Issues Surrounding the Immunization of Health Care Personnel Against Influenza

Influenza immunization rates among health care personnel (HCP) vary by occupational group and demographics. In general, researchers have found that physicians are more likely to accept the vaccination than nurses or nonmedical HCP. Older HCP are vaccinated more often than those younger than age 50, and HCP with some college education are more likely to receive the vaccination than those with only a high school education or less. An understanding of the immunization patterns and demographics of HCP can guide the development of strategies to improve influenza immunization rates. This chapter explores patterns, demographics, and individual factors influencing HCP decisions regarding vaccination. It also reviews the research surrounding the question, “Should influenza immunization be mandatory?”

Immunization Rates Among Health Care Personnel

King et al. analyzed data from the National Center for Health Statistics 2000 National Health Interview Survey (NHIS), an annual face-to-face survey of the U.S. population, to determine the nature of the variance in vaccination rates. The researchers, who studied a representative sample of 1,651 HCP who worked in both hospital and nonhospital settings, noted that the overall influenza vaccination rate among their sample was 35.8%. Unlike the researchers whose findings are mentioned above, King et al. found no correlation between vaccination rates and educational level; but, like the others, they did find significantly lower vaccination rates among HCP younger than age 50. They also found that health care aides, who have a substantial amount of close contact with patients, have the lowest influenza vaccination rates among health care workers. They found that the group with the highest vaccination rates are those who diagnose illness, including physicians, followed by health technicians and those responsible for health assessment, including nurses. Walker et al. conducted a similar review using the 2002 NHIS data and found the overall influenza rate among HCP to be 38.4%; they also found vaccination rates to be lower among HCP who were younger than age 50. In addition, they found that hospital employees were more likely to be vaccinated than nonhospital employees.
Other researchers have also studied variations in HCP influenza vaccination rates and found the following:

- Christini et al. conducted surveys with more than 1,000 HCP at two Pennsylvania tertiary care teaching hospitals in an urban center. Their overall influenza vaccination rate was 52%. They found that physicians and medical students were significantly more likely to have received the influenza vaccine than all other groups combined, with vaccination rates of 69% and 63%, respectively ($p < .0001$). They found that the vaccination rate of nurses was 46%; aides, 42%; and those who worked in administration, 29%. Among physician groups, they found that pediatricians were significantly more likely to be vaccinated (84%) than internists (69%) or surgeons (43%) ($p < .0001$).

- Abrahamson and Levi analyzed survey results from 275 HCP (physicians, nurses, pharmacists, administrative and ancillary staff) at 27 primary care community clinics in the Jerusalem area at the conclusion of the 2007 influenza season. The overall influenza vaccination rate was approximately 30%, with physicians reporting a significantly higher rate of immunization than nonphysicians (40.4% compared with 24.9%, $p = .008$). The researchers also saw significant associations between immunization and HCP age, as well as immunization and gender: Of those between ages 54 and 65, 50.6% were immunized, compared with 20.7% of those between ages 24 and 53, $p < .001$; 41% of males were immunized, compared with 27.1% of females, $p = .037$.

- A study by Martinello et al. assessed immunization among physicians (attending physicians, house staff, and medical students) and nurses (patient care associates, licensed practical nurses, and registered nurses) in a large urban teaching hospital in Connecticut. Like the others, these researchers found higher rates of immunization among physicians than nurses (82% versus 62%, $p = .0009$).

- Maltezou et al. conducted a nationwide survey of HCP in 132 public hospitals in Greece to learn the reasons for their acceptance or nonacceptance of the influenza vaccine during the 2006–2007 influenza season. Among respondents, the mean influenza immunization rate was 5.8%. Like other researchers, they found a correlation between older age and higher immunization rates; but unlike several others, they found that nurses had higher immunization rates than physicians (47.6% versus 24.7%).

- In an earlier nationwide survey, Maltezou et al. studied immunization rates among physicians according to the type of hospital in which they worked. They found lower rates among physicians working in the following types of hospitals:
  - Psychiatric hospitals, with a physician immunization rate of 9.7%, compared with a rate of 16.6% among physicians in general hospitals
  - Hospitals with 201–400 beds, or those with more than 400 beds, with physician immunization rates of 14.2% and 15.2%, respectively, compared with an immunization rate of 22.7% among physicians in hospitals with 1–200 beds

- Lester et al. surveyed all residents, interns, and fellows in postgraduate training at 10 Toronto teaching hospitals during the 1999–2000 influenza season to determine vaccination rates as well as factors influencing vaccination decisions and vaccine effectiveness. Overall, 51.3% of the 670 survey respondents selected for analysis received the vaccine during the study period. Vaccination rates were similar between males and females, and researchers observed no significant differences among age groups. Immunization rates were higher for those working in the fields of community and occupational medicine (76.9%) and pediatrics (75%) and lower for those working in psychiatry (31.9%), surgery (36.3%), and radiology (36.3%).

- In a hospital in Geneva, Switzerland, Harbarth et al. surveyed HCP from three departments whose patients are at high risk—geriatrics, obstetrics, and pediatrics—to learn why they declined the influenza vaccination. These researchers found the immunization rate to be highest among physicians and lowest among nurses.

**Factors Influencing HCP Vaccination**

The medical literature provides a wide variety of reasons that HCP accept or decline influenza vaccinations. Among them are the following:
Reasons HCP accept the influenza vaccination:
- Desire for self-protection\(^8,10,12,13\)
- Desire to protect patients\(^7,8,12,14,15\)
- Desire to protect family members\(^8,15\)
- Previous receipt of influenza vaccine\(^15–18\)
- Perceived effectiveness of the vaccine\(^16,19\)
- Desire to avoid missing work\(^12,15,20\)
- Peer recommendation\(^12\)
- Personal physician recommendation\(^15\)
- Strong worksite recommendation\(^21\)
- Had influenza previously\(^20\)
- Belief that receiving the vaccine is a professional responsibility\(^21\)
- Access to the vaccination/convenience\(^20,21\)
- Vaccinations provided free of charge\(^20,21\)
- Belief that benefit of the vaccination outweighs the risk of side effects\(^21\)

Reasons HCP decline the influenza vaccination:
- Fear of getting influenza/influenza-like illness\(^3,7,14,18,20,22\)
- Fear of vaccine side effects\(^8,10,12,13,17,18,21–24\)
- Perceived ineffectiveness of the vaccine\(^8,10,11,13,16–18,21,23,24\)
- Perceived low or no likelihood of developing influenza\(^8,13,14,16,20–22,24\)
- Fear of needles\(^16,20,22,25\)
- Insufficient time, inconvenience, or forgetting to get the vaccination\(^3,7,10,13,17,21\)
- Reliance on homeopathic medications\(^1,24\)
- Belief that their own host defenses would prevent influenza\(^11,25\)
- Belief that other preventive measures would minimize or eliminate influenza risk\(^19,25\)
- Lack of physician recommendation\(^1\)
- Belief that influenza is not a severe disease\(^12\)
- Lack of free vaccinations\(^1,12\)
- Younger age\(^7,26\)

Other factors that can influence HCP acceptance of influenza vaccinations include thimerosal in vaccines and culture:
- Public concern about exposure to thimerosal, a mercury-containing antibacterial compound used as a preservative in some vaccines, may pose a barrier to vaccination, according to the Centers for Disease Control and Prevention (CDC).\(^27\) Although there is no scientific evidence that thimerosal in influenza vaccine—or in any other vaccine—poses health risks beyond occasional local hypersensitivity, the U.S. Public Health Service and other federal agencies and professional medical organizations have recommended eliminating or reducing thimerosal from vaccines as one way of reducing the public’s exposure to mercury. Some states have passed legislation banning the use of vaccines containing mercury. The intranasal live, attenuated influenza vaccine (LAIV) and many of the single-dose injectable preparations of the trivalent inactivated influenza vaccine (TIV) are thimerosal free. The availability of thimerosal-free influenza vaccines is expected to increase.\(^27\)

Cultural considerations play an important role in HCP decisions to accept or decline vaccination. In their efforts to find out why HCP declined the influenza vaccination, Harbarth et al. note significant differences between the reasons they identified in their hospital in Geneva, Switzerland, and those cited in the North American studies they reviewed. While the most often-cited reasons for declining the vaccination in North American studies were avoiding medications whenever possible and fear of adverse reactions, these concerns were cited by only a minority of HCP in Geneva. The reason HCP in Geneva most often gave for declining the vaccination was confidence in their host defenses against influenza.\(^11\) It is important to recognize such differences when planning immunization strategies. Reliance on strategies that may work to influence HCP attitudes, beliefs, or perceptions in one cultural setting may “miss the mark” and not address HCP concerns in another.

Appendix 2-1 on pages 20–23 describes several articles about surveys that researchers have used to find out why HCP have accepted or declined influenza vaccinations.

**Impact of Institutional Outbreaks**

HCP can acquire influenza from the community or their patients and can transmit it to patients or other HCP. Influenza transmission and outbreaks in health care organizations have been recognized for many years and have been associated with substantial morbidity, mortality, and costs.\(^28–30\) Influenza’s short incubation period and ease of transmission through respiratory droplets from person to person can result in explosive outbreaks of febrile respiratory illness; health care settings are favorable environments for such transmission.\(^31,32\) In their review of 28 articles on...
hospital influenza outbreaks, Voirin et al. note that such outbreaks are probably underdetected and underreported due to a lack of standardization in surveillance methodologies and definitions of influenza, alerts based on nonspecific symptoms, and symptoms masked by treatment (for example, the absence of fever in a patient receiving antipyretics); taken together, it is not surprising that identifying, tracking, and describing outbreaks is difficult. See Appendix 2-2 on pages 24–27 for a summary of influenza outbreaks that have occurred in various health care settings.

A summary description of some of the issues surrounding the impact of institutional outbreaks of influenza follows:

- **Patient Morbidity and Mortality**
  Influenza is the sixth leading cause of death in adults in the United States. Each year, influenza causes substantial morbidity and mortality, particularly in high-risk populations such as the very young and the elderly, and among those with high-risk illnesses or conditions such as chronic pulmonary or cardiovascular disorders or immunosuppression due to disease or medications. Deaths associated with influenza are often due to pneumonia or complications associated with underlying cardiopulmonary conditions, and as many as 90% of all influenza-related deaths occur among the elderly. Van den Dool et al. note that influenza outbreaks have been associated with attack rates as high as 60%, with half of those infected developing pneumonia and one-tenth of these patients dying from the disease. Increased rates of HCP vaccination result in decreased rates of health care–associated influenza. In fact, Hayward et al. conclude that the organization to incur costs associated with finding replacement staff in addition to the costs associated with any medical care. Delayed or curtailed admissions during influenza outbreaks reduces revenue to health care organizations.

- **Staff Shortages**
  At the current national influenza vaccination rate among HCP of 42%, many HCP remain vulnerable to becoming ill with the disease. In a review of the literature by Keech and Beardsworth, self-reported estimates of working days lost by healthy adults ranged from < 1 day to 4.3 days per influenza illness episode. Influenza among HCP can result in staffing shortages, especially during the peak of influenza season and at a time when many hospitals are strained by the volume of patient admissions due to influenza and its complications. In years when there is a good match between the vaccine and circulating influenza viruses, immunization reduces illness and work absenteeism.

- **Increased Costs**
  Health care–associated influenza illness increases health care costs. Patients who develop influenza can have additional charges for diagnostic procedures, treatments, supplies, and extra hospital days. HCP who take sick leave cause the organization to incur costs associated with finding replacement staff in addition to the costs associated with any medical care. Delayed or curtailed admissions during influenza outbreaks reduces revenue to health care organizations. Keech and Beardsworth also note that productivity can suffer, as staff function at a reduced capacity when they return to work. Costs and the loss of revenue associated with patient or family dissatisfaction caused by awareness of an organization’s influenza incidence or outbreak may be more difficult to quantify.

- **Cost Savings of Effective Programs**
  The cost savings associated with HCP influenza vaccination programs generally outweigh the costs associated with providing the vaccine, and vaccinating ultimately results in a safer environment for patients. Research done in 1994 by Nichol et al. found 25% fewer upper respiratory infections, 43% fewer sick days taken, and 44% fewer visits to physicians for upper respiratory infections in healthy adults who received the vaccine than in the placebo group, with an estimated cost savings of $46.85 per person vaccinated. Other researchers have estimated that 11 HCP absentee days were averted for every 100 HCP who received the vaccine. Burls et al. performed systematic reviews of the literature for vaccine effectiveness, cost-effectiveness, and economic impact and determined that vaccination of HCP against influenza not only protects HCP but also provides indirect protection to high-risk populations. They also concluded that vaccination of HCP is cost-effective and is probably cost saving. Although Thomas et al. found no high-quality evidence that HCP influenza vaccinations reduce the incidence of influenza in elderly populations,
the researchers recognized that, due to the serious nature of the disease in elderly and compromised groups and the low risks associated with HCP vaccinations, increasing vaccine coverage is important, as is assessing the effects of vaccination in well-designed studies.44

Issues Surrounding Mandatory Influenza Immunization Programs

Despite national and international recommendations for vaccinating HCP, voluntary efforts to do so have historically been poor, having leveled off at about 42% in the United States.27 Talbot comments that, because education does not appear to be a continuing driving factor in increasing HCP influenza vaccination acceptance rates, requiring vaccination to some degree appears to be the next logical step.45 He further states, “Low rates of influenza vaccinations among [health care workers] should be akin to poor hand hygiene adherence and substandard infection control practices—unacceptable to all.”45(p. 109) The low rates of voluntary vaccination have led, inevitably, to discussions about whether HCP should be required to receive the influenza vaccine each year, and the moral, ethical, and legal implications of such a requirement. The following authors have examined the issue of mandatory influenza vaccination programs for HCP from these perspectives:

- Anikeeva et al. considered the ethical implications of various efforts to increase vaccination rates, including mandating vaccinations. The ethical principles of nonmaleficence (first do no harm) and beneficence (act in the best interest of patients) considered within the context of requiring HCP to receive influenza vaccinations are strong arguments in favor of such a requirement. However, the rights of HCP to make their own health care choices and have their autonomy respected are also ethical considerations. These researchers also cite other negative aspects of compulsory influenza vaccination programs, including the following46:

  - The coercive and invasive nature of such programs, especially if linked to sanctions such as job loss

  - The liability suits that could arise in cases of serious side effects of the vaccine, with a history of successful court challenges to mandatory influenza vaccination programs

  - The potential damage to workplace relationships, alienating HCP and undermining trust

  - The inability of HCP to accept the vaccination for various reasons, including medical contraindications

For these reasons, these authors conclude that a non-compulsory program is ethically preferable to a required or mandated one. They suggest positive incentives for vaccination such as prizes, recognition or rewards for units or departments, or financial rewards to avoid the ethical pitfalls of coercion. Furthermore, education and minor sanctions (such as requiring HCP to actively decline the vaccination, suspension of minor privileges, restrictions on areas in which nonvaccinated HCP could work) can be justified from an ethical perspective. Voluntary programs should also ensure that barriers to receiving the vaccine are minimized.

- Finch argues against the implementation of mandatory influenza vaccinations of HCP for the following seven reasons47:

  1. Truly mandatory programs would allow only medical or religious reasons for nonacceptance of the vaccination, resulting in job loss for HCP who decline for other reasons. This would have a detrimental effect on the relationship between those carrying out the mandate and HCP. In contrast, voluntary programs, which focus on the common purpose of protecting patients and mutual respect among all involved, strengthen relationships.

  2. There would likely be legal challenges to such programs, which might be viewed as invading civil liberties.

  3. Liability issues would be raised if HCP were to experience a rare but serious side effect of the vaccine, such as Guillain-Barre syndrome or anaphylaxis.

  4. Voluntary hepatitis B vaccination programs, which can serve as models for noncompulsory influenza vaccination programs, have reached an acceptance rate of 75% among HCP, accomplished through targeted education, free vaccine, and active declinations.
Compulsory vaccination programs may minimize the focus on other infection prevention measures, such as hand hygiene and prompt patient isolation, and thereby create a false sense of security.

If public reporting of HCP vaccination rates were required to protect patient safety, this could strengthen voluntary vaccination programs, obviating the need for mandatory programs.

The use of active declinations conveys strong institutional support of influenza vaccinations of HCP and, along with other voluntary measures, has been useful in helping to achieve higher vaccination rates.

Backer, in a counterpoint to Finch, proposes the following reasons in favor of mandatory influenza vaccination:

- Immunity to vaccine-preventable diseases is a critical component of disease prevention and infection control programs.
- Low vaccination rates in voluntary vaccination programs persist despite the CDC and the Advisory Committee on Immunization Practices recommendations, in place since 1984, that HCP receive this vaccine.
- Health care personnel are at greater risk for becoming ill with influenza than are members of the general public due to their more frequent exposure to individuals with the disease.
- Health care personnel shed the virus for at least 1 day before the onset of symptoms; many shed the virus for 5–10 days, although they have few or no symptoms; and many HCP work even when they are ill.
- The obligation to protect patients from harm and to act in their best interests serves as a moral imperative to give HCP the influenza vaccine.
- An awareness of the vaccine's benefits and not requiring HCP to receive it promotes liability concerns.
- The vaccine is safe, with systemic effects no more common than with placebos.
- Influenza vaccination programs are the most cost-effective of all adult preventive health programs, reducing HCP respiratory illnesses and absenteeism while protecting patients and reducing the risk of health care–associated influenza outbreaks.
- Mandatory vaccination programs do work, as evidenced by the requirements in most states that children in schools and day care settings receive certain vaccinations. In addition, many health care organizations require HCP to show evidence of immunity to rubella and measles.
- Both the National Foundation for Infectious Diseases (since 2004) and the Society for Healthcare Epidemiology of America (since 2005) have encouraged organizations to strengthen their HCP influenza vaccination efforts.
- Unless organizations improve HCP vaccination rates, legislation is likely to mandate it.
- When applied fairly and used judiciously, a mandated vaccination program is an appropriate public health practice.

Poland et al. assert that influenza among HCP is a significant threat to patient safety, and the most efficient method for preventing morbidity and mortality among patients is HCP immunization. Mandatory influenza immunization programs are needed because voluntary programs over the past 25 years have failed to raise rates much above 40%. Requiring the vaccination of all HCP who have direct patient contact (unless there are medical contraindications or religious objections, or the individual signs an informed declination) would mirror the highly successful hepatitis B vaccination requirements for HCP. The authors suggest that, if the concern were an “exotic” virus with the same morbidity and transmissibility as influenza, public, legislative, and medical views of this health threat would be different. They postulate the following “seven truths” surrounding mandatory vaccination of HCP:

- **Providing a Safer Environment for Health Care Personnel and Patients Through Influenza Vaccination: Strategies from Research and Practice**
1. Influenza causes significant morbidity and mortality.

2. HCP infected with influenza can spread it to their vulnerable patients.

3. HCP influenza vaccination is cost-effective and prevents disruption in the workplace.

4. The CDC already recommends influenza vaccination for HCP.

5. Vaccination rates increase when vaccination is required.

6. Health care organizations and HCP have the ethical and moral duty to protect patients from communicable diseases.

7. Either the health care system will lead the way in this effort, or the duty will fall to legislative policymakers or enforcement organizations.

- Helms and Polgreen also support mandatory influenza vaccinations for HCP, citing the following reasons:
  
  - There is evidence that vaccinating HCP reduces mortality among patients in long term care facilities; in hospitals, HCP vaccinations reduce the transmission of influenza to patients.
  
  - The vaccination reduces HCP absenteeism and is cost-effective.
  
  - Voluntary vaccination programs have not been successful in achieving rates much above 40%.
  
  - The risk of harm to patients who develop influenza as a result of their exposure to influenza-infected HCP far outweighs the risk of harm to HCP from the vaccine.

- In their counter to Helms and Polgreen, Isaacs and Leask argue against mandatory HCP influenza vaccinations for the following reasons:
  
  - The evidence is weak that HCP vaccinations protect patient populations, other than immunocompromised patients or patients in long term care facilities.
  
  - Vaccinating HCP could infringe on autonomy and civil liberty.
  
  - Mandatory vaccination programs could damage morale and alienate staff.
  
  - Voluntary, multifaceted programs should be promoted to encourage HCP participation.

- Mah says the debate over mandatory influenza vaccinations for HCP requires clarifying the underlying disputes in the language of policy debate. Stakeholders on both sides of the issue may define the same policy goals or interpret the evidence differently. Those opposed to mandatory programs cite the risk of adverse events and stress the coercive nature of such programs and the value of using nonvaccine infection control measures. Mah says that those in favor of mandatory vaccination stress the risk of influenza transmission associated with subclinical infections, duty of care, and reduced HCP absenteeism.

**Summary**

This chapter summarizes the multiple demographic characteristics and individual factors associated with HCP decisions to accept or decline influenza vaccination. It also explores the impact of institutional outbreaks of influenza, as well as issues and recommendations surrounding both voluntary and mandatory vaccination. Chapter 3 builds on this information, focusing on strategies that health care organizations can use to improve vaccination rates among their HCP.
References


### Appendix 2-1.

**Examples of Research Articles Using Surveys to Identify Factors Influencing Vaccination of Health Care Personnel (HCP) Against Influenza**

<table>
<thead>
<tr>
<th>Reference</th>
<th>Setting(s) or Population(s)</th>
<th>Reasons for Accepting or Rejecting Influenza Vaccine</th>
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<tr>
<td>Abramson Z.H., Levi O.: Influenza vaccination among primary healthcare workers. <em>Vaccine</em> 26:2482–2489, May 12, 2008.</td>
<td>Primary care community clinics</td>
<td>Reasons given for not taking the vaccination included lack of time, forgetting it was being offered, or unavailable vaccine (18.4%), the misconception that the vaccine can cause influenza (15.1%), and lack of physician recommendation (37%).</td>
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<td>Apisarnthanarak A., et al.: Impact of knowledge and positive attitudes about avian influenza (H5N1 virus infection) on infection control and influenza vaccination practices of Thai healthcare workers. <em>Infect Control Hosp Epidemiol</em> 29:472–474, May 2008.</td>
<td>Hospital (two tertiary care centers)</td>
<td>The main reasons given for receiving vaccination were self-protection (84%), protection of patients (56%), the desire to avoid missing work (25%), the belief that it was better to be vaccinated than to contract influenza (21%), and recommendation of their peers (15%). The increased acceptance of influenza vaccination by HCP was associated with the threat of an impending avian influenza epidemic. Among the HCP who reported not being vaccinated, the main reasons given were the unavailability of free vaccine, fear of side effects, and the belief that influenza is not a severe disease.</td>
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<td>Bryant K.A., et al.: Improving influenza immunization rates among healthcare workers caring for high-risk pediatric patients. <em>Infect Control Hosp Epidemiol</em> 25:912–917, Nov. 2004.</td>
<td>Pediatric hospital (neonatal and pediatric intensive care units, oncology unit)</td>
<td>Protecting patients was the most common reason given for receiving the vaccine, followed by having received the vaccine previously, having the vaccine recommended by a personal physician, protecting their family members, avoiding influenza illness, and avoiding missing work. Oncology unit HCP cited the desire to protect their patients more often than intensive care unit HCP. The reasons for refusing vaccination varied by type of unit.</td>
</tr>
<tr>
<td>Chan-Tompkins N.H., et al.: Employee thoughts on influenza vaccine: Here we go again. <em>Infect Control Hosp Epidemiol</em> 29:186–187, Feb. 2008.</td>
<td>Hospital</td>
<td>The most common reasons for declining the vaccine were concern that it would give them influenza-like symptoms (26.4%), not believing in vaccines (20%), dislike of injections (12.5%), and believing they were not at risk for contracting influenza (9.1%). Reasons for declining varied according to whether the HCP was involved in direct patient care.</td>
</tr>
<tr>
<td>Christini A.B., Shutt K.A., Byers K.E.: Influenza vaccination rates and motivators among healthcare worker groups. <em>Infect Control Hosp Epidemiol</em> 28:171-177, Feb. 2007.</td>
<td>Hospital (2 tertiary care teaching hospitals)</td>
<td>Belief that the vaccine could cause illness and inconvenience were frequently cited as reasons for not receiving the vaccine, while understanding the potential for transmitting influenza from asymptomatic HCP was associated with accepting the vaccine. This group of researchers also found different reasons among groups of HCP and physician subspecialties for receiving the vaccine.</td>
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<td>Cowan A.E., et al.: Influenza vaccination status and influenza-related perspectives and practices among US physicians. <em>Am J Infect Control</em> 34:164–169, May 2006.</td>
<td>Physicians (family physicians, internists, geriatricians, and pulmonologists)</td>
<td>Reasons given for being vaccinated included believing that HCP have a professional responsibility to be vaccinated, having access to vaccination on site and free of charge, being aware of strong workplace recommendation for HCP vaccinations, and believing that the benefits of vaccination outweigh the risk of side effects. Reasons given for not being vaccinated were being “too busy/forgot” and being concerned about adverse reactions. Other reasons cited were believing that the chance of contracting influenza was small or that the effectiveness of the vaccine was insufficient.</td>
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<tr>
<td>Harbarth S., et al.: Influenza immunization: Improving compliance of healthcare workers. <em>Infect Control Hosp Epidemiol</em> 19:337–342, May 1998.</td>
<td>Hospital (geriatric, obstetric, and pediatric units)</td>
<td>The most frequent reasons HCP gave for not receiving the vaccine were believing that their own host defense mechanisms would protect them from influenza (32%), perceiving a low risk of getting influenza (23%), believing the vaccine does not work (19%), and never getting influenza (16%).</td>
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<td>Kimura A.C., et al.: The effectiveness of vaccine day and educational interventions on influenza vaccine coverage among health care workers at long-term care facilities. <em>Am J Public Health</em> 97:684–690, Apr. 2007.</td>
<td>Long term care facilities</td>
<td>Factors associated with not being vaccinated during the 2001–2002 influenza season included younger age, perception that the vaccine was risky or ineffective, and the unavailability of free vaccine. Other reasons included forgetting to get vaccinated and being too busy. Receiving the influenza vaccination during the previous season was an important factor in receiving it during the next influenza season.</td>
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<tr>
<td>Maltezou H.C., et al.: Influenza vaccination acceptance among health-care workers: A nationwide survey. <em>Vaccine</em> 26:1408–1410, Mar. 10, 2008.</td>
<td>Public hospitals</td>
<td>This survey in 32 Greek hospitals found that the majority of vaccinated HCP (89.1%) did so in order to protect themselves; 59.1% were vaccinated to protect their families and 55.2% to protect their patients. Physicians and nurses were more frequently vaccinated to protect their patients compared with those in other professions. The main reasons for refusal to be vaccinated were the perception of not being at risk for contracting influenza and fear of the vaccine’s adverse effects. Other reasons for refusal included the belief that the vaccine is ineffective, absence during and being uninformed about the vaccination program, and being unaware that HCP are a target group for influenza vaccination. Significant differences in the levels of vaccine acceptance were found among professions, which are attributable to differences in levels of knowledge about or motivation for vaccination.</td>
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<td>Manuel D.G., et al.: Health behavior associated with influenza vaccination among healthcare workers in long-term-care facilities. <em>Infect Control Hosp Epidemiol</em> 23:609–614, Oct. 2002.</td>
<td>Long term care facilities</td>
<td>Vaccinated HCP had a more positive attitude toward influenza vaccination and a greater belief that the vaccine is effective. Nonvaccinated HCP were more likely to believe that other preventive measures are more effective than vaccination. HCP who participated in focus groups said they believe that the main purpose of influenza vaccination programs is to protect residents’ health at the expense and potential harm of staff, while placing a burden of responsibility on staff.</td>
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<td>Mehta M., Pastor C.A., Shah B.: Achieving optimal influenza vaccination rates: A survey-based study of healthcare workers in an urban hospital. <em>J Hosp Infect</em> 70:76–79, Sep. 2008.</td>
<td>Hospital (teaching)</td>
<td>The top two reasons for not receiving the vaccine were “I do not feel I need the vaccine” and “I am afraid of getting sick from the vaccine.” The respondents who believed they could protect their patients by accepting the influenza vaccine were more likely to be immunized.</td>
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<td>Ofstead C.L., et al.: Influenza vaccination among registered nurses: Information receipt, knowledge, and decision-making at an institution with a multifaceted educational program. <em>Infect Control Hosp Epidemiol</em> 29:99–106, Feb. 2008.</td>
<td>Hospital (large tertiary medical center)</td>
<td>The majority of registered nurses who responded to a survey (86.7%) cited receiving the influenza vaccine in the past as the reason they would be vaccinated during the coming influenza season. Reasons most frequently reported for declining vaccination were doubts about the risk of influenza and the need for vaccination, concerns about vaccine effectiveness and side effects, and dislike of injections.</td>
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<td>Piccirillo B., Gaeta T.: Survey on use of and attitudes toward influenza vaccination among emergency department staff in a New York metropolitan hospital. <em>Infect Control Hosp Epidemiol</em> 27:618–622, Jun. 2006.</td>
<td>Hospital (emergency department of teaching hospital)</td>
<td>The main reason respondents gave for receiving the vaccine was having had influenza previously. Misconceptions about the efficacy of the vaccine, concerns about side effects, and the fear of contracting influenza were given as reasons for declining the vaccine.</td>
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<tr>
<td>Steiner M.A., et al.: Factors influencing decisions regarding influenza vaccination and treatment: A survey of healthcare workers. <em>Infect Control Hosp Epidemiol</em> 23:625–627, Oct. 2002.</td>
<td>Hospital</td>
<td>The most common reasons for accepting the vaccine were to avoid missing work, convenience, and having it provided at no cost to HCP. More than half had had influenza previously and wanted to prevent it. The most common reasons for rejecting the vaccine were concerns that it would cause illness, a dislike of needles or painful injections, and a perception of low risk of contracting influenza. One-third of vaccine recipients indicated that they would refuse vaccination if asked to pay for it out-of-pocket.</td>
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<tr>
<td>Willis B.C., Wortley P.: Nurses’ attitudes and beliefs about influenza and the influenza vaccine: A summary of focus groups in Alabama and Michigan. <em>Am J Infect Control</em> 35:20–24, Feb. 2007.</td>
<td>Focus groups of registered nurses in two cities</td>
<td>Many nurses voiced concerns about influenza vaccine ineffectiveness and safety as reasons for rejecting vaccination. Unvaccinated nurses did not think they were at risk for influenza, believing that they did not fall into high-risk groups and that they had stronger immune systems due to workplace exposure to diseases. They believed the vaccine was not important and that using routine preventive measures, such as hand hygiene and Standard Precautions, minimized their risk. Nurses who seemed to be more knowledgeable about influenza and risk factors for the disease accepted the vaccination more often than less-knowledgeable nurses.</td>
</tr>
<tr>
<td>Wodi A.P., et al.: Influenza vaccine: Immunization rates, knowledge, and attitudes of resident physicians in an urban teaching hospital. <em>Infect Control Hosp Epidemiol</em> 26:867–873, Nov. 2005.</td>
<td>Resident physicians at a university</td>
<td>Most of the residents (93.3%) who had received the influenza vaccine cited self-protection as one of the reasons for doing so; but only 33.3% cited self-protection as the most important reason for being vaccinated. Only 2.7% cited protecting patients as the most important reason. Lack of time was the reason most often given for nonacceptance of the vaccine (47.1%), followed by doubts about its effectiveness (24%) and concerns about side effects (20.7%).</td>
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### Appendix 2-2.
Examples of Articles About Health Care–Associated Influenza Outbreaks

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<tr>
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<td>Sartor C., et al.: Disruption of services in an internal medicine unit due to a nosocomial influenza outbreak. <em>Infect Control Hosp Epidemiol</em> 23:615–619, Oct. 2002.</td>
<td>Hospital medical unit</td>
<td>1 week in patients</td>
<td>This 19-bed medical unit had 23 patients during the outbreak period, which included the index case admitted with influenza. Nine of the 22 hospitalized patients (41%) developed influenza-like illness. Five of the 22 health care personnel (HCP) (23%) on the unit also developed illness. Vaccinated patients and HCP were significantly less likely to develop influenza than those who were not vaccinated. The first two HCP who developed influenza-like illness or confirmed influenza worked with patients while ill themselves and may have transmitted the infection to their patients. The outbreak resulted in postponement of 8 scheduled admissions and all emergency admissions for 11 days. Hospital charges attributable to the outbreak were also figured.</td>
</tr>
<tr>
<td>Malavaud S., et al.: Nosocomial outbreak of influenza virus A (H3N2) infection in a solid organ transplant department. <em>Transplantation</em> 72:535–537, Aug. 15, 2001.</td>
<td>Solid organ transplant unit</td>
<td>4 days</td>
<td>A 12-bed transplant unit with all single rooms experienced 4 cases of health care–associated influenza A during a 4-day outbreak. None of the patients had received influenza vaccination. Three of the 27 HCP who had been working in the department at the time of the outbreak were diagnosed with influenza during the same period, with 1 nurse reporting headache and fever two days before the onset of the first case. None of the 3 HCP had received the influenza vaccination. Although the precise origin of infection could not be determined, there was a temporal association between ill HCP and subsequent infection in the 4 patients.</td>
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<td>Cunney R.J., et al.: An outbreak of influenza A in a neonatal intensive care unit. <em>Infect Control Hosp Epidemiol</em> 21:449–454, Jul. 2000.</td>
<td>Neonatal intensive care unit</td>
<td>18 days in the infants</td>
<td>This 34-bed unit had a census of 38 infants on the first day of the outbreak; of 54 infants in the unit over the 18-day period, 19 (35%) were positive for influenza A, with 6 being asymptomatic. One infant died. Only 15% of HCP in the unit had a history of recent influenza vaccination. Although it could not be determined whether the virus was introduced by a visitor or by HCP, 10 (71%) of the 14 HCP who reported influenza-like illness during the outbreak period worked while ill.</td>
</tr>
<tr>
<td>Weinstock D.M., et al.: Control of influenza A on a bone marrow transplant unit. <em>Infect Control Hosp Epidemiol</em> 21:730–732, Nov. 2000.</td>
<td>Bone marrow transplant unit</td>
<td>1 week</td>
<td>The outbreak occurred in the adult bone marrow transplant (BMT) unit, with 7 cases of health care–associated influenza; 6 patients also developed pneumonia, and 1 patient died. Five staff members developed influenza-like illness during the outbreak. Multiple measures were instituted to control the outbreak, including postponement of all nonessential admissions, discontinuing the practice of “floating” non-BMT staff to the unit, and offering influenza vaccine and rimantadine prophylaxis to all staff.</td>
</tr>
<tr>
<td>Adal K.A., et al.: Prevention of nosocomial influenza. <em>Infect Control Hosp Epidemiol</em> 17:641–648, Oct. 1996.</td>
<td>Hospital</td>
<td>69 days</td>
<td>Ten patients acquired influenza while hospitalized during the outbreak period. Patients ranged in age from 5 months to 83 years, and no clusters of cases were observed on the units. Many HCP admitted to working while they had fever and respiratory symptoms, exposing both patients and other HCP to influenza. Use of a mobile vaccination cart improved HCP vaccination rates.</td>
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<td>Morens D.M., Rash V.M.: Lessons from a nursing home outbreak of influenza A. <em>Infect Control Hosp Epidemiol</em> 16:275–280, May 1995.</td>
<td>Long term care facility</td>
<td>Approximately 13 months</td>
<td>This outbreak occurred on one 37-bed unit of a five-unit long term care facility. During the outbreak period, 39 residents had occupied beds, of whom 11 developed clinical or proven influenza; 6 of the ill residents died. Thirty-six of the 39 residents had received influenza vaccine, as had 10 of the 11 who developed clinical influenza. Illness among HCP appears not to have been associated with illness in residents, but illness in residents may have been associated with influenza in the 3 nurses who dispensed medications or administered tube feedings. The authors suspect that HCP may have spread the virus via their hands or fomites, such as medication cart items.</td>
</tr>
<tr>
<td>Coles F.B., Balzano G.J., Morse D.L.: An outbreak of influenza A (H3N2) in a well immunized nursing home population. <em>J Am Geriatr Soc</em> 40:589–592, Jun. 1992.</td>
<td>Long term care facility</td>
<td>4 weeks</td>
<td>Thirty-seven of 124 residents and 18 of 146 HCP had influenza-like illness, with HCP illness beginning 16 days prior to onset in the residents. While 90% of the residents had received influenza vaccinations prior to the outbreak, only 10% of the HCP had received it. Six residents developed pneumonia, and 3 died of illness related to influenza.</td>
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<td>Centers for Disease Control and Prevention: Suspected nosocomial influenza cases in an intensive care unit. <em>MMWR Morb Mortal Wkly Rep</em> 37:3–4, 9, Jan. 15, 1988. <a href="http://www.cdc.gov/mmwr/preview/mmwrhtml/00001025.htm">http://www.cdc.gov/mmwr/preview/mmwrhtml/00001025.htm</a> (accessed Apr. 23, 2009).</td>
<td>Medical–surgical intensive care unit</td>
<td>Not stated</td>
<td>Three patients in a 15-bed medical–surgical intensive care unit were identified as having influenza. A nurse who had cared for all 3 patients was absent from work due to an influenza-like illness during the time of the illness in the patients, but isolates were not available for confirmation. Neither the nurse nor the patients had received influenza vaccine.</td>
</tr>
<tr>
<td>Hall C.B., Douglas R.G.: Nosocomial influenza infection as a cause of intercurrent fevers in infants. <em>Pediatrics</em> 55:673–677, May 1975.</td>
<td>Infant ward for children &lt; 2 years</td>
<td>Study period of 1 month duration during increased community influenza activity</td>
<td>Thirteen of 17 infants hospitalized during the study period developed intercurrent fevers, with 92% due to influenza. One physician subsequently identified as having influenza had worked during his first febrile day, and a number of HCP had cared for infants while ill with influenza-like illnesses or upper respiratory infections during the study period, though they were not tested for influenza.</td>
</tr>
<tr>
<td>Kapila R., et al.: A nosocomial outbreak of influenza A. <em>Chest</em> 71:576–579, May 1977.</td>
<td>Hospital</td>
<td>1 week</td>
<td>Eight immunocompromised patients on the same unit developed symptoms of health care–associated pneumonic influenza; none of the patients had received influenza vaccine. Five of the 8 patients died. The source of the outbreak could not be identified, and no HCP developed clinical symptoms of influenza.</td>
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