted yes cells (12+132 = 144) and multiply by 100 (132/144x100= 91.6%) (Pallant, 2010). The negative predictive value is calculated by dividing the number of cases in the predicted no, observed no cell (43) and divide by the number in predicted no cells (43+4=47) and multiply by 100 (43/47x100= 91.5%). The model predicted 91.6% of individuals who refused to take influenza vaccine and identified 91.5% of individuals who did in 2011.

Preliminary results indicate that only one of the three independent variables made a statistically significant contribution to the model. "Attitudes and Control Beliefs toward influenza vaccine" with an odds ratio of 1.26 (CI 1.09-1.17) indicates that respondents who did not take influenza vaccine were 1.26 times more likely to have a higher score on the survey, controlling for the other two factors of the model. The variables in the equation, the B value of .163, indicate that there is a positive correlation between scores of the scale and individuals that refuse to take the vaccine. This model did better at estimating the results than the default model generated by SPSS.

In conducting an analysis for the years 2010 and 2009 the results were similar. The predictors were statistically significant at chi-squared x^2 were (3, N=191) 106.566 (2010) and 90.999 (2009) respectively. Both were significant at $p < .05$. This explained between 37.9% and 42.8% (Cox & Snell R square) and 55% and 63.2 (Nagelkerke R Square) respectively of the variance in influenza acceptance. The model was able to correctly identify 89% in 2009 and 92% in 2010 who accepted the vaccine and to correctly identify 83% in 2009 and 86% in 2010 of those who did not take the vaccine. For both years "Attitudes and Control Beliefs toward influenza vaccine" was significant p =.05 in predicting who accepted the vaccine. This model was able to discriminate who chose to receive or not receive the vaccine in 2010 and 2009 (Appendix E Tables E.8 and E.9). Table 4.5 summarizes the results for acceptance of vaccine for the year 2011.

TABLE 4.5 LOGISTIC REGRESSION PREDICTING LIKELIHOOD OF ACCEPTANCE OF INFLUENZA VACCINE BY PARTICIPANTS IN 2011

Variables in the Equation								
Step 1a	B	SE	Wald	df	Sig	Exp (B)	95% CI for Exp (B)	
							Lower	Upper

ATTIV	.234	.041	32.734	1	.000	1.263	1.166	1.369
KNOWID	-.128	.164	.608	1	.436	.880	.639	1.213
FEARIV	.055	.079	.480	1	.488	1.056	.905	1.233
Constant	-12.09	2.62	21.23	1	.000	.000		

Overview of Items 37, 38, and 39

For item 37 "If you got an influenza vaccine this year what was the most important reason for doing so?" Comments reflected that for participants who accepted the influenza vaccine, the primary reason was to prevent and protect against influenza disease. The second most common reason for acceptance was having an underlying condition such as asthma. The third most common reason was having had influenza in the past. Several individuals mentioned that it was mandated and if they did not get it they were expected to wear a mask throughout flu season. One individual who took the vaccine wrote "though I think getting a vaccine is important for health care provider to prevent the spread of disease, it is a personal choice and should not be mandated."

For item 38 " If you did **NOT** obtain an influenza vaccine this year what was the most important reason for not getting it?" The primary reason for non-acceptance was to concern or prior experience with side effects. One participant chose not to take it because she worked on a Neuro unit, "I have seen a lot of Guillain-Barre patients who recently received the flu shot and have had flu like symptoms prior to (sic). The Neuro Intensivists I work with also did not receive the flu vaccine." Although there have been many reports

of minor influenza-like-illness associated with the vaccine, only in 1976 was there a small but significant rise in Guillain-Barre Syndrome and no rise associated with influenza vaccine since then (Atkinson et al., 2011). Another participant wrote, " do not want the negative side effects. Only protects against three strains of flu, there are many more than that. If the flu vaccine protected against all strains the benefits would outweigh the risks (mainly side effects)." Eight individuals believed that their own immune system was enough. For example one individual stated, "I have rarely gotten influenza in the past and believe some natural immunity is better than the vaccine." Another stated, "Primarily, I'm not around many people and I have other health conditions that cause me to choose how much to put in my body to challenge it's (sic) healing ability and to maintain my health." Four stated they did not believe in the vaccine. Other comments from this section included, "working in academia, rather than a clinical setting; little exposure to those who are ill." "I'm not involved in patient care. In fact, I am not a clinician," and finally, "I do not practice and therefore do not have exposure to patients. Therefore my risk is not the same as that of a practicing nurse." These last three comments seem to reflect disconnect between nurse educators and the influence they have on future generations of nurses.

Finally, for item 39 "If you put that you have had a 'bad reaction" to influenza vaccine please describe." The most common reaction was influenza-like-symptoms including, fever, fatigue, and chills. Several mentioned that they had to miss work due to vaccine reactions. Two participants incorrectly stated when the vaccine was initially introduced. One put down, "in the late 1970's when the vaccine was introduced." The other participant stated, "The first year the influenza vaccine was available (I believe it

was the early 1980's)." What is of concern regarding those two comments made by nurse educators is that trivalent inactivated influenza vaccine (TIV) was introduced in the 1940s and has been manufactured the same way since (Atkinson et al., 2011).

These comments should be examined and developed into for further revisions of the nurse educator 26-item scale. Concepts that should be examined closely include personal choice, misconceptions regarding influenza vaccine, and their role as nurse educators in modeling behavior for a new generation of nurses.

Summary

After conducting factor analysis on the original 36-item scale, a 26-item scale was derived from principle components analysis. The 26-item scale and the 3 subscales were tested for internal reliability by calculating Cronbach's Alpha and Spearman-Brown coefficient. Initial testing for reliability and validity indicated that the survey instrument was reliable and valid for examining reasons that nurse educators may give for taking or not taking an annual influenza vaccine.

Criterion validity was analyzed by conducting logistic regression on the 3 subscales. The model predicted 91.6% of individuals who refused to take influenza vaccine and identified 91.5% of individuals who did in 2011 and was able to correctly identify 89% in 2009 and 92% in 2010 who accepted the vaccine and to identify 83% in 2009 and 86% in 2010 of those who did not take the vaccine. This model did better at estimating the results than the default model generated by SPSS.

Comments indicate that the most common reason for accepting the vaccine was to protect and prevent influenza in themselves, family and/or patients. Reasons for not accepting the influenza vaccine were (1) concerns about side effects, (2) reliance on own

immune system, (3) didn't believe the vaccine worked. The most common adverse reaction to an influenza vaccination was having an influenza-like-illness including fatigue, fever and malaise and in some cases resulting in lost days of work.

CHAPTER 5: DISCUSSION

The purpose of this study was to develop and conduct a psychometric analysis of a scale to quantify nurse educators' attitudes, beliefs, knowledge and barriers toward influenza vaccine. The scale was researcher-developed and based on the Health Belief Model (HBM) and the Theory of Reasoned Action (TRA). The items for the scale were developed from themes revealed in the literature review, the SHOTS survey, comments from a piloted survey conducted in 2010, and content reviewed by five nurse educators from University of Hawai'i Maui College.

Goal One Construct Validity

Comparison of the Three Subscales with Underlying Theory

Goal one stated that the survey instrument was a construct valid instrument for measuring attitudes, beliefs, knowledge and barriers toward influenza vaccine. Exploratory principal component analysis utilizing oblique (direct oblimin) yielded three components. All components indicate that elements from the theoretical concepts of the HBM and TRA models were reflected in the final 26-item scale.

Component one was named " Attitudes and Control Beliefs Towards Influenza Vaccine," and consisted of 16 items. Items 36, 27, 14, and 4 reflect behavioral control (TRA) and/or cues to action (HBM) indicating what it would take for the participant to receive the vaccine. For example item 36 states, "I would get it if my worksite offered it." This could be interpreted at cues to action from the HBM or control of beliefs from form the TRA. What is surprising is that these items had factor loadings that indicated they had more influence than items 2, 9,16, 17, 21, 24, 28, 30, 32, and 34 which appear to reflect attitudes and beliefs towards influenza vaccine. This could offer insight into

interventions that would assist in meeting the 2020 Healthy People goal of having 90% of HCWs receive an annual influenza vaccine. Items 2, 9,16, 17, 21, 24, 28, 30, 32, and 34 appear to reflect attitudes or beliefs toward influenza vaccine. For example item 2 states, "Getting an influenza shot is a personal decision made by the individual nurse," may reflect attitudes and influence beliefs. This could be interpreted from both the TRA and HBM model. It is a value held by the participants who value personal choice and that attitude may influence their beliefs. Finally, item 25 states, "My family does NOT believe that the vaccine works," indicates subjective norm or what others think of the vaccine (TRA). According to the TRA model, subjective norm or peer pressure may influence one's attitude or belief toward an activity (Ajzen & Fishbein, 1980).

Component two was named "Knowledge or Beliefs Towards Influenza Disease," and consisted of 3 items 8, 12 and 22. These items reflect believes or knowledge regarding influenza disease. For example item 8 states, "Influenza is a serious disease," this reflects knowledge that the disease is serious. The commonality of all three questions is that they ask about the disease itself and not the vaccine. This could be reflected as perceived threat from the HBM (Glanz et al., 2008).

Component three was named " Perceived Barriers Towards Influenza Vaccine" and consisted of items 1, 23, 29, 10 and 35 that depict barriers and fears regarding influenza vaccine. Item 35 states, "I have had a bad reaction when I have got the vaccine," and item 23 states, "The influenza vaccine make me sick." These comments reflect fears and barriers toward the influenza vaccine. The items that loaded the highest in this component reflect "perceived threat" or "attitude toward belief and are elements from both the HBM model and the TRA model. Item 10 "My healthcare provider told

me NOT to get the vaccine," could be considered a subjective norm an element from the TRA model because for most patients healthcare providers' recommendations are usually followed.

Goals Two and Three

Goal two stated that the survey instrument is a reliable tool in measuring attitudes, beliefs, knowledge and barriers towards influenza vaccine. The final instrument had a calculated Cronbach's alpha of .949 and Spearman-Brown split-half coefficient of .952 indicating good internal reliability. Component 1 had 16 items and Cronbach's alpha of .93 with a split-half coefficient of .93. For Components 2, and 3 Cronbach's alpha were .73, and .83 respectively. Spearman-Brown split-half coefficients were .76, .81 respectively. These are sufficient for a new scale (Munro, 2005).

Goal three stated that the scale would have satisfactory item performance. Inter-item correlations ranged from (.31-.88) indicating good correlation between the items. Internal consistency measures and total scale statistics indicated that the item performance was satisfactory.

Goal Four

Goal Four stated that the 26-item instrument was able to predict acceptance or non-acceptance by examination of the relationship between participants and their scores. The model predicted 92% of individuals who refused to take influenza vaccine and identified 92% of individuals who did in 2011. In conducting an analysis for the years of 2010 and 2009 the results were similar. The model was able to correctly identify 89% in 2009 and 92% in 2010 who accepted the influenza vaccine and to correctly identified 83% in 2009 and 86% in 2010 of those who did not take the vaccine. For all three years

"attitudes and beliefs toward influenza vaccine" was significant p =.05 in predicting who accepted the vaccine. This model did better at estimating the results than the model generated by SPSS.

The resulting 26-item scale provides a foundation for understanding the beliefs, knowledge, attitudes and barriers toward influenza vaccine by nurse educators. It was surprising that perceptions of the participant's ability to obtain the vaccine had the highest factor loading. This could lead to developing interventions in order to achieve the 2020 Healthy People goal of 90% of HCWs obtaining an annual influenza vaccination (2020, 2010).

Themes Identified from items 37, 38, and 39

The three opened-ended questions were reviewed for themes and patterns in regards to acceptance and non-acceptance of vaccine.

Item 37 asked, "If you got an influenza vaccine this year what was the most important reason for doing so?" For those who took the vaccine the biggest single reason was to protect or prevent them, their family and their patients from getting influenza. The second most common reason was for those who had underlying disease (i.e. asthma, diabetes, etc.) (Appendix F Table 1).

Themes identified from those who took the vaccine include:

- Protect or prevent from getting influenza
- Protect patients
- Had an underlying medical condition
- Mandated to by employer
- Had previous history of disease

Item 38 asked " If you did **NOT** obtain an influenza vaccine this year what was the most important reason for not getting it?" For those who reported not taking the influenza vaccine out of 52 comments 17 were concerned about side effects. One individual reported, "Due to the past two times of receiving the vaccine caused me to be in bed for two weeks." Another individual stated, "I believe that taking a flu shot puts you at a disadvantage by making you unable to ward of disease. If you are healthy and without disease it may a disadvantage to compromise your immune system instead of letting your body build natural immunity." Another person wrote, "I do not truly trust the government and the potential uses of the vaccine." Someone else put, "I believe that vaccines can be dangerous. It is much better to live right, eat healthy non GMO, organic foods and exercise." While some of the comments reflect common sense such as "eat healthy" and "exercise," many reflect non-evidence based practice bordering on conspiracy such as, "I truly do not trust the government," (Appendix F Table 2).

Themes identified in those who chose not to take the vaccine include:

- Belief that own immune system is better, this could be interpreted as lack of knowledge how influenza disease is spread
- Fear of side effects
- Did not think they were in a high risk group
- Do not believe the vaccine works
- Lack of knowledge of influenza vaccine
- Lack of concept of role modeling for future generations of nurses
- Fear of the government in vaccine development
- Belief that the vaccine may not work

- Not enough time or just forgot
- Personal choice
- Allergies

Finally for item 39 "If you put that you have had a 'bad reaction" to influenza vaccine please describe." The most common reaction was influenza-like-symptoms including sore arm, fever, fatigue, and chills. Several mentioned that they had to miss work due to vaccine reaction. One individual wrote, "Fever, bad cold within days of getting flu shot. Prior to that it was years between colds. This has happened to me twice and each time was told I was ""crazy"". I had the flu when H1N1 came out, survived it, and felt fine in 5 days. I do not preach these views but keep them to myself. It is my business. Being a health care worker does not mean you have to subscribe to blindly to big Pharma propaganda." An other person stated, "I have never had a reaction. But a friend had GB syndrome following the flu vaccine." One individual put down, " The only reaction I experienced was in the late 1970's when the vaccine was introduced. Within 24 hours of the immunization, I developed a fever of over 100 F, chills sweats, myalgia and fatigue. It lasted about a week." Another individual wrote, " The first year the influenza vaccine was available (I believe in the early 2980's), I had a terrible illness (aches, fever, chills, nausea, vomiting) within the week of receiving the vaccine. Since then, no reactions and I've taken the flu vaccine every year since then." (Appendix F Table 3).

Themes identified for having a bad reaction:

- Influenza-like-illness (fever, chills and fatigue)

- Friends or family having had a bad reaction including Guillain-Barre Syndrome
- Sore arm

Other themes identified included:

- Knowledge regarding influenza vaccine including when it was introduced
- Lack of awareness of role-modeling as a nursing instructor

These themes were consistent with the literature review. These themes should be examined and developed into for further revisions of the nurse educator 26-item scale. Concepts that should be examined closely include personal choice, misconceptions regarding influenza vaccine, and their role as nurse educators in modeling behavior for a new generation of nurses.

Limitations

There are several limitations to this study. First the convenience sampling is a methodological limitation in this study. The study sample consisted of nurse educators willing to respond to the electronic survey resulting in possible bias towards those that were willing to participate, thereby limiting generalizability. The results were based on a sample that barely met the minimal qualifications.

The second limitation is that a test-retest was not conducted for temporal stability. Part of the reason is that by the time a second retest could have been conducted in November, the Centers for Disease Control announced that the worst flu season in ten years. This could have changed the temporal stability as more nurse educators may choose to take the vaccine than otherwise would have.

The third limitation was a limited geographical area from three states located in the western United States. Additional research is needed in other geographical areas in the United States and internationally. The literature review was international in scope and indicated that HCWs and nurses were resistant to influenza vaccine worldwide. It would be interesting to conduct an international survey on nurse educators from different parts of the globe.

The fourth limitation is that on July 1, 2012 the Joint Commission made it a "requirement that all Joint Commission accredited health care organizations establish an annual influenza vaccination program for licensed independent practitioners and staff" (Zhani, 2013). The Joint Commission is an independent, non-profit organization that accredits and certifies over 18,000 health care organizations (Stewart, Cox, & O'Connor, 2011). This may have influenced respondents' participation in the survey.

Significance to Nursing

Since nurses are responsible for administering the most vaccinations it is critical that they have a better understanding of the importance of vaccinations in disease management. It is not enough that hospitals and other healthcare institutions mandate use of influenza vaccine. Nurse educators, nurses and other HCWs must be able to utilize evidence in order to assist clients to make an informed consent.

Questions to consider include:

- How are healthcare institutions providing vaccine to nurses?
- Are healthcare institutions providing adequate education to their staff?

Nurse educators not only role model for student nurses but they may also role model for nursing staff that work with their students. Therefore, a close examination of

how vaccine education is currently presented in the nursing curriculum is recommended. Questions to consider are:

- How is vaccine education being presented in textbooks, the media and other sources of information?
- What current evidence exists regarding safety and efficacy and how do we disseminate it to nurses?
- How can nurse educators become more aware of the influence they have with nursing student, peers and their patients?
- What does personal choice mean in the context of being a nurse educator and role model?

Role modeling can take on several different aspects. For example:

- Nurse educators who participate in school vaccination programs emphasize to their students the importance of how vaccines prevent illnesses.
- Have student nurses participate in elder care vaccination programs.
- Have student nurses research past and present vaccine-preventable diseases including the history of the influenza vaccine.
- Have flu shot clinics in classrooms and have student nurses educate, obtain an informed consent, and administer vaccinations to other students.

These are all important considerations in developing, presenting and expanding vaccine concepts in the nursing curriculum.

Future Research

Testing of the revised instrument with different populations of nurse educators in different geographical locations would be the next step in research. This would test for external validity and allow for the results to be generalizable.

The instrument could be revised for other HCWs including nurses and student nurses will further assist in validation of the instrument. The literature review was international in scope and the instrument may be translated and used with nurse educators from different countries and regions around the world.

Examining nursing textbooks to understand how vaccinations, especially adult vaccinations, are presented in relationship to infectious diseases.

Summary

The final 26-item scale demonstrated good reliability and validity for the total scale and subscales. The instrument was able to discriminate between those who accepted the vaccine and those who did not. The findings from this study support the initial psychometric properties of the 26-item survey as a valid and reliable measure of nurse educators' attitudes, beliefs, knowledge and barriers towards influenza vaccine.

After additional reliability and validity evidence is generated the instrument may be used to examine, for potential interventions, in increasing acceptance of influenza vaccine by nurses and other HCWs. The knowledge gained from this survey can be utilized to increase nurse educators' knowledge, increase accuracy in nursing textbooks and increase future generations of nurses' knowledge of and the importance of influenza vaccine in reducing and preventing disease in themselves, their family and most importantly their patient population.

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APPENDIX A

Survey Regarding Nurse Educators' Knowledge, Attitudes, and Barriers Toward Influenza Vaccine. Below is a list of reasons of why nurses may or may not get an annual influenza vaccine or things that make it hard to get a yearly influenza vaccination. On a scale of 1 to 5, with 1 being "Strongly agree," 2 being " agree," 3 being "neutral," 4 being "disagree," and 5 being "strongly disagree." Please CHECK the box the closet reflects your answers. NOTE: In this survey "clinic" refers to the place you received your vaccine.

		1 Strongly Agree	2 Agree	3 Neutral	4 Disagree	5 Strongly Disagree
1	The influenza shot hurts too much					
2*	Getting an influenza shot is a personal decision made by the individual nurse					
3 **	The clinic/facility was NOT open at a time I could go					
4	Hospitals and other healthcare institutions should NOT require that all employees get an annual influenza vaccine					
5**	I could NOT get the time off from work					
6	My religion forbids it					
7	Where I work discourages getting an annual influenza vaccine					
8*	Influenza is a serious disease					
9	I do not think the vaccine works to prevent getting flu					
10**	My healthcare provider to me NOT to get the vaccine					

* Reverse score items
** Dr. V. Neiderhauser SHOTS survey

		1 Strongly Agree	2 Agree	3 Neutral	4 Disagree	5 Strongly Disagree
11	I think influenza vaccine makes the body weak					
12	I do NOT think influenza is a serious disease					
13*	Getting an annual influenza vaccine decreases nurses' sick leave					
14*	I plan to get the influenza vaccine for the 2012-2013 influenza season					
15	My insurance does not pay for influenza vaccine					
16*	Getting an annual influenza vaccine prevents the spread of influenza from me to my patients and other healthcare workers					
17	I choose to use alternative health care (like homeopathy)					
18	I worry about how safe influenza vaccine is					
19**	I worry what is in the vaccine					
20**	I just forgot					
21	I do not believe in getting influenza vaccine					
22*	Flu causes many deaths every year					

* Reverse score items
** Dr. V. Neiderhauser SHOTS survey

		1 Strongly Agree	2 Agree	3 Neutral	4 Disagree	5 Strongly Disagree
23	The influenza vaccine makes me sick					
24*	It is important for nurses to get an annual influenza vaccination					
25	My family does NOT believe that the vaccine works					
26	Nurses I work with do NOT believe in getting influenza vaccine					
27*	I would get it if it was free					
28	I never get flu so I do not need an annual vaccine					
29	I am scared of the side effects of the influenza vaccine					
30	It is NOT important for children 5 and younger to get an annual influenza vaccination					
31*	Nursing programs should mandate that all student nurses get an annual influenza vaccine					
32*	It is important for the elderly to get an annual influenza vaccination					
33	The clinic ran out of the vaccine					
34*	Getting an annual influenza vaccine provides personal protection against influenza					
35	I have had a bad reaction when I have					

* Reverse score items
** Dr. V. Neiderhauser SHOTS survey

		1 Strongly Agree	2 Agree	3 Neutral	4 Disagree	5 Strongly Disagree
	got the vaccine					
36*	I would get it if my worksite offered it					

Please take a few minutes and write in the answers to the next four questions. If it is not applicable please leave blank or put N/A.

37. If you got an influenza vaccine this year what was the most important reason for doing so?

_____

_____

_____

38. If you did NOT obtain an influenza vaccine this year what was the most important reason for not taking it?

_____

_____

39. If you put that you have had a "bad reaction" to influenza vaccine please describe:

_____

_____

* Reverse score items
** Dr. V. Neiderhauser SHOTS survey

Finally I would like to ask you a few questions about you.

40. Are you: □Male □Female

41. What age range are you? □ 18-29 years □ 30-39years □ 40-49years □ 50-59 years □> 60years

42. Are you currently □single □married □separated □divorce □widowed

43. What is your highest degree in nursing? □BS/BSN □MS/MSN □PhD

□DrNP □Ed.D/D.Ed □Other (Please specify) .

44. Did you take the influenza vaccine for 2011/2012 flu season? □Yes □No

45. Did you take the influenza vaccine for 2010/2011 flu season? □Yes □No

46. Did you take the influenza vaccine for 2009/2010 flu season? □Yes □No

47. Would you recommend to patients that they get an annual influenza vaccine? □Yes □No

48. Would you recommend to other nurses or nursing students to obtain an annual influenza vaccine? □Yes □No

49. Check the area which you primarily teach?

* Reverse score items
** Dr. V. Neiderhauser SHOTS survey

□Fundamentals
□Adult Health
□Geriatrics
□Pediatrics
□OB/GYN
□Public Health
□Psych/Mental Health
□Other (Please specify)
.

50. What race or ethnicity do you consider yourself? (Check the box of the one you most identify with)

□African-American
□Chinese
□Filipino
□Japanese
□Hawaiian
□Hispanic/Latino/Chicano
□Native American
□Other Asian
□Pacific Islander
□White (non-Hispanic
□Other (specify)
_____

THANK YOU VERY MUCH FOR HELPING ME TODA

* Reverse score items
** Dr. V. Neiderhauser SHOTS survey

APPENDIX B: INSTITUTIONAL REVIEW BOARD APPROVAL

TO: Denise Cohen Principal Investigator Nursing

FROM: Ching Yuan Hu, Ph.D. C

Interim Director c---::> -1
Human Studies Program
Office of Research Compliance
University of Hawai‘i, Mānoa

Re: CHS #20235- "Development and Testing of a Survey Tool to Examine Nurse Educators' Knowledge, Beliefs, Attitudes, and Acceptance Toward Influenza Vaccine"

This letter is your record of the Human Studies Program approval of this study as exempt.

On May 23, 2012, the University of Hawai’i (UH) Human Studies Program approved this study as exempt from federal regulations pertaining to the protection of human research participants. The authority for the exemption applicable to your study is documented in the Code of Federal Regulations at 45 CRF 46 (2).

Exempt studies are subject to the ethical principles articulated in The Belmont Report, found at http://www.hawaii.edu/irb/html/man ual/appendices/A/belmont.html

Exempt studies do not require regular continuing review by the Human Studies Program. However, if you propose to modify your study, you must receive approval from the Human Studies Program prior to implementing any changes. You can submit your proposed changes via email at uhirb@hawaii.edu. (The subject line should read: Exempt Study Modification.) The Human Studies Program may review the exempt status at that time and request an application for approval as non-exempt research.

In .order to protect the confidentiality of research participants, we encourage you to destroy private information which can be linked to the identities of individuals as soon as it is reasonable to do so. Signed consent forms, as applicable to your study, should be maintained for at least the duration of your project.

This approval does not expire. However, please notify the Human Studies Program when your study is complete. Upon notification, we will close our files pertaining to your study.

If you have any questions relating to the protection of human research participants, please contact the Human
Studies Program at 956-5007 or uhirb@hawaii.edu. We wish you success in carrying out your research project.

1960 East-West Road
Biomedical Sciences Building 8104
Honolulu, Hawai'i 96822
Telephone: {808) 956-5007
Fax: (808) 956-8683
An Equal Opportunity/Affirmative Action Institution
Denise Cohen,

The U.H. Human Studies Program has received your request for changes on your exempt project noted above. The proposed amendments will be added into your current project file. The proposed changes do not alter the exempt status of your project still in effect.

Thank you for keeping us informed about the progress of this study.

Sincerely,

Jacob Kowalski
Human Studies Program
UH Office of Research Compliance

On Mon, Aug 27, 2012 at 7:19 AM, Committee on Human Studies <uhirb@hawaii.edu> wrote:
>>
> From: Denise Cohen <denisec@hawaii.edu>
> Date: Fri, Aug 24, 2012 at 3:56 PM
> To: uhirb@hawaii.edu
> Cc: John Casken <casken@hawaii.edu>
>
> Re: CHS#20235- "Development and Testing of a Survey Tool to Examine Nurse Educators' Knowledge, Beliefs, Attitudes and Acceptance Toward Influenza Vaccine
>
> The study modification would change from "a convenience sample of approximately 300 nurse educators in the State of Hawai'i" to "a convenience sample approximately 300 nurse educators in the United States"
>
> Reason for change: Not enough nurse educators in the State of Hawai'i to test reliability and validity
>
> All other criteria remains the same.
>
> Please let me know if you have further question

APPENDIX C: CONSENT

University of Hawai‘i
Consent to Participate in Research

Participation in an examination of nurse educators' attitudes, belief, knowledge and acceptance towards influenza vaccine

My name is Denise Cohen and I am a graduate student at the University of Hawaii (UH). A requirement of my PhD degree program is to conduct a research project. The purpose of my project is to examine nurse educators' attitudes, beliefs, knowledge and acceptance towards influenza vaccine. Participation in this study will involve the completion of an anonymous on-line (Internet) survey. I am asking you to participate in this project because you are at least 18 years old and a nurse educator.

Project Description – Activities and Time Commitment: Participants will fill out a survey that is posted on the Internet. Survey questions are primarily Likert scale style choice. However, there will be several opportunities to expand upon your answers with an open-ended narrative response. Completion of the survey will take approximately 25 minutes. It is planned that approximately 300 people will take part in this project.

Benefits and Risks: There will be no direct benefit to you for participating in this survey. The results of this project may contribute to a better understanding of why nurse educators do or do not take an annual influenza vaccine. There is little risk to you in participating in this project.

Confidentiality and Privacy: This survey is anonymous. I will not ask you to provide any personal information that could be used to identify you. Likewise, please do not include any personal information, such as your name, in your survey responses.

Voluntary Participation: Participation in this project is voluntary. You can freely choose to participate or to not participate in this survey, and there will be no penalty or loss of benefits for either decision. If you agree to participate, you can stop at any time without any penalty or loss of benefits to which you are otherwise entitled.

Questions: If you have any questions about this study, you can contact me at 808. 283.5414. My email address is denisec@hawaii.edu. You can also contact my faculty advisory, Dr. John Casken at 808.956.5750. His email address is casken@hawaii.edu. If you have any questions about your rights as a research participant, you can contact the UH Committee on Human Studies at 808.956.5007 or uhirb@hawaii.edu.

To Access the Survey: Please go to the following web page https://www.surveymonkey.com/s/VVYJ6BS for a link to the survey and instructions for completing it. Submittal of the survey will be considered as your consent to participate in this study.
Please print a copy of this page for your reference.

APPENDIX D

You have permission to use the questions without charge. Best wishes on your study!
Vickie

Victoria Niederhauser DrPH, RN
Dean & Professor
University of Tennessee
College of Nursing

Sent from my iPhone

On Nov 12, 2012, at 7:48 PM, denisec@hawaii.edu wrote:

> Name: Denise Cohen
> Organization: University of Hawaii Maui College
> Address: 310 Kaahumanu Ave
> Phone: 808-984-3493
> email: denisec@hawaii.edu
> Message: Aloha Vickie,
>
> I hope that you remember me. Years ago when I took a course from you on quantitative research you gave me verbal permission to use your SHOTS survey but no publishing because you hadn't published it yet. Since then I have been working on a questionnaire regarding attitudes and beliefs of nurse educators to influenza vaccine. I'm doing a reliability and validity on the self-developed survey. I just reviewed your survey today and realized that there are 4-5 questions on the survey that are identical to the SHOTS survey that you developed.
>
> I would like your permission and I would pay $50.00 to use them and of course credit you. My question to you is can I use them to test criterion-related validity.
>
> Please Advise
>
> Sincerely,
>
> Denise Cohen

APPENDIX E SURVEYTABLES

TABLE E. 1. SUBSCALE 4

Took influenza vaccine for 2011-2012	Yes No	136 55	71.2% 28.8%
Took influenza vaccine for 2010-2011	Yes No	143 48	74.9% 25.1%
Took influenza vaccine for 2009/2010	Yes No	139 52	72.8% 27.2%
Would recommend to patients that they get an annual influenza vaccine	Yes No No answer	171 16 4	89.5% 9.4% 2.1%
Would you recommend to patients that they get an annual influenza vaccine	Yes No No answer	169 18 4	88.5% 9.4% 2.1%

TABLE E.2 SUBSCALE 5 DEMOGRAPHICS CHECK THE AREA IN, WHICH YOU PRIMARILY TEACH?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Other (please specify)	48	25.1	25.1	25.1
	Fundamentals	24	12.6	12.6	37.7
	Adult Health	53	27.7	27.7	65.4
	Geriatrics	6	3.1	3.1	68.6
	Pediatrics	11	5.8	5.8	74.3
	OB/Gyn	23	12.0	12.0	86.4
	Public Health	13	6.8	6.8	93.2

	Psych/Mental Health	13	6.8	6.8	100.0
	Total	191	100.0	100.0	

TABLE E.3 SUBSCALE 5 WHAT RACE OR ETHNICITY DO YOU CONSIDER YOURSELF? (CHECK THE BOX OF THE ONE YOU MOST IDENTIFY WITH)

		Frequency	Percent	Valid Percent	Cumulative Percent
	Other (please specify)	16	8.4	8.4	8.4
	African-American	2	1.0	1.0	9.4
	Chinese	5	2.6	2.6	12.0
	Filipino	8	4.2	4.2	16.2
	Japanese	8	4.2	4.2	20.4
Valid	Hawaiian	2	1.0	1.0	21.5
	Hispanic/Latino/Chicano	3	1.6	1.6	23.0
	Other Asian	1	.5	.5	23.6
	Pacific Islander	3	1.6	1.6	25.1
	White (non-Hispanic)	143	74.9	74.9	100.0
	Total	191	100.0	100.0	

APPENDIX F STATISTICAL ANALYSIS

TABLE F.1 RELIABILITY STATISTICS FOR 36-ITEM SCALE

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items		N of Items
.938	.937		36
Cronbach's Alpha	Part 1	Value N of items	.850 18a
	Part 2	Value N of items	.909 18b
		Total N of Items	36
Correlation Between Forms			.875
Spearman-Brown Coefficient		Equal Length Unequal Length	.933 .933
Guttman Split-Half Coefficient			923

TABLE F.2 ITEM-TOTAL STATISTICS 36-ITEM SCALE

No.	Item	Corrected item-total correlation	Cronbach's alpha if deleted
1	The influenza shots hurts too much	.358	.938
2	Getting an influenza shot is a personal decision made by the individual nurse	.424	.938
3	The clinic/facility was NOT open at a time I could go	.156	.940

No.	Item	Corrected item-total correlation	Cronbach's alpha if deleted
4	Hospitals and other healthcare institutions should NOT require that all employees get an annual influenza vaccine	.727	.934
5	I could not get the time off from work	.264	.938
6	My religion forbids it	.182	.939
7	Where I work discourages getting an annual influenza vaccine	.335	.938
8	Influenza is a serious disease	.437	.937
9	I do not think the vaccine works to prevent getting the flu	.720	.934
10	My health care provider told me NOT to get the vaccine	.398	.937
11	I think influenza vaccine makes the body weak	.643	.935
12	I do NOT think influenza is a serious disease	.521	.936
13	Getting an annual influenza vaccine decreases nurses sick	.285	.938

No.	Item	Corrected item-total correlation	Cronbach's alpha if deleted
	leave		
14	I plan to get the influenza vaccine for the 2012-2013 influenza season	.835	.933
15	My insurance does not pay for influenza vaccine	.243	.939
16	Getting an annual influenza vaccine prevents the spread of influenza from me to my patients and other health care workers	.704	.935
17	I choose to use alternative health care (like homeopathy)	.598	.935
18	I worry about how safe influenza vaccine is	.632	.935
19	I worry about what is in the vaccine	.661	.935
20	I just forgot	.189	.939
21	I do not believe in getting influenza vaccine	.831	.933
22	Flu causes many deaths a year	.357	.938
23	The influenza vaccine makes me	.625	.935

No.	Item	Corrected item-total correlation	Cronbach's alpha if deleted
	sick		
24	It is important for nurses to get an annual influenza vaccine	.841	.934
25	My family does NOT believe that the flu vaccine works	.666	.935
26	Nurses I work with do NOT believe in getting an influenza vaccine	.251	.939
27	I would get it if it was free	.589	.936
28	I never get the flu so I do not need an annual vaccine	.702	.935
29	I am scared of the side effects of the influenza vaccine	.671	.935
30	It is NOT important for children 5 and younger to get an annual influenza vaccine	.582	.936
31	Nursing programs should mandate that all student nurses get an annual influenza vaccine	.726	.934
32	It is important for the elderly to get an annual influenza	.622	.936

No.	Item	Corrected item-total correlation	Cronbach's alpha if deleted
	vaccination		
33	The clinic ran out of the vaccine	.135	.940
34	Getting an annual influenza vaccine provides personal protection against influenza	.763	.934
35	I have had a bad reaction when I have got the vaccine	.579	.936
36	I would get it if my worksite offered it	.628	.935

TABLE F.3 EIGENVALUES

Component	Initial Eigenvalues		
	Total	% of Variance	Cumulative
1	12.3	46%	46%
2	1.8	6.8%	52%
3	1.5	5.5%	58%
4	1.1	4.2%	62%
5	1.0	3.7%	66. %

TABLE F.4 COMPARISON OF EIGENVALUES FROM PCA AND CRITERION VALUES FROM PARALLEL ANALYSIS USING MONTE CARLO PCA FOR PARALLEL ANALYSIS

Component	Random Eigenvalue	PCA Eigenvalue	Accept/Reject
1	1.8	12.3	Accept
2	1.7	1.8	Accept
3	1.6	1.5	Reject
4	1.5	1.1	Reject
5	1.4	1.0	Reject

TABLE F.5 LOGISTIC REGRESSION CLASSIFICATION TABLE

		Predicted		
		recode 44tookinfluencavaccine in 2011		Percentage correct
Observed		0	1	
recoded44took influenza vaccinein2011	0	43	12	78.2
	1	4	132	97.1
Overall Percentage				91.6
		Predicted		
		recode 45tookinfluencavaccine in 2010		Percentage correct
Observed		0	1	
recoded45took vaccinein2010 influenza	0	36	12	75.0
	1	6	137	95.8
Overall Percentage				90.6
		Predicted		
		recode 46tookinfluencavaccine in 20009		Percentage correct
Observed		0	1	
Recode46 took Influenza vaccine 2010	0	35	17	67.3
	1	7	132	95.0
Overall Percentage				87.4

TABLE F.6 LOGISTIC REGRESSION FOR THOSE WHO TOOK THE VACCINE IN 2010

Variables in the Equation								
Step 1a	B	SE	Wald	df	Sig	Exp (B)	95% CI for Exp (B)	
							Lower	Upper
ATTIV	.177	.032	30.63	1	.000	1.193	1.121	1.271
KNOWID	-.267	.150	3.16	1	.075	.766	.571	1.028
FEARIV	.095	.070	1.84	1	.175	1.100	.959	1.262
Constant	-7.810	1.91	16.65	1	.000	.000		

TABLE F.7 LOGISTIC REGRESSION FOR THOSE WHO TOOK THE VACCINE IN 2009

Variables in the Equation								
Step 1a	B	SE	Wald	df	Sig	Exp (B)	95% CI for Exp (B)	
							Lower	Upper
ATTIV	.140	.027	26.78	1	.000	1.150	1.091	1.212
KNOWID	-.163	.134	1.48	1	.224	.850	.654	1.105
FEARIV	.098	.063	2.45	1	.117	1.103	.976	1.247
Constant	-7.43	1.79	17.16	1	.000	.000		

APPENDIX G: COMMENTS

TABLE G.1 IF YOU GOT AN INFLUENZA VACCINE THIS YEAR WHAT WAS THE MOST IMPORTANT REASON FOR DOING SO?

Personal protection from exposure and disease
to protect myself, my family, and my patients
To prevent spreading disease to others and protecting myself
I have asthma and allergies and prone to flu. I get it every year no matter what the cost.
Protect self and others
Pregnant
To avoid getting the flu.
To protect myself, my family and patients.
stay well
To lessen the chance that I will contract influenza
I feel it helps lessen the severity if you come down with it. I did get the flu one year and was very sick and have been getting the flu shot ever since
due to health reasons, I cannot afford to get the flu
prevent me from getting the flu
Protect myself and my patients.
Protect myself
I am a healthcare professional and believe it is part of my practice.
not to get and spread the flu

Contact with compromised people in clinical practice
To protect clients, co-workers, students, and myself from transmitting influenza.
Didn't want to get sick
To protect myself, family and patients from getting the flu
I believe it helps protect my health. I feel I am at risk when I travel by air for respiratory infections.
Prevent getting the flu and passing it on to others.
avoid getting sick
To prevent myself from getting the flu
Help protect against illness from contracting the flu, or at least decreasing severity if I do.
to avoid getting the flu and missing work
stay well
So I don't get serious respiratory Infection
mandate, protecting fragile patients I am taking care of
professional responsibility and personal protection
to immunize me again the current strains of flu
for protection
I get the influenza vaccine annually.
to protect my family from getting the flu
Personal and public protection
prevent illness so I could continue to work
Protect my family, students and patients

To protect my family and my patients who are immunocompromised and to protect myself as well from a longer term viral illness. We are all susceptible.
To protect my family and my patients who are immunocompromised and to protect myself as well from a longer term viral illness. We are all susceptible.
My doctor asked me if I wanted it. I'm not current a bedside nurse.
I work in a healthcare facility and I like to protect myself, co workers, and my patients from getting the flu.
I am exposed to all kinds of viruses
To not get the flu
protect my self
h1n1
Not getting flu and missing work/ school or getting family sick
To decrease the severity of the flu.
I did not get a vaccine this year.
personal and family protection
Prevention
protection for self & patients
to prevent myself from getting the flu
I did not get one
Protection from influenza
keeping me well
health promotion
get one every year. I believe it improves my overall health.

Keep up my immunity so I don't get the flu
It was free and our nursing students were giving the shots so it was convenient, so I wanted them to give me one and practice their injections
prevent getting the flu and having to miss work or other activities
Required at work.
Convenience
Ongoing prevention of illness for myself and for the protect of the patients I encounter.
not to get sick
Prevention
So I would not get the flu
did not get
did not want the flu
protection for me and my patients
work with the public in the health care profession
protection of family and patients
I have a lung condition and the getting the flu could exacerbate the problem.
High risk because of age and going into the clinical setting.
protect my health
To prevent getting the flu
Prevent the spread of influenza to the vulnerable populations we care for.
Protection from the flu in the hospital environment
Prevention

protect myself & people I work with
free and convenient
Avoiding getting influenza. Herd protection for others.
Keep me and my family healthy
I PLAN to get a flu vaccine this year but it is too early yet. My workplace does get the vaccine so that all of us have the option to get it if we want it. If we do not get it, most of the clinical sites we work in require that we wear a mask throughout the flu season which makes complete sense to me.
personal protection
Prevent spread to immunocompromised patients.
Personal protection and minimize spread to my patients, students, and family.
To reduce the likelihood of me giving influenza virus to someone else.
Flu prevention, not being sick for a week
To protect my patients.
patient safety think it would be good to have a generic box for additional comments i.e. :) though I think getting a vaccine is important for health care providers to prevent the spread of disease, it is a personal choice and should not be mandated. forms requiring reasons for not taking the immunization frequently put options which imply ignorance/lack of education. Though I do get the vaccine for patient safety, I do have concerns, and I find it offensive for people to take a stance of presumed intellectual superiority for non compliance. there's my soap box :) hope your study goes well! Mahalo
Protection of self, family, students, and patients with whom I come in contact.

protection of self and others
Protect myself and others.
prevent spread of influenza to patients
two years ago my institution only gave the H1N1 virus on a certain date and I was out of the country on that date and they had run out of the vaccine by the time I returned. Within two weeks of returning home, I had a certified case of the H1N1 virus -- miserably ill for a week and then a long time to recover. This is the first time in years that I have missed the seasonal ""flu"" shot and I was not happy. I had influenza in 1967 and was miserably ill then as well -- I'm just not up for missing life (as well as work) or taking it home then to my children and now to my grandchildren, not to count the mothers and babies I work with on a daily basis in the clinic and the hospital.
Why not? It prevents serious illness. The vaccine comes with only minor side effects. It is important to prevent the spread of what can potentially be a fatal illness.
Prevention of spread of influenza
Personal/Patient Health
public health
Required for my employment.
Protect myself
I just got one today actually, and it is because I believe it is important for healthcare workers to have that protection. Besides I hate being sick.
protect myself and my patients
To avoid illness and the spread of it

To protect myself, my family, my students and my patients
Reduced risk of flu
I don't want to get the flu
To protect me and those around me from the flu
to both lessen my risk of getting influenza and to lessen the risk of spreading it to others (particularly my patients)
To keep from spreading the flu to those immune compromised and of course for not getting it myself.
Protect myself and community, especially elderly.
have not gotten it yet
I believe all health care personal should get the influenza vaccine.
reduce risk of getting the flu
Have not had one yet. Flu clinics are held in October. But my main reason for getting one is because I have asthma.
Provided by my employer
Haven't gotten it yet, but will soon.
I have patient care contact, especially with the elderly, and they have compromised immune function. Also. I don't want to get the flu.
To prevent illness.
Prevention
personal and public health
so that I am protected
So I don't get the flu, infect others, and miss work

Protect myself, my family, patients, and anyone else I come in contact with.
not get the flu
Not to get sick.
To reduce my chances of acquiring influenza
I have not yet received the vaccine
stay healthy
To decrease odds of contracting influenza

TABLE G. 2 IF YOU DID NOT OBTAIN AN INFLUENZA VACCINE THIS YEAR WHAT WAS THE MOST IMPORTANT REASON FOR NOT TAKING IT?

I have rarely gotten influenza in the past and believe some natural immunity is better than the vaccine.
Due to the past two times of receiving the vaccine caused me to be in bed for two weeks.
N/A, I did receive the vaccine
I do not truly trust the government and the potential uses of the vaccine
I am healthy and avoid ill people.
risk vs. benefit questionable long term effects vs. immediate short term benefit
Working in academia, rather than a clinical setting; little exposure to those who are ill
Just talked myself out of it. Wanted to stay healthy on my own.
I do not believe in the vaccine
I do not believe that vaccines are necessary.
I was late because I keep forgetting and time flew by.
Time. Not enough of it.
I have a bad reaction when I receive the injection but not the nasal spray. I'm over age 50

and am told I cannot receive the nasal spray.
I did not get it because it was not available soon enough, was already exposed to 13 cases, and seemed immune to it.
I have severe Latex allergies and was told that the stopper was latex and my healthcare provider would not administer it to me.
The times that I have gotten the vaccine were the times that I tested positive for influenza.
Just do not feel I'm in a risk associated group and prefer to not have chance of side effects
I believe that vaccines can be dangerous. It is much better to live right, eat healthy non GMO, organic foods and exercise.
I simply do not get it however, I strongly encourage patients to get it
Safety
my family members both got sick right after having it so I did not get it
My sister got Guillain-Barre after an influenza vaccine so I do not get the vaccine
I RELY UPON MY STRONG, HEALTHY IMMUNE SYSTEM
I do not like the idea of injecting my body with the vaccine.
I became extremely ill the one time I did get a vaccine 10 years ago. I never have had the "" flu"" before or since that year I got the vaccine, and never missed work due to illness.
I personally did get the vaccine b/c of my way of living and have always taken the precautions and necessary steps to avoid getting the flu. I have only received the vaccine once in my lifetime. To this day I have gotten the flu during my 2nd yr of undergrad.
I do not believe it is protective for the normal relatively healthy adult.
I have never gotten a influenza vaccine and only rarely get colds or the flu, self limiting

and not severe
Had one before and still got the flu.
did not feel it really worked and concern of what might be in it.
Side effects of the vaccine
It is unclear if the vaccine is for the current year or the year before. It is also unclear to me how the pharmaceutical companies can know what virus will be active in which year.
Afraid of side effects.
I do not believe the flu vaccine is safe.
My schedule and sense that it is not a priority for me.
Have not yet had the time to get it, but plan on getting the vaccine when I see my PCP at the end of Aug.
don't want to expose self
Sensitivity / allergic reaction
Wasn't easily available.
Working at QMC Neuro ICU, I have seen a lot of Guillain-Barre patients who recently received the flu shot and have had flu like symptoms prior to. The Neuro Intensivists that I work with also did not receive the flu vaccine.
access, cost
do not want the negative side effects. only protects against three strains of flu, there are many more than that. if the flu vaccine protected against all strains the benefits would outweigh the risks (mainly the side effects)
I am not involved in patient care. In fact, I am not a clinician.
I do not practice and therefore do not have exposure to patients. Therefore my risk is not

the same as that of a practicing nurse.
It is too early yet and we are awaiting the arrival of our workplace vaccine.
I believe that taking a flu shot puts you at a disadvantage by making you unable to ward off disease. I f you are healthy and without disease it may be a disadvantage to compromise your immune system instead of letting your body build natural immunity.
Because I had a neurologic reaction (that's what my doc said when I last had the vaccine in 1998. I had been getting vaccine every year up until then.
I am awaiting the flu clinics offered by my employer
egg allergy
Primarily, I'm not around many people and I have other health conditions that cause me to choose how much I put in my body to challenge it's healing ability and to maintain my health.
Personal choice
I don't believe that it protects me.

TABLE G. 3 IF YOU HAD A "BAD REACTION" TO INFLUENZA VACCINE PLEASE DESCRIBE

The only reaction I experienced was in the late 1970's when the vaccine was introduced. Within 24 hours of the immunization, I developed a fever of over 100 F, chills, sweats, myalgia, and fatigue. It lasted about a week.
abscess in the axilla
Body aches, headache, nausea for 24 hours. Not disabling but quite uncomfortable.
I develop influenza and suffer from vomiting and diarrhea forcing me to take precious time off from work.
I am also allergic to the preservative Thimersol (sic) and I required benadryl and epipen.

I haven't had any but have friends who said they did feel sick like they had the flu
Fever, bad cold within days of getting flu shot. Prior to that it was years between colds. This has happened to me twice and each time was told I was ""crazy"" . I had the flu when H1N1 came out, survived it, and felt fine in 5 days. I do not preach these views but keep them to myself. It is my business. Being a health care worker does not mean you have to subscribe blindly to big pharma propaganda.
na. But I did get the flu one year despite the vaccine.
I did have redness and heat at the site but it was not a ""bad"" reaction.
Headache, arthralgia, nausea necessitating a loss of one day of work
I have not had a reaction however my husband did. He was so very sick!
I got the flu anyway - swab was positive for influenza
worse flu sx
Sore shoulder and neck for over 6 months, had to get pt
Bed ridden for 6 days, lost 5 pounds, debilitating pain, lethargic.
I felt a little malaise the next day
Fever, malaise, sore arm for two weeks.
Muscle aches, fever, malaise
The first year the influenza vaccine was available (I believe it was the early 1980's.), I had a terrible illness (aches, fever, chills, nausea, vomiting) within the week of receiving the vaccine. Since then, no reactions and I've taken the flu vaccine every year since then.
I have had flu like symptoms or developed a cold twice after having vaccine and though have been told this is coincidental, I rarely have had even a cold in my life.
I have only had one flu shot my entire life

Respiratory problems
Many years ago, I had a ""serum sickness""-type reaction to influenza vaccine and was sick for 3 days with it. The vaccine has been reformulated since then and I have received the vaccine annually with no problem.
Injected into my right deltoids. I developed numbness and tingling in my right arm, chest, face and scalp
I did have a good immune response reaction once - made me feel lousy with fever and chills one night but felt I was mounting a good immune response!
low grade fever - felt a bit of fatigue for a day
hives, itching eyes
I have never had a reaction. But a friend had GB syndrome following the flu vaccine.
flu like symptoms for the 3 days following the vaccine
Got sick.