

**THE IMPACT OF A THEORY-DRIVEN FLU VACCINE COMPLIANCE  
COMMUNICATIONS CAMPAIGN:  
A MULTIYEAR EVALUATION**

by

Amy L. Ashbridge

AB, Wellesley College, 2001

MA, University of Wales, Cardiff, United Kingdom, 2003

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This thesis was presented

by

Amy L. Ashbridge

It was defended on

April 14, 2016

and approved by

Jeanette Trauth, PhD

Associate Professor, Department of Behavioral and Community Health Sciences  
Graduate School of Public Health, University of Pittsburgh

Frank Ghinassi, PhD

Associate Professor, Department of Psychiatry  
School of Medicine, University of Pittsburgh

**Thesis Adviser:** Elizabeth Felter, DrPH

Visiting Assistant Professor, Department of Behavioral and Community Health Sciences  
Graduate School of Public Health, University of Pittsburgh

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**ABSTRACT**

Achieving full participation in a flu vaccination program for health care workers remains a persistent challenge. While previous studies in the literature have looked at the theoretical background surrounding flu vaccination, few studies have looked at the efficacy and effectiveness of flu vaccination communications campaigns that have been used to encourage populations to become vaccinated. Over three years, a novel flu vaccine compliance communications campaign was developed and implemented at two pilot sites, Western Psychiatric Institute and Clinic of UPMC (WPIC), and Magee-Womens Hospital of UPMC (Magee). Pilot sites received the intervention as a rolled-out approach, with UPMC Presbyterian Shadyside serving as a control arm for all three years of the intervention. In the third year of the program, a policy mandate was introduced across UPMC.

Moderate increases compared to the initial baseline data, and then year-to-year increases within the individual hospital campus, were seen when a risk-based communications campaign was introduced at Magee and WPIC, with no significant changes when a social-norms component was added. In this population, a social-norms-based approach is unlikely to deliver measurable results with employee vaccination. The largest increases came during the final year of the policy mandate, with no significant changes across the three populations. This indicates that policy is the

strongest influencer in employee influenza vaccination, but moderate increases can be achieved with the adoption of a risk-based approach to vaccine communications if such a policy is not feasible. Additionally, employees demonstrated greater engagement with communications materials when theory-driven campaigns were introduced, compared to employee response to communications materials used in the control hospital.

This communications approach and campaign carries public health significance by shaping future campaigns and programs, and delivering lessons learned regarding application of motivators, related to routine influenza vaccination, and the expansion of vaccination to other HCW and general adult populations. By developing a novel practice that can be applicable toward a range of vaccination practices, this project carries public health significance in filling a gap toward best practices for encouraging vaccination when organizational or other mandates are not available.

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## 1.0 INTRODUCTION

*“The flu must be really bad this year. They keep telling us about it.”*

— Milieu therapist, Western Psychiatric Institute and Clinic, November 2013

It can be a daunting challenge to catch the eyes of busy hospital employees, and persuade them that flu vaccination is important for them and for their patients. With lives on the line every day, and other tasks that employees perceive to have a larger impact on patient care or research, it is all too easy for a health care worker (HCW) to believe that flu vaccination is not the most important thing to do to get through the day. Nationally, vaccine uptake remains low even among HCW who acknowledge that vaccination can protect them and their patients from serious illness (Clark, Cowan, & Wortley, 2009).

Over the course of three years, a novel flu vaccine compliance campaign was developed and implemented at two pilot sites at the University of Pittsburgh Medical Center (UPMC): Western Psychiatric Institute and Clinic of UPMC (WPIC), the system’s primary behavioral health hospital and network, and Magee-Womens Hospital of UPMC (Magee), a medical-surgical facility with an emphasis on women’s health and maternity care. This campaign was heavily influenced by the Health Belief Model and a Social Norms Theory, with goals to increase employee flu vaccination by addressing this particular health behavior change with a theoretical approach.

This thesis evaluates the implementation of this campaign, with effects of messaging WPIC and Magee (with UPMC Presbyterian Shadyside serving as a cohort control arm) on flu vaccine uptake, and employee interaction with campaign materials. The primary evaluation questions addressed are:

1. Did the risk-based communications campaign for influenza vaccination among health care workers correlate with an increase in vaccination rates over baseline at the intervention sites?
2. Does the combination of risk-based and social-norms-based communications for influenza vaccination among health care workers lead to additional increases in change from baseline at the intervention site?
3. Are significant changes demonstrated in change from baseline when a theory-based intervention is used in conjunction with a policy mandate?
4. What lessons were learned to inform future health communication campaigns?

In looking at concurrent successes — and lessons learned — at WPIC and Magee, it is proposed that a communications program can be developed that is successful not only in a medical-surgical environment, but also for HCW who may work in other settings and may face other challenges. This program can be scaled in either direction, and adapted to address other health-related concerns facing HCW and their patients, as well as any cultural concerns.

*“2. The sooner you get your flu shot, the sooner we can stop talking about how important it is to get a flu shot.*

— “Five Reasons to Get Your Flu Shot That You Haven’t Seen Before,” *Extra*, Western Psychiatric Institute and Clinic local news section, November 2015

## **2.0 PROJECT INTRODUCTION**

### **2.1 LITERATURE REVIEW**

Seasonal influenza remains a persistent health concern, affecting individuals across a range of demographic, age, gender, and socioeconomic (SES) backgrounds. More than 125,000 flu cases were reported in the United States between Sept. 28, 2014 and May 23, 2015 (Appiah et al., 2015). An average of 36,000 deaths are reported each year, and influenza and pneumonia consistently remain the eighth-leading cause of death in the United States (Centers for Disease Control and Prevention, 2016). Typically, only one-third of those who seek care for influenza have received the flu vaccine (Hayward, 2015).

Influenza typically is more serious — with higher levels of mortality — in individuals with high-risk conditions such as pregnancy, cardiovascular disease, respiratory illnesses, and other chronic conditions. These high-risk groups also typically account for higher health care costs and productivity losses that are related to influenza (Molinari et al., 2007). Others without concurrent illnesses, or who belong to high-risk groups, also are susceptible to influenza and its complications. In 2014-2015, children in particular were susceptible to influenza-related hospitalizations, with 43.3 percent having no underlying condition before their hospitalization (Appiah et al., 2015).

#### **2.1.1 Business and Economic Impact of Influenza**

In addition to the direct health-related impact of influenza, the illness also carries high annual economic burden, both for the United States in general, and for businesses. Direct medical costs

reach approximately \$8.7 billion annually, with another \$6.2 billion in indirect costs (Centers for Disease Control and Prevention, 2016). More than half of the expenses related to influenza come from hospitalizations, with about 30 percent of expenses coming from outpatient-directed care (Molinari et al., 2007).

Businesses have particular susceptibilities for the economic burden of influenza. According to some studies, employers can expect to lose nearly 24 hours of employee productivity per illness occurrence, with at least 1 percent of employees being affected annually (Tsai, Zhou, & Kim, 2014). All told, more than 17 million workdays are lost nationally each year (Centers for Disease Control and Prevention, 2016). This impact is significant, and requires targeted strategies to reduce the impact on employers (Tsai et al., 2014). In some cases, the literature recommends that one way to reduce this burden and medical cost is to increase vaccination rates among employees (Karve, Misurski, Meier, & Davis, 2013).

### **2.1.2 Special Concerns for Health Care Workers**

Health care workers (HCW) are of unique interest when it comes to influenza spread, burden, and prevention. Even though HCW may not necessarily be at high risk of influenza-related complications (Marentette, 2011), they do have a high risk of exposure to influenza from their ill patients, and can spread flu to their patients, their colleagues, and members of their community (Brandt, 2011). Although most health care workers are aware of the need to become vaccinated, many do not do so (Clark et al., 2009).

Vaccination of HCW has been shown to reduce influenza transmission within health care settings (Chen, 2012), in addition to creating a healthier workforce better capable of caring for patients (Brandt, 2011). Numerous federal agencies recommend influenza vaccination among

HCW, due to the potential of high vaccination rates being correlated to lower absenteeism, and lesser spread of influenza from HCW to patients, and vice versa (Rebmann, 2012). Unlike other vaccinations, however, HCW must become vaccinated against influenza each year, and thus require annual reminders about their vaccination status, and need to take action (Nowalk, 2010).

### **2.1.3 Merits of Vaccination Against Influenza**

Vaccination against influenza is the best way for HCW to avoid spreading the disease to their patients or transmitting it (Zimmerman et al., 2009). Vaccination also carries strong benefits across general and targeted populations, and carries the potential to not only reduce the burden of illness, but also the burden on health care providers who must address these cases when patients present with illness in an outpatient, inpatient, or long-term facility (Kostova et al., 2013). The literature notes that during a six-year evaluation, influenza vaccination prevented between 1.1 million and 5 million cases annually, depending on how well vaccination matches circulating strains (Kostova et al., 2013). It is predicted that universal vaccination — as opposed to simply targeted vaccination in high-risk groups, including the elderly, pregnant women, and HCW — could carry significant cost savings amounting to more than \$3.1 billion in both direct and indirect costs, when compared to a targeted campaign (Clements, Chancellor, Nichol, DeLong, & Thompson, 2011).

### **2.1.4 Vaccination Trends and Best Practices**

Healthy People 2020 goal IID-12 calls for increasing vaccination rates for all adults and children, with further specific goals and data for the vaccination of health care workers, Goal IID-12.13 (Office of Disease Prevention and Health Promotion, 2016b). The eventual target vaccination rate

is 90 percent, with midpoint goals to increase vaccination from year to year (Office of Disease Prevention and Health Promotion, 2016b). This goal mirrors what has been in place at the University of Pittsburgh Medical Center (UPMC), the location for this program; the target vaccination rate at UPMC has historically been 90 percent for HCW.

Achieving this 90-percent goal has been a lengthy challenge at the national level. According to baseline data gathered in the 2010-2011 season, HCW vaccination has ranged from as low as 55.8 percent, increasing to only 66.9 percent in the 2012-2013 vaccination season (Office of Disease Prevention and Health Promotion, 2016a). Vaccination rates largely do not differ between male and female populations (achieving 66.3 percent and 66.9 percent respectively in 2012-2013), but disparities do exist along typical socioeconomic status lines (Office of Disease Prevention and Health Promotion, 2016a).

HCW who have achieved less than a high school education only had a 48.2 vaccination rate in 2012-2013, compared to a 74.2 percent vaccination rate in college-educated HCW, and 80.7 percent among those who have an advanced degree including a doctorate, master's, or medical degree (Office of Disease Prevention and Health Promotion, 2016a). Likewise, HCW living below the federal poverty level achieved a 49.6 percent vaccination in 2012-2013, compared to 78.5 percent vaccination among those living at five times the federal poverty level or higher (Office of Disease Prevention and Health Promotion, 2016a).

The Centers for Disease Control and Prevention note that these rates are “unacceptably low” (C. L. Y. Black, X.; Ball, S.W.; Donahue, S.M.A; Izrael, D.; de Perio, M.A.; Laney, A.S.; Williams, W.W.; Lindley, M.C.; Graitcer, S.B.; Lu, P.; Bridges, C.B.; DiSogra, C.; Sokolowski, J.; Walker, D.K.; Greby, S.M., 2015), and while specific rates are not available for HCW in Pennsylvania, the Hospital and Healthsystem Association of Pennsylvania (HAP), the primary

lobbying and advocacy organization for health care facilities in Pennsylvania, state that these federal rates “mirror Pennsylvania Department of Health (DOH) findings for the 2014-2015 flu season” (The Hospital and Healthsystem Association of Pennsylvania, 2015).

Interventions and evidence-based practices have been suggested to address vaccination in this population. These programs largely have revolved around ensuring that employees are aware of on-site vaccination (thus reducing a barrier to becoming vaccinated), and addressing myths regarding vaccination and vaccine efficacy and safety (Office of Disease Prevention and Health Promotion, 2016c).

Recommendations both at the federal and state level note that a universal vaccination program is the strongest driver for achieving this 90-percent target. In Pennsylvania in 2012, 53 health care facilities achieved a higher than 90 percent rate, with many facilities seeing 99 percent of HCW become vaccinated (Pennsylvania Department of Health, 2016). “No other policy or campaign to promote [HCW] influenza has consistently achieved equivalent success,” notes the CDC (C. L. Y. Black, X.; Ball, S.W.; Donahue, S.M.A; Izrael, D.; de Perio, M.A.; Laney, A.S.; Williams, W.W.; Lindley, M.C.; Graitcer, S.B.; Lu, P.; Bridges, C.B.; DiSogra, C.; Sokolowski, J.; Walker, D.K.; Greby, S.M., 2015). In addition to the state and federal recommendations, HAP also “encourages members to implement universal influenza vaccination initiatives” in order to maximize vaccination and prevent spread of disease (The Hospital and Healthsystem Association of Pennsylvania, 2016).

### 2.1.5 Barriers to Vaccination

Personally held beliefs arise throughout the literature as significant contributors for why HCW refuse to become vaccinated. The CDC further breaks down these barriers into four primary belief systems that HCW who refuse vaccination may hold:

- Influenza is not a risk to the individual HCW or patient for whom they care
- The vaccine is ineffective
- The vaccine has a high risk of side effects
- The individual is afraid of needles (Centers for Disease Control and Prevention, 2014)

These beliefs are confirmed by additional data from earlier flu seasons, where HCW who denied vaccination state that they didn't need the vaccine, they didn't think it would work, and that they might get sick if they got the vaccine (C. L. Y. Black, X; Ball, S.W.; Donahue, S.M.A; Izrael, D.; de Perio, M.A.; Laney, A.S.; Williams, W.W.; Lindley, M.C.; Graitcer, S.B.; Lu, P.; Bridges, C.B.; DiSogra, C.; Sokolowski, J.; Walker, D.K.; Greby, S.M., 2014). For an individual who feels that the vaccine is both ineffective, and that it would make them ill, declining vaccination as a protective factor becomes a reasonable choice (Anikeeva, Braunack-Mayer, & Rogers, 2009).

Although these barriers may not appear to have scientific backing to the public health professional, they are consistent barriers that been raised and expressed throughout the literature. To the HCW, these issues represent substantial risk and concern. Therefore, any campaign that seeks to encourage HCW vaccination not only needs to address their motivators for choosing to become vaccinated, but also the main barriers or perceptions that HCW may have about

vaccination. It is unlikely that any campaign that does not address these specific barriers will demonstrate long-term success (Anikeeva et al., 2009).

Access to vaccine — both at an economic level and in terms of physical space — also must be addressed (Anikeeva et al., 2009). Vaccination rates are notably low among HCW who work in areas where vaccination is not available on-site, and is either not reimbursed by insurance, or provided at no cost. This is especially true in long-term care settings—whether they be long-term medical, skilled nursing facilities, or long-term psychiatric care—where staff have noted that many employers do not require, provide, or promote vaccination (C. L. Y. Black, X.; Ball, S.W.; Donahue, S.M.A; Izrael, D.; de Perio, M.A.; Laney, A.S.; Williams, W.W.; Lindley, M.C.; Graitcer, S.B.; Lu, P.; Bridges, C.B.; DiSogra, C.; Sokolowski, J.; Walker, D.K.; Greby, S.M., 2015). While only 2.6 percent of HCW noted in one study that their hospitals did not promote influenza vaccination, nearly 30 percent of staff in long-term settings had the same report (C. L. Y. Black, X.; Ball, S.W.; Donahue, S.M.A; Izrael, D.; de Perio, M.A.; Laney, A.S.; Williams, W.W.; Lindley, M.C.; Graitcer, S.B.; Lu, P.; Bridges, C.B.; DiSogra, C.; Sokolowski, J.; Walker, D.K.; Greby, S.M., 2015).

### **2.1.6 Previous Work in the UPMC Population**

The University of Pittsburgh Medical Center (UPMC) has been reviewed in the literature for its work to increase vaccine uptake among employees, with an emphasis on HCW who are based in the hospital setting. These reviews have primarily focused on motivators and barriers related to vaccine uptake (Nowalk, 2010), and the use of incentives as motivator in this population (Zimmerman et al., 2009). Motivators in this population are similar to those demonstrated in other HCW populations: protection of self and others (Nowalk, 2010), reducing time off of work

(Zimmerman et al., 2009), and recommendations and perception of social norms by key stakeholders, such as physicians and UPMC Employee Health (Zimmerman et al., 2009).

UPMC has experienced similar difficulties to national targets when achieving a 90 percent vaccination rate. Historical data reported peak vaccination rates — the highest level achieved during the vaccination season — of 73 percent among employees in the organization’s hospital division (now the Health Services Division) in 2013, and 68.5 in 2012. Among the hospitals used as site locations for this project, vaccination rates before the start of this evaluation ranged from 62.9 percent to 81.2 percent. Although the lowest rate is on par with that demonstrated at the federal level, the highest achieving hospital during a baseline year still did not achieve 90 percent.

Various tactics have been used to encourage vaccination across the organization, largely mimicking those recommended by the Community Guide (Office of Disease Prevention and Health Promotion, 2016c). Methods have included newsletter and intranet communications to publicize free, on-site vaccine access, videos that address myths regarding vaccination, and periodic messaging from hospital presidents to employees. These tactics have been used to reach the organization as a whole, with many individual business units and hospitals opting to create unique programs adapted for their campus, and aligned against the idea of promoting accessibility and reducing misconceptions. During the 2011-2012 season, the organization partnered with the Allegheny County Health Department to encourage employee vaccination—including all employees, not just those who provided patient care—through the use of incentives and a lottery system. Employees who were vaccinated were entered into a drawing for a perceived high-value prize of one of 200 gift cards to local businesses, including shops and restaurants, in Allegheny County. Yet, despite these actions and more traditional tactics, vaccination historically had not

reached 90 percent, even in the highest performing hospitals, including hospitals and residences specializing in maternal and infant health, pediatrics, geriatrics, and cancer care.

### **2.1.7 Theoretical Framework for Addressing Influenza Vaccination in Health Care**

#### **Workers**

Key motivators appear in the literature for why HCW desire to become vaccinated. These motivators thus can be modified and addressed to create reasons why individuals who have not yet become vaccinated may want to do so; detractors include fear of side effects, and a perception of not being at risk for getting the flu (Maltezou, 2008) can be addressed and mitigated. Recurrent motivators include high risk of contact to influenza (Chen, 2012), protecting oneself and one's patients from influenza (Clark et al., 2009), and a strong belief that the vaccine is effective in protecting the HCW, patient, and family from influenza (Prematunge, 2012).

These motivators largely align with the tenets illustrated in the Health Belief Model (Ballestas, McEvoy, & Doyle, 2009): perceived susceptibility, perceived severity, perceived barriers, cue to action, and self-efficacy (Rosenstock, 1974). Therefore, it is posited that a flu communications campaign would be most effective by focusing on the severity of flu and its ability to affect a wide range of individuals (including individuals who are close to the HCW in question), reducing any barriers to getting the vaccine (by promoting easy access to the vaccine), creating an automatic cue to action by keeping vaccination and flu severity front of mind for HCW, and portraying the vaccine as a simple step that the HCW can do to reduce the severity of illness, and to minimize its impact on individuals around the HCW.

Additionally, the literature also notes that for many HCW, becoming vaccinated against influenza is a direct responsibility as part of their job (Chen, 2012), and may be viewed as an

important social norm in the workplace. In keeping with the central components of the Social Norms Theory, it is proposed that a flu vaccination communications campaign should address the real and perceived norms in the hospital culture (Perkins & Berkowitz, 1986), with an emphasis on creating the perceived norms that are desirable for mass vaccination. It would be imperative to communicate to staff that not only does flu vaccination offer important protective benefits to patient, family, and self, but it is also an essential component of being a valued member and participant of the the hospital community (Manuel, Henry, Hockin, & Naus, 2002).

## **2.2 PROJECT DEVELOPMENT**

Project ideation and development for a flu vaccination communications campaign at UPMC came after a multiyear observational period, and the realization that one of the sites chosen for pilot selection (Western Psychiatric Institute and Clinic of UPMC [WPIC]) consistently was the lowest-ranked UPMC facility in terms of achieving optimal flu vaccine compliance against the organizational benchmark of 90 percent. Additionally, although the literature presents various figures for the “ideal” flu vaccination percentage necessary to acquire herd immunity, and that even 85 percent may not have a significant impact in decreasing hospital-acquired influenza (Dionne, Brett, & Culbreath, 2015), there was a large systemwide concern at UPMC that despite various efforts, the majority of the hospitals in the Hospital and Community Services Division (now the Health Services Division) had been unable to achieve systemwide goals.

### **2.2.1 Stakeholder Approval and Sign Off**

Early in 2013, preceding Year 1 (2013-2014 flu vaccination season), the WPIC leadership team was approached with the theoretical framework behind the overarching program, and asked if they would be interested in having WPIC participate at the main building (“WPIC Main”), outpatient/ambulatory clinics, and research locations. Leadership were agreeable to the idea, and offered insight into the barriers behind flu vaccination from a staff perception, unique challenges that WPIC had at its central location and off-site ambulatory clinics, and opportunities to keep in mind as the program progressed.

Infection Control stakeholders at Magee-Womens Hospital (Magee) reached out early in Year 2 (2014-2015) of WPIC’s pilot. They were aware of the intervention at WPIC, and were interested in having a similar program adapted for use at Magee. The decision was made to utilize the current project in use at WPIC, and modify the campaign and its assets to more adequately represent the patient population at Magee.

UPMC Employee Health and Emergency Preparedness leadership were informed of the program concept in early 2013, and agreed to make vaccination data available for past and future seasons (the 2012-2013 current season at the time), and all subsequent seasons. During the data analysis phase in late 2015/early 2016, Human Resources for Magee and WPIC developed reports detailing employee demographics for those two campuses, as well as the cohort group and control arm, UPMC Presbyterian Shadyside.

## **2.2.2 Project Rollout**

Communications at WPIC followed a similar path and tactics approach throughout the multiyear pilot, with the addition of social norms and executive photo components in Year 2. There was a leadership change at WPIC in between Year 1 and Year 2, and a written communications plan and brief was not provided to leadership in Year 2.

### **2.2.2.1 WPIC Year 1**

In August 2013, immediately preceding Year 1, the leadership team at WPIC was given a formal written communications plan focusing on a multipronged approach that would address flu risk, benefits from getting the vaccine, barrier mitigation (the challenges of getting the vaccine at an off-site location, and outside the UPMC system), and a top-down directive from leadership. It was proposed that all available tactics be used for this campaign, including screensavers on clinical computers (those used in patient care areas), television screens/message boards outside the cafeteria used for internal communications, email announcements, and messages from leadership direct to staff. Managers were encouraged to discuss flu vaccination direct with their staff members, and the hospital leadership team was strongly encouraged to send out email messaging regarding vaccination to staff.

### **2.2.2.2 Phase I, Component 1**

The campaign would focus along the central tagline of “Care for Us? Protect Us.” The campaign placed emphasis on the duty of the employee to protect others from serious flu complications. The campaign tagline was designed to be applicable to a variety of audiences and roles. Employees

could envision “us” as anyone who they felt protective of, including patients, family members, colleagues, neighbors, and other community members.

### **2.2.2.3 Phase I, Component 2**

The latter half of the campaign would continue using the central campaign theme, but would place greater emphasis on overcoming barriers to getting the flu vaccine. Clinics outside of WPIC’s physical locations were promoted, such as traveling carts, UPMC Employee Health, and a systemwide flu vaccine verification form to be used if an employee received the vaccine outside of the system. To follow the central campaign theme, messaging also emphasized that getting the flu vaccine off-site can be a challenge, but that flu complications were a bigger challenge. Similar tactics were used as in Component 1.

### **2.2.3 WPIC Year 2**

A similar approach to Year 1 was conducted at WPIC in Year 2, with the addition of social norms concepts to the risk-based approach. The WPIC leadership team agreed to have pictures of them receiving individual flu vaccine in Year 2, with an emphasis on flu vaccination being something that is done across WPIC.

### **2.2.4 Magee Rollout**

Leadership teams at Magee did not receive a formal written communications plan in Year 1, Year 2, or Year 3. Themes at Magee in Year 1 were designed by Infection Control stakeholders. Year 3

mimicked communications across the UPMC system, with additions when requested by stakeholders.

### **2.2.5 Creative Development**

Design assistance was sought from designers affiliated with Garrison Hughes, who provide dedicated in-house design services for UPMC and its facilities. This process began in August 2013, before the launch of the campaign at WPIC. It was explained to the designer that the graphical treatment for this campaign would need to be applicable to a range of individuals and tastes, and should reflect the diverse patient population served at WPIC. The designer was given a general overview of the project, including the basic concepts involved: a risk-based campaign that was focused on caring for others, and reducing their risk from flu and flu complications. Color choices were determined based on the UPMC official color manual, and an asset was designed that would work in a variety of media, including email, digital/intranet, screensavers, and print fliers.



**Figure 1. Care for Us? Protect Us.**

Second and third design requests were submitted in August 2014, to reflect the new theme at WPIC for Year 2 of “We Care for Them. We Protect Them.” and to adapt the Year 1 campaign

for audiences at Magee. These services were again provided by Garrison Hughes, and the same designer was kept from Year 1 to Year 2.



**Figure 2. We Care for Them. We Protect Them.**

In an attempt to most closely mimic the Year 1 campaign at WPIC into Year 2, thus reducing concerns with creating a campaign that was more visually appealing, and reducing concerns that any additional flu vaccination uptake was due to the refreshed look, it was decided to simply swap out the new tagline, and keep the existing graphic and color style the same as Year 2.

To likewise minimize any drastic changes in graphical impact at Magee in Year 2, contrasted to WPIC in Year 1, the decision was made to keep the tagline in the same font treatment, and an identical color treatment for the asset. Initial asset plans called for replicating the individual asset components to be an all female asset, but Infection Control stakeholders and the designer agreed that this plan made the asset less enticing than WPIC in Year 1. To play up the idea of the patient population being predominantly women's and infant's health, it was decided to have the asset feature a mother and her child.



**Figure 3. Care for Us? Protect Us.**

## **3.0 ARTICLE**

### **3.1 OVERVIEW AND BACKGROUND**

Influenza carries a significant public health and economic impact. With influenza and pneumonia ranking as the eighth-leading cause of death in the United States, and carrying more than \$8 billion in direct medical costs (Centers for Disease Control and Prevention, 2016), efforts to reduce influenza disease burden are a strong national priority (Office of Disease Prevention and Health Promotion, 2016b). Vaccination is the best way for health care workers (HCW) to avoid spreading influenza to their patients, and of becoming ill and costing manpower hours to their employers (Zimmerman et al., 2009). Although most health care workers are aware of the need to become vaccinated, many do not do so (Clark et al., 2009). With Healthy People 2020 goals of 90 percent vaccination, yet national achievement hovering below 70 percent (Office of Disease Prevention and Health Promotion, 2016b), areas for opportunity remain to increase vaccination rates.

Mandatory vaccination is strongly recommended as a best practice, yet it carries challenges for organizations and employees to implement (Anikeeva et al., 2009). While previous studies in the literature have looked at tactics for achieving vaccination that are supported by evidence-based programs [(Tao et al., 2010), (Ballestas et al., 2009), (Zimmerman et al., 2009), (Doratotaj, Macknin, & Worley, 2008)], few studies have looked at the efficacy and effectiveness of flu vaccination communications campaigns that have been used to encourage populations to become vaccinated.

### 3.2 THEORETICAL FRAMEWORK

It was posited that an approach grounded in the Health Belief Model, with a focus on risk to patients, colleagues, or family members, would have a moderate mediating factor on employee vaccination. Many HCW make their decisions to become vaccinated because of several beliefs that tend to align themselves along the central tenets of the Health Belief Model: high risk of contact to influenza (Chen, 2012), protecting oneself and one's patients from influenza (Clark et al., 2009), and a strong belief that the vaccine is effective in protecting the HCW, patient, and family from influenza (Prematunge, 2012).

Additionally, it was proposed the Social Norms Theory — with messaging to staff that vaccination is a community and professional norm in the hospital — would contribute to the campaign in a positive manner. Many HCW who become vaccinated feel that to do so is a duty of their job, and to meet the norms of their job categorization and organization (Godin, Vezina-Im, & Naccache, 2010). Therefore, drafting a messaging campaign that plays to this perception is posited to have a strong influence on the target population's decision to become vaccinated.

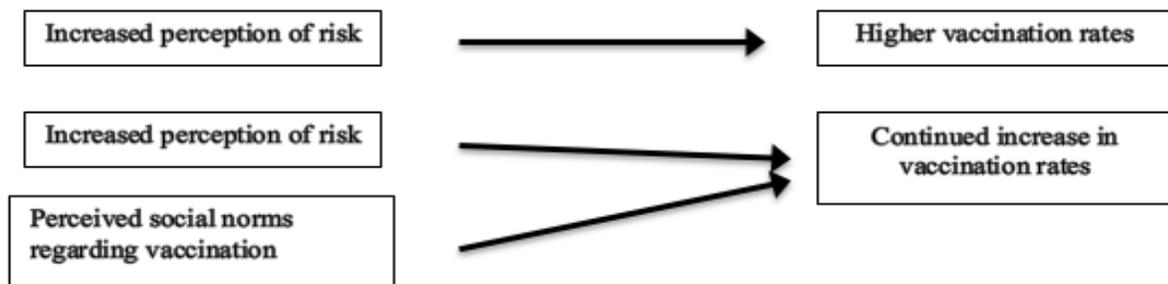


Figure 4. Theoretical Approach

## 3.3 METHODS

### 3.3.1 Site Selection

UPMC is a 20-facility academic medical center network in western Pennsylvania, with headquarters in Pittsburgh, Pa. Two business units/hospitals at UPMC were selected for the communications pilot due to their existing flu vaccination rates, ease of communications control within the facility, and stakeholder buy in. Neither Magee-Womens Hospital (Magee) nor Western Psychiatric Institute and Clinic of UPMC (WPIC) had been able to achieve the systemwide influenza vaccination target of 90 percent, and leadership teams at each campus were willing to participate with the eventual aim of improving vaccination rates. The combined UPMC Presbyterian Shadyside campus served as a control arm.

WPIC is a behavioral health facility with inpatient and ambulatory/outpatient locations. Magee is a medical-surgical facility with an emphasis on women's health/maternity services, neonatology, bariatric programs, and cancer care. Some outpatient behavioral health care is provided, with an emphasis on addiction recovery and postpartum needs. UPMC Presbyterian Shadyside is a split campus under a single operating license; UPMC Presbyterian and UPMC Shadyside are two separate facilities under this unified umbrella. A variety of medical-surgical care is provided at both campuses, including cancer care, transplant, pulmonology, and trauma.

**Table 1. Campus Gender Composition.**

	WPIC (n=2075)	Magee (n=2375)	Shadyside (n=2825)	Presbyterian (n=5666)
<b>Female</b>	1527 (73.59%)	2047 (86.19%)	2156 (75.32%)	4054 (71.55)
<b>Male</b>	548 (26.41%)	348 (14.65%)	669 (23.68%)	1612 (28.45%)

**Table 2. Employee Job Role.**

	WPIC (n=2075)	Magee (n=2375)	Shadyside (n=2825)	Presbyterian (n=5666)
<b>Clinical</b>	1291 (62.21%)	1571 (66.1%)	2185 (77.35%)	3345 (59.04%)
<b>Nonclinical</b>	784 (37.78%)	804 (33.85%)	640 (22.65%)	2221 (39.2%)

**Table 3. Employee Education Status.**

	WPIC (n=2075)	Magee (n=2375)	Shadyside (n=2825)	Presbyterian (n=5666)
<b>Not Indicated</b>	414 (19.95%)	593 (24.97%)	645 (22.83%)	1475 (26.03%)
<b>Indicated</b>	1661 (80.04%)	1782 (75.03%)	2180 (77.17%)	4191 (73.97%)
<b>High School or GED</b>	106 (6.38%)	243 (13.64%)	422 (19.36%)	788 (18.8%)
<b>Technical or Business School</b>	63 (3.79%)	222 (12.46%)	214 (9.82%)	421 (10.04%)
<b>Some College</b>	249 (14.99%)	235 (13.19%)	403 (18.49%)	774 (18.47%)
<b>Two- or Four- Year College</b>	755 (45.45%)	891 (50%)	943 (43.26%)	1721 (41.06%)
<b>Some Graduate School</b>	43 (2.59%)	28 (1.57%)	20 (.917%)	83 (1.98%)
<b>Master's Degree</b>	392 (23.6%)	132 (7.41%)	124 (5.69%)	220 (5.25%)
<b>Doctorate</b>	52 (3.13%)	25 (1.4%)	42 (1.93%)	62 (1.48%)

### 3.3.2 Rollout and Overview

WPIC and Magee were selected to participate in unique communications campaigns — breaking away from systemwide messaging — as a phased-in approach spanning flu vaccination and flu seasons from 2013-2016. Magee served as a control arm for Year 1 (2013-2014) and Year 3 (2015-2016), with UPMC Presbyterian Shadyside serving as a consistent control arm for all three seasons. In Year 3, a policy was implemented at the UPMC systemwide level that required mandatory vaccination (exempting employees with medical or religious contraindications) for all staff who provide care to patients, or who are based in a patient care facility, regardless of job role.

**Table 4. Phased-In Approach.**

	Year 1: 2013-2014	Year 2: 2014-2015	Year 3: 2015-2016
<b>WPIC</b>	Communications focusing on risk (Health Belief Model)  <b>Tagline: Care for Us? Protect Us.</b>	Communications focusing on risk and perceived norms (Health Belief Model and Social Norms Theory)  <b>Tagline: We Care for Them. We Protect Them.</b>	Policy intervention Communications focusing on risk and perceived norms (Health Belief Model and Social Norms Theory)  <b>Tagline: We Care for Them. We Protect Them.</b>
<b>Magee</b>	Traditional campaign	Communications focusing on risk (Health Belief Model)  <b>Tagline: Care for Us? Protect Us.</b>	Policy intervention
<b>UPMC Presbyterian Shadyside</b>	Traditional campaign	Traditional campaign	Policy intervention

### **3.3.3 Year 1: 2013-2014 Flu Season**

Communications campaigns at all campuses ran concurrently with a systemwide requirement that employees either receive the flu vaccine, or participate in an educational module about flu, the importance of vaccination, and an acknowledgement that they were declining the vaccine. Employees who did not complete the educational module were issued corrective action based on the organization's corrective action policy.

UPMC Presbyterian Shadyside followed the organizational systemwide messages during this time, with an emphasis on completing the mandatory requirements, and taking protective action against flu. Components used at this campus included digital message boards, emailed communications, and digital graphics on the facility's intranet site. Emails from executives also were sent to all staff in the hospital.

#### **3.3.3.1 Western Psychiatric Institute and Clinic: Care for Us? Protect Us.**

A novel flu vaccine communications campaign was developed after conversation with stakeholders that would encourage behavior modification based on the Health Belief Model. It was proposed that because these employees had not been responsive to previous campaigns regarding protection of patients (likely due to the facility's nature as a psychiatric/behavioral health hospital with a patient population who were not typically at high risk for flu complications), they would be more receptive to a campaign that illustrated flu risk and protective factors regarding others in their lives for whom they may care — loved ones, fellow colleagues, community members, and patients. "Care for Us? Protect Us" was designed to be a campaign that was intentionally vague in classifying "us." The campaign suggested that employees should think of anyone who may be

important to them who could be at risk for flu complications, and thus needed protection against influenza.



Figure 5. Digital Message Board and Screensaver, WPIC.

Traditional tactics were used throughout the duration of the campaign. Limited emails were sent from leadership to staff, and staff received direct targeted emails generally related to flu, outside of a traditional newsletter; a newsletter was not available at this campus for Year 1.

### **3.3.3.2 Magee-Womens Hospital: Traditional Campaign.**

Communications approaches and tactics at Magee largely followed the systemwide materials, with some additional modifications based on client request and need. Infection Control requested assistance in developing a communications campaign that while not theoretically-based, was perceived to be more “fun” for employees. The Year 1 campaign focused around various sports themes, reflecting a common culture in the hospital to be involved with professional sporting activities. Specific methods included direct emails to staff from hospital leadership, screensavers on clinical computers, newsletter content, and dedicated space on the facility’s intranet page.

### **3.3.4 Year 2: 2014-2015 Flu Season**

UPMC Presbyterian Shadyside and systemwide communications followed similar tactics to those used in Year 1. Executive emails were sent to all staff at UPMC Presbyterian Shadyside at the peak of the vaccination campaign, urging employee participation. Messaging continued to be used on the facility intranet, digital message boards, and clinical screensavers.

#### **3.3.4.1 Western Psychiatric Institute and Clinic: We Care for Them. We Protect Them.**

An additional layer involving social norms was added for the Year 2 campaign. The campaign theme was modified to “We Care for Them. We Protect Them,” to reflect that flu vaccination was a normative belief at WPIC, and that actions from all employees were necessary to protect individuals who may be at risk of getting the flu and serious complications.



**Figure 6. Asset for WPIC.**

To promote social norms of flu vaccine, the hospital's leadership team was asked to participate and have their pictures taken as they received their flu shots. They also were asked to state a personal reason why they were vaccinated. Reasons ranged from protecting children to protecting patients, and not wanting to get sick with the flu and having to take time off. These pictures and messages were used on clinical screensavers and digital message boards, on print fliers in the hospital's digital boards, and on the facility's intranet.



**Figure 7. WPIC Leadership Photo, Digital Message Board and Screensaver.**



**Figure 8. WPIC Leadership Photo, Digital Message Board and Screensaver.**

Between Year 1 and Year 2, a newsletter was initiated at WPIC, and an additional digital message board was installed in the hospital's main lobby.

### 3.3.4.2 Magee-Womens Hospital: Care for Us? Protect Us.

To evaluate the impact of risk-based communications at a similar facility in a year without a systemwide mandate, Magee received a unique campaign in Year 2. This campus had traditionally seen strong vaccine compliance rates, but executive stakeholders and Infection Control stakeholders were particularly concerned with the facility’s inability to obtain the organizational target of 90 percent.

Year 2 at Magee kept the novel Year 1 tagline from Western Psychiatric Institute and Clinic. Modifications were made, however, to reflect the unique patient population at Magee, and tactics that had been previously successful at Magee involving women and infant health. Employees at Magee have generally been receptive to the idea of getting the flu shot as protective measures for preventing flu in maternity, neonate, and cancer patients. Therefore, “Care for Us? Protect Us?” followed the previously demonstrated model from Western Psychiatric, but was modified to focus on women and infants. This campaign continued to focus on a risk-based approach, and communicated to employees that getting the flu shot would help to prevent against negative consequences.



**Figure 9. Asset for Magee.**

A video was created in conjunction with UPMC Media Relations and the Magee-Womens Research Institute and Foundation about a Magee patient who had not gotten her flu shot, and became severely ill with flu, necessitating the premature delivery of her daughter, and subsequent

transfer of the infant to the neonatal intensive care unit, and mother to UPMC Presbyterian. Although this video focused on flu from the patient perception, it served as a reminder that not getting vaccinated — and becoming ill with flu — could have adverse side effects.

### **3.3.5 Year 3: 2015-2016 Flu Season**

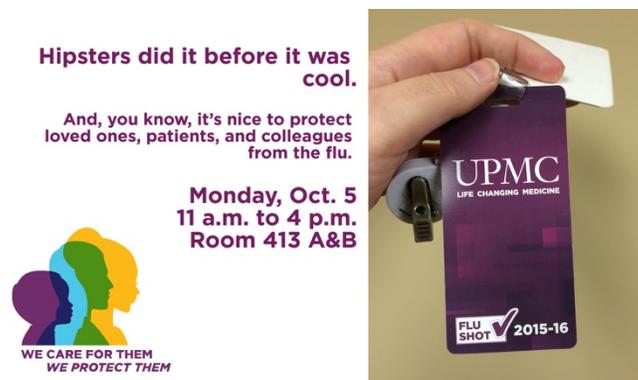
2015-2016 marked the beginning of mandatory vaccination at UPMC. All employees who provide patient care or who work in a clinical care facility (inpatient or outpatient), regardless of job function, were required to become vaccinated by Nov. 30, 2015. Employees who were not vaccinated, and who were not formally exempted by the organization due to religious or medical reasons, faced corrective action up to and including termination. Individuals who were not vaccinated, regardless of reason, were mandated to wear a surgical mask if they were within six feet of a patient, regardless of employee job function.

UPMC Presbyterian Shadyside and systemwide communications took multiple approaches during Year 3. The majority of messaging focused around the idea that “Safety Isn’t Optional,” with some concept leakage from WPIC involving the Social Norms approach. Tactics included executive emails, direct-targeted email communications in employee newsletters, digital message boards and clinical screensavers, and systemwide and facility intranet usage.

#### **3.3.5.1 Western Psychiatric Institute and Clinic: We Care for Them. We Protect Them.**

Because of the systemwide mandate, the campaign at WPIC made larger usage of the Social Norms approach in Year 3. This strong focus built off of pop culture references, and the use of a purple hang tag that was used at a systemwide level to identify those who had been vaccinated, the campaign.

Communications took a more humorous approach in Year 3, playing up on the idea that this year, the vaccine may be mandatory, but it was also something that “we” did because it was important — and to consider the protective factor of vaccination as a side perk. Messaging approaches were shorter during this campaign, and made use of novel techniques for flu communications at the systemwide level, including a list of “... Reasons to get the flu vaccine that you probably haven’t seen before,” which included not wanting to use sick time, and that if employees got the flu vaccine, they would stop being told that they had to get the flu vaccine.



**Figure 10. Digital Message Board and Screensaver, WPIC**

### **3.3.5.2 Magee-Womens Hospital: Traditional Campaign.**

Magee returned to the traditional campaign for Year 3, following all systemwide communications and tactics, with no additional communications developed at a local level. Stakeholders expressed some initial concern, as this was the first year in many years where Magee had not received a modified program, but were receptive to the plan of following systemwide messaging and tactics. Specific tactics included direct emails to staff from hospital leadership, screensavers on clinical computers, newsletter content, and dedicated space on the facility’s intranet page.

## 3.4 RESULTS

### 3.4.1 Flu Vaccine Compliance

#### 3.4.1.1 Annual Peak Compliance Rates.

Magee was the only hospital to achieve a peak rate that met or exceeded the organizational goal of 85 percent in the years before vaccination was made mandatory. WPIC continued to be the lowest performing hospital throughout the communications campaign, and policy mandate.

**Table 5. Employee Flu Vaccination Rates.**

	2012-2013 <i>(Baseline)</i>	2013-2014 <i>(Year 1)</i>	2014-2015 <i>(Year 2)</i>	2015-2016 <i>(Year 3)</i> <i>(period ending Dec. 7, 2015)</i>
<b>WPIC</b>	62.9	70.2	72	90.3**
<b>MWH</b>	81.2	83.4	85.6	95.9**
<b>PRES</b>	69.1	78.9	81.7	93.9**
<b>SHY</b>	69.8	78.5	81.8	96**

\*\* p<.001

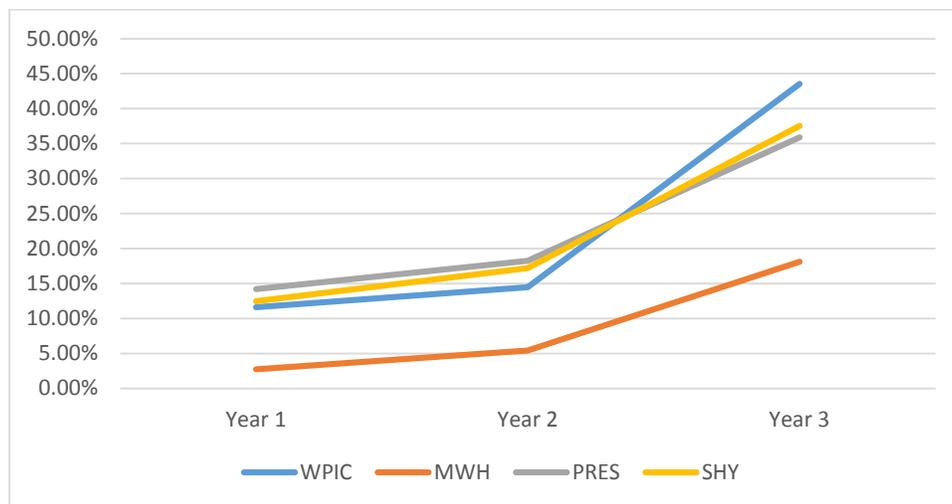
#### 3.4.1.2 Change Compared to Baseline.

Magee saw the lowest gains among all campuses in Year 1 and Year 3, when the Magee followed systemwide policy interventions and communications tactics. Magee doubled its within-campus gains in Year 2 (comparing Year 2 to Year 1), but also had the lowest year-to-baseline gain during that year.

WPIC made moderate gains from year to year, and in each year of the pilot compared to baseline. The highest increase was in Year 3 (period ending Dec. 7, 2015) with a 43.561 percent increase. WPIC saw a within-campus increase in Year 2 (comparing Year 2 change from baseline to Year 1 change from baseline), but a lower within-campus gain that was seen at the control arm for the same period. Double-digit increases from baseline were noted all three years of the campaign, but statistical significance was not demonstrated in any of the three years.

**Table 6. Percent Change Compared to Baseline.**

	Year 1	Year 2	Year 3 (period ending Dec. 7, 2015)
<b>WPIC</b>	11.61%	14.47%	43.56%
<b>MWH</b>	2.71%	5.42%	18.1%
<b>PRES</b>	14.18%	18.23%	35.89%
<b>SHY</b>	12.46%	17.19%	37.54%



**Figure 11. Percent Change Compared to Baseline.**

### **3.4.2 Messaging Evaluation and Impact**

With the exception of Year 1, WPIC flu banner ad clickthrough rates—the percentage of staff who click through a banner message on the facility’s intranet site—have been comparable or moderately exceeded typical campaign rates. In Year 3, the flu clickthrough rate was 85 percent greater than a competing campaign targeting general worksite health behavior. At Magee, the flu banner clickthrough rate exceeded the typical campaign rate in Year 1, was lower than the typical campaign clickthrough rate in Year 2, and was relatively comparable to the typical campaign rate in Year 3.

A similar number of articles related to the flu vaccine mandate were distributed in each campus’ local news section during Year 3, the only year for which email click rates are available. WPIC and UPMC Presbyterian Shadyside each ran seven articles or teasers (in the newsletter’s summary view) during this period. Five articles or teasers were published at Magee. Clickthrough rates — the employees who choose to read the full article — were determined by dividing total article views by the n at each campus times three (3), to illustrate total readership. The systemwide clickthrough average ratio of .03 is used as a benchmark. Rates were consistent at Western Psychiatric and Magee (.054 and .069, respectively), but substantially lower at UPMC Presbyterian Shadyside (.028).

## **3.5 DISCUSSION**

### **3.5.1 Impact of Theory on a Policy Intervention**

Policy remains the strongest driver for encouraging HCW vaccination in this population. All four campuses (including UPMC Presbyterian Shadyside as two separate campuses) demonstrated statistically significant increases in Year 3. None of the campuses demonstrated statistical significance during Chi-square testing of percent increase from baseline, indicating that although WPIC may have had a larger increase, it was not a significant increase. These findings show that in this population, although policy mandates have the strongest effect on vaccination rates in this campuses, the addition of a theory-driven communications campaign does not carry any significant correlation to vaccination rate increases.

### **3.5.2 Impact of Risk-Based and Social Norms-Based Communications Campaigns**

Correlation was demonstrated between the implementation of a risk-based/Health Belief Model-focused campaign, and increased flu vaccination rates at both Western Psychiatric Institute and Clinic in Year 1, and Magee-Womens Hospital in Year 2. In Year 1, additional system mandates were initiated, requiring all employees to either become vaccinated, or to complete an educational module acknowledging that they were aware of the risks of noncompliance, and still did not intend to be vaccinated. This correlation between a risk-based campaign and increased vaccination rates was indeed replicated in Year 2, when both Magee and WPIC demonstrated higher gains from baseline. Magee more than doubled its within-campus gains—those year-to-year gains at the

campus when not compared against a control arm. In that same year, WPIC saw a more moderate increase of approximately 3 percent from the original baseline year.

Magee's within-campus successes and WPIC's moderate increases from baseline indicate that a risk-based campaign emphasizing the vaccine's protective factor, and seriousness of influenza, could lead to moderate gains in the absence of a systemwide mandate. Slight year-to-year gains were expected, as past behavior in obtaining influenza vaccine is a strong predictor for employees to continue to be vaccinated [(Chor, 2011) (Marentette, 2011) (Parry, 2011) (Shahrabani & Benzion, 2010)], but employee behavior at Magee in particular suggests that risk can be a strong motivator for vaccine adoption.

These results confirm the findings of Nativ et. al., that health care workers who believed their work placed them at additional risk, and that patients were at risk, were more likely to become vaccinated than those who had no risk of either their working conditions, or for their patients (Nativ, Paz, Peterfreund, & Potasman, 2010). It is likely that by communicating to Magee employees that flu posed a risk situation, that a greater number of employees may have made the decision to become vaccinated. Additionally, it was communicated to these employees that their patients were at very high risk for flu-related complications, due to their pregnancies or other health issues.

Although there were only moderate increases in employee vaccination rates, employees demonstrated greater engagement with the collateral components when a Social Norms approach was blended with risk perception. Strong employee response was noted at WPIC in Year 2, based on intranet click through rates, and in Year 3, based on emailed newsletter engagement rates. Although WPIC's intranet response was similar to the typical intranet response in Year 2, in Year 3, the response was higher than the average campaign response at WPIC, and was higher than both

the flu campaign and average campaign responses at Magee. Because segmented rates remained low (those engagement rates for particular communications tactics such as intranet and email usage), this indicates that multiple platforms are necessary to address a health concern of this scope.

### **3.5.3 Unaddressed Barriers and Unmet Needs**

There is a severe disparity in the number of workplace flu vaccine clinics available at WPIC, when compared to those available at UPMC Presbyterian Shadyside and Magee. Over the course of a typical flu vaccine compliance season, WPIC will typically have at most five or six clinics, compared to upwards of 20 clinics each at UPMC Presbyterian, UPMC Shadyside, and Magee. Additionally, very few clinics are held at any of WPIC's off-site locations; the two main ambulatory programs based in Oakland typically have one clinic each per season, and the other locations have no clinics.

This access to vaccine is a barrier that should be addressed in order to further increase employee participation at WPIC (Derber & Shankaran, 2012). For this evaluation to be the most complete in terms of evaluating flu vaccine compliance, it would be necessary to ensure that all locations have the same or similar number of formal flu vaccine clinics, and amount of time given to staff to make sure they can become vaccinated. This would allow to control for this barrier when conducting the evaluation. Reducing this barrier was something outside of the scope of control for this project.

### **3.6 LIMITATIONS**

This was an observational evaluation, and thus did not allow for randomization or control of effects or subjects. Likewise, controlling communication received by the control arm was not feasible. Employees outside the facility may see specific communications, and other members of the UPMC Internal Communications team viewed materials and chose to adapt for their campuses, and systemwide usage. The latter does demonstrate the program's adaptive capabilities, though, and illustrate that a tagline, while in use at one facility, can have core components that translate well and adapt well at another facility. Participants across the campuses also carry significant changes in educational background. A disproportionate number of employees at WPIC had postsecondary education, with a further disproportionate number achieving a master's level education or beyond. While the percentage of master's-trained or beyond employees at Magee, Shadyside, or Presbyterian ranged between 6.72 and 8.81 percent (inclusive of doctorate-level employees), the percentage of employees at WPIC who had a master's degree or higher was 26.73. This is likely attributable to the higher educational requirements for behavioral health providers.

### **3.7 IMPLICATIONS**

The implementation and evaluation of this project led to important lessons and guidelines for future projects, both regarding influenza vaccination—as well as general adult vaccination—and employee response and engagement with workplace health campaigns. It appears that a policy mandate is the strongest driver for increasing influenza vaccination in the HCW population, even in light of theoretically-driven campaigns that specifically target employee and patient motivators

and detractors. When a policy mandate is not a viable option due to legal or contractual concerns, a communications campaign focusing on risk perception would be an appropriate tactic to use to encourage vaccination uptake in the workplace.

## **4.0 PROJECT CONCLUSION**

As a pure implementation and evaluation study focusing on employee and workplace health and quality improvement, an article of this nature would be most applicable to journals focusing on health communications, implementation and evaluation, and employee health. Sample journals that could be targeted for publication include *Implementation Science*, *Journal of Health Communication*, the *International Journal of Workplace Health Management*, the *Journal of Healthcare Management*, and the *International Journal of Healthcare Management*. Hospital and health care business-to-business submissions should also be considered.

While this project may have been targeted toward influenza vaccination, the work and results here do carry additional weight and merit when approaching adult vaccination as a whole. Many projects related to vaccination in tend to skew toward childhood populations; some evidence-based practices are named for encouraging adult vaccination, but few evidence-based interventions have been identified. By developing a novel practice that can be applicable toward a range of vaccination practices, this project carries public health significance in filling a gap toward best practices for encouraging vaccination when organizational or other mandates are not available.

### **4.1.1 Additional Limitations**

#### **4.1.1.1 Gender**

All populations have a heavy skew toward female subjects. Across all four cohort groups (counting UPMC Presbyterian and UPMC Shadyside separately), the split between male and female

employees was approximately 75 percent to 25 percent. This is representative of the UPMC population as a whole, which also is disproportionately split between male and female employees. The gender proportion seen at UPMC is mirrored at a national level. According to the Bureau for Labor Statistics, approximately 78 percent of those working in a health care or health care-associated field are female (Bureau of Labor Statistics, 2015). When assessing flu compliance within campuses and against control groups, this proportion would not be a concern, because it is mimicked across all campuses. Gender would be a cause for closer observation and concern when trying to draw comparisons against broader populations, however.

#### **4.1.1.2 Study Design**

The ideal study design for this nature would have involved randomly assigning employees at all campuses to one of three groups: A risk-based communications group, a risk- and social-norms-based communications group, and a control group receiving only systemwide communications. Additionally, these employees would have been assigned in a way that ensured an equal mix of clinical and nonclinical employees, as well as service employees, were in each group.

This was not feasible in this project because of the way that employees receive communications at UPMC. Additional noise would have been created — and concept leakage could not have been prevented — if employees were randomly assigned with no regard to where they performed their job functions. Employees at UPMC receive communications based on where they are located. Therefore, the only way to split out employees for an implementation and evaluation project is to do it at the business unit or facility level.

## **4.1.2 Further Implications**

### **4.1.2.1 Additional Populations**

Although UPMC has moved to mandated vaccination for all clinical employees, and all employees based at a facility that provides clinical care, there is room for adaptation of this program to be used in general nonclinical employees at UPMC who still have a choice regarding influenza vaccination. Additionally, this adaptation would allow the program to be used outside of UPMC, and in additional HCW populations. Replicating the programs in HCW populations outside UPMC (both medical-surgical and in behavioral health) would give additional data points to determine whether a risk- and social-norms-based approach does provide a large compounding affect in correlation with increased employee compliance for flu vaccination.

### **4.1.2.2 Subsequent Campaigns**

There would be significant merit in expanding this approach to other communications campaigns focusing on health behavior and behavior change. Although this multiyear campaign focused on flu vaccination and compliance, there is nothing that indicates that similar tactics and approaches would not be useful for similar programs and conditions. Indeed, it can be argued that concepts in the Health Belief Model and Social Norms Theory carry much impact when designing campaigns that encourage HCW to do myriad behaviors, including emergency preparedness (Ejeta, Ardalan, & Paton, 2015), hand hygiene (Leontsini & Winch, 2014), and workplace safety (McGonagle, Walsh, Kath, & Morrow, 2014).

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