

AMERICAN UNIVERSITY OF BEIRUT

FACTORS ASSOCIATED WITH LOW INFLUENZA
VACCINATION RATE AMONG AMERICAN UNIVERSITY
OF BEIRUT MEDICAL CENTER REGISTERED NURSES

by
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to the Rafic Hariri School of Nursing
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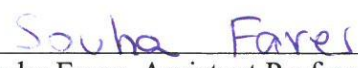
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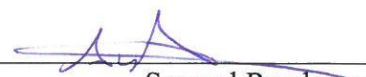
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AN ABSTRACT OF THE project

Fatima Ali Dirani for Master of Nursing
Major: Community Nursing and Public Health

Title: Factors Associated with Low Influenza Vaccination Rate among American University of Beirut Medical Center Registered Nurses

The Centers for Disease Control and Prevention recommends healthcare personnel to receive the influenza vaccine annually since this measure improves patient outcomes, reduces absenteeism, and reduces influenza infection among staff. Yet, influenza vaccination rate among healthcare workers mainly among nurses is still low.

This study aims to assess the influenza vaccination status among AUBMC RNs, find out the factors associated with the low rate, and propose interventions to enhance it.

A cross-sectional study of 210 RNs with direct patient contact was conducted in April 2014. RNs filled a self-administered questionnaire that included items questioning about demographic data, influenza vaccination status, reasons for not receiving the influenza vaccine, knowledge and beliefs about influenza and influenza vaccination, and evaluation of the influenza vaccination activities provided at AUBMC.

The rate of nurses who took the vaccine in the sample was computed using descriptive statistics. Univariate and bivariate logistic regression models were carried out to study the unadjusted and adjusted associations between the dependent variable “reception of influenza vaccine” and the set of independent variables.

Results of the study revealed that the influenza vaccination rate among AUBMC RNs from this sample was 21.4%. In the unadjusted logistic regression analysis, intention ($p= 0.00$), total knowledge ($p= 0.026$), and total evaluation ($p= 0.038$) were significantly associated with the reception of the influenza vaccine. In the multivariable logistic regression analysis, we considered two logistic regression models for the dependent variable “reception of the vaccine”. Only intention remained significantly associated with the reception of the influenza vaccine.

Findings of this study showed that RNs' knowledge at AUBMC about influenza and about the effectiveness of the influenza vaccine in preventing influenza was associated with the uptake of the vaccine. Raising this knowledge would eradicate the ongoing misconceptions about it and improve the influenza vaccination rate among RNs at AUBMC.

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CHAPTER 1

INTRODUCTION

1.1 Overview of the Chapter

This chapter provides an overview about influenza and influenza vaccine, significance and aim of the study.

1.2 Influenza and Influenza Vaccine

1.2.1 Influenza in General

The Centers for Disease Control and Prevention (CDC) describe flu as an infectious respiratory disease that affects the nose, throat, and lungs. The influenza viruses cause this disease (CDC, 2013). As per the CDC (2013), influenza virus infection complications can vary from mild to severe illness, and sometimes to death. It is believed that flu viruses spread principally by droplets from the infected people's cough, sneeze or talk. Signs and symptoms of flu include fever, cough, sore throat, runny or stuffy nose, muscle or body aches, headaches, fatigue, vomiting and diarrhea (more common in children). Period of contagiousness may begin one day before symptoms develop and up to five to seven days after sickness (CDC, 2013).

Moreover, the CDC pointed out that the severity of flu differs from season to season depending on the types of the spreading flu viruses, and on the match between the vaccine and the viruses. Bacterial pneumonia, ear infections, sinus infections, dehydration, and worsening of chronic medical conditions are among the complications of flu (CDC, 2013).

The World Health Organization (2003) mentioned that around 5-15% of the global population is affected by influenza epidemics yearly. Most cases are mild, however, influenza can still be the main reason behind the severe illness in three to five million people and around 250,000–500,000 deaths worldwide. Severe illness and deaths owed to influenza occur mainly in the high-risk populations of infants, the elderly and chronically ill patients (cited in Khazaeipour, Ranjbarovin, & Hoseini, 2010).

1.2.2 Influenza Vaccine

The CDC (2011) refers to the availability of two types of influenza vaccines. The first is the live attenuated influenza vaccine (LAIV) which is given intranasally and is approved for use in healthy non-pregnant persons aged 2–49 years. The second is the trivalent inactivated vaccine (TIV) which is given intramuscularly to any person aged \geq six months. Both types enclose selected vaccine virus strains to motivate a protective immune response against the wild-type viruses which are considered to be most likely in circulation during the forthcoming season (CDC, 2011).

According to CDC (2011), influenza vaccine effectiveness differs from year to year and depends on the age and health status of the vaccinated person and the “match” between the viruses in the vaccine and those in circulation. Based on international surveillance and scientists’ estimations concerning the types and strains of viruses that will circulate in a given year, the vaccine strains are chosen for to be included in the influenza vaccine yearly. Since the predominant circulating influenza viruses are naturally modified from season to season and immunity declines over time post vaccination, annual vaccination is recommended. In all conducted studies, the most frequent side effect of vaccination is soreness at the vaccination site which lasted less than 2 days and was mild and seldom affected the recipient’s ability to accomplish

routine daily activities. Contraindications to influenza vaccination mainly include a history of anaphylactic hypersensitivity to egg or other components of the vaccine (CDC, 2011).

According to the CDC (2013), it is recommended to get vaccinated against influenza soon after the vaccine is available annually. The ideal month for influenza vaccination is October. Nevertheless, as long as the flu viruses are circulating having the vaccine could be protective. Antibodies that protect against influenza virus infection develop two weeks after vaccination. So, it is better to get vaccinated and be protected prior to the spread of influenza in the community (CDC, 2013).

As per the CDC (2013) recommendations, everyone six months of age and older should get the flu vaccine. It is especially important that some people more than others receive the influenza vaccine: Those who are at high risk of developing severe complications if they acquired the flu, and those living with or caring for others who are at high risk of developing severe complications including health care personnel (CDC, 2013).

1.2.3 Influenza in Healthcare Workers

Salgado et al. (2004), and Nuno, Chowell, and Gumel (2007) mentioned that healthcare workers (HCWs) can be a means for influenza transmission in communities and hospitals due to their exposure to infected patients and high-risk groups (cited in Zhang, While, & Norman, 2012). As per the APIC Public Policy Committee (2008), this situation causes increased morbidity and mortality risk and extended hospital stay for affected patients (cited in Johansen, Stenvig, & Wey, 2011). Also, according to Dash et al. (2004), low influenza vaccination rates among HCWs create a public health

threat (cited in Johansen et al., 2011). For instance, in the United States (U.S.) as per the CDC (2010) and Dash et al. (2004), low vaccination rates among healthcare workers led to an estimated 3,349 to 48,614 influenza-associated deaths from 1986 through 2004 and 226,000 hospitalizations annually, along with institutional staff and patient infection rates running as high as 70% during outbreaks (cited in Johansen et al., 2011). Furthermore, the percentage of the U.S. population contracting influenza disease annually is 5-20% according to National Foundation of Infectious Diseases [NFID] (2008), and this causes workplace absenteeism percentage of 10% according to Rothberg and Rose (2005) which would produce 22 million health care provider visits, 75 million days of absenteeism, and 200 million days of limited activity according to King et al. (2006) (cited in Johansen, et al., 2011).

Therefore, to the WHO (2010), vaccination against influenza is the most efficient way to prevent this infection and its consequences (cited in Zhang et al., 2011). Moreover, it was evident in studies conducted by Carman et al. (2000), Lundstorm et al. (2002), and Wilde et al.(1999) that HCWs vaccination against influenza has significant economic benefits by reducing associated health care costs such as decreased absenteeism from work and the additional costs of sick leave and staff replacement (cited in Zhang et al., 2012) . For those reasons, the World Health Organization (WHO), CDC, other healthcare professional organizations and many countries' government agencies recommend HCWs to receive the annual seasonal influenza vaccine (cited in Zhang et al., 2012). Thus far many studies reveal that the uptake of influenza vaccine in HCWs globally is low (cited in Zhang et al., 2012).

Many studies revealed that nurses are the most hesitant to receive the influenza vaccine even though they are the group with the most patient contact among HCWs

(cited in Zhang et al., 2012). Besides, several studies that profile nurses who do not get vaccinated as well as factors influencing their decisions are published. The most commonly reported factors preventing nurses from getting the vaccine include: beliefs that the influenza vaccination is not protective against influenza and that an individual's own state of health and immune defenses will prevent the disease, fears about the side effects, concerns about the risk of contracting influenza from the vaccine, lack of awareness of healthcare workers vaccination recommendations, lack of knowledge about influenza in general and its potential severity as a disease, and lack of awareness of how influenza vaccinations can prevent or reduce complications from influenza infection influenza (cited in Johansen et al., 2011).

1.3 Significance of the Study

Developing HCWs influenza vaccination program, tracking vaccination rates and causes for declination, and developing processes to enhance vaccination rates among HCWs is a new standard required by the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) that should be implemented by accredited healthcare institutions in the United States (cited in Poland, Ofstead, Tucker, & Beebe, 2008).

To our knowledge, no study has been conducted in Lebanon to assess the influenza vaccination rate among healthcare workers and to find out the barriers to vaccination. Therefore, taking into consideration that the Healthy People 2020 target is 90% influenza vaccination coverage among healthcare personnel, it is important to conduct such a study at American University of Beirut Medical Center (AUBMC). This study will evaluate the influenza vaccination status among AUBMC registered nurses

(RNs), find out the factors associated with the low rate, and propose interventions to enhance the rate. RNs are selected specifically as the target population for this study since they are the key to preventing influenza by their positive effects on their colleagues, and they have the most direct contact care with patients.

The low uptake of influenza vaccine among AUBMC HCWs in general, and among RNs in specific, was the motive for conducting this study. It is important to note that free of charge influenza vaccines are available to the HCWs at the University Health Services (UHS) -Family Medicine Department and influenza vaccination campaigns are held yearly. As per the UHS department at AUBMC a total of 285 out of 2660 AUBMC employees, including HCWs (excluding doctors) and non-healthcare workers were vaccinated against influenza during the 2013/14 season at the UHS department. That is, 10.7 % of the AUBMC employees vaccinated against influenza at the UHS department, and this result is very low as compared with the CDC recommendations.

The CDC (2011) noticed that healthcare personnel are exposed to patients with influenza in the workplace; therefore, they are at risk of acquiring influenza and transmitting it to patients and to co-workers. Also, it had been shown that influenza vaccination of healthcare personnel is associated with a decrease in absenteeism due to respiratory infections and a significantly lower rate of serological evidence of influenza infection. In addition, influenza can cause outbreaks of severe respiratory illness among patients which had been shown to be associated with low vaccination rates among healthcare personnel (CDC, 2011). In summary, healthcare personnel might serve as sources of influenza virus transmission and preventing influenza among this population may protect patients at risk of influenza complications; in particular, patients unable of

receiving influenza vaccine, patients who respond poorly to vaccination and persons for whom antiviral treatment is unavailable can benefit from healthcare personnel vaccination (CDC, 2011).

Several studies have been conducted worldwide indicating that poor knowledge about the vaccine was the major cause behind the low uptake of the influenza vaccine among healthcare personnel. However, no study has been conducted in Lebanon to our knowledge. Doctor Umayya Musharrafieh, an AUBMC Family Medicine attending physician, was approached to obtain her opinion in conducting such a project, she said that only few randomized controlled studies exploring the positive effects of vaccination on HCWs are available since it is unethical to undertake traditional study structure and methods when influenza vaccine should be given to HCWs during influenza season. Doctor Musharrafieh added that influenza vaccination has long been recognized as the best practice in the prevention of influenza. However, in Lebanon there are no studies conducted to look into influenza vaccination and rate of immunization, and consequently there is an imperative need to do more research in this area.

The personal interest in conducting this study arose when I was completing my residency rotation as a community health nurse at the UHS -Family Medicine Department at AUBMC. The community health nurse at the UHS discussed with me her concern regarding the low uptake of influenza vaccine among AUBMC healthcare personnel. At AUBMC, the HCWs are not required nor mandated to receive the influenza vaccine. But the vaccine is available for free for those who want to receive it. Therefore, it is important to find out the factors behind the low uptake of influenza vaccine among AUBMC HCWs. RNs are the target population in this study because they constitute the major component of the care delivery system with direct patient

contact. Also, their level of knowledge entails them to easily perceive the risks and benefits of influenza and influenza vaccination, and in turn could affect others in deciding whether it is worth receiving the influenza vaccine or not. Accordingly, it is important to conduct a study to improve the influenza vaccination coverage rate among HCWs in Lebanon.

1.4 Aim and Objectives

The aim of this study is to improve the influenza vaccination rate among registered nurses at AUBMC. Specific objectives are:

- 1- To compute the influenza vaccination rate among the study sample
- 2- To determine the factors associated with the low vaccination rates among nurses
- 3- To recommend strategies to improve the influenza vaccination rate at AUBMC

CHAPTER 2

LITERATURE REVIEW

2.1 Overview of the Chapter

This chapter reviews the literature on influenza vaccination status among healthcare workers in general and among RNs in particular, factors that affect their uptake of the vaccine, and interventions applied in some healthcare institutions to enhance the uptake of the vaccine among healthcare workers including RNs. Literature was retrieved from several sources including PUBMED and Cumulative Index for Nursing and Allied Health Literature (CINAHL) and cited articles in the reference list of other articles retrieved from those databases. Below is a detailed summary of the literature review against which the proposed study results will be compared. Only international studies were reviewed since to date no national studies are published except for one study assessing the knowledge and beliefs of family physicians in Lebanon concerning influenza and pneumococcal vaccines. In addition, this chapter presents the theoretical framework adopted in this study.

2.2 Influenza Vaccination Rates

In a study conducted by Canning, Phillips, and Allsup (2005), the vaccination rate among nurses and healthcare assistants participating in the study was 7.6 % (Canning, Phillips, & Allsup, 2005). In Johansen, Stenvig, and Wey (2011) study the vaccination rate among RNs was 35.5% (Johansen, Stenvig, and Wey , 2011). In another study conducted by Zhang, While, and Norman (2012), the vaccination rate among qualified nurses was 37.0% (Zhang et al., 2012). As per a study conducted in

Iran by Khazaeipour, Ranjbarnovin, and Hoseini (2010) the overall immunization rate in 884 healthcare workers was 5.2 % (Khazaeipour et al., 2010). Hence, it is very obvious that the influenza vaccination rate among healthcare workers including RNs is very low.

2.3 Factors Associated with Influenza Vaccine Uptake and Declination

The aim of a research study conducted by Canning et al. (2005) was to examine the reasons behind the low uptake of influenza vaccine in healthcare workers in the UK (Canning et al., 2005). The total number of participants in this study was 144 HCW. Out of the 144 participants, 128 responded to the question regarding the main reason for not receiving the vaccine, results revealed: 28.9% did not think the vaccine was needed; 18% were not aware of the vaccine; 14.1% just did not want the vaccine; 10.9% were concerned about the side-effects of the vaccine; 5.5 % had no time; 3.1% did not consider it; 3.1% were not available at convenient times; 2.3% did not think it was beneficial; 2.3% preferred natural resistance; 2.3% were absent from work when vaccine was available; 2.3% did not like injections; 2.3% never had it in the past; 1.6% forgot to get it; 3.1% had other reasons than the ones listed in the questionnaire (Canning et al., 2005).

Of the non-vaccinated participants, 49.6% mentioned that they might be influenced to receive the vaccine in the future. Of these, 40% provided a reason why they might think of receiving the vaccine in the future: 25% said that suffering from influenza would be a positive influence; 17.5% said that increased availability of the vaccine would be a positive influence; 5% said that no side effects of the vaccine would be a positive influence (Canning et al., 2005). Of the 11 participants who received the

vaccine, 36.4% mentioned that they receive it every year. As well, the main reason mentioned for receiving the vaccine was chronic illness (Canning et al., 2005).

Regarding their thoughts of the benefits of vaccinating HCWs, 105 participants answered this question and results indicated: 43.8% considered that vaccination would decrease sick leave of HCWs; 27.6% considered that vaccination would provide personal protection against flu; 18.1% considered that there would be no benefit of vaccinating HCWs; 10.5% considered that vaccination would protect patients from flu (Canning et al., 2005).

In summary, it was apparent that lack of knowledge about the influenza vaccine, in particular about its benefits and side-effects, appeared to be the major cause for the low vaccine uptake. Approximately half of the participants were either not aware of the vaccine or did not consider they were in need for it. As well, no more than 10% of the participants were aware of the benefits of the vaccine including the protection of patients against the serious complications of acquiring influenza. However, most of the respondents were aware of the major benefits of the vaccine with respect to personal protection against flu and decrease in sick leave (Canning et al., 2005). In addition, vaccine availability affected its uptake among some HCWs since the Occupational Health Department responsible for staff influenza vaccination offered the vaccine only one day per week during working hours. As a result, certain groups of staff had difficulty accessing this service such as those working night shifts (Canning et al., 2005). Half of the non-vaccinated participants mentioned that they would be influenced to be vaccinated in the future. This was a cheering finding from this study for the development of an intensive hospital promotional program which would significantly increase the vaccination rate (Canning et al., 2005). One of the barriers to vaccination

referred to by about one-fifth of the participants was the unavailability of the vaccine on the wards. Those participants mentioned that they would be influenced to receive the vaccine in the future if it is to be offered on the wards or had increased availability (Canning et al., 2005). It was revealed in this study that influenza vaccination was not significantly associated with age, gender, having children at home, ward type or shift pattern (Canning et al., 2005).

In another study, Johansen et al. (2011) inspected the correlation between Triandis model factors (intention, habit, facilitating conditions, and social, cognitive, and affective factors) and nurses' decisions concerning influenza vaccinations in order to understand why some get vaccinated while others do not. The descriptive correlational design was used and the selected sample included 193 registered nurses in North and South Dakota (Johansen et al., 2011). The tool for this study was titled: "Registered Nurses Influenza Vaccination Questionnaire (RNIVQ)" (Johansen et al., 2011).

In this study, 50.1% of the participants strongly agreed that receiving the influenza vaccine was a habit for them, 78.7% strongly agreed that influenza and its complications can be serious, 43.9% strongly agreed that HCWs are at a higher risk of acquiring influenza than the general public, and 32.3% strongly agreed that they were knowledgeable of CDC recommendations for HCWs influenza vaccinations (Johansen et al., 2011). Moreover, 6.5% of the participants mentioned that their employers charge for the influenza vaccination, whereas 3.9% mentioned that their employers do not offer it at all (Johansen et al., 2011). On the other hand, 89.1% of the participants mentioned that obtaining the flu vaccine was made somewhat or extremely easy by their employer (Johansen et al., 2011). Only 1.9% mentioned that they were required to receive the flu

vaccine by their employer unless medically contraindicated and 80.6% mentioned that they were strongly recommended by their employer to receive the vaccine (Johansen et al., 2011).

Regarding the cognitive factor items, it was revealed that 32.3% of the participants strongly agreed with the item “flu vaccine is effective in preventing influenza illnesses in healthcare workers”. As well, it was shown that 40.6% of the participants strongly agreed that the influenza vaccine prevents the spread of influenza to patients, with 33.5% strongly agreeing that the influenza vaccine is effective in preventing influenza-related hospitalizations in vaccinated persons. More than half of the participants (52.3%) strongly agreed that the influenza vaccine cannot give the recipient influenza and 61.3% strongly agreed that the benefits of the influenza vaccine outweigh the risks of side effects, whereas 2.6% strongly agreed that the vaccine can cause the disease (Johansen et al., 2011).

Regarding the intention factor items, it was revealed that 9.7% of the participants strongly disagreed with the statement “I intend to get the flu vaccine every year.” As well, 9% of the participants mentioned that it is highly unlikely that they would plan to get vaccinated in the next influenza season (Johansen et al., 2011).

Regarding the social factors items, it was revealed that 34.8% of the participants strongly agreed that it is the HCWs professional responsibility to be vaccinated annually, and 65.2% of the participants strongly agreed that their employer believed they should be vaccinated (Johansen et al., 2011).

Regarding the affective factor items, it was revealed that 60% of the participants felt being vaccinated against influenza would be extremely good, 53.5% felt it would be

extremely safe, 51.6% felt it would be extremely valuable, 60.6% felt it would be extremely wise, and 36.8% felt it would be extremely rewarding (Johansen et al., 2011).

With respect to the demographic characteristics, there were no significant differences between the participants who mentioned being vaccinated against flu yearly and those who did not (Johansen et al., 2011).

Regarding the cause behind the CDC recommendation of influenza vaccination for healthcare workers, the results were as follows: 42.6% of the participants mentioned that it is recommended to protect patients, 36.1% mentioned that it is recommended to protect healthcare workers, and 31% mentioned that it is recommended to prevent the general spread of influenza (Johansen et al., 2011). Regarding the reasons behind vaccination of HCWs against flu, the results were as follows: 46.5% mentioned HCW flu vaccination protects oneself, 33.5% mentioned HCW flu vaccination protects patients, and 31.6% mentioned HCW flu vaccination decreases and prevents the incidence of influenza in general (Johansen et al., 2011).

In summary, this study revealed that the participants who agreed that the flu vaccine can give the recipient influenza and those who disagreed that side effects are rare were both less likely to report having been vaccinated in the past and had lower scores for both habit and intention (Johansen et al., 2011). In addition, it was revealed that not only knowledge motivated nurses to be vaccinated, but other factors may have affected nurses' decision to be vaccinated. This study showed a significant result as stated by Johansen and colleagues: "Respondents who believed that the influenza vaccine is effective in preventing influenza and that vaccination of HCWs prevents the spread of influenza to patients were more likely to report having been consistently vaccinated over the last ten years, more likely to report greater intention to be

vaccinated, and more likely to report getting vaccinated as a habit” (Johansen et al., 2011, p.121).

Zhang et al. (2012) examined the relationship between knowledge, risk perceptions, health beliefs towards seasonal influenza and vaccination and the vaccination behaviors of nurses (Zhang *et al.* 2012). The design of this study was cross-sectional and its target population was qualified nurses attending continuing professional education courses at a large university in central London (Zhang et al., 2012). Data collected through the questionnaire incorporated knowledge about seasonal influenza and vaccination, risk perception towards influenza and pandemic, health locus of control dimensions assessed by the Multidimensional Health Locus of Control (MHLC) scales, vaccination behaviors, reasons for accepting or refusing vaccination, and demographic characteristics (Zhang et al., 2012).

The strongest predictor of vaccination status in this study was the risk perception score. That is, it was indicated that respondents who had higher risk perception scores were >1.76 times more likely to have been vaccinated than those with lower scores. As well, it was indicated that knowledgeable respondents were more likely to be vaccinated than the unknowledgeable (Zhang et al., 2012).

After two step cluster analysis, it was shown that the never vaccinated participants had the lowest knowledge score, risk perception score and powerful others sub-score of MHLC. This result was statistically significant (Zhang et al., 2012). In addition, the vaccination behaviors in nurses were more complex necessitating an analysis of both vaccinated and unvaccinated nurses’ behaviors (Zhang et al., 2012). A strong predictor of nurses’ vaccination behaviors was lack of knowledge about influenza and vaccination, principally for those who had never been vaccinated. Also, it

seemed that it was a habit for some not to be vaccinated (Zhang et al., 2012). Knowledge levels were not significantly different between those occasionally vaccinated and continuously vaccinated; nevertheless, on average higher knowledge scores than those continuously vaccinated were found in the newly vaccinated in 2009. This increase in their risk perceptions towards influenza could be explained by the widespread reporting of the risks in the media encouraging them to be vaccinated for the first time in their lives. It was recommended that timing might be essential to the success of vaccination campaigns and subsequently making behavior alteration easier (Zhang et al., 2012).

Furthermore, this study showed that the perception of personal vulnerability to illness was an important factor in nurses making vaccination decisions. Yet, the perceptions of the negative consequences of contracting influenza and severity of influenza were not important factors. This proposed that focusing on the negative consequences of contracting influenza in future educational campaigns might be more effective than focusing on the nurses' professional responsibility to protect patients or other susceptible groups (Zhang et al., 2012).

The reasons provided by nurses for having vaccination focused on their personal health motivation rather than a professional responsibility. The two main reasons provided by nurses for not having a vaccination were concerns about the vaccine's side-effects and effectiveness or safety. This indicated the ongoing misconceptions about influenza vaccine in nurses (Zhang et al., 2012).

The aim of a study conducted by Poland, Ofstead, Tucker, and Beebe (2008) was to assess the perceptions of RNs regarding influenza-prevention initiatives which

included mandatory vaccination policies and policies that require influenza vaccination while permitting informed declination (Poland et al., 2008).

Of the 93-item survey, seven questions evaluated RNs' preferences regarding participation in an influenza prevention program and assessed their receptivity to mandatory influenza vaccination policies. As well, the survey questioned if the participants would support a policy that required all HCWs with direct patient contact to get annual influenza vaccination, either as a flu shot or as a nasal spray influenza vaccine, except if there is a medical or religious contraindication or a signed, informed declination. Included in the survey were questions concerning information receipt, knowledge, and behaviors related to vaccination and influenza-like illness. The relationship between various factors and HCWs' opinions about influenza prevention programs and policies was evaluated by means of responses for these items (Poland et al., 2008).

Of those who had received the influenza vaccine in the past, 65.3% supported mandatory vaccination, and only 20.6% of those who had never been vaccinated supported mandatory vaccination. This revealed that there was an association between past reception of influenza vaccination and opinions about mandatory vaccination. Also, those who considered that they had received all the required information that aided them to make good decisions about influenza vaccination were more likely to believe that it was appropriate to have a mandatory vaccination policy (Poland et al., 2008).

Despite working at an institution with widespread education and convenient access to vaccination, just 64.5% of RNs had the intention to receive the influenza vaccine during the forthcoming influenza season. However, it was a surprising finding to the researchers that the majority of RNs (59.3%) favored that influenza vaccination

be a required immunization with the allowance of informed declination (Poland et al., 2008).

The objective of a cross-sectional survey conducted by Ofstead, Tucker, Beebe, and Poland (2008) among RNs was to assess their receipt of information and knowledge about influenza and vaccination, in addition to their influenza vaccination status and reasons for declining vaccination. RNs were the chosen population for this study due to their close contact with patients and other staff, their number being the largest number among HCWs, and their influenza vaccination rate being the lowest among HCWs. This study was conducted during influenza prevention program that is based on education and reminders to encourage individuals to request vaccination voluntarily (Ofstead, Tucker, Beebe, & Poland, 2008). The Health Belief Model (HBM) was used to design the survey. The number of participants in this study was 513 RN (Ofstead et al., 2008).

The majority of the respondents (86.7 %) had received influenza vaccination previously, and 64.5% had the intention to receive the vaccine during the 2005/6 influenza season. Those previously vaccinated were much more likely to intend to be vaccinated [326 out of 445, i.e. 73.3%] the next season as compared to those who were never vaccinated [5 out of 68, i.e.7.4%] (Ofstead et al., 2008). Only 13.3% of the participant RNs had never been vaccinated against influenza, and what appeared to influence their decision were their beliefs and preferences. Of those, 62.7% mentioned that the vaccine should be used for other people at higher risk, 57.1% mentioned that they had a concern about vaccination side effects, 44.4% mentioned that they were not at high risk for influenza, 34.9% mentioned that they disliked receiving injections, 31.3% mentioned that influenza vaccine was not effective, 8.1% mentioned that they

did not have time to get vaccinated, and none (0%) mentioned that there was no insurance coverage for vaccination (Ofstead et al., 2008).

Regarding educational interventions and cues to action, more than 90% of the respondents mentioned that they were exposed to educational bulletins, and most mentioned that they had received information about influenza severity (74.7%), transmission (77.6%), vaccine safety (81.1%), and the time and location of free vaccination (89.7%). Around 90% of the respondents mentioned that they were aware of the presence of influenza prevention policies and the availability of free vaccine at work. 85% of the respondents believed that they received all the required information to make good decisions about vaccination (Ofstead et al., 2008).

Regarding the knowledge items, only 9.6% of the respondents answered correctly more than 85% of the knowledge questions (with 1% answered all of the questions correctly and 8.6% answered 12 of 13 questions correctly). The mean number of correct answers was 9.6 (73.8%), SD was ± 1.55 , and range was 0-13 correct answers. More than 95% of the participants correctly answered the question indicating that influenza is a serious condition transmitted primarily by coughing and sneezing; that symptoms include fever, headache, cough, sore throat, and bodily aches; and that they were susceptible to influenza (Ofstead et al., 2008).

Receipt of information about vaccine safety and effectiveness was positively associated with the intention to receive vaccination. There was a positive association between prior vaccination status and receipt of information about vaccine safety with a p value of 0.004 and effectiveness with a p value of 0.03. As well, 286 RNs (66.8%) pointed out that they intended to receive vaccination. The RNs who mentioned that they had received all the information required to aid them in deciding about vaccination were

significantly ($P < 0.001$) more likely to mention previous vaccination (89.2%) and intention to be vaccinated in the future (68.1%) than the 32 RNs who did not believe they had received sufficient information. Of those 32 RNs, 78.1% mentioned past vaccination and 56.3% mentioned having intention to be vaccinated in the future (Ofstead et al., 2008).

No association was found between RNs' intention to be vaccinated and their exposure to particular types of educational interventions and cues to action that have been executed by Mayo Clinic annually such as posters, bulletins, written reminders, and support from supervisors to receive influenza vaccine. As well, no association was found between intention to be vaccinated and the receipt of information about certain topics regarded as significant under the HBM. In addition, no association was deducted between knowledge and self-reported previous vaccination status except for one item on the knowledge test where RNs were more likely to intend to receive vaccination if they did not believe that the injected influenza vaccine contained live viruses that could cause influenza, compared with RNs who believed that the injected influenza vaccine contained live viruses (Ofstead et al., 2008).

Ofstead et al. (2008) concluded that the improvement in influenza vaccination rate at Mayo Clinic to reach 76.5% was attributed not only to educational interventions, but to the cumulative impact of education, cues to action, improved vaccination access, and incentives (Ofstead et al., 2008).

In their study, Khazaeipour et al. (2010) aimed at finding out the influenza vaccination coverage in the 2008/09 vaccination season among HCWs in Tehran, Iran, and at evaluating the knowledge, attitudes and practices of HCWs to validate the compliance with national guidelines and the feasibility of implementing the

recommendations of the CDC (Khazaeipour et al., 2010). Between October 2008 and February 2009, this cross-sectional survey study was conducted among HCWs reporting to the Health Deputy of the Tehran University of Medical Science, Tehran, Iran who had received free influenza vaccine over the past 3 years (Khazaeipour et al., 2010).

Out of the 139 participants, 18% were nurses and midwives. Around 80.6% of the participants pointed out that they had taken an influenza vaccine previously and 66.9% of the participants mentioned that the influenza vaccine is available for free at their workplace (Khazaeipour et al., 2010). More than half of the participants (65.4%) mentioned that they would take the vaccine in the next year, and 12.9 % mentioned that if the vaccine will be administered for free the next year, they would receive it. The effectiveness of the influenza vaccine was the main reason mentioned by the participants for receiving it. Those participants constituted 51.4% of the vaccinated participants. Also, of the vaccinated participants, 43.2% mentioned that influenza is a serious disease, 43.2% mentioned that they are at risk due to the nature of their work, and 32.4% mentioned that they are influenced by media reports (Khazaeipour et al., 2010).

Merely 19.4% of the total participants did not receive the influenza vaccine in the past year. Of those participants, 23.1% had concerns about adverse effects and 20% believed that the vaccine was not needed. Those reasons were the two major reasons for not being vaccinated (Khazaeipour et al., 2010).

The mean knowledge scores varied between educational levels; however, between males and females there was no significant difference in mean knowledge scores (Khazaeipour et al., 2010). Of the total participants: 39.6% considered that immunization itself can cause influenza, 93.5% knew that the influenza vaccine must be

received on an annual basis, 74.8% believed that persons aged 50 years of age and more and physicians and nurses ought to be vaccinated against influenza, 64.7% considered that immunizing long-term care residents is desirable, and 58.3% considered that immunizing the members of households with high-risk patients is a must (Khazaeipour et al., 2010).

The knowledge scores of midwives and nurses were significantly lower than those of other groups in spite of their close contact to high-risk groups with a p-value = 0.006 (Khazaeipour et al., 2010). The knowledge of medical physicians and dentists was significantly higher than that of other groups with a p-value = 0.008. It was revealed that HCWs who generally received the influenza vaccine were those who believed that it is a professional responsibility to adopt such a behavior (Khazaeipour et al., 2010)

The mean knowledge score about influenza vaccination among HCWs was 17.37 which is a high score (Khazaeipour et al., 2010) as compared with a mean knowledge score of 9.6 in the study of Ofstead et al (cited in Khazaeipour et al., 2010). The majority of HCWs did not know that antibodies against vaccine antigens have a survival period of six months in the body, with immunity starting at two weeks post vaccination. Also, 38.1% of the total participants had the misconception that the influenza vaccine could cause influenza infection (Khazaeipour et al. 2010).

In summary, this study revealed that the main reasons for not being vaccinated as provided by the participants were concerns about vaccine side effects, the belief that immunization was not needed, unavailability of vaccine, forgetting and lack of time, belief in low efficacy of the vaccine, and lack of interest (Khazaeipour et al., 2010).

2.4 Recommendations to Improve Influenza Vaccination Rates

Extensive and persistent efforts to overcome the lack of knowledge about the influenza vaccine and the interest in it were one of the recommendations yielded by the study of Canning et al. (2005) to significantly increase the influenza vaccine uptake by HCWs. Another recommendation was the creation of a more accessible vaccination service which covers the different shift patterns of the HCWs. Also, the funding of nurse immunizers to provide the vaccine on the wards would help increase the uptake of the vaccine. Canning et al. (2005) stated: “Prior to starting the vaccination program, an educational road show could visit all wards at different times to create awareness and interest in influenza and influenza vaccination. This could also be an ideal opportunity to allay fears and correct misconceptions that have developed around influenza vaccine (Canning et al., 2005, p. 925)”.

Poland et al. (2008) suggested the implementation of policies that require annual influenza vaccination for HCWs which would protect other HCWs and ensure a healthy workforce and at the same time would protect the health of both patients and the public (Poland et al., 2008).

Khazaeipour et al. (2010) recommended on-going education for HCWs about influenza, vaccine action, and CDC recommendations in order to increase the rate of influenza vaccination coverage in Iran. Also, they recommended training sessions and organized staff meetings to improve vaccine uptake among nurses and nurse assistants (Khazaeipour et al., 2010).

Ofstead et al. (2008) suggested that an ecological model which considers the environment that surrounds individuals and incorporates elements related to interpersonal relations, institutions, communities, and public policy may be more

effective than efforts to increase vaccination rates by changing individual beliefs and behaviors (Ofstead et al., 2008). The environment needed to engage all HCWs in efforts to prevent influenza may be based on the recent guidelines and standards from the CDC which recommends that all HCWs receive influenza vaccination annually and that facilities educate HCWs and obtain signed declinations from those who are reluctant to receive vaccination for causes other than medical contraindications. Tracking HCWs influenza vaccination rates and using them as an indicator of patient safety are as well CDC recommendations. In summary, provision of education to HCWs about influenza and vaccination, documentation of HCWs vaccination rates, determining reasons for declination, and making program improvements based on this data are considered institutional requirements (Ofstead et al., 2008).

2.5 Theoretical Framework

The Health Belief Model (HBM), as it explains health behavior, was used in this study as a theoretical framework to explore how the RNs at the AUBMC think about influenza as a disease and about its vaccine. According to Rosenstock, Strecher, and Becker (1988), this model recommends that a person's health-related behavior depends on the person's perception of the following constructs (Rosenstock, Strecher, & Becker, 1988): (a) the severity of a potential illness; (b) the person's susceptibility to that illness; (c) the benefits of taking a preventive action; (d) the barriers to taking that action; (e) cues to action; and (f) self efficacy.

When applying the HBM to RNs behavior towards influenza vaccination, then it is implied that these constructs must be present for knowledge about disease in order to be transformed into preventive action. That is, in order for RNs to have perception of

threat to influenza, they must have the perception of their increased susceptibility to influenza, the perception of influenza severity, and the perception that potential benefits of being vaccinated outweigh the potential barriers to it. In addition, RNs should be supported by adequate cues to action such as posters, educational sessions, etc... Afterwards, the RNs will perceive the benefits of taking the preventive action which is receiving the influenza vaccine.

CHAPTER 3

METHODS

3.1 Overview of the Chapter

This chapter explains the methodology used in the study. It presents the study design and setting, the study population, questionnaire development, data collection, and ethical considerations. It also describes the data management process, the study variables, and the statistical data analyses.

3.2 Study Design and Setting

This study is quantitative, cross-sectional, descriptive correlational. It was conducted at the American University Medical Center (AUBMC).

3.3 Study Population and Sample

The target population was the registered nurses (RNs) at AUBMC. Included in the study were: (1) all RNs at AUBMC with direct patient contact, (2) out-patient departments' RNs because they have direct patient contact, even though their contact is less than the in-patient departments' registered nurses. Nurse Managers and RNs at the administration level were excluded from the study since they have very minimal or no patient contact.

3.3.1 Sample Size Determination

The total number of nurses who met the study inclusion criteria was 594 (This number was provided by the Nursing Office Administration). The expected response rate for this study was 50-60%. Therefore we expected to collect between 297 and 357 questionnaires.

3.4 Questionnaire Development

The questionnaire was adopted from the literature, mainly from the article titled: “Influenza Vaccination among Registered Nurses: Information Receipt, Knowledge, and Decision-Making at an Institution with a Multifaceted Educational Program” by Ofstead and colleagues (Ofstead et al., 2008). This questionnaire was designed based on the Health Belief Model which was the framework of the current study. Minimal changes were introduced to fit the setting. Ofstead et al. (2008) pointed out that this questionnaire was reviewed by the research team prior to data collection. It is important to note that the questionnaire was developed following an extensive literature review and consultation with experts in public health, vaccine research, nursing research and survey design (Ofstead et al., 2008). Prior to data collection, the questionnaire was pilot tested among five RNs for clarity, length and ease of understanding. It required a maximum of ten minutes to be completed. No changes were made based on the RNs input. Those five RNs were not included in the final sample. The questionnaire was self-administered in the English language only since, all the RNs at AUBMC can read and write English as speaking and reading English is a criterion for RN employment at AUBMC.

3.4.1 Content

The front page of the questionnaire incorporated an invitation letter describing the questionnaire and inviting the RNs to participate in the research study. Followed by the invitation letter was the informed consent which incorporated the purpose of the study, the method to complete the questionnaire, benefits and potential risks of participation, and a statement of the confidentiality of answers. The consent also included information related to the investigator's address and phone number, and the site of the study. The questionnaire included the following five sections:

- Section I: Demographic Data and Background
- Section II: Influenza Vaccination Status
- Section III: Reasons for Not Receiving the Influenza Vaccine for the Last Influenza Season (2013-2014)
- Section IV: Knowledge and Beliefs About Influenza and Influenza Vaccination Among the Participants
- Section V: Evaluation of the Influenza Vaccination Activities Provided at AUBMC

Section I: Demographic Data and Background

The demographic data collected were: (1) Gender of the participant, (2) Age (20-30, 31-40, 41-50, 51-60 and 61-70), (3) Highest Education Level attained by the participant (Diploma, Bachelor's Degree, Master's Degree, or Doctoral Degree), (4) Unit of the participant's current employment (inpatient or outpatient), and the total years of experience as an RN (0-10, 11-20, 21-30, 31-40, or 41-50).

Section II: Influenza Vaccination Status

This section assessed two items:

- 1- Intention: whether the participant had the intention to be vaccinated the next upcoming influenza season (since intention may be related to knowledge and behavior). The answer was either yes or no.
- 2- Receipt of the influenza vaccine: whether the participant had received the vaccine during the last season; that is, between September and November of the year 2013. The answer was either yes or no. The vaccination rate was calculated from this item.

Those who answered “No” on this item filled section III, IV, and V. Those who answered “Yes” skipped section III and filled section IV and V directly.

Section III: Reasons for Not Receiving the Influenza Vaccine for the Last Influenza Season (2013-2014)

This section was completed only by RNs who did not receive the influenza vaccine. It included reasons for declining influenza vaccination. The participant could choose more than one reasons from the following list:

- a- I consider influenza vaccine should be used for other people at higher risk
- b- I have concerns about influenza vaccination side effects
- c- I consider myself not at high risk for influenza
- d- I dislike receiving injections
- e- I consider that influenza vaccine is not effective
- f- I did not have time to get vaccinated
- g- I just did not want to get the vaccine

Section IV: Knowledge and Beliefs about Influenza and Influenza Vaccination among the Participants

This section assessed the knowledge and beliefs about influenza and its vaccine among RNs. Items included basic knowledge statements, in addition to statements representing the four dimensions of the Health Belief Model (perception of severity, perception of susceptibility, perception of benefits, and perception of barriers).

Knowledge and beliefs were then analyzed if they were related to receptivity of the influenza vaccine.

The participant placed a “√” in the box reflecting if the statement was true or false. The participant could answer by “not sure” if he/she was not sure if the statement was true or false. The statements were:

- 1- Healthcare workers are less susceptible to influenza infections than other people (This statement is false, and it represents perception of susceptibility as per the Health Belief Model)
- 2- Influenza is more serious than a “bad cold” (This statement is true, and it represents perception of severity as per the Health Belief Model)
- 3- Influenza is transmitted primarily by coughing and sneezing (This statement is true and it is a basic knowledge statement)
- 4- Symptoms typically appear 8 to 10 days after a person is exposed to influenza (This statement is false and it is a basic knowledge statement)
- 5- Adults with influenza commonly experience nausea and vomiting or diarrhea (This statement is false and it is a basic knowledge statement)

- 6- The signs and symptoms of influenza include fever, headache, sore throat, cough, nasal congestion, and aches and pains(This statement is true, and it represents perception of severity as per the Health Belief Model)
- 7- Healthcare workers can spread influenza even when they are feeling well(This statement is true, and it represents perception of susceptibility as per the Health Belief Model)
- 8- People with influenza can transmit the infection only after their symptoms appear (This statement is false, and it represents perception of susceptibility as per the Health Belief Model)
- 9- Influenza is transmitted primarily by contact with blood and body fluids (This statement is false and it is a basic knowledge statement)
- 10- Influenza vaccination may not work if the vaccine contains the wrong mix of viruses (This statement is false and it is a basic knowledge statement)
- 11- The flu shot contains live viruses that may cause some people to get influenza (This statement is false and it represents perception of barrier as per the Health Belief Model)
- 12- Influenza vaccination does not work in some persons, even if the vaccine has the right mix of viruses (This statement is true and it represents perception of benefit as per the Health Belief Model)
- 13- New influenza vaccine is produced annually (This statement is true and it is a basic knowledge statement)
- 14- October is the best time to receive influenza vaccine (This statement is true and it is a basic knowledge statement)

15- The influenza vaccine must be received annually (This statement is true and it is a basic knowledge statement)

16- Side effects of vaccine are common (This statement is true and it represents perception of barrier as per the Health Belief Model)

17- Immunity against influenza starts 2 weeks after being vaccinated (This statement is true and it represents perception of benefit as per the Health Belief Model)

Section V: Evaluation of the Influenza Vaccination Activities Provided at AUBMC

This section included items to evaluate the influenza vaccination activities provided at AUBMC for healthcare workers in order to improve those activities, if needed. This in turn can enhance the influenza vaccination rate in the future.

The participants indicated their level of agreement on each of the following statements, on a scale 1 – 5 where 1 indicates “strongly disagree” and 5 “strongly agree”:

- 1- Posters or bulletins about influenza were present during the influenza season at the unit I work in
- 2- Free influenza vaccination was offered at AUBMC
- 3- A reminder was sent by email to receive the influenza vaccine
- 4- I received information about time and location for free influenza vaccination at AUBMC
- 5- I received information about safety and risks associated with influenza vaccination
- 6- I received information about contraindications for receiving influenza vaccination

- 7- I received information about risk of healthcare workers transmitting influenza to patients
- 8- I received information about severity of influenza
- 9- I received information about effectiveness of influenza vaccination
- 10- I received information about other ways to help prevent influenza transmission

The participants' responses indicated their clues of action and agreement regarding the influenza vaccination activities. Improvement plans were proposed based on the results.

3.5 Data Collection

Data collection started after securing IRB approval over three consecutive weeks from April 7, 2014 till April 28, 2014. This period was exterior to the time frame recommended for the reception of the influenza vaccine, to make sure that those who regularly receive the vaccine had already received it. The study coordinator Ms. Fatima Dirani, distributed the questionnaire to the RNs. Completed questionnaires were put in a sealed envelope and left in the nurse manager's office or with the nurse in charge. Later on, the study coordinator collected the filled questionnaires from the nurse managers and the nurses in charge. It is important to note that not all of the distributed questionnaires were returned back. Of the 350 distributed questionnaires, only 208 filled questionnaires were returned. Therefore, the response rate based on this sample was 59.6%.

3.6 Ethical Considerations

All the collected questionnaires are stored in a locked cabinet at the School of Nursing at AUB. Each questionnaire was given a number as a code to guarantee confidentiality and serve the purpose of the study.

3.6.1 IRB Approval

AUB Institutional Review Board approval was secured prior to conducting the study. Professor Mary Arevian, the principal investigator of the study, was given the approval to conduct the study on April 2, 2014. The study required an expedited review from the IRB. Professor Mary Arevian was the first and Dr. Souha Fares was the second reviewer of the study.

3.6.2 Informed Consent

RNs participating in this study read an informed consent and their decision to fill the questionnaire were considered as consent to participate in the study. Notably, participation in this study was voluntary and anonymous and did not cause any harm to the participants.

3.7 Measures

3.7.1 Dependent Variable

- The main dependent variable was the uptake of the influenza vaccine for the last influenza season from September till November 2013 (yes/no).

3.7.2 Independent Variables

The independent variables were:

- Demographic and background characteristic which included: age, gender, highest level of education, unit and years of experience
- Knowledge and Beliefs: knowledge and beliefs were measured in section 4 of the questionnaire (each item in this section was answered by true, false, or not sure). New dichotomous variables were later created, taking the value 1 if the RN has the correct answer and 0 otherwise (i.e. wrong answer or not sure)
- Evaluation of the Influenza Vaccination Activities Provided at AUBMC (Likert scale 1 - 5). A total score was computed by summing individual scores on the ten items.

3.8 Statistical Analysis

Data were entered and analyzed using SPSS version 21 for Windows. Descriptive Statistics were used to summarize the characteristics of the study participants and to compute the rate of nurses who took the vaccine in the sample (objective 1). Univariate and bivariate logistic regression models were carried out to study the unadjusted and adjusted associations between the dependent variable “Reception of influenza vaccine” and the set of independent variables. Odds ratios and their 95% confidence intervals were computed (objective 2). A p-value ≤ 0.05 was considered significant.

CHAPTER 4

RESULTS

4.1 Overview of the Chapter

This chapter presents the results of descriptive statistics, bivariate analysis and multivariate analysis.

4.2 Descriptive Statistics

A total of 210 filled questionnaires were received at the end of the third week of data collection. Only two missing data were found in the knowledge questions and were removed from the analysis.

4.2.1 Demographic Data

The majority of the RNs were females (68.1%), and 69.5% belonged to the age group (20-30). Most of the RNs had earned a bachelor's degree (63.3%), and 80.5% work in inpatient units. The majority of the RNs (79.4%) have between 0-10 years of experience.

Out of the 210 participants, 45 received the influenza vaccine for the last influenza season. That is, the vaccination rate from this sample was 21.4%. It is worth noting that only 32.4% of the RNs had the intention to receive the influenza vaccine the next upcoming season (2014-2015).

Table 1 illustrates the demographic data and the intention to receive the influenza vaccine for the whole sample and by vaccination status.

Table 1: Demographic Data of Participating RNs and their Intention to Influenza Vaccine Reception

Variable		N (%) 210	Reception N (%)	
			No =165 (78.6%)	Yes= 45 (21.4%)
Gender	Male	67 (31.9%)	51 (76.1%)	16 (23.9%)
	Female	143 (68.1%)	114 (79.7%)	29 (20.3%)
Age	20-30	146 (69.5%)	114 (78.1%)	32 (21.9%)
	31-40	46 (21.9%)	36 (78.3%)	10 (21.7%)
	41 & above	18 (8.6%)	15 (83.3%)	3 (16.7%)
Education	Diploma	12 (5.7%)	10 (83.3%)	2 (16.7%)
	Bachelor's Degree	133 (63.3%)	104 (78.2%)	29 (21.8%)
	Master's Degree	65 (31%)	51 (78.5%)	14 (21.5%)
Unit	Inpatient	169 (80.5%)	132 (78.1%)	37 (21.9%)
	Outpatient	41 (19.5%)	33 (80.5%)	8 (19.5%)
Experience	0-10	166 (79.4%)	132 (79.5%)	34 (20.5%)
	11 & above	43 (20.6%)	32 (74.4%)	11 (25.6%)
Intention	No	142 (67.6%)	133 (93.7%)	9 (6.3%)
	Yes	68 (32.4%)	32 (47.1%)	36 (52.9%)

4.2.2 Reasons for not receiving the Influenza Vaccine

Majority, 165 participants out of 210 (78.6%), did not receive the influenza vaccine. The most two common reasons given by participants for not receiving the influenza vaccine were considering that influenza vaccine is not effective (42.8%) and having concerns about influenza vaccination side effects (31.3%). It is important to note that 21.1% of the participants who did not receive the influenza vaccine mentioned that they did not have time to get vaccinated. Table 2 illustrates the reasons provided by RNs who did not receive the influenza vaccine.

Table 2: Reasons for not receiving the Influenza Vaccine

Reason	Proportion (%) of Respondents
I consider influenza vaccine should be used for other people at higher risk I consider that influenza vaccine is not effective	19 (11.4%)
I have concerns about influenza vaccination side effects	52 (31.3%)
I consider myself not at high risk for influenza	16 (9.6%)
I dislike receiving injections	28 (16.9%)
I consider that influenza vaccine is not effective	71 (42.8%)
I did not have time to get vaccinated	35 (21.1%)
I just did not want to get the vaccine	28(16.9%)

4.2.3 Knowledge of RNs about Influenza and Influenza Vaccination

Correct answers to the knowledge questions were common. For instance, all participating RNs correctly answered (by true) that the signs and symptoms of influenza include fever, headache, sore throat, cough, nasal congestion, and aches and pains. Also,

89.4% of the participating RNs correctly answered (by false) that healthcare workers are less susceptible to influenza infections than other people. Moreover, 93.3 % of the participating RNs correctly answered (by true) that influenza is transmitted primarily by coughing and sneezing, and 89.9% of the participating RNs correctly answered (by true) that the influenza vaccine must be received annually.

Incorrect answers to knowledge questions were also common. For instance, only 41.8% of the participating RNs correctly answered (by false) that symptoms typically appear 8 to 10 days after a person is exposed to influenza. Also, 24.5% of the participating RNs correctly answered (by false) that the flu shot contains live viruses that may cause some people to get influenza, and 43.8% of the participating RNs correctly answered (by true) that immunity against influenza starts 2 weeks after being vaccinated.

Table 3 illustrates the knowledge of RNs about influenza and influenza vaccination. Correct responses are highlighted.

Table 3: Knowledge of RNs about Influenza and Influenza Vaccination

Survey Question (correct response)	Proportion (%) of Responses		
	False	True	Not Sure
1- Healthcare workers are less susceptible to influenza infections than other people (False)	186 (89.4%)	17 (8.2%)	5 (2.4%)
2- Influenza is more serious than a “bad cold” (True)	27 (13%)	152 (73.1%)	29 (13.9%)
3- Influenza is transmitted primarily by coughing and sneezing (True)	10 (4.8%)	194 (93.3%)	4 (1.9%)

4- Symptoms typically appear 8 to 10 days after a person is exposed to influenza(False)	87 (41.8%)	69 (32.2%)	52 (25%)
5- Adults with influenza commonly experience nausea and vomiting or diarrhea(False)	115 (55.3%)	47 (22.6%)	46 (22.1%)
6- The signs and symptoms of influenza include fever, headache, sore throat, cough, nasal congestion, and aches and pains (True)	0 (0%)	208 (100%)	0 (0%)
7- Healthcare workers can spread influenza even when they are feeling well (True)	22 (10.6%)	166 (79.8%)	20 (9.6%)
8- People with influenza can transmit the infection only after their symptoms appear(False)	143 (68.8%)	42 (20.2%)	23 (11.1%)
9- Influenza is transmitted primarily by contact with blood and body fluids(False)	176 (84.6%)	21 (10.1%)	11 (5.3%)
10- Influenza vaccination may not work if the vaccine contains the wrong mix of viruses (True)	24 (11.5%)	120 (57.7%)	64 (30.8%)
11- The flu shot contains live viruses that may cause some people to get influenza(False)	51 (24.5%)	124 (59.6%)	33 (15.9%)
12- Influenza vaccination does not work in some persons, even if the vaccine has the right mix of viruses (True)	32 (15.4%)	119 (57.2%)	57 (27.4%)
13- New influenza vaccine is produced annually (True)	6 (2.9%)	146 (70.2%)	56 (26.9%)
14- October is the best time to receive influenza vaccine (True)	16 (7.7%)	142 (68.3%)	50 (24%)

15- The influenza vaccine must be received annually (True)	10 (4.8%)	187 (89.9%)	11 (5.3%)
16- Side effects of vaccine are common (True)	39 (18.8%)	133 (63.9%)	36 (17.3%)
17- Immunity against influenza starts 2 weeks after being vaccinated (True)	13 (6.3%)	91 (43.8%)	104 (50%)

4.2.4 Evaluation of the Influenza Vaccination Activities at AUBMC

Means, medians and inter-quartile range (IQR) were used to describe the participants' ratings on the influenza vaccination activities offered at AUBMC. The participants indicated their level of agreement on a five-point likert scale for 10 statements (1=Strongly Disagree, 2= Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree). All items were positively stated.

Most of the participants “agreed” that free influenza vaccination was offered at AUBMC” (median= 4 and mean = 4.17). In addition, most of the participants tended to agree that a reminder was sent by email to receive the influenza vaccine (median= 4 and mean=3.95) and that they received information about time and location for free influenza vaccination at AUBMC (median= 4 and mean=3.86).

Most of the participants “did not agree” that posters or bulletins about influenza were present during the influenza season at the unit they work in (median =2 and mean = 2.63). In addition, participants did not agree that they received information about contraindications for receiving influenza vaccination (median =2 and mean = 2.54).

Many participants tended to be neutral with respect to receiving information about safety and risks associated with influenza vaccination (median= 3 and mean= 2.77), receiving information about risk of healthcare workers transmitting influenza to

patients (median= 3 and mean= 2.78), receiving information about severity of influenza (median= 3 and mean= 2.59), receiving information about effectiveness of influenza vaccination (median= 3 and mean= 2.68), and receiving information about other ways to help prevent influenza transmission (median= 3 and mean= 2.75).

Table 4 illustrates the results of the evaluation of the influenza vaccination activities at AUBMC.

Table 4: Evaluation of the Influenza Vaccination Activities at AUBMC

Evaluation	Median (IQR)	Mean
1- Posters or bulletins about influenza were present during the influenza season at the unit I work in	2 (2,4)	2.6333
2- Free influenza vaccination was offered at AUBMC	4 (4,5)	4.1714
3- A reminder was sent by email to receive the influenza vaccine	4 (4,5)	3.9524
4- I received information about time and location for free influenza vaccination at AUBMC	4 (3,5)	3.8619
5- I received information about safety and risks associated with influenza vaccination	3 (2,4)	2.7762
6- I received information about contraindications for receiving influenza vaccination	2 (2,3)	2.5429
7- I received information about risk of healthcare workers transmitting influenza to patients	3 (2,4)	2.7810
8- I received information about severity of influenza	3 (2,3)	2.5905

9- I received information about effectiveness of influenza vaccination	3 (2,4)	2.6810
10- I received information about other ways to help prevent influenza transmission	3 (2,4)	2.7524

4.2.5 Further Description of Knowledge and Evaluation

In order to better value the knowledge level of the participants, new dichotomous variables were then created, taking the value 1 if the RN has the correct answer and 0 otherwise (i.e. wrong answer or not sure).

Afterwards, the scores of total knowledge and total evaluation were computed by summing up individual scores on the new knowledge items and evaluation items separately. Means and standard deviations were obtained for further assessment of the knowledge and evaluation results with respect to reception and intention to receive the influenza vaccine. The maximum score for knowledge total is 17 and for evaluation total is 50.

The minimum score for total knowledge in the sample was 5 and the maximum score was 16. Therefore, none of the participants answered the whole knowledge questions correctly. The mean score for knowledge was 11.61 (SD = 2.18).

The minimum score for total evaluation was 10 and the maximum score was 50. The mean score for evaluation was 30.74 (SD = 7.58).

Table 5 illustrates the total knowledge and evaluation scores.

Table 5: Total Knowledge and Evaluation Scores

Variable (N)	Minimum	Maximum	Mean	SD
Knowledge Total (208)	5	16	11.6154	2.18828
Evaluation Total (210)	10	50	30.7429	7.58875

4.3 Bivariate and Multivariable Data Analysis

The mean knowledge score for those who did not receive the influenza vaccine was 11.43 (SD= 2.16), whereas, the mean knowledge score for those who received the influenza vaccine was 12.26 (SD= 2.15).

The mean evaluation score for those who did not receive the influenza vaccine was 30.16 (SD= 7.58), whereas, the mean evaluation score for those who received the influenza vaccine was 32.84 (SD=7.29).

Table 6 illustrates those scores.

Table 6: Total Knowledge and Evaluation Scores with respect to Vaccine Reception Status

Vaccine Reception Status		N	Mean	SD
Total Knowledge	No	163	11.4356	2.16891
	Yes	45	12.2667	2.15744
Total Evaluation	No	165	30.1697	7.58820
	Yes	45	32.8444	7.29245

In the unadjusted logistic regression analysis, none of the demographics was significantly associated with the reception of the influenza vaccine. However, intention was significantly associated with the reception of the influenza vaccine ($p = 0.00$). Those who intended to receive the vaccine were more likely to receive the vaccine than those who did not intend to receive the vaccine (OR= 16.625, 95% CI= 7.278- 37.979). Total knowledge was significantly associated with the reception of the influenza vaccine ($p = 0.026$). Those who answered more correct answers on the knowledge questions were more likely to receive the influenza vaccine than those who answered more wrong answers (OR= 1.202, 95% CI= 1.023- 1.414). Total evaluation was significantly

associated with the reception of the influenza vaccine ($p = 0.038$). Those who gave a higher rate for the influenza vaccination activities provided at AUBMC were more likely to receive the influenza vaccine than those who gave a lower rate for those activities (OR= 1.049, 95% CI= 1.003- 1.098).

In the multivariable logistic regression analysis, we included variables that were significant at $p < 0.2$ in the unadjusted analysis. We considered two logistic regression models for the dependent variable “reception of the vaccine”: Model one included intention, total knowledge, and total evaluation; Model two included total knowledge and total evaluation. In model one, only intention remained significantly associated with the reception of the influenza vaccine (OR = 15.153, $p < 0.001$). In model two, even though the overall model remained significant (add p of model), both knowledge total and evaluation total lost their significance. However, a trend towards significance was observed in the knowledge total score (OR = 1.171, $p = 0.063$).

Table 7 illustrates the unadjusted and adjusted analysis.

Table 7: Adjusted and Unadjusted Data Analysis

Variable		Unadjusted OR (95%CI)	Adjusted
Gender	(Male vs Female)	0.811 (0.405, 1.623)	
Age	(20-30 vs 31-40)	0.990 (0.443, 2.209)	
	(20-30 vs 41 & above)	0.713 (0.194, 2.615)	
Education	(Diploma & BS vs MSN & PHD)	1.009 (0.495, 2.058)	
Unit	(Inpatient vs Outpatient)	0.865 (0.368, 2.032)	

Experience	(0-10 vs 11 & above)	1.335 (0.611, 2.917)	
Intention	(No vs Yes)	16.625 (7.278, 37.979)	<u>Model 1:</u> 15.153 (6.497, 35.341) P = 0.00
Knowledge Total	(Wrong vs Correct)	1.202 (1.023, 1.414)	<u>Model 1:</u> 1.032 (0.846, 1.258) P = 0.758 <u>Model 2:</u> 1.171 P = 0.063
Evaluation Total	(Low Rate vs High Rate)	1.049 (1.003, 1.098)	<u>Model 1:</u> 1.027 (0.971, 1.085) P = 0.351 <u>Model 2:</u> 1.038 P = 0.112

CHAPTER 5

DISCUSSION

5.1 Overview of the Chapter

This chapter discusses major findings of the study, as compared to prior conducted studies. It also presents the limitations of the study and the recommendations/implications for practice.

5.2 Discussion

In this study, the influenza vaccination rate among AUBMC RNs was 21.4%. This rate is very low as compared by the CDC recommendations. This finding is consistent with other studies (Canning et al., 2005; Johansen et al., 2011; and Zhang et al., 2012). This low rate may be attributed to several reasons given by RNs. In our study, the major reasons given by participants for not receiving the influenza vaccine were considering that influenza vaccine is not effective (42.8%), having concerns about influenza vaccination side effects (31.3%), and not having time to get vaccinated (21.1%). This result confirms the ongoing misconceptions about influenza vaccine in nurses as shown in other studies. For instance, in their study Zhang et al. (2012) found that the two main reasons provided by nurses for not having a vaccination were concerns about the vaccine's side-effects and its effectiveness or safety. This finding was also established by studies conducted by Ofstead et al. (2008) and Khazaeipour et al. (2010). Moreover, giving time as a barrier to receiving the influenza vaccine lays a responsibility on the organization. This is due to the fact that the influenza vaccine is

administered only in one or two slots of time. Therefore, those who are not on duty or work night shifts during these slots cannot receive the vaccine.

Furthermore, the intention to receive the influenza vaccine rate was 32.4%. Intention was significantly associated with the uptake of the vaccine. That is, those who intended to receive the vaccine were more likely to receive the vaccine than those who did. It is important to note that 6.3% of those who did not receive the vaccine and 52.9% of those who received the vaccine intend to receive it next influenza season. This result is similar to the finding in the study of Ofstead et al. (2008) where those previously vaccinated were much more likely to intend to be vaccinated the next season as compared to those never vaccinated (Ofstead et al., 2008).

None of the demographic characteristics was associated with the uptake of the influenza vaccine. This result is consistent with previous studies (Canning et al., 2005; Johansen et al., 2011).

Most RNs participating in this study had basic knowledge about influenza. However, they had lower knowledge regarding the influenza vaccine. For instance, all of the participating RNs knew the signs and symptoms of influenza. The majority of them knew that HCWs have an increased susceptibility to influenza and the modes of transmission of influenza. This is may be attributed to the fact that they either had personal experience with the disease or studied about influenza in their basic nursing curriculum. On the other hand, the participating RNs showed poor knowledge regarding the function of the influenza vaccine and the immunity it provides to human beings. When the knowledge responses were summed up to produce a score, the mean number of correct responses on knowledge items score 11.61 (68.3%) of 17 (range, 0-17). This score is somewhat similar to that in the study of Ofstead et al. (2008) where the mean

number of correct responses on knowledge items was 9.6 (73.8%) of 13 (range, 0-13). When this knowledge score was analyzed with respect to receiving the influenza vaccine, it was shown that those RNs with higher knowledge scores were more likely to receive the influenza vaccine. Therefore, knowledge was associated with influenza vaccine uptake. This result was also proved in other studies (Canning et al., 2005; Johansen et al., 2011; and Zhang et al., 2012; Ofstead et al., 2008; Khazaeipour et al., 2010).

Concerning evaluation of awareness campaigns of influenza activities provided at the AUBMC, it was apparent that participants were aware about the availability of the free influenza vaccine at the UHS. However, little or no information was offered about the vaccine safety and contraindications, and about influenza severity and other ways to prevent it. Evaluation was significantly associated with receiving the influenza vaccine. Those who agreed that they received information about influenza and its vaccine were more likely to be vaccinated than those who did not. This finding was similar to the finding in the study conducted by Ofstead et al. (2008) where there was a positive association between prior vaccination status and receipt of information about vaccine safety and effectiveness(Ofstead et al., 2008). In our study, information about influenza and its vaccine might have been delivered only for those who received the vaccine at the site of vaccination. Consequently, they gave higher scores about the influenza vaccination activities provided at the AUBMC than those who did not receive the vaccine. No information was delivered ahead of time so that HCWs can take the proper decision to be vaccinated or not.

5.3 Limitations

The sample size was small with respect to the selected population. Due to time constraint, only 210 RNs out of 596 RNS participated in this study over a three weeks period. In addition, the vaccination rate was calculated based on self reporting by participants and not on medical files review. Also, socially desirable responses could have been provided by some participants.

5.4 Recommendations/Implications for practice

As evident from the results of this study, knowledge about influenza and its vaccine and evaluation of the influenza program activities provided at AUBMC were associated with the uptake of the influenza vaccine. Therefore, the program should emphasize more on providing education through sessions, posters, bulletins, etc... ahead of time from offering the vaccine. This would enhance the knowledge of the HCWs and in turn would give them enough time to decide whether to receive the vaccine or not. Extensive education would also eradicate the misconceptions most HCWs have about influenza vaccination. For this reason, this study will be submitted to the AUBMC nursing administration, infection control committee, and the UHS. Then a grand round would be held in order to disseminate the findings. In turn, this study can be a starting point to conduct further research to improve influenza vaccination rates among AUBMC RNs in addition among the community as a whole.

Another recommendation to improve the influenza vaccination rate among AUBMC RNs is, as recommended by Canning et al (2005), the creation of a more accessible vaccination service which covers the different shift patterns. Also, the

funding of nurse immunizers to provide the vaccine on the wards would help increase the uptake of the vaccine.

Implementation of a policy that mandates HCWs to receive the influenza vaccine would increase the rate. However, this step requires further research before considering it a solution.

5.5 Conclusion

The findings of this study showed that RNs' knowledge at AUBMC about influenza and about the effectiveness of the influenza vaccine in preventing influenza was associated with the uptake of the vaccine. Therefore, raising this knowledge would eradicate the ongoing misconceptions about it and improve the influenza vaccination rate among RNs at AUBMC.

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