
MANDATORY INFLUENZA POLICY: RESOURCE LIST

A. Examples of how hospital/health systems implemented the mandatory influenza policy

1. **Babcock H., Gemeinhart N., Jones M., Dunagan C., Woeltje K. Mandatory Influenza Vaccination of Health Care Workers: Translating Policy to Practice. *Clin Infect Dis* 2010; 50:459–464.**

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. 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-Barre´ 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. 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-Barre´ syndrome (15 [5%]), and other (116 [36%]), including 14 because of pregnancy. Many requests reflected misinformation about the vaccine. 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.

2. **Karanfil L., Bahner J., Hovatter J., Thomas W. Championing Patient Safety through Mandatory Influenza Vaccination for All Healthcare Personnel and Affiliated Physicians. *Infect Control Hosp Epidemiol* 2011; 32(4).**

The objective was to determine whether a mandatory seasonal influenza vaccination program will increase vaccination rates among healthcare personnel (HCP) and affiliated physicians. MedStar Health is a not-for-profit regional healthcare organization that includes 9 hospitals with approximately 25,000 HCP and approximately 4,000 affiliated physicians. HCP describes any person employed by MedStar Health. With previous vaccination rates parallel to reported national rates of 54% among HCP, MedStar Health introduced a mandatory seasonal influenza vaccination program promulgated during the 2009–2010 influenza season. HCP and affiliated physicians were given an opportunity to apply for medical or religious exemptions. Noncompliant HCP were terminated. Noncompliant physicians had their privileges administratively suspended for the influenza season. HCP compliance (vaccinated and exempt) was 99.9%. The influenza vaccination rate among HCP was 98.5%. There were 338 approved medical exemptions and 18 approved religious exemptions. Only 0.01% of HCP (9 full-time, 2 part-time, and 17 per diem employees) were terminated. Overall, 93% of the affiliated physicians were vaccinated; 7 religious and 99

medical exemptions were granted. In total, 149 physicians (4%) had their admitting privileges suspended during the influenza season. This concludes that a mandatory influenza vaccination program achieves high rates of vaccination among HCP and affiliated physicians.

3. Rakita R., Hagar B., Crome P., Lammert J. Mandatory Influenza Vaccination of Healthcare Workers: A 5-Year Study. *Infect Control Hosp Epidemiol* 2010; 31(9).

The rate of influenza vaccination among healthcare workers (HCWs) is low, despite a good rationale and strong recommendations for vaccination from many health organizations. The objective was to increase influenza vaccination rates by instituting the first mandatory influenza vaccination program for HCWs. The study design and setting was a 5-year study (from 2005 to 2010) at Virginia Mason Medical Center, a tertiary care, multispecialty medical center in Seattle, Washington, with approximately 5,000 employees. All HCWs of the medical center were required to receive influenza vaccination. HCWs who were granted an accommodation for medical or religious reasons were required to wear a mask at work during influenza season. The main outcome measure was rate of influenza vaccination among HCWs. In the first year of the program, there were a total of 4,703 HCWs, of whom 4,588 (97.6%) were vaccinated, and influenza vaccination rates of more than 98% were sustained over the subsequent 4 years of our study. Less than 0.7% of HCWs were granted an accommodation for medical or religious reasons and were required to wear a mask at work during influenza season, and less than 0.2% of HCWs refused vaccination and left Virginia Mason Medical Center. A mandatory influenza vaccination program for HCWs is feasible, results in extremely high vaccination rates, and can be sustained over the course of several years.

4. Septimus E., Perlin J., Cormier S., Moody J., Hickok J. Multifaceted Mandatory Patient Safety Program and Seasonal Influenza Vaccination of Health Care Workers in Community Hospitals. *JAMA* 2011; 305(10):999-1000.

Most health care institutions recognize their ethical and professional responsibility to protect patients from preventable nosocomial infections while accommodating employees' needs. Accordingly, we developed a multifaceted patient safety program that required seasonal influenza vaccination of health care workers but accommodated declination for any reason. We assessed vaccination rates in a large, diverse health care system primarily comprised of community hospitals after implementing this program. HCA Inc is a national health system operating 163 hospitals, 112 outpatient surgery centers, and more than 400 physician practices in 23 states. The goal was to increase seasonal influenza vaccination, with a target rate of 100% for clinical employees and at least 75% for all other employees. While the mean vaccination rate for the preceding season had been 58%, this mandatory patient safety program was associated with a rate over 95%. In contrast, only 62% of health care workers nationwide were vaccinated as of January 2010.

B. Benefits of the worker influenza vaccination

1. **Anikeeva O., Braunack-Mayer A., Rogers W. Requiring Influenza Vaccination for Health Care Workers. *Am J Public Health* 2009; 99:24-29.**

Annual influenza vaccination for health care workers has the potential to benefit health care professionals, their patients, and their families by reducing the transmission of influenza in the health care setting. Furthermore, staff vaccination programs are cost-effective for health care institutions because of reduced staff illness and absenteeism. Despite international recommendations and strong ethical arguments for annual influenza immunization for healthcare professionals, staff utilization of vaccination remains low. We have analyzed the ethical implications of a variety of efforts to increase vaccination rates, including mandatory influenza vaccination. A program of incentives and sanctions may increase health care worker compliance with fewer ethical impediments than mandatory vaccination.

2. **Chironna M., Tafuri S., Santoro N., Prato R., Quarto M., Germinario CA. A Nosocomial Outbreak of 2009 Pandemic Influenza A (H1N1) in a Paediatric Oncology Ward in Italy, October – November 2009. *Eurosurveillance* 2010; 15(1).
Website: <http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=19454>**

A nosocomial outbreak of 2009 pandemic influenza A(H1N1), with eight confirmed cases, occurred in a paediatric oncology ward in Italy, in October/November 2009. The fact that one case was infected despite being isolated and without contact to a symptomatic patient, hints towards potential transmission through a health care worker (HCW) and underlines the importance of vaccination of HCW who are involved in the care of critically ill patients.

3. **Dool C., Bonten M., Hak E., Heijne J., Wallinga. The Effects of Influenza Vaccination of Health Care Workers in Nursing Homes: Insights from a Mathematical Model. *PLoS Med* 2008; 5(10):e200.**

Annual influenza vaccination of institutional health care workers (HCWs) is advised in most Western countries, but adherence to this recommendation is generally low. Although protective effects of this intervention for nursing home patients have been demonstrated in some clinical trials, the exact relationship between increased vaccine uptake among HCWs and protection of patients remains unknown owing to variations between study designs, settings, intensity of influenza seasons, and failure to control all effect modifiers. Therefore, we use a mathematical model to estimate the effects of HCW vaccination in different scenarios and to identify a herd immunity threshold in a nursing home department. We use a stochastic individual-based model with discrete time intervals to simulate influenza virus transmission in a 30-bed long-term care nursing home department. We simulate different levels of HCW vaccine uptake and study the effect on influenza virus attack rates among patients for different institutional and seasonal scenarios. Our model reveals a robust linear relationship between the number of HCWs vaccinated and the expected number of influenza virus infections among patients. In a realistic scenario, approximately 60% of influenza virus infections among patients can be prevented when the HCW vaccination rate increases from 0 to 1. A threshold

for herd immunity is not detected. Due to stochastic variations, the differences in patient attack rates between departments are high and large outbreaks can occur for every level of HCW vaccine uptake. The absence of herd immunity in nursing homes implies that vaccination of every additional HCW protects an additional fraction of patients. Because of large stochastic variations, results of small-sized clinical trials on the effects of HCW vaccination should be interpreted with great care. Moreover, the large variations in attack rates should be taken into account when designing future studies.

4. Dool C., Bonten M., Hak E., Wallinga J. Modeling the Effects of Influenza Vaccination of Health Care Workers in Hospital Departments. *Vaccine* 2009; 27(44):6261-6267.

Nowadays health care worker (HCW) vaccination is widely recommended. Although the benefits of this strategy have been demonstrated in long-term care settings, no studies have been performed in regular hospital departments. We adapt a previously developed model of influenza transmission in a long-term care nursing home department to study the effects of HCW vaccination in hospital wards. We study both the effectiveness and efficiency in reducing the hazard rates of influenza virus infection for patients. Most scenarios under study show a similar or higher impact of hospital HCW vaccination than has been predicted for the long-term care nursing home department. Therefore, it seems justified to extend the recommendations for HCW vaccination, based on results in the long-term care setting, to short-term care settings as well.

5. Talbot T., Babcock H., Caplan A., Cotton D., Maragakis L., Poland G., Septimus E. Revised SHEA Position Paper: Influenza Vaccination of Healthcare Personnel. *Infect Control and Hosp Epidemiol* 2010; 31(10):987-995.

This document serves as an update and companion piece to the 2005 Society for Healthcare Epidemiology of America (SHEA) Position Paper entitled “Influenza Vaccination of Healthcare Workers and Vaccine Allocation for Healthcare Workers During Vaccine Shortages.”¹ In large part, the discussion about the rationale for influenza vaccination of healthcare personnel (HCP), the strategies designed to improve influenza vaccination rates in this population, and the recommendations made in the 2005 paper still stand. This position paper notes new evidence released since publication of the 2005 paper and strengthens SHEA’s position on the importance of influenza vaccination of HCP. This document does not discuss vaccine allocation during times of vaccine shortage, because the 2005 SHEA Position Paper¹ still serves as the Society’s official statement on that issue. SHEA views influenza vaccination of HCP as a *core patient and HCP safety practice* with which noncompliance should not be tolerated. It is the professional and ethical responsibility of HCP and the institutions within which they work to prevent the spread of infectious pathogens to their patients through evidence-based infection prevention practices, including influenza vaccination. Therefore, for the safety of both patients and HCP, SHEA endorses a policy in which annual influenza vaccination is a condition of both initial and continued HCP employment and/or professional privileges. The implementation of this policy should be part of a multifaceted, comprehensive influenza infection control program; it must have full, visible leadership support with the expectation for influenza vaccination fully and clearly communicated to all existing and applicant HCP; and it must have ample resources and support to implement and to sustain the HCP

vaccination program. This recommendation applies to all HCP working in all healthcare settings, regardless of whether the HCP have direct patient contact or whether the HCP are directly employed by the facility. It also applies to all students, volunteers, and contract workers. SHEA recommends that only exemptions due to recognized medical contraindications to influenza vaccination be considered.

- 6. Vanhems P., Voirin N., Roche S., Escuret V., Regis C., Gorain C., Pires-Cronenberger S. Risk of Influenza-Like Illness in an Acute Health Care Setting during Community Influenza Epidemics in 2004-2005, 2005-2006, and 2006-2007 A Prospective Study. *Arch Intern Med* 2011; 171(2):151-157.**

The person-to-person transmission of influenza-like illness (ILI) and influenza has been described mostly in long-term care units. Studies in acute hospital settings are rare and mostly retrospective. We prospectively estimated the relative risk (RR) of hospital-acquired (HA) ILI during hospitalization according to in-hospital exposures to contagious individuals. Surveillance of ILI and laboratory-confirmed influenza was undertaken at Edouard Herriot Hospital (1100 beds) during 3 influenza seasons. A total of 21 519 patients and 2153 health care workers (HCWs) from 2004 to 2007 were included. The RR of HA-ILI in patients was calculated according to exposure to other contagious patients and HCWs. For patients exposed to at least 1 contagious HCW compared with those with no documented exposure in the hospital, the RR of HA-ILI was 5.48 (95% confidence interval [CI], 2.09-14.37); for patients exposed to at least 1 contagious patient, the RR was 17.96 (95% CI, 10.07-32.03); and for patients exposed to at least 1 contagious patient and 1 contagious HCW, the RR was 34.75 (95% CI, 17.70-68.25). Hospitalized patients exposed to potentially infectious patients and HCWs with ILI inside the hospital are at greater risk for HA-ILI. Such results identify priorities regarding preventive measures for seasonal or pandemic influenza.

C. The value of surgical/submicron masks in the preventing transmission of Influenza

- 1. Aiello A., Murray G., Perez V., Coulborn R., Davis B., Uddin M., Shay D., Waterman S. Mask Use, Hand Hygiene, and Seasonal Influenza-Like Illness among Young Adults: A Randomized Intervention Trial. *J Infect Dis* 2010; 201:491-498.**

During the influenza A(H1N1) pandemic, antiviral prescribing was limited, vaccines were not available early, and the effectiveness of nonpharmaceutical interventions (NPIs) was uncertain. Our study examined whether use of face masks and hand hygiene reduced the incidence of influenza-like illness (ILI). A randomized intervention trial involving 1437 young adults living in university residence halls during the 2006–2007 influenza season was designed. Residence halls were randomly assigned to 1 of 3 groups- face mask use, face masks with hand hygiene, or control- for 6 weeks. Generalized models estimated rate ratios for clinically diagnosed or survey-reported ILI weekly and cumulatively. We observed significant reductions in ILI during weeks 4–6 in the mask and hand hygiene group, compared with the control group, ranging from 35% (confidence interval [CI], 9%–53%) to 51% (CI, 13%–73%), after adjusting for vaccination and other covariates. Face mask use alone showed a similar reduction in ILI compared with the control group, but adjusted estimates were not statistically significant. Neither face mask use and hand hygiene nor face mask

use alone was associated with a significant reduction in the rate of ILI cumulatively. These findings suggest that face masks and hand hygiene may reduce respiratory illnesses in shared living settings and mitigate the impact of the influenza A(H1N1) pandemic.

- 2. Ang B., Poh B., Win M., Chow A. Surgical Masks for Protection of Health Care Personnel against Pandemic Novel Swine-Origin Influenza A (H1N1)–2009: Results from an Observational Study. *Clin Infect Dis* 2010; 50.**

There is ongoing debate about the efficacy of surgical masks versus N95 respirators for protection against pandemic novel swine-origin influenza A (H1N1)–2009. Our hospital, which is designated to manage outbreaks of emerging infection, has robust surveillance systems to detect infection in staff. The incidence of pandemic H1N1-2009 remained low in staff with use of surgical masks.

- 3. Brankston G., Gitterman L., Hirji Z., Lemieux C., Gardam M. Transmission of Influenza A in Human Beings. *Lancet Infect Dis* 2007; 7(4):257-265.**

Planning for the next influenza pandemic is occurring at many levels throughout the world, spurred on by the recent spread of H5N1 avian influenza in Asia, Europe, and Africa. Central to these planning efforts in the health-care sector are strategies to minimize the transmission of influenza to health-care workers and patients. The infection control precautions necessary to prevent airborne, droplet, and contact transmission are quite different and will need to be decided on and planned before a pandemic occurs. Despite vast clinical experience in human beings, there continues to be much debate about how influenza is transmitted. We have done a systematic review of the English language experimental and epidemiological literature on this subject to better inform infection control planning efforts. We have found that the existing data are limited with respect to the identification of specific modes of transmission in the natural setting. However, we are able to conclude that transmission occurs at close range rather than over long distances, suggesting that airborne transmission, as traditionally defined, is unlikely to be of significance in most clinical settings. Further research is required to better define conditions under which the influenza virus may transmit via the airborne route.

- 4. Centers for Disease Control and Prevention. Prevention Strategies for Seasonal Influenza in Healthcare Settings (2010).
Website: <http://www.cdc.gov/flu/professionals/infectioncontrol/index.htm>**

HCP should don a facemask when entering the room of a patient with suspected or confirmed influenza. Remove the facemask when leaving the patient's room, dispose of the facemask in a waste container, and perform hand hygiene.

5. **Han K., Zhu X., He F., Liu L., Zhang L., Ma H., Tang X. Lack of Airborne Transmission during Outbreak of Pandemic (H1N1) 2009 among Tour Group Members, China, June 2009. *Emerg Infect Dis* 2009; 15(10):1578-1581.**
Website: www.cdc.gov/eid/content/15/10/pdfs/09-1013.pdf

During June 2–8, 2009, an outbreak of influenza A pandemic (H1N1) 2009 occurred among 31 members of a tour group in China. To identify the mode of transmission and risk factors, we conducted a retrospective cohort investigation. The index case-patient was a female tourist from the United States. Secondary cases developed in 9 (30%) tour group member who had talked with the index case-patient and in 1 airline passenger (not a tour group member) who had sat within 2 rows of her. None of the 14 tour group members who had not talked with the index case-patient became ill. This outbreak was apparently caused by droplet transmission during coughing or talking. That airborne transmission was not a factor is supported by lack of secondary cases among fellow bus and air travelers. Our findings highlight the need to prevent transmission by droplets and fomites during a pandemic.

6. **Loeb M., Dafoe N., Mahony J. Surgical Mask vs N95 Respirator for Preventing Influenza among Health Care Workers: A Randomized Trial. *JAMA* 2009; 302(17):1865-1871.**

Data about the effectiveness of the surgical mask compared with the N95 respirator for protecting health care workers against influenza are sparse. Given the likelihood that N95 respirators will be in short supply during a pandemic and not available in many countries, knowing the effectiveness of the surgical mask is of public health importance. The objective was to compare the surgical mask with the N95 respirator in protecting health care workers against influenza. The study design was noninferiority randomized controlled trial of 446 nurses in emergency departments, medical units, and pediatric units in 8 tertiary care Ontario hospitals. Assignment to either a fit-tested N95 respirator or a surgical mask when providing care to patients with febrile respiratory illness during the 2008-2009 influenza season. The primary outcome was laboratory-confirmed influenza measured by polymerase chain reaction or a 4-fold rise in hemagglutinin titers. Effectiveness of the surgical mask was assessed as noninferiority of the surgical mask compared with the N95 respirator. The criterion for noninferiority was met if the lower limit of the 95% confidence interval (CI) for the reduction in incidence (N95 respirator minus surgical group) was greater than -9%. Between September 23, 2008, and December 8, 2008, 478 nurses were assessed for eligibility and 446 nurses were enrolled and randomly assigned the intervention; 225 were allocated to receive surgical masks and 221 to N95 respirators. Influenza infection occurred in 50 nurses (23.6%) in the surgical mask group and in 48 (22.9%) in the N95 respirator group (absolute risk difference, -0.73%; 95% CI, -8.8% to 7.3%; $P=.86$), the lower confidence limit being inside the noninferiority limit of -9%. Among nurses in Ontario tertiary care hospitals, use of a surgical mask compared with an N95 respirator resulted in noninferior rates of laboratory confirmed influenza.

7. Seto W., Tsang D., Yung R., Ching T., Ng T., Ho M. Effectiveness of Precautions against Droplets and Contact in Prevention of Nosocomial Transmission of Severe Acute Respiratory Syndrome (SARS). *Lancet* 2003; 361:1519–20.

We did a case-control study in five Hong Kong hospitals, with 241 non-infected and 13 infected staff with documented exposures to 11 index patients with severe acute respiratory syndrome (SARS) during patient care. All participants were surveyed about use of mask, gloves, gowns, and hand-washing, as recommended under droplets and contact precautions when caring for index patients with SARS. 69 staff who reported use of all four measures were not infected, whereas all infected staff had omitted at least one measure ($p=0.0224$). Fewer staff who wore masks ($p=0.0001$), gowns ($p=0.006$), and washed their hands ($p=0.047$) became infected compared with those who didn't, but stepwise logistic regression was significant only for masks ($p=0.011$). Practice of droplets precaution and contact precaution is adequate in significantly reducing the risk of infection after exposures to patients with SARS. The protective role of the mask suggests that in hospitals, infection is transmitted by droplets.