Infection Prevention and Control

Linking Emergency Preparedness and Health Care Worker Vaccination Against Influenza: A Novel Approach

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"Who watches the watchers?" was a phrase rendered from the "Satires" of the ancient Roman poet Juvenal.[1] Health care workers (HCWs) are supposed to be the watchers of our health, helping ensure that we all stay healthy and that diseases are contained and not spread to others. Even though influenza vaccination has been found to be the single most important measure for preventing hospital-acquired influenza, HCWs continue to have low vaccination rates.[2]

In November 2000 the U.S. Department of Health & Human Services published a health promotion and disease prevention initiative, Healthy People 2010, establishing a goal of a 60% rate for influenza vaccination of HCWs by 2010.[3] Yet, the national vaccination rate for HCWs remains at unacceptably low levels: 38% in the 1999–2000 influenza season, 42% in 2005–2006, 44% in 2006–2007, and 49% in 2007–2008.[4–7]

In 2006, in an attempt to address the failure to improve HCW vaccination rates, the U.S. Centers for Disease Control and Prevention (CDC) published recommendations, which focused on three strategies: educating HCWs about benefits of vaccination; providing annual, free on-site vaccination; and obtaining signed declination forms for vaccine refusers.[8,9]

Also in 2006, The Joint Commission established a new infection control standard for influenza vaccination of HCWs that included education, on-site access to vaccination, and ongoing program evaluation to improve HCW participation.[9–12]* Health care institutions have attempted to increase their immunization rates using a variety of methods: education, reminder notices, providing small incentives, establishing easy access to free vaccination, active promotion of vaccination within the workplace, and/or compulsory vaccination as a condition of employment.[13–15] Except for mandatory programs that have achieved vaccination acceptance rates as high as 98.4%

* Standard IC 02.04.01: The hospital offers vaccination against influenza to licensed independent practitioners and staff. Element of Performance 3: The hospital provides influenza vaccination at sites accessible to licensed independent practitioners and staff (IC-12–IC-13).

Article-at-a-Glance

Background: Health care workers (HCWs) can acquire and transmit influenza to their patients and coworkers, even while asymptomatic. The U.S. Healthy People 2010 initiative set a national goal of 60% coverage for HCW influenza vaccination by 2010. Yet vaccination rates remain low. In the 2008–2009 influenza season, Flushing Hospital Medical Center (FHMC; New York) adopted a "push/pull" point-of-dispensing (POD) vaccination model that was derived from emergency preparedness planning for mass vaccination and/or prophylaxis to respond to an infectious disease outbreak, whether occurring naturally or due to bioterrorism.

Launch of the HCW Vaccination Program: In mid-September 2008, a two-week HCW vaccination program was launched using a sequential POD approach. In Push POD, teams assigned to specific patient units educated all HCWs about influenza vaccination and offered on-site vaccination; vaccinated HCWs received a 2009 identification (ID) validation sticker. In Pull POD, HCWs could enter the hospital only through one entrance; all other employee entrances were "locked down." A 2009 ID validation sticker was required for entry and to punch in for duty. Employees without the new validation sticker were directed to a nearby vaccination team. After the Push/Pull POD was completed, the employee vaccination drive at FHMC was continued for the remainder of the influenza season by the Employee Health Service.

Results: Using this model, in two days 72% of the employees were reached, with 54% of those reached accepting vaccination.

Conclusions: This model provides a novel approach for institutions to improve their HCW influenza vaccination rates within a limited period through exercising emergency preparedness plans for infectious disease outbreaks.

under threat of termination, most employment-related programs have achieved only small increases in immunization rates.[16–18] At our institution, implementing some of these methods resulted in only modest gains in HCW vaccination rates, with an acceptance rate of only 38% in the 2006–2007 vaccination season.[19] As a result, we decided to employ an emergency preparedness model as the primary means for vaccinating our employees in the 2008–2009 season.[20]

Interest in the ability to recognize and respond to a bioterrorism or naturally occurring event has intensified during the past years. Exercises have focused on problems that hospitals would face with respect to (1) leadership and decision making, (2) prioritization and distribution of antibiotics and vaccines, and (3) applying principles of disease containment, including facility lockdown.[21] Recent events, including the emergence of severe acute respiratory syndrome (SARS) in November 2002 to July 2003, concerns over avian influenza, and, most recently, pandemic H1N1 influenza, have prompted hospitals to reappraise their emergency preparedness plans. However, regular drilling of such plans to challenge their inherent assumptions is often lacking, giving rise to a false sense of security known as the "paper plan syndrome."[22,23] Modification of emergency preparedness plans through drills and exercises is required to render them more effective.[24] At our institution, the decision to link the HCW influenza vaccination program to exercising our emergency preparedness plan was viewed as an opportunity to enhance the effectiveness of both.

In this article, we report on the use of a novel program to increase influenza vaccination rates of HCWs at a community hospital by exercising its emergency preparedness plans for mass vaccination and/or prophylaxis for infectious disease outbreaks as a model for improvement of both employee vaccination rates and emergency preparedness.

Methods

Setting

The Flushing Hospital Medical Center (FHMC) in Flushing, New York, is an urban, 325-bed, acute care community hospital with 1,642 employees, situated in a culturally diverse neighborhood of New York City. In 2008, our full-service emergency department (ED) treated 45,200 patients; our outpatient departments saw 114,000 patients.

Launch of the HCW Vaccination Program

In mid-September 2008, we launched our HCW vaccination program with a widely disseminated, facility-based educational campaign about seasonal influenza vaccination that used informational pamphlets, posters, and workshops in a two-week period. At the campaign's conclusion, we initiated, with no advance notification, influenza vaccination efforts using a sequential "push/pull" point-of-dispensing (POD) approach.

The Push POD. *Push* refers to actively offering vaccination at locations to which employees are assigned to work. For the purpose of our program, we defined all hospital employees as HCWs because we believe that interaction between employees, patients, and visitors places all at potential risk of acquiring and spreading influenza.

Applying the incident command system (ICS) model derived from emergency preparedness planning, vaccination teams established by the nursing department and assigned to specific patient units reported to the command center at 8:00 A.M. (8:00) on the day of the Push POD.[20,25] Before deployment, each team was given a 30-minute focused in-service on dissemination of vaccine information to potential recipients, the use of permission/declination forms, and vaccine administration. On arrival in each clinical unit or office, the vaccination teams briefly educated all HCWs about the importance of influenza vaccination and offered on-site vaccination to those who consented. There was no cost to the employee. Those who declined vaccine for any reason were required to sign a declination form. Only after vaccination or signing the declination form was a 2009 validation sticker placed on the HCW's identification (ID) badge to easily identify employees already screened. The teams reported back to the command center after all employees present on the assigned units were reached, a process that took about 90 minutes. Data for employees reached, vaccinated, or declining vaccination were recorded. Assigned Push POD teams reported to the command center at 4:00 P.M. (16:00) and again at midnight (24:00) to cover all working shifts: All components of the program were repeated.

The Pull POD. *Pull* refers to the process of actively identifying HCWs who were not reached during the Push phase the previous day. In this second phase, between 6:00 A.M. (6:00) and 9:30 A.M (9:30), HCWs could enter the hospital only through one entrance. All other employee entrances were "locked down" in compliance with the New York City Building fire code regulations. At our institution, all employees—including physicians and management—are required to punch in at the beginning of their shift. Electronic time-clock punch-in devices in the facility were disabled except for the one nearest to this open employee entrance. A 2009 ID validation sticker was required for entry and to punch in for duty. Those employees without the sticker were directed to a nearby vaccination team. Vaccine was administered or the HCW was required to

Table 1. Vaccination Rate of the Novel Program (Push/Pull POD), Year 2008–2009*

Strategies	Number of HCWs Reached	Percent of HCWs Reached†	Number of HCWs Who Declined	Number of HCWs Vaccinated	Percent of HCWs Vaccinated‡
Push POD	871	53%	351	520	60%
Pull POD	310	19%	192	118	38%
Totals	1,181	72%	543	638	54%

$$\text{Vaccination Rate of the Novel Program} = \frac{\text{Number of HCWs Vaccinated (638)}}{\text{Total Number of HCWs Reached (1,181)}} = 54\%$$

* POD, point of dispensing; HCW, health care worker.

† Based on total number of employees (1,642)

‡ Based on total number of HCWs reached (1,181)

sign a declination form. Only then could the HCW receive an ID validation sticker and be allowed entry into the facility.

After the two-day program, the data for the number of doses of vaccine administered and declination forms signed were tabulated using Microsoft Excel 2007. After the Push/Pull POD was completed, the employee vaccination drive at FHMC was continued for the remainder of the influenza season by the Employee Health Service (EHS).

Results

As a result of this two-day exercise, 1,181 (72%) of the 1,642 total employees of our institution were reached. As shown in Table 1 (above), the Push POD phase reached 871 of FHMC employees (53%), with 520 (60%) accepting influenza vaccine. During the Pull POD, an additional 310 HCWs (19%) were reached, of whom 118 (38%) were vaccinated (Table 1). Together, the two-day Push/Pull POD drill achieved a vaccination rate of 54% among the 1,181 employees who were reached, representing 39% (638/1,642) of all HCWs (Table 1 and Table 2 [right]). For 2008–2009, the overall HCW influenza vaccination rate for FHMC was 56%, which included vaccinations offered by the EHS following the two-day Push/Pull POD and documented vaccinations received outside FHMC (Table 2). This rate was significantly higher ($p < .001$) than the 38% rate for the 2006–2007 season (Table 3, right).

Table 2. Overall Vaccination Rate, 2008–2009*

Strategies	Number of HCWs Vaccinated	Vaccination Rate†
Combined Push/Pull POD	638	39%
Vaccination Through Employee Health Services and Outside of FHMC	281	17%
Totals	919	56%

$$\text{Overall Vaccination Rate} = \frac{\text{Number of HCWs Vaccinated (919)}}{\text{Total Number of Employees (1,642)}} = 56\%$$

* HCW, health care worker; POD, point of dispensing; FHMC, Flushing Hospital Medical Center.

† Based on total number of employees (1,642).

Table 3. Comparison of Vaccination Rates Between 2006–2007 and 2008–2009*

Seasons	Number of HCWs Vaccinated	Vaccination Rate†
2006–2007	600	38%
2008–2009	919	56%, $p < .001$

*HCW, health care worker.

† Based on total number of employees: 1,580 in 2006–2007 and 1,642 in 2008–2009.

Discussion

The Push/Pull POD plan we have described for influenza vaccination of HCWs in 2008–2009 was initially devised as part of our emergency preparedness/drilling for mass immunization/ prophylaxis for infectious disease outbreaks. The linkage of our Emergency Response Plan with improvement in HCW influenza vaccination rates is a unique approach that can enhance the effectiveness of both programs. Using components of our emergency preparedness plans, including the ICS model, we were able to reach 72% of hospital employees and vaccinate 39% of our total workforce in a two-day period, nearly achieving the national average for seasonal influenza vaccination of HCWs within that limited time frame. With respect to emergency preparedness planning, the initiative offered an opportunity to organize, execute, and evaluate performance for mass vaccination/prophylaxis in the context of a drill. During the Push phase, the incident manager of the ICS was able to monitor the deployment and success of vaccination teams in real

time and to maximize the efficient use of limited resources, and during the Pull phase to monitor the facility lockdown and the activities within the controlled environment of a fixed POD.

A novel feature of our program was the facility lockdown in the Pull POD. Limiting access to the facility as well as restricting access to the device required to clock in for work only to those employees who had been issued ID validation stickers during the Push POD for either having received or declined influenza vaccine proved to be a successful method for identifying, reaching, and vaccinating additional HCWs.

The use of mobile vaccination teams is an important and effective method to increase HCW influenza vaccination rates.[26] Such teams engage in face-to-face interactions with HCWs to specifically address their questions and concerns, potentially resulting in an increased acceptance of influenza vaccination.[9] HCWs might also be positively influenced by observing their coworkers accepting vaccination. The process also offered the advantages of employee convenience, avoidance of staffing disruptions, and no cost to the employee.

The Pull POD phase of our vaccination program, involving a facility lockdown as part of emergency preparedness planning response to infectious disease outbreaks, is to our knowledge and a review of the literature, a novel approach in reaching employees. Although our pilot lockdown of 2½ hours during a single weekday morning work-shift change was only a brief test, we were successful in reaching employees not encountered in the Push POD. Although many HCWs declined vaccination in this Pull phase, vaccination declinations had to be signed to clock in for work. Future exercise planning would determine if additional or longer lock-down periods at different shift times can be implemented at our busy urban community hospital. For larger institutions, the manner or feasibility of implementation of the Pull POD needs to be considered.

Our data set only identified whether or not HCWs were vaccinated; those who were not vaccinated signed a declination. Although this study was not designed to examine vaccine refusal, reasons for declination were obtained. The most common reasons cited were fear of side effects and the belief that the vaccine was ineffective. These findings are consistent with other studies.[7] Addressing the reasons for declination would help refine and focus educational efforts to help increase HCW vaccination rates in the future.

We did not report on the 2009–2010 vaccination season, given the unusual circumstances of that influenza season. New York State had instituted mandatory influenza vaccination for HCWs, only to later suspend the mandate because of disruptions in vaccine supply for both seasonal influenza and monovalent H1N1 vaccine. Some reluctant HCWs agreed to be vaccinated because of the original mandate, whereas others withheld their consent while awaiting results of legal challenges. There was also anxiety expressed by some HCWs over receiving two vaccinations. In particular, concerns over the "newness" of the H1N1 vaccine and recollections of problems associated with "swine flu" vaccine in 1976 might have had a crossover effect in creating or reinforcing negative perceptions about influenza vaccines in general.

The challenge of achieving and maintaining high annual HCW influenza vaccination rates in the absence of a requirement for vaccination necessitates a multifaceted approach. Mandatory vaccination is increasingly being recommended by professional organizations, including the Society for Healthcare Epidemiology of America, the Infectious Diseases Society of America and the American Academy of Pediatrics.[27–29] However, even if such mandates succeeded in achieving high influenza vaccination rates among HCWs, there would still be the need to regularly exercise emergency preparedness plans for mass vaccination or prophylaxis in preparation for other potential infectious disease threats.[21,30]

The emergency preparedness plan as exercised tested our inherent assumptions and succeeded in reaching a majority of our employees over a limited time frame. The plan was executed without altering staffing patterns and allowed for real patients to receive care without interruption. The exercise demonstrated the ability of our ICS to successfully deploy multidisciplinary teams and monitor their activities, to rapidly screen HCWs, to efficiently distribute vaccine, and to collect measurable data on performance to drive the process.

Conclusion

The Push/Pull POD model derived from emergency preparedness planning is an effective tool for improving influenza vaccination rates among HCWs. The addition of our Pull POD, that is, the lockdown phase of restricting access to the facility, is a unique strategy that was implemented and found to be successful. This model addresses issues of standards of care and performance improvement for HCW influenza vaccination and emergency preparedness planning and drilling for mass vaccination and prophylaxis. We believe that this model can serve as a dual platform for other institutions to improve their HCW vaccination rates and emergency preparedness planning. The ability to reach and offer influenza vaccination to a majority of HCWs early in the influenza vaccination season, and to accomplish such vaccination efficiently, allows for targeted initiatives for those HCWs most resistant to vaccination. Future studies

should explore different approaches to the Push/Pull model as it relates to duration, frequency, sequencing, or separating its components to create best practices that fit the needs of different institutions. Mandatory influenza vaccination of HCWs would clearly have the most significant impact on improving acceptance rates but would still not obviate the need to regularly exercise emergency preparedness plans in preparation for other potential infectious disease threats. J

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