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Evidence-Based Interventions: Improving Influenza Vaccination Rate Among Health Care Workers (HCWs) Targeting Direct Care-Givers

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Introduction

The healthcare industry is challenged with changing the cultures in organizations so that Health Care Workers (HCWs) understand the importance of protecting the patients and themselves from the very contagious influenza virus. Numerous studies indicated that HCWs pose the greatest risk of contracting influenza and infecting patients because of their exposure in the workplace and the community (Beguin , Boland, & Ninane, 1998; Carman et al. 2000; CDC 2006; Heimberger et al., 1995; Poland, Tosh, & Jacobson, 2005; Thomas, Jefferson, Demicheli, & Rivetti, 2006; Stewart & Rosenbaum, 2010; Yassi , Murdzak , Cheang , Tran, & Aoki , 1994). HCWs lack the knowledge and awareness of the consequences and implications of not being vaccinated, and the risk of spreading the flu among vulnerable immune-compromised populations (Hofmann, Ferracin, Marsh, & Dumas, 2006; Zhang, While, & Norman, 2011).

A large-scale outbreak can cause significant financial burden, decrease quality of patient care, and create safety concerns for organizations and all stakeholders as the virus spreads among patients, HCWs, and the community. Health care organizations are responsible for the safety of their patients and staff, and when there is increased absenteeism of HCWs due to seasonal influenza, it compromises the safety of the workplace (Anikeeva, Braunack-Mayer, & Rogers, 2009).

The implementation of evidence- based strategies to educate HCWs can reduce the barriers and misconceptions associated with taking the vaccine, provide clarity on how the vaccine works, reduce the social cues associated with vaccine refusal, particularly when leaders' role model and promote the vaccine. Mobile carts used along with these interventions proved to be effective in increasing vaccination rates among HCWs, resulting in reducing absenteeism,

nosocomial infections, and providing a safe working environment for patients and health care workers (Salgado, Giannetta, Hayden, & Farr, (2015).

Background

It has been shown that increasing HCWs influenza vaccine rate is a cost-effective strategy that helps reduce lost work days, as well as reduces nosocomial transmission and mortality among hospitalized patients (Burls et al., 2005; Carmen et al., 2000; Hayward et al., 2006; Healthy People 2020, 2013; Taylor, Mitchell, McGeer et al., 2014). HCWs who have been vaccinated against seasonal influenza are more likely to consider protecting the high-risk patient population from influenza, but the most common reason for vaccination was personal protection. Workers who get vaccinated are knowledgeable about the risk of influenza, its complications, the risk of side effects or adverse events, the effectiveness of the vaccine and, and that they are susceptible to influenza due to the nature of their work (Askarian, M., Khazaeipour, & McLaws, M, 2009). Some studies have suggested that physicians who have been vaccinated are more likely to recommend vaccination to their patients (Bautista, Vila, Uso, Tellez, Zanon, 2006; Galicia-Garcia et al., 2006; Ricart et al., 2002). It was also noted that nurses and physicians' attitude about vaccination are an important influence to other workers' decision to get vaccinated (Ciblak, Nohutcu, Gurbuz, Badur, & Guldal, 2012; Satman, Akalin, Cakir, & Altinel, 2013).

During outbreaks, HCWs are repeatedly exposed to the influenza virus. During an average season, 23% of HCWs are infected with the virus, show mild symptoms, and often continue to work even when infected (Stewart & Rosenbaum, 2010; Poland, Tosh, & Jacobson, 2005). The annual influenza attack rate is 5-10% in adults and 20% in children which can result in hospitalization or death (WHO, 2016). It is estimated that there are 3 to 5 million annual cases of

severe flu illnesses and 1-4 deaths per 100,000 U.S populations. Influenza is easily spread and is a serious public health issue (WHO, 2016). Influenza vaccination rate among HCWs remains less than 70% (Nowalk, Lin, Raymund, Bailor, & Zimmerman, 2013), and it is well below the 90% national goal (Healthy People 2020, 2013).

Seasonal influenza vaccination among HCWs has been a national challenge for many years, and many organizations are unable to achieve voluntary vaccination rates above an average of about 65%. Instead, health care organizations are faced with alarming rates of vaccine declination, often greater than 50 % (Hoffman et al., 2006). In February of 2012, the National Vaccine Advisory Committee (NVAC) highly recommends that physicians' practices, healthcare organizations, and employers mandate vaccination for their employees if voluntary vaccination yield rates less than 90% (Lowes, 2012). As a result of this mandate, 400 healthcare institutions have established a mandatory influenza vaccination policy (Immunization Action Coalition, 2014). However, mandatory influenza vaccination programs meet resistance from unionized healthcare workers (Lowes, 2012). Such was the case in 2009-10 during the H1N1 epidemic, when there was an attempt to make vaccination mandatory, only to have the order reversed due to the rebuttal from unionized healthcare workers (Lowes, 2012). New York State Nursing Association (NYSNA) issued a position statement that supports voluntary vaccination (NYSNA, 2012). The American Nurses Association (ANA) strongly recommends nurses and other allied health professions become vaccinated and, now supports mandatory influenza vaccination of HCWs except for religious and medical contraindications. To protect the public, and in light of recent exposures to measles in the community, ANA revised their position on influenza

vaccination to fall in line with evidence- based studies and CDC recommendations for health care workers vaccinations (ANA, 2015).

Pearson and colleagues cited several evidence-based recommendations from CDC and ACIP committee for use of a 5-model intervention to increase influenza uptake among HCWs which includes; 1) education and campaign, 2) improved access, 3) role modeling, 4) legislative practice e.g. signed declinations, 5) measurement and feedback (Pearson, Bridges, & Harper, 2006). Multiple studies had shown the increase from 10%-30 % in vaccination rate when multiple interventions were used (Harbarth, Siegrist, Schira, Wunderli, & Pittet, 1998; Lugo, 2007; Pearson et al., 2006; Poland et al., 2005 &; Talbots, 2008).

Organizations which have implemented five or more interventions in one season are more successful and have the highest vaccination rate (Wicker, Rabenau, Gottschalk, Krause, & McLennan, 2010). The Joint Commission (TJC) set a target goal of vaccination rates of 90% or better in their "Healthy People 2020" initiative for all health care organizations (2012). To achieve these goals, healthcare organizations across the United States (U.S) have been implementing mandatory vaccination policies because it is the only method of achieving almost 100% vaccination compliance among HCWs, and ensuring safety in the healthcare environment. Achieving vaccination rates of 90% or better is enabling organizations to meet the target goal "Healthy People 2020" at an earlier date. However, many of them still opt for voluntary vaccination for HCWs (Tilburt, Mueller, Ottenberg, Poland & Koenig, 2008).

Lost productivity is a major effect of influenza in healthy working adults with rates of absenteeism up to 30% in hospital workers (O'Donoghue, Ray, & Terry, 1997). Experiences show that absenteeism, lost work days due to sick calls are the highest within the months of

December through February when influenza-like illness is likely to peak. Increase in vaccination will reduce the risk of influenza among HCWs, and reduce the organization's financial liability for employees' lost working days. Keech et al. (1998), the only research literature which reported that employees who have mild influenza illness and who report to work ill can significantly reduce their reaction time by 20 – 40%. As a result of their action, there is an increased risk of poor decisions making, and the risk of errors that can seriously compromise patients' wellbeing. The CDC estimates that influenza costs $6.2 billion in lost productivity and 10.4 billion in medical costs (Molinari, Ortega, & Meissonier, 2007). A successful vaccination program will not only benefit the organization but will have a positive impact on the community at large by reducing the number of community members who would likely be contaminated by infected family members working in healthcare, reduce the chances of widespread epidemic illness, while reducing the social and economic burden of unnecessary health care costs, deaths, absenteeism from work and school. (Nichol, D'Heilly, Greenberg & Ehlinger, 2009).

Review of the Literature

Methods

The University of Massachusetts's Amherst's online library database was utilized for this literature search, including Cochrane Database of Systematic Reviews, MEDLINE, EMBASE, Cumulative Index to Nursing and Allied Health Literature (CINAHL), Google Scholar, Journal Storage (JSTOR), Wiley Online Libraries, and Pub Med. Reference sections that included studies and relevant peer review articles were hand-searched for additional eligible studies. National websites for documents on influenza such as CDC, ACIP, TJC, Journal of American Medical Association (JAMA) and, ANA were also included in the literature review. Defined

search terms such as health care workers, influenza vaccine, influenza, immunization, vaccination rate, acute care, long-term care, health care professionals, health behaviors and risk perception were used both as individual words and collectively. Additional parameters such as English Language and published dates between 2010 and 2016 were used. Publications older than 2010 were considered hallmark studies.

The studies were randomized controlled, non-randomized, systematic review, time series, observational and quantitative, qualitative, mixed methods and peer- reviewed best practice recommendations. Studies that applied interventions to improve or predict HCWs influenza vaccination rates were considered for inclusion. Publications were within and outside of the U.S and concerns human subjects. Studies that did not explicitly name interventions were excluded at the full-text phase. When no interventions were explicitly named in the title or abstract of an article, the article text was retrieved and reviewed. The study population had to consist of HCWs, but the HCWs could be from any HCW group (e.g. physicians, nurses, allied health practitioners, technicians). Only studies conducted in any acute, long term combined with ambulatory or long-term alone were included. All studies had to include influenza vaccination rate as an outcome. Excluded from the search were duplicate studies, dissertation, electronic broadcast or storage

The literature review yielded 32 publications from all data sources. Twenty one articles met inclusion criteria. Only published, peer-reviewed studies were included; studies published solely in abstract form and which did not provide primary data were excluded. Of the 21 articles, six randomized controlled trials (RCTS), eight non-randomized trials and seven systematic reviews were included in this project. The AGREE 11 tool was used to critique the evidence calculating the strength of the evidence at a rate of 75.4 % (Brouwers, et al., 2013).

Discussion of Literature Review

In 2003, the influenza vaccination rate was 46% among Canadians working in hospitals, ambulatory, and long-term care settings, and only 35% among workers in long-term care (Johansen, Sambell, & Zhao, 2006). The Canadian Medical Association (CMA) identified twelve (n=12) eligible studies from acute, ambulatory and long-term care that were evaluating influenza vaccination campaigns in HCWs to determine which combination of campaign components were significantly associated with increases in influenza vaccination among staff (Collins, Dey, & Halder, 2001; Lemaitre, Meret & Rothan-Tondeur, 2009). The method of study was quantitative and observational through eight electronic databases from 2008 to 2010 with interrupted time series design. Collins et al. (2001) found that campaigns with a greater variety of components, including education or promotion, better access to vaccines, legislative or regulations and role model yielded the highest uptake in the intervention group. Campaigns with education and promotion resulted in minimal increases in vaccination rates. Similarly, campaigns that had only access to the vaccine had very little impact (Ohrt, & Mckinney, 1992; Zimmerman et al., 2009). Conversely, the campaigns with a mandatory declination form and mandatory masking for unvaccinated HCWs achieved higher vaccination rates than other intervention (Bertin, Scarpelli, & Proctor, 2007; Wicker, 2009).Although there was a 15-20% increase in vaccination rate from baseline in one season, none of the studies reached the recommended level of 90% uptake of vaccine among health care personnel (Bertin et al., 2007).

Several other studies cited by the Canadian Medical Association and which were conducted in non -acute and long-term care facilities in Canada, United Kingdom, Germany, Switzerland and the U.S utilizing mixed methods of observational, quantitative or self-reporting indicated a

moderate increase in vaccination uptake after implementing several CDC, and ACIP recommended interventions (Lam, Chambers, Pierrynowski - MacDougall, & McCarthy, 2010). There were slight variations regarding how the vaccine was promoted, however, all of the studies showed an improvement in uptake of vaccine by HCWs by 10-30% over 1-2 flu seasons (Pearson et al., 2006).

There were considerable selection biases, inaccuracies in self- reporting, and the inability to pool data across the studies because of the diversity of the study methods and campaign components. Also, the study methods had several risks of biases that interfered with accurate results, such as a lack of comparable baseline characteristics across study groups.

In the 2005-2006 flu season, the Virginia Mason Medical Center (VMMC) in Seattle was the first in the U.S to initially mandate influenza vaccination. With the help of the Washington Nurses Association, the nurses at VMMC were successful in having the individual mandate for vaccination repealed. Despite the repeal, voluntary vaccination in 2009-2010 flu season rose to 98.9 % after the medical center implemented several evidence based interventions such as vaccination drive-through stations and several vaccine choices from thermisol-free to intranasal and masking for unvaccinated persons (Schnirring, 2010). Voluntary vaccination has failed to achieve expected numbers needed to protect patients. According to Perl (2005), Johns Hopkins University influenza program only achieved a 70% when the vaccine was made voluntary. This author also added that full vaccination coverage could be only achieved through mandatory vaccination policy. In further support of this finding, Bertin and colleagues (2007), agreed with Perl's belief, adding that, despite of the mandate there must be an exception for the few workers who may have documented egg allergy, or need to decline vaccination for documented religious

reasons. In addition, they advocated for adding signed declination statements with other interventions to increase HCWs vaccination rate (Bertin et al., 2007). While some institutions have achieved high rates of vaccination by mandatory policies, this approach is still questioned. A mandatory vaccination program is not necessary and can be avoided because voluntary vaccination can be as successful (Steckel, 2007). During a 2007 study of a flu vaccination program in the US, 90% of the exempt RNs voluntarily received the flu vaccine, showing that voluntary vaccination programs can result in a high percentage of employees being vaccinated (Poland, Ofstead, Tucker, & Beebe, 2008).

Forty-six systematic reviews in the long term and acute care in Greece showed that mandatory vaccination was the most effective intervention followed by "soft mandates," such as declination statements. (Lytras, Kopsachilis, Mouratidou, Papmichail, & Bonavas, 2016). Babcock, Gemeinhart, Jones, Dunagan, and Woeltje, (2010) studied the effects of adding mandatory vaccination and masking policy to the Barnes Jewish Christian (BJC) facilities' current initiative. BJC is Missouri's biggest employer with 26,000 employees across several acute, non –acute and long-term care. The study found that fewer employees sought religious or medical exemptions which resulted in slight increase in vaccine uptake (Babcock et al., 2010). There were other studies concluding that masking for unvaccinated HCWs increase vaccination uptake up to 90% and impacted the number of declinations when HCWs were given preference (Quan, et al., 2012).

Carman et al. (2000) described a study in 20 long-term care geriatric hospitals in central Scotland where they found vaccination rate for HCWs was only 50.9% in hospitals where vaccine was routinely offered, compared with 4.9% in those hospitals where vaccine was not

routinely offered. The authors further concluded, "In all studies, except where there is mandatory vaccine policy, the quality of evidence is undetermined by relatively low levels of vaccination among health care workers, even in the intervention group." (Carman et al., 2000, p. 93)

Poland et al. (2005) reported that vaccination is a duty of care. These authors strongly believe that it is a nurse's ethical and moral responsibility to protect patients from being infected and emphasized that those who refuse the vaccine for reasons other than medical, religious, or philosophical ones, are jeopardizing the lives of their patients.

In 2007, The Joint Commission (TJC) made influenza vaccination programs for HCWs a criterion for organizations to maintain accreditation (TJC, 2006). They required institutions to provide free on-site vaccination, educate staff about influenza disease and vaccine, and document the reasons for the staff refusal to be immunized against flu. Healthcare organizations that implemented a strong and multiple set of interventions in their program that target barriers to vaccination before the mandate have been successful in raising and sustaining acceptable vaccine rates (TJC, 2006).

CDC revised its strategies to improve influenza vaccination among health care workers by adding the following recommendations 1) offer incentives/contest, 2) use declination forms, 3) foster team-building 4), track and report vaccination rates to staff and supervisors, 5) publicize a vaccine day, 6) encourage employee to set example; remind employees that their actions and recommendation weigh into other’s decisions to get vaccinated, 7) sharing Vaccine Information Statements (VIS) from CDC and Joint Commission websites, and 8) establish a written influenza policy (CDC, 2016).

A systematic review by the Community Preventive Services Task Force (2013), found evidence that supported CDC's recommendations and included 45 studies which were conducted in medium, large hospitals, and in long-term care facilities in the United States, Europe, and Canada. The study evaluated the effectiveness of interventions such as vaccine information, efforts to enhance access, activities to change attitudes and norms, and policy changes combined with free, on-site, and actively promoted influenza vaccinations. Results of the study showed a vaccination increase of 11-19 median percentage points among physicians and nurses. The estimated effect showed a relative reduction of four influenza cases in HCWs, 100% reduction in nosocomial infections confirmed at death and a lower rate of all case mortality among patients after the first year. Carman et al. (2000) agreed with the findings of a study that claimed a significant decrease in nosocomial infections, and mortality rate of patients as vaccination rates increased. Many experts believe that the best way to prevent the spread of influenza in health care is by immunization of HCWs (CDC, 2016; Potter, Stott, Roberts, et al., 1997; Wilde, McMillan et al., 1999). Other institutions have increased their HCW vaccination rates using a variety of strategies. The Memorial Sloan Kettering Cancer Institute successfully increased vaccination rates of HCWs on the bone marrow transplant unit by 12% in one year, by improving accessibility (Weinstock et al., 2000). Reports indicated an increased vaccination rates [odds ratio (OR =11.01; 95% CI = 2.13-56.80) p = .0001] with successful implementation of a program using visual aids, e.g., posters and pamphlets (Qureshi, Hughes, Murphy, & Primrose, 2004). St. Joseph Hospital in Wisconsin achieved a staff vaccination rate of 83% when vaccination was done the same time with the annual tuberculosis screening (APIC, 2007). St. Jude Children's Hospital in Memphis, TN, with children with high-risk diseases, improved their

HCWS influenza vaccination rates from 40% to 80% with a program that included a pre-campaign marketing of meetings, posters, newsletters, and 24/7 vaccine accessibility for all staff (McCullers, Speck, Williams, Liang, & Joseph, 2006). A U.S program that implemented free vaccine with an educational program increased vaccination rate from 5% to 44% in one season (Shannon, 1993).

In 2008 a multidisciplinary team developed and implemented an evidence-based Leadership –Modeled Program in an organization in the U.S (Hood & Smith, 2009). The organization had previously implemented other evidence-based approaches such as education, 24-hour vaccine accessibility, and computerized annual influenza pandemic training modules. With the introduction of the new Leadership-Modeled Program, leadership played a central role in reaching out to employees through role modeling the vaccine, electronic slide presentations, emails and personal messaging to employees who historically declined the vaccine. This resulted in improvement in vaccination rates from a baseline of 66% to 77% in the first year and 77%-84% in year two (Hood & Smith, 2009).

The level and quality of the literature was rated using the Johns Hopkins Evidence Level and Quality Guide scale at a level 1 with B- Good quality evidence (Johns Hopkins University-Nursing Evidence-Based Practice model).

Evidence-based Recommendation to Improve Vaccination Rate

Education played a critical role in compliance with influenza vaccination and, when the constructs of the HBM was incorporated in designing the educational program, there was a tendency to change HCWs negative attitudes and beliefs about the influenza vaccine, and hence improve vaccination rates (Corace et al. 2016). HCWs must be aware of what the vaccine is, how

it works, its side effects and risks. The DNP addressed HCWs concerns, beliefs, and misconceptions about the vaccine. The educational program addressed the risk of contracting influenza, reporting to work with symptoms, thereby increasing the risk of infecting patients and other HCWs. The leadership-model program gave senior leaders the opportunity to interact with employees, and support the program in a way they have never done before. The goal of this project was to enhance vaccination rate by 11- 15% for 2017-2018 flu season.

Theoretical Framework/Evidence-Based Practice Model

The Health Belief Model (HBM) is the most frequently used theory to predict influenza vaccination uptake among HCWs, and the key constructs of this model are attitudes, self-efficacy, perceived risk and benefits, cues to action, and social norms (Corace et al.2016). This model was used to guide this study and was helpful in identifying the factors that prevented HCWs from vaccination uptake (Appendix A).This framework was used to also understand preventative and health promotion behavior towards the influenza vaccine. The belief about vaccination and influenza illness are consistent with the five key constructs 1) perceived susceptibility to self or others to influenza, 2) perceived severity of influenza to self and others, 3) perceived benefits of influenza vaccination to self or others, 4) perceived barriers to influenza vaccination, and 5) cues to action (i.e., internal and external motivators for vaccine uptake (Corace et al. 2016).

Susceptibility referred to those HCWs who had a low level of understanding of how the flu is contracted and believe that they would not contract influenza illness, therefore, decline to be vaccinated. Those HCWs who believe they were in danger of contracting the illness felt positive

about getting vaccinated, believe there was a risk, and were motivated to change behavior to reduce the risk of contracting influenza.

Perceived severity described the belief about the level of discomfort or pain associated with influenza. Perceived benefits of the vaccine were considered the level of belief about vaccination benefits; vaccination reduced the risk to oneself and others from contracting the illness. Perceived barriers to getting the vaccine described the belief concerning potential difficulties created by the vaccine, such as the unpleasantness or inconvenience and served as obstacles in changing one's behavior and created resistance to promoting positive attitudes and making a healthy choice to be vaccinated. (Shahrabani, Benzion, Yom Din, 2009; Sendi, Locher, Bucheli, Battegay, 2004; Wu, 2009).

Cues to action positively or negatively affected individual health behaviors; Communication, access to information, vaccination of friends and other family members or media advertisement motivated one to get vaccinated, and served as positive cues (Prematunge et al., 2012). On the contrary, a peer or a colleague negatively commenting about the vaccination, misconception of the vaccine, or household members refusing the vaccination would have likely demotivate the individual, resulting in vaccine refusal. The extent of each of these created driving and restraining forces in making decisions (Champion & Skinner, 2008). These five constructs in the HBM aligned with the reasons stated by HCWs for accepting or refusing the flu vaccine (Brewer & Hallman, 2006; Champion & Skinner, 2008; D'Souza, Zyngier, Robinson, Schlotterlein, & Sullivan-Mort, 2011; Kraut, Graff, & Mc Lean, 2011; McEwen & Farren, 2005; Zhang et al., 2011). When the vaccine was thought to be safe and effective in preventing infection of self and others, and the belief that influenza is a serious illness, HCWs were more

likely to be vaccinated and their intention to be vaccinated was positively affected by higher levels of susceptibility, severity, and benefits, and negatively affected by higher levels of barriers (Prematunge et al., 2012).

Project Design and Methods

The purpose of this quality improvement project was to improve influenza vaccination uptake in HCWs. The pre-intervention survey (Appendix B) reflected the change model theory (HBM), which focused on identifying attitudes and behavior of the HCWs towards influenza vaccination, and understanding the barriers that prevented vaccine uptake. The DNP student/ Director of occupational health explained the project to potential participants/employees who presented to occupational health for annual physicals, and had declined the flu vaccine last season; employees consented by voluntarily completing all coded hand delivered pre and post questionnaires. Completed questionnaires were placed in a conveniently located drop box to secure confidentiality. The DNP student also rounded on the nursing units and located the employees who had declined vaccination last flu season, explained the project, and requested those who volunteered to complete and return the coded questionnaires in a nearby drop box. The group of employees selected as direct care givers included; Registered Nurses (RNs), Licensed Practical Nurses (LPNs)), Patient Care Technician (PCTs), and Certified Nursing Assistant (CNAs). Employee confidentiality was maintained throughout the implementation period by using locked drop boxes located outside the door of the occupational health office and on the nursing units, and was only accessed by the DNP student. Survey collection continued until there were no additional volunteers. The surveys intended to obtain demographics such as age, gender, years worked in the current institution, educational level, and knowledge of attitudes

and behaviors towards influenza vaccination among HCWs. This tool helped the DNP student implement an appropriate educational program, and addressed the concerns and needs of the group. The post-intervention survey collected confidential self-reported information regarding exposure to influenza, vaccination status, and history of flu and vaccination status last season (See Appendix C) .The DNP student distributed the post intervention surveys after each educational session and throughout the campaign until 110 surveys were fully completed and matching the identifiers from the pre survey responses. Post Surveys were also distributed as needed from the occupational health office during vaccination activities. A drop box was also available on the vaccination/roving mobile cart during nights and weekends. All completed surveys/questionnaires were only accessible to the DNP student.

The proposal was presented to senior leadership, introducing the responsibilities of the evidence-based Leadership- Modeled Program. Senior leader's commitment, support, and participation in the program were critical in raising HCWs awareness about the importance of being vaccinated. The leadership program required senior leaders to role model for the organization's flu campaign and consent to be videoed to enhance vaccination promotion. The video was placed on the organization's intranet and other available internal media sources that are popularly used or are clearly visible to HCWs such as, screen monitors located at entrances and exits of the hospital and LTC. Leaders and hospital executives crafted emails, and also mailed personal memos to the intervention group, which were those who historically declined the vaccine (Hood & Smith, 2009). In addition, influenza committee members were actively engaged with nursing management in promoting the vaccine, discussing with staff members the benefits of getting vaccinated and, planned with the DNP student a convenient schedule that

made the vaccine more accessible to staff. The DNP student had the first meeting with Vice President of this facility during the summer where plans for the proposal were discussed and letter of support was issued (Appendix D: letter of support).

Project Site and Population

The organization is a full-service community teaching hospital with long-term care (LTC) services which was the primary site where the educational and leadership-model interventions were executed. It is a Magnet designated organization whose mission was to ensure the highest quality and safest delivery of care in the area. Additionally, the organization was committed to creating a healthy work environment through establishing prevention and wellness programs, such as weight watchers' incentives, subsidized gym membership, and hand hygiene campaigns.

The project enrolled employees who had declined the flu vaccine last season. The group of employees included a combination of full time or part time RNs, LPNs, PCTs, and CNAs as previously defined. The population for the QI project was comprised primarily of African American, more females than males, and ages between 26-75 years old. The majority of RNs had a minimum of bachelor's in nursing, LPNs with a professional diploma, and the rest of the study group had at least a high school diploma to be employed in the organization. There were meetings with the nursing leaders from both acute and long term care, infection control, and pharmacy personnel where the project was discussed and supported throughout the influenza season. There was a presentation of "Gap" analysis and need for the project during a scheduled Department Head Meeting (Appendix E-Meeting Agenda). The nursing leaders met with nursing managers to reinforce the goals of the project.

Inclusion criteria:

- All RNs, LPNs, CNAs, and PCTs employed at either facility with full time or part time status still employed and had declined the flu shot last season.
- Employees' participation in the Influenza vaccination campaign and completion of the pre and post intervention tools.

Exclusion criteria:

- RNs, LPNs, CNAs, and PCTs who are ineligible to receive the vaccination
- RNs, LPNs, CNAs, and PCTs who are non- employees or new hires whose mandatory requirement was a condition of employment.
- Contract personnel
- RNs, LPNs, CNAs, and PCTs who customarily get vaccinated at another site or location, such as retail pharmacies, clinics and doctor's offices other than from the organization.

Goals /Objectives

The objectives of this project were to educate HCWs about the risk of acquiring influenza, signs, symptoms and complications of the infection, and increase their awareness and understanding of the benefits of influenza vaccine. Further objectives are to change negative attitudes and dispel myths and misconceptions about the vaccine. The goal were to achieve a significant higher vaccine uptake among the selected group of HCWs that included those who had declined previously. Future goals included increasing HCWs vaccination rate above the national goal of 90% across the organization, thereby reducing nosocomial influenza transmission, absenteeism of direct care givers, promoting consistency in the workforce as it

relates to patient care, and avoiding the financial burden associated with a flu outbreak within the organization. The project objectives include the following:

- The DNP implemented an evidence-based comprehensive educational program and leadership-modeled program in the fall of 2017. The educational program addressed the HBM elements of susceptibility, severity, and benefits that underscored common perceptions, beliefs, and information about the influenza virus and vaccination. The leadership-modeled program recruited executive and senior leadership personnel to role model the vaccination while being videoed. The video was displayed via a screen monitor throughout the acute and LTC areas. Leadership executives also addressed HCWs during first day 'kick off", encouraging them to get vaccinated. Participants from the group who had previously declined the flu were directly addressed by Chief Operating Officer (CEO) through mailed memorandum to personal addresses, and blast emails reminders at least once weekly to all employees.
- Influenza vaccination progress for RNs, LPNs, PCTs and CNAs was monitored and measured weekly through the electronic influenza database.
- After implementation of the interventions, demographic characteristics of the survey responses were evaluated for possible correlation with any changes in participants' attitudes and behaviors towards vaccination.
- Effectiveness of the vaccine intervention program for the group of RNs, LPNs, PCTs, and CNAs for both acute and long term care was measured for the 2017/18 flu season.
- Upon project completion, a program evaluation was done and the outcome was shared with the organization. Future interventions that may be useful for further improving

vaccination rates were further discussed during Quality Committee meetings, and with senior leadership personnel.

Implementation/Data Collection Procedure

The project was explained to the potential group of employees who had declined the flu vaccine last season, followed by the distribution of the pre-intervention surveys. Each participant/employee was required to document a unique identification code at the top of the survey, which corresponded with a roster of their names. Completion of the survey/questionnaire indicated that permission was granted by each participant. The role of each participant was identified in the surveys, and those who did not belong to the selected group were removed from the project, and were not included in the data analysis.

Completed surveys were returned to a drop box located outside the door of occupational health service or the roving drop box. The distribution of post-intervention surveys to the participants occurred after the educational sessions. The location of distribution also included the nursing units, during vaccine “kick off”, during mobile cart/ roving, or in occupational health throughout the implementation period. Each participant was required to document on his/her post survey the same assigned unique identifier used in the pre-survey. Completed surveys were returned via conveniently located drop boxes. After post survey was completed by the participants, they were directed to the vaccination station to either accept or decline the flu shot. All HCWs vaccination information were collected via an employee electronic database (IPADs), and operated by occupational health staff including the DNP student. A mobile drop box for post-survey collection was also available during nights and weekends

vaccination roving/mobile carts. The completed post surveys were only accessible to the DNP student.

Data Analysis

Descriptive statistics were used to express the results in percentages and frequencies. A brief survey tool was developed that represented the phenomena of interest, and was used to measure desired outcome (influenza vaccine decision). The survey was feasible and cost-effective means of gathering data on the selected group of the population. The DNP student consulted with the mentor to review vaccination data and created a table to show demographic responses among the different categories of employees who participated in the project from long term and acute care. There were 110 completed surveys that qualified for inclusion in the project. 60 participants from acute and 55 from long term care (See table 1).

Table 1-Participants demographics

	Acute Care		**Long Term Care**	
Demographics	**N**	**Percent (%)**	**N**	**Percent (%)**
Job Categories				
RNs	32	53.3	5	9.1
LPNs	1	1.6	11	20
PCTs	22	36.6	0	0
CNAs	5	8.3	39	70.9
Total = 60			Total= 55	

Years Employed

1-5	13	21.6	9	16.3
5-10	11	18.3	23	41.8
10-15	15	25	12	21.8
15-20	5	8.3	5	9.3
20-25	6	10	3	5.4
25-30	6	10	2	3.6
30-35	4	6.6	1	1.8
Total = 60			Total = 55	

Educational Level

Diploma	16	26.6	43	78.1
Associate's Degree	12	20.1	10	18.1
Bachelor's Degree	26	43.3	2	3.6
Master's Degree	6	10	0	0
Total =60			Total =55	

Ethical Consideration/Protection of Human Subjects

Institutional Review Board (IRB) permission waiver was granted from the project facility IRB and the University of Massachusetts IRB during fall 2017. The responsibilities related to human subjects' protection included the adherence to the basic ethical principles of conducting research that involved human subjects which are 1) respect for persons, 2) beneficence and 3)

justice (The National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 1979)

The first principle, respect for persons was secured by voluntary participation in the project. The project information sheet and invitation to participate were discussed and information sheet distributed to the employee group during rounding and unit meetings. All group members had the right to refuse further participation at any time. All participants were adult caregivers who consented voluntarily. There was no discipline or repercussion for declining to participate in the project. Consent was implied when the participants returned the completed survey. The survey instruments had personal identifying codes that linked to specific employees of the group, however, once all data was collected, employee roster of names associated with code identifiers was destroyed. Survey information collected was placed in a locked area in the employee's health office to secure confidentiality.

The principle of beneficence was ascertained, as there was no risk of harm to participants who were taking part in the project. The project consisted of completing a demographic data collection sheet and attending an educational presentation that informed employees about influenza and the seasonal vaccine. While some argued that there were risks in taking the influenza vaccine, the actual vaccination of caregivers was the scope of this project. If the effect of improving one's knowledge about influenza led to improved vaccination rates, then the possible benefits to society as a whole outweighed the risks, and benefits were maximized while possible harm were minimized, as outlined in the Belmont Report (The National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 1979).

All participants were protected by the Health Insurance Portability and Accountability Act of 1996 (HIPAA) which, among other guarantees, protected the privacy of patients' health information (Modifications to the HIPAA Privacy, Security, Enforcement, and Breach Notification Rules, 2013). Additionally, the DNP student and practice personnel carefully conducted this project following the Standards of Care for practice in an Occupational Health setting. All information collected was part of evaluating the impact of this project and the aggregated data from the project participants did not include any potential participants' identifiers. The risk to employees participating in this project was no different from the risks of patients receiving standard medical care. Participant's confidentiality was assured by coding the participants with unique identification codes. The list of participants and their identifying codes were kept in locked filing cabinets in the office of Occupational Health, and was only accessible to the project coordinator/- DNP student. All electronic files containing identifiable information was password protected to prevent access by unauthorized users and only the project coordinator and the Occupational Health nurse had access to the passwords.

Results

Outcomes

The outcome from the post education intervention and the leadership- model intervention was interesting. The data collected from the pre intervention surveys helped in understanding more of how employees felt about the vaccination process, therefore, the educational sessions were modified to meet the learning needs of the group, and brought clarity to some complex issues concerning the efficacy levels of the vaccine from one year to another. The most critical question raised by many was, why some vaccinated persons still experienced respiratory

symptoms, sometimes debilitating even after been vaccinated. Overall, most of the participants were satisfied with the explanation and made a decision to be vaccinated, while others were still undecided.

There was a total of two hundred and eight-nine (n=289) from 850 direct care givers from the selected category for this project who did not receive the vaccine during the 2016-17 season, and either worked in acute or the long term care facility. For this Quality Improvement project, one hundred and twenty (n=120) HCWs from the list 289 volunteered to participate in the project; One hundred and ten (n=110) completed both pre and post intervention surveys and were included in the project. Forty seven (n=47) participants from 110 in all work categories accepted the vaccine during the implementation period, resulting in a 42% increase in vaccination rate among the project sample, and an overall improvement vaccination rate of 16.2% from last season's vaccination rate. Vaccination rate for the combined organization within the specified categories has improved from 66% to 82.2%. The number of HCWS who volunteered for the project, categories, and vaccination status post intervention are displayed below (See table 2).

Table 2- Vaccination Status of Participants

	Acute Vaccination Status				**LTC Vaccination Status**		
	RNs	LPNs	PCTs	CNAs	RNs	LPNs	CNAs
2016-17 Flu Vaccination Decliners Group	32	1	22	5	5	11	39
2017-2018 Decliners Group Accepting Vaccination After Intervention	16	0	7	4	2	4	14

% Accepting Vaccination Following Intervention	50%	0%	31.80%	80%	40%	36.40%	35.90%

Facilitators and barriers. The following were barriers in implementing this project; 1) staff preconceived notion about influenza vaccine and their willingness to co-operate with change and program plan, 2) variable support from administration, 3) employee being honest with answering the survey questions, 4) challenge meeting the desired number of voluntary participants, 5) masking policy not enforced, 6) employee lack of understanding of evidence- based research and interventions. A few nursing leaders did not show the expected level of commitment and support in encouraging employees participation. To address the barriers, all nursing leaders, and administrators were invited to attend a vaccination committee meeting where the influenza vaccine program was explained in details. Other vaccination benefits were emphasized such as, increased vaccination has proven to reduce absenteeism, vaccination is cost-savings to the organization, it reduces nosocomial infections among patients and other hospital workers, and increasing vaccination uptake among employees will maintain compliance with Joint Commission standards and recommendations for patient safety; furthermore, vaccination will keep the community healthier. All survey participants were informed of the confidentiality of the responses and will be encouraged to be honest in their responses. Employees who had difficulties with the educational material due to language barriers had access to an interpreter and lastly, employees were given an introduction to this evidence- based project during the education component. The project was time constrained to three months and was executed in the later part of October and completed late January.

Several facilitators were identified and included 1) minimal cost to implement the project, 2) available resources and convenient space in the facility, 4) co-operation and support from the VP and educator of long term care, 5) support from pharmacy director and infection control team, 6), vaccination incentives, 7) support from employees who had a positive experience with taking the influenza vaccine and had their yearly vaccination.

Discussion

The educational intervention had great feedback and most participants were attentive and curious about the content of the video. The video illustrated a scenario of an influenza epidemic, (See Appendix F) where many persons were infected and also infected others, participants showed they were interested in getting more information from pharmacy personnel present about the composition of the vaccine and how it worked. While a number of participating employees walked away after the video presentation and the learning exercise undecided in the midst of an epidemic, many others were willing to be vaccinated for reasons such as, 1) not wanting to infect their families and young children at home 2) wanting to protect their unborn babies, 3) fear of children of the families getting the virus from other kids and bringing it home, and 4) fear of patients and their families contracting the virus and infecting them. Some were not willing to take the risk of getting infected since there was a heightened alert in the media from the CDC's influenza death reports during the current epidemic. Most of the participants expressed concerns about the efficacy of the vaccine, however, many of them volunteered to be vaccinated after their concerns were addressed by Infection Control Officer and Pharmacy persons present at the educational sessions. Interestingly, employees showed very little concern for patient safety or patient getting infected by their illness. One to one education using the educational

leaflets/handouts, (See Appendix G) was very time consuming, but had some successes with a number of participants changing their minds from declining to accept the vaccine. The employees' memorandum (See Appendix H), although it came from executive leaders and addressed every employee individually who declined flu from last season, survey reflected that it did not have a strong impact on vaccination decisions. However, leaders promoting vaccination at town hall meetings, department head meeting, role modelling the vaccine and video role out seemed to have had a more positive impact on participants' vaccination decisions. There was no clear relationship between job categories, years employed and educational levels. Over the 3-month implementation period, some of the participants accepted the vaccine because of the rapid rising rate of influenza in the nation, were recovering from a recent respiratory infection, or had a family member or friend who was infected with the influenza virus. Six RNs in the acute area who decided to take the vaccine were new mothers or grandmothers, and wanted to protect their newborns or young children at home, which accounted for the increase in vaccination uptake among RNs. More direct care givers became more aware after education that there were more exposed to a immune-compromised population, and their line of duties made them vulnerable to getting respiratory infections and spreading them around.

In the organization where this project was implemented, PCTs and RNs dominated the acute area and CNAs and LPNs dominated the long term care. There were no PCTs in the long term area and very limited number of CNAs in the acute area. Acute care staff showed more interest in the education program and understood the risks associated with their duties and responsibilities compared to the LTC. Despite overemphasizing the risk of staff exposure in long term care facilities around the nation, and pointing out to care givers that most common

outbreaks occur in long LTC facilities, referencing facilities in the neighborhood that were affected by recent flu outbreak in 2016-17 season, many HCWs stuck to their decisions not to get vaccinated. Contrary to the acute care area, residents of LTC are more vulnerable to infections because of their poor immune response to vaccination coupled with stays greater than three months and, numerous opportunities to socialize outside of the facility with greater exposure to the public that can inversely infect HCWs.

Future recommendations

Reports from recent studies revealed that respiratory infections including influenza can trigger a myocardial infarction. An association is suggested between laboratory- confirmed influenza and acute myocardial infarction (Kwong, Schwartz, Campitelli, & Chung, 2018**).** It is recommended that for future educational programs, emphasis should be placed on the complications of influenza illness, such as pneumonia and the inflammatory effects of getting influenza that can trigger a myocardial infarction and therefore increase mortality rate. This may enhance HCWs understanding of the seriousness of not getting vaccinated- will correlate under the HBM-severity of illness (Corace, 2016).

To maintain sustainability, leadership is at a strategic position to help change the culture of the organization by consistently motivating others, promoting the vaccine, and communicating with HCWs and stakeholders. Organizations that are proactive to achieve population health will help prevent falling victim to influenza illness and its complications, therefore impacting global health policy change.

Recent reports from the CDC identified that flu vaccines that were incubated in egg embryo were not as effective against the H3N2, the common circulating virus; the virus was more

susceptible to mutations resulting in only 25% effectiveness this season than the vaccines manufactured in cell membrane (WHO, 2018). Vaccine total effectiveness was 36% for all A and B viruses in this season's vaccine. New recommendation for the 2018/19 flu season for vaccine manufacturers is to include the B/Colorado virus as the fourth virus, similarly to the current quadrivalent vaccine (WHO, 2018).

Conclusion

Voluntary vaccination rate among the selected group of direct care givers in the organization was approximately 66% which was below national standards; implementation of evidence-based intervention proved successful, raising vaccination rate in one season by 16% with a current vaccination rate of 82%.

Much of the evidence unanimously upholds that robust vaccination, promotion, and access to the vaccine are the strength of a successful influenza program (ANA, 2005). These models, however, must be implemented together to work well. Other experts argued that vaccination success can only be obtained using a comprehensive variety of interventions, and even when that is done most organizations attained no more than a 70-80% vaccination coverage (Shannon, 1993). The literature suggests that the most common reasons for HCWs declining the vaccine surrounds misconceptions concerning the historical efficacy and safety of the influenza vaccine (CDC, 2016). HCWs beliefs about influenza illness and vaccination in this project were consistent with the HBM constructs; perception of disease severity, perceived susceptibility to disease, perceived benefits for taking action and social cues (Corace, 2016). Increases in vaccination rates resulted in reduce nosocomial infection in a hospital setting and the community; reduced absenteeism among nursing personnel and, a safer patient care environment

(Frenzel et al., 2016). As a result of the literature review, the DNP student found that robust influenza education with a Leadership modeled intervention fitted the need of the organization to achieve a 10-15% vaccination rate. If the upward trend continues, the organization could meet the vaccination goal rate of 90% or better, to achieve" Healthy People 2020".

The DNP student plans to share the results of the project at the May 2018 monthly meetings with the organization's Influenza committee, Quality Improvement Committee and a power point presentation at Department Leadership meeting. The project will also be published through the University of Massachusetts online library.

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