MAJOR ARTICLE

Mandatory Influenza Vaccination of Health Care Workers: Translating Policy to Practice

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(See the editorial commentary by Pavia, on pages 465–7.)

Background. Influenza vaccination of health care workers has been recommended since 1984. Multiple strategies to enhance vaccination rates have been suggested, but national rates have remained low.

Methods. BJC HealthCare is a large Midwestern health care organization with ~26,000 employees. Because organizational vaccination rates remained below target levels, influenza vaccination was made a condition of employment for all employees in 2008. Medical or religious exemptions could be requested. Predetermined medical contraindications include hypersensitivity to eggs, prior hypersensitivity reaction to influenza vaccine, and history of Guillan-Barré syndrome. Medical exemption requests were reviewed by occupational health nurses and their medical directors. Employees who were neither vaccinated nor exempted by 15 December 2008 were not scheduled for work. Employees still not vaccinated or exempt by 15 January 2009 were terminated.

Results. Overall, 25,561 (98.4%) of 25,980 active employees were vaccinated. Ninety employees (0.3%) received religious exemptions, and 321 (1.2%) received medical exemptions. Eight employees (0.03%) were not vaccinated or exempted. Reasons for medical exemption included allergy to eggs (107 [33%]), prior allergic reaction or allergy to other vaccine component (83 [26%]), history of Guillan-Barré syndrome (15 [5%]), and other (116 [36%]), including 14 because of pregnancy. Many requests reflected misinformation about the vaccine.

Conclusions. A mandatory influenza vaccination campaign successfully increased vaccination rates. Fewer employees sought medical or religious exemptions than had signed declination statements during the previous year. A standardized medical exemption request form would simplify the request and review process for employees, their physicians, and occupational health and will be used next year.

Influenza infection is associated with 36,000 excess deaths and >200,000 hospitalizations in the United States annually [1, 2]. It is the leading cause of vaccine-preventable death in the United States every year [3]. The risk of complications associated with influenza is higher among older persons, young children, and patients with underlying medical conditions [2, 4]. Infected people may shed virus before symptoms develop [5–8], and health care workers often work while sick. Outbreaks of influenza in hospitals have been well described [3, 4, 9–12].

Influenza vaccination of health care workers reduces employee illness and absenteeism [4, 13–15]. In nursing home settings, vaccination of health care workers has been shown to decrease morbidity and mortality among nursing home residents [16–18]. The impact of vaccination of workers in acute care settings is more difficult to study because of the short duration of most hospitalizations. Other evidence for the importance of herd immunity on influenza rates comes from a Japanese study in which the vaccination of school children against influenza resulted in decreased mortality associated with pneumonia or influenza in the general population [19].

Annual influenza vaccination was first recommended for health care workers by the Advisory Committee on Immunization Practices in 1984 [3, 20, 21]. The Society for Healthcare Epidemiology [22], the Association for Professionals in Infection Control [11], and the Infectious Disease Society of America [23] also strongly endorse health care worker vaccination. The US National Health objectives for 2010 include a health care worker influenza vaccination rate of 60%. Recommended prac-

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tices to improve vaccination rates include making the vaccine available without charge to employees at multiple convenient sites and times, using incentives and rewards, and having visible leadership support [21, 24–27]. More recently, declination statements have been suggested as a way to increase vaccination rates. The impact of these statements is still being studied [28–30]. Despite these efforts, vaccination rates among health care workers remain low across the United States; the influenza vaccination rate among US health care workers during 2006–2007 was 44.4% [3].

Mandatory vaccination is a controversial strategy that pits health care worker autonomy against patient safety [31–36]. Other vaccines, such as measles, mumps, and rubella vaccine and varicella vaccine, are already required by many health care facilities, as is annual tuberculin skin testing. Virginia Mason Hospital (Seattle, WA) implemented a mandatory influenza vaccination program in 2004, and there have been media reports of other individual hospitals instituting similar programs. There are no reports in the literature of large multihospital systems implementing a mandatory influenza vaccination policy.

Annual influenza campaigns at BJC HealthCare include free vaccine available at multiple sites and times, extensive publicity, incentives and educational programs, and more recently, declination statements. In 2007, influenza vaccination rates were added to the BJC patient safety and quality scorecard used at all hospitals in the organization. Hospital leaders receive incentives based on their hospital's performance on scorecard measures. Despite significant efforts by occupational health and infection prevention specialists, the vaccination rate among BJC employees remained below the BJC goal of 80%. In 2008, BJC HealthCare implemented a mandatory influenza vaccination policy for all employees.

METHODS

Setting. BJC HealthCare is a large Midwestern health care organization with ~26,000 employees. Facilities include 11 acute care hospitals and 3 extended care facilities, as well as day care centers, employed physician groups, occupational medicine, home care, and behavioral health services. Hospitals are located in urban, suburban, and rural settings and range from 40 to 1250 beds. Of the acute care hospitals, 1 adult and 1 pediatric facility are teaching hospitals.

BJC Occupational Health Services coordinates and standardizes occupational health programs through the Council of Occupational Health Professionals, which includes a representative from each facility. Bimonthly council meetings are designed for education, policy, and procedure standardization, coordination of occupational health and safety surveillance, and development of interventions throughout BJC. Each facility uses the centralized BJC occupational health database for tracking employee vaccinations, immune status, and occupational injuries and exposures. The database includes demographic and job information on all BJC employees.

2008 Influenza policy. In 2008, as a patient safety initiative, influenza vaccination was made a condition of employment for all BJC employees, regardless of job function, including clinical and nonclinical staff, contracted clinical personnel, and volunteers. Hospital-employed physicians, including hospitalists, residents, and fellows, were included in the policy. Most attending physicians affiliated with BJC HealthCare are in private practice or are employed by Washington University School of Medicine (St. Louis, MO) and are not covered by the policy. The policy was communicated to employees through their managers, with standardized educational materials and fact sheets provided; an Intranet site; letters mailed to employees' homes; articles in *BJC Today,* an in-house newspaper distributed at all facilities; and "Town Hall Meetings" scheduled throughout the vaccination campaign with infectious diseases physicians, infection prevention specialists, and occupational health nurses available for questions or concerns. The CEO of BJC published a letter in the BJC newspaper explaining the rationale for the policy. The multidisciplinary implementation team met regularly before and during the vaccination campaign to ensure timely, consistent, and coordinated communication and responses to any issues that arose.

Free vaccine, including thimerosal-free and intranasal preparations, was available at multiple locations at all facilities starting 15 October 2008. Vaccinations were tracked at each facility in real time. Multiple methods of tracking vaccination were available to each facility, including badge scanners, consent forms with carbon copies, a database into which managers could directly enter their vaccinated employees, and preprinted labels with bar codes. All data were entered in real time or were downloaded regularly into the BJC occupational health database. Feedback was provided not less than weekly to managers at the facilities. Managers interacted with their staff to ascertain reasons for noncompliance and to provide coaching about influenza, the vaccine, and the consequences of noncompliance.

Employees who were neither vaccinated nor exempted by 15 December 2008 were suspended without pay. Those who were vaccinated before 15 January 2009 could return to work. Employees still not vaccinated or exempt by 15 January 2009 were terminated for failure to meet their conditions of employment.

Exemptions. Medical or religious exemptions could be requested. Religious accommodations required a letter from the employee to Human Resources that stated a religious conviction opposed to vaccination. Employees were notified within 5 days whether their request had been granted.

Medical exemptions required a letter from a licensed physician (MD or DO) that stated a medical contraindication to influenza vaccination. Predetermined accepted medical contraindications were based on the Advisory Committee on Im-

munization Practices recommendations [3]. These included hypersensitivity to eggs, prior hypersensitivity reaction to influenza vaccine, and history of Guillan-Barré syndrome. Pregnancy was accepted as a medical exemption if requested by the employee's physician, despite the vaccine being recommended during pregnancy, because the vaccine is listed as a category C agent. Occupational health nurses reviewed other reasons on a case-by-case basis with assistance from their medical director as needed. Employees received a form within 5 days that stated whether their request had been granted. Denials included an explanation of the reason for denial on the form. Second requests with clarifications could be submitted for review. Some physicians who had written exemption request letters were contacted directly by the facility occupational health medical director for clarification or at the request of the employee. Granted medical exemptions could be permanent or temporary (1 year only). Concerned employees not meeting criteria for exemption could discuss their concerns with the occupational health nurses or medical directors. Employees who were granted an exemption were encouraged to wear an isolation mask while providing patient care during the influenza season to avoid contracting or transmitting influenza. No specific enforcement was put in place, and no data on compliance were collected.

RESULTS

Of 25,980 active employees, 25,561 (98.4%) were vaccinated (Table 1). Medical exemptions were granted to 321 employees (1.24%). Religious accommodations were granted to 90 employees (0.35%). Overall, 25,974 employees (99.96%) were compliant with the policy (vaccinated or exempt). Only 8 employees (0.03%) were terminated for noncompliance with the policy. At the 2 teaching hospitals, there were 907 residents and fellows in >27 graduate medical education programs. All of these trainees complied with the new policy: 902 (99.45%) were vaccinated, and 5 received exemptions (3 medical and 2 religious). Vaccination rates in 2008 increased by 43.4%, compared with rates in 2006, and by 26.5%, compared with rates in 2007 (Figure 1).

Of 372 requested medical exemptions, 321 (86.3%) were granted (188 permanent and 133 temporary). Reasons for medical exemption included allergy to eggs (107 [33% of exemptions; 0.4% of all employees]), prior allergic reaction or allergy to other vaccine component (83 [26% of exemptions; 0.31% of employees]), history of Guillan-Barré syndrome (15 [5% of exemptions; 0.05% of employees]), and other (116 [36%]). The majority (89 [77%]) of employees with other indications for a medical exemption received a temporary exemption: 50 for a prior vaccine reaction that was not further specified, 25 for medical reasons not further specified by their physician, and 14 for pregnancy. The remaining 27 (23%) of 116 employees with other indications were granted permanent exemptions: 15 for a prior severe reaction to an influenza vaccine, 5 for a neurologic condition, 3 for concerns of triggering a flare of an autoimmune disease, 2 for being vegan, 1 for multiple food sensitivities, and 1 for concern for increased risk of rejection of a transplanted organ.

Table 1. Summary of Employee Vaccination Status

Vaccination status	No. (%) of employees
Vaccinated	25,561 (98.4)
Religious exemption granted	90 (0.35)
Medical exemption granted	321 (1.24)
Egg allergy	107
Prior reaction and/or allergy to other component	83
History of Guillan-Barré syndrome	15
Other	116
Policy compliant (vaccinated or exempt)	25,972 (99.96)
Noncompliant (neither vaccinated or exempt)	8 (0.03)
Total employees	25,980

Eight employees (0.03%) were not vaccinated or granted an exemption, and their employment was terminated. Two employees worked with information systems in the corporate offices of BJC HealthCare. The other 6 noncompliant employees were from 4 acute care hospitals: 1 laboratory technician, 1 patient care technician, 1 paramedic, 1 nurse, 1 sitter, and 1 physical therapist. The remaining hospitals and service organizations had no noncompliant employees. Two employees were per diem employees, 3 were part-time, and 3 were full-time employees. The median duration of employment before termination was 37.5 months (range, 23– 134 months). Of these employees, most did not submit an exemption request. One employee submitted a request for a religious exemption 2 days before termination, after being unable to obtain a doctor's note stating a medical contraindication; the request was denied.

Adverse events reported by employees were tracked in the occupational health database. Twenty-one employees (0.08%) reported a possible adverse reaction. Eleven reported a sore arm. Five reported a possible allergic reaction, and 1 reported a possible vagal response with fainting. Four events of uncertain relation to the vaccine were also reported by employees, including 2 cases of fever and myalgias, 1 with upper respiratory symptoms, and 1 case of a new neurologic syndrome diagnosed as chronic inflammatory demyelinating polyneuropathy, which could not be objectively linked to the influenza vaccine because of several other potential antecedent triggers.

DISCUSSION

The mandatory vaccination program successfully increased vaccination rates at a large multihospital health care organization. Efforts during previous years included most recommended

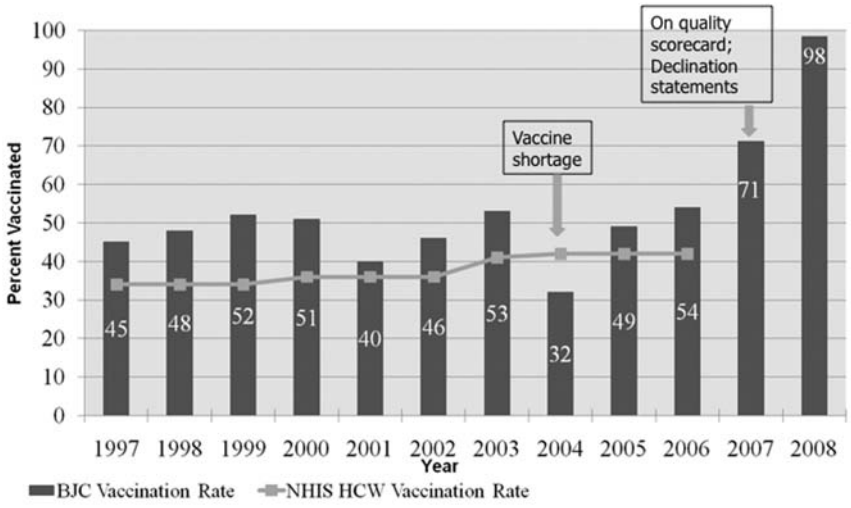

Figure 1. BJC HealthCare annual influenza vaccination rates (percentage of total employees). The National Health Interview Survey rates of influenza vaccination among health care workers during 1997–2006 are shown with the trend line.

practices to maximize vaccination rates, including free, easily available vaccine, incentives, and leadership support. Despite these efforts, rates were still suboptimal (Figure 1). The mandatory program markedly increased vaccination rates across all facilities. Key factors that supported the success of the program included consistent communication emphasizing patient safety and quality of care, coordinated campaigns, leadership support, and medical director support to talk with any employee with concerns about the vaccine, on request. The program was established as a patient safety initiative; thus, no prospective attempts were made to link to absenteeism. Because of the way that employees are reimbursed for time off work, we were unable to distinguish between sick time and vacation time and, thus, could not assess the impact of the program on absenteeism. In addition, the year that the program was implemented had a mild influenza season; therefore, finding reduced absenteeism would be difficult to link to the vaccination program.

Few other organizations have established mandatory influenza vaccination programs. Virginia Mason Hospital implemented a mandatory program in 2004, with resulting vaccination rates of >98%. Several smaller hospitals were mentioned in the media for attempting mandatory campaigns, but no details have been published. To our knowledge, this is the first report of a large multihospital health care organization implementing a mandatory influenza vaccination program.

Some programs allow health care workers to sign declination forms stating that they understand the risks of not receiving the influenza vaccine to themselves, their patients, and their families. Declination statements have recently been publicized as a potentially valuable strategy for increasing vaccination rates [11, 21, 22], but data on their efficacy are mixed [28–30]. We found that many fewer employees sought medical or religious exemptions than had signed declination statements in previous years. Requests for religious exemptions were reviewed by Human Resources at each facility. The letter from the employee had to state a sincere religious conviction opposed to vaccination. Some requests were only submitted after medical exemption requests had been denied, and some requests stated opposition to a mandatory policy, not to vaccination itself. These requests were denied.

Severe egg allergy is a contraindication to receipt of the influenza vaccine [3]. Virginia Mason Hospital provides free, onsite egg allergy testing for employees seeking an exemption on the basis of egg allergy. Our organization did not attempt to verify reports of significant egg allergy or allergy to other vaccine components. Egg allergy rates decrease with age, and reported rates in the medical literature range from 0% to 0.35% [37–39]. Overall, 107 (0.4%) of all employees reported a significant egg allergy.

Exemption requests often reflected misinformation about the vaccine and about influenza among employees and among their physicians. Several requests cited chemotherapy or an immunosuppressed state as reasons not to get the vaccine, even though these groups are at high risk for complications from influenza and are specifically recommended to be vaccinated. Several requests cited pregnancy, although the vaccine is recommended during pregnancy [3, 40]. Other requests did not include enough information to make a determination of the validity of the request. Some health care workers whose initial request for exemption was denied returned to their personal physician for a more detailed note or requested that occupational health contact their physician to discuss their request. Some community physicians felt beleaguered by these multiple contacts. A standardized form listing accepted contraindications and their definitions, with

checkboxes and space for additional information and contact information, would simplify the request and review process for health care workers, their physicians, and occupational health staff.

BJC HealthCare benefitted from strong leadership support for this initiative and a solid infrastructure for timely and consistent communication. The experience at our organization may not be completely generalizable. Economic factors at the time of the study may have limited the number of employees willing to lose their jobs. Influenza vaccination rates increased in 2007 (Figure 1) and may have continued to increase even without a mandatory vaccination policy, although we believe that such a dramatic increase would have been unlikely. Not all physicians affiliated with BJC HealthCare are employees of the organization and, thus, were not covered by the policy. All physicians employed by the organization, however, including ~900 residents and fellows, complied with the policy. In conclusion, a mandatory influenza vaccination policy was successful in increasing vaccination rates at a large multihospital health care organization with ~26,000 employees.

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