Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

The Journal of Emergency Medicine, Vol. 42, No. 1, pp. 79–85, 2012

0736-4679/$–see front matter

ELSEVIER

doi:10.1016/j.jemermed.2010.02.034

Administration of Emergency Medicine

AN INTERVENTION TO IMPROVE COMPLIANCE WITH TRANSMISSION PRECAUTIONS FOR INFLUENZA IN THE EMERGENCY DEPARTMENT: SUCCESSES AND CHALLENGES

Larissa May, MD, MSPH,*†‡ Derrick Lung, MD, MPH,*[1] and Katherine Harter, BS§‖

*Department of Emergency Medicine, †Department of Microbiology, Immunology, and Tropical Medicine, and ‡Department of Epidemiology and Biostatistics, The George Washington University, Washington, DC, §The George Washington University School of Medicine and ‖The George Washington University School of Public Health and Health Services, Washington, DC
Reprint Address: Larissa May, MD, MSPH, Department of Emergency Medicine, The George Washington University, 2150 Pennsylvania Avenue, NW, Suite 2B, Washington, DC 20037

□ **Abstract—Background: Concern with the potential for hospital-based transmission of influenza has come to the forefront due to emergency department (ED) crowding and the novel H1N1 pandemic. Compliance with infection control guidelines for influenza in the ED is generally unknown, and effective yet low-resource training is needed to educate staff on the importance of decreasing the potential for ED transmission of the virus. Objectives: This study evaluates compliance with patient assignment and transport precautions for influenza in an urban ED before and after implementation of electronic reminders. Methods: We included patients with a diagnosis of influenza for two consecutive influenza seasons, and retrospectively collected limited patient encounter data on patient location, transport, and compliance with assignment and transport precautions for both years. For the second influenza season we sent monthly reminders to all ED providers via the electronic medical record (EMR), explaining the importance and proper use of infection control precautions in patients with suspected influenza. Compliance between the two seasons was compared using descriptive statistics and chi-squared analysis. Results: Overall compliance with infection control precautions was poor, but increased with the use of electronic reminders from 29% to 45% ($p = 0.015$). Compliance with precautions for patients moved to the hallway or Radiology increased from 7% to 24% ($p = 0.001$). Conclusions: The EMR may be a useful tool for improving compliance with transmission-based precautions by implementing reminders on order sets and informational mailings, and by tracking compliance. Future study should be undertaken to determine the most effective interventions to prevent ED transmission of influenza. © 2012 Elsevier Inc.**

□ **Keywords—influenza; education; electronic medical record; infection control**

INTRODUCTION

Background and Importance

Influenza is transmitted by inhalation of direct respiratory droplets, and direct or indirect contact via fomites (1,2). Concern with potential hospital-based transmission of influenza has come to the forefront due to the increased virulence of past influenza seasons, significant changes to influenza vaccine production, and pandemic

[1]Current affiliations: Department of Emergency Medicine, Stanford University, Palo Alto, CA and Medical Toxicology Program, University of California at San Francisco, San Francisco, CA.

This work was presented as a poster presentation at the Society for Academic Emergency Medicine annual meeting, New Orleans, LA, May 16, 2009.

RECEIVED: 8 October 2009; FINAL SUBMISSION RECEIVED: 20 November 2009;
ACCEPTED: 18 February 2010

flu due to the novel swine-origin novel influenza A (H1N1) virus.

The outbreak of the H1N1 virus, first identified in the United States in April 2009, led the Centers for Disease Control and Prevention (CDC) to issue extended guidelines for health care personnel to prevent health-care-associated transmission of the viral infections, including both preventive measures and procedures for those who became ill (3). These guidelines, which outline specific strategies for prevention and control of influenza in acute care facilities, supplement CDC's 2008 infection control recommendations (4). Despite these strategic references, at least 48 cases of influenza A (H1N1) strain have been reported among health care personnel since the initial outbreak, indicating that compliance with the CDC's recommendations may be lower than desired (5). Although there is limited and controversial evidence regarding the effectiveness of either surgical or N95 masks in reducing transmission of the influenza virus, studies of occupational exposures during the severe acute respiratory syndrome (SARS) outbreak suggest that the wearing of either surgical or N95 masks might be protective in the health care setting (6–10). A recent study on the use of surgical masks compared to N95 masks by nurses in Canada demonstrated similar rates of laboratory-confirmed influenza infection (11). Influenza infection control is particularly important in the emergency department (ED) because both index cases and more severe cases are expected to present to the ED, and the phenomenon of ED crowding continues to increase at an alarming rate across the United States (12).

Compliance with infection control guidelines for influenza is generally unknown in the ED, and effective yet low-resource training is needed to educate staff on the importance of decreasing the potential for transmission of the virus in the ED. One potentially powerful tool that can be employed is the electronic medical record (EMR). The EMR has progressed rapidly over the past couple of decades from passive record keeping to systems including functions of order entry, provider notifications and alerts, and patient tracking. EMR systems have been successfully used for improving adherence to clinical guidelines such as pressure ulcer prevention, decreasing adverse drug reactions, and monitoring of infectious diseases, as well as compliance with pneumonia guidelines (13,14). To our knowledge, the use of this tool for infection control and prevention has not been reported or published.

Goals of this Investigation

This pilot study aimed to compare compliance with CDC infection control guidelines in confirmed cases of influenza in an urban, academic hospital ED before and after a novel EMR-based educational intervention. Our hypothesis was that there is inconsistent utilization of infection control precautions for influenza cases in the ED, and that compliance could be improved by an educational intervention program using an EMR.

METHODS

Study Design, Setting, and Selection of Participants

This study was a retrospective analysis of patients selected from the ED census of an urban, academic hospital with an annual patient volume of 62,000 visits per year. We included all patients with a diagnosis of laboratory-confirmed influenza (by rapid nasopharyngeal influenza testing) for the 2007–2008 (October 1, 2007 to April 30, 2008) and 2008–2009 (October 1, 2008 to April 24, 2009) influenza seasons for comparison. We identified patients through the ED EMR system (Picis, Inc., Wakefield, MA). The database was queried for all patients with the discharge diagnosis of "Influenza (identified by flu swab only)" for the study period. The study was approved by our Institutional Review Board (IRB). The requirement for informed consent of study subjects was waived by the IRB.

Study Protocol

Limited patient encounter data were collected, including ED location (room, hallway, or chair), Radiology Department transport, documentation of the use of droplet precautions, and week and month of ED visit. Patient charts were reviewed for documentation of compliance with CDC infection control guidelines for influenza. Figure 1 displays recommended droplet-based transmission precautions. For the purposes of this study, we defined appropriate infection control precautions as: 1) patient is assigned to a private room or cohorted or 2) if the patient was moved, transported, or placed in a hallway, the patient was given a surgical mask.

- In addition to Standard Precautions, healthcare personnel should adhere to Droplet Precautions during the care of a patient with suspected or confirmed influenza for 5 days after the onset of illness:
  - Place patient in a private room or with cohort.
  - Wear a surgical or procedure mask when entering the patient's room.
  - If patient movement or transport is necessary, ***have the patient wear a surgical or procedure mask***, if possible.

Figure 1. Centers for Disease Control and Prevention infection control guidelines for influenza.

Intervention

Our ED has no standard intervention or protocol to identify and isolate patients with respiratory symptoms. In October 2008, before the start of the 2008–2009 influenza season, the investigators sent an informational e-mail to all providers (nurses, technicians, and physicians working in the ED) via the Picis EMR system, explaining the importance and proper use of infection control precautions for patients with clinically suspected or confirmed influenza. This e-mail was repeated every month from October through April as a reminder to staff. In addition, a reminder for droplet precautions was added next to the electronic order checkbox, accessed when ordering an influenza nasopharyngeal swab, in the Picis EMR beginning in September 2008. This EMR intervention was visible both to nursing staff and physicians who were entering or viewing the order.

Data Analysis

A retrospective chart review was performed for the 2007–2008 influenza season and the same review was performed for the 2008–2009 influenza season. Compliance with patient assignment and transport precautions, our outcome measure, was compared between the two seasons with descriptive statistics and chi-squared analysis using Microsoft ® Excel software (2003 version, CHITEST statistical function; Microsoft Corporation, Redmond, WA) with an alpha value of 0.05.

No other infection control interventions geared toward influenza were implemented in the ED during the study period, beyond routine processes. A potential confounder to our study is the impact of public health recommendations after the novel H1N1 outbreak in April 2009. To minimize this effect, for the 2008–2009 influenza season we did not include cases that presented after the onset of media coverage of the novel influenza H1N1 virus. This was done to avoid confounding the data due to an increased public and staff awareness of influenza. Thus, we only included patients through April 24, 2009, which was before release of recommendations to ED staff obtained from the CDC and Department of Health.

RESULTS

Comparable numbers of patients were seen in the ED for the 2007–2008 and the 2008–2009 influenza seasons (36,942 patients and 38,186 patients, respectively), with no change in the total number of private beds assigned between the two time periods. A total of 711 influenza swabs were ordered in the ED for the 2007–2008 season and 931 swabs were ordered during the 2008–2009 season. During the 2007–2008 influenza season, the ED had 129 swab-confirmed cases of influenza in the study period and droplet precautions were used in 38 (29%) cases. Within the subgroup of patients who were moved to the hallway or Radiology, defined precautions were used in 7 (7%) cases. During the following 2008–2009 influenza season, through April 24, 2009, the ED had 112 swab-confirmed cases of influenza, and infection control precautions were used in 50 (45%) cases. For the subgroup of patients who were moved to the hallway or Radiology, infection control precautions were used in 20 (24%) cases. Overall compliance with transmission precautions increased between the two seasons, from 29% to 45%, with a p-value of 0.015. Compliance with precautions for patients moved to the hallway or radiology increased from 7% to 24%, with a p-value of 0.001. Figures 2 and 3 show the number of patients diagnosed with influenza who were placed in transmission precautions during their ED stay, including movement from private rooms to the hallway or Radiology, for the 2007–2008 (Figure 2) and 2008–2009 (Figure 3) seasons. Despite our intervention, compliance with infection control precautions remained below desirable levels for the ED setting.

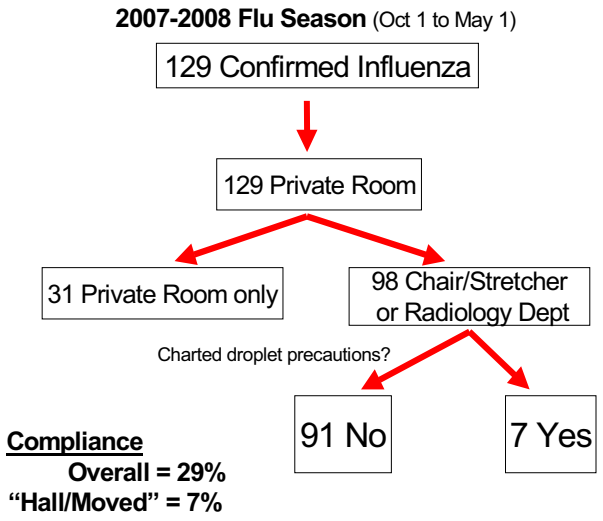

Figure 2. Data from the 2007–2008 flu season.

DISCUSSION

Having protocols or educational endeavors for ED infection control of influenza potentially can have a significant effect, particularly for patients admitted to the hospital. A review by Salgado found attack rates during influenza epidemics of 0.7–20% in patients and 11–59%

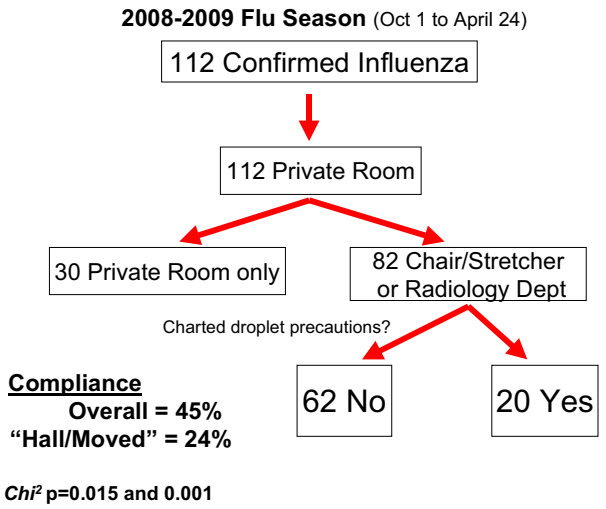

Figure 3. Data from the 2008–2009 flu season.

in health care workers (15). Mortality for hospital-acquired influenza in most acute care facilities is 16%, and as high as 33–60% in transplant intensive care units (15). As the incubation period for influenza can be as short as 2 days, realistically, there is no meaningful time to introduce effective control measures once the infection has been transmitted (16). Although increased compliance may diminish the rate of nosocomial respiratory infections, ED crowding increases opportunities for transmission of influenza, and thus increases the importance of infection control in this setting (17–20).

Few studies have described actual compliance with transmission-based precautions (21). Our study showed a statistically significant improvement in compliance with transmission-based precautions for influenza in an urban ED; however, compliance was less than ideal in both influenza seasons. The literature demonstrates mixed results for educational interventions of staff regarding infection control precautions. Educational interventions for the prevention of nosocomial infections, including hand washing before patient contact and wearing a mask around patients, have shown good results, with nurses and patient care technicians having the greatest improvement in compliance (22–24). Other studies have shown that compliance with isolation procedures after standardized lectures and videos alone was poor, but improved after the institution of smaller, more intensive in-service sessions tailored to individual departments and provided during multiple shifts (25). Nonetheless, studies have demonstrated the success and cost-effectiveness of certain practices, including hand washing and glove use, in decreasing the spread of respiratory infections (26–28).

Low-cost interventions to improve droplet-based transmission precautions in the ED are sensible; however, further evidence is needed before instituting more extensive protocols.

Studies have demonstrated a sixfold decrease in droplet exposure when surgical masks are used, compared with properly fitted respirators, which can afford at least a 100-fold reduction in exposure (29).

It is not known how long surgical masks provide protection while worn, and whether the rates of protection derived from their use differ for patients vs. health care providers. According to the CDC, "no studies have definitively shown that mask use by either infectious patients or health-care personnel prevents influenza transmission" (30). However, in the setting of a new, serious, highly transmissible virus, it should be noted that the CDC may recommend both contact and airborne precautions until the data indicate that droplet precautions are sufficient.

During the SARS epidemic in Hong Kong, staff members who used masks, gowns, and hand-washing practices were less likely to develop SARS than those who did not (28). Increased proximity to infected cases is directly related to the increased risk of transmission of infection, supporting the CDC recommendations for private rooms and droplet isolation (31–33). Contact precautions are successful in reducing the risk of infection in most studies and, in concert with droplet-based precautions, may help decrease nosocomial transmission of respiratory infections. For example, nosocomial transmission of the respiratory syncytial virus was significantly reduced by the use of gown-and-glove precautions during a longitudinal intervention trial (18,26,28).

Effective infection control precautions are important to prevent the spread of serious respiratory illness, including novel influenza, especially because the index cases for these illnesses may not be identified in a timely fashion. There is great concern for containing index cases and mitigating the initial spread. Not only can ED infection control practices affect nosocomial spread, but they might also decrease absenteeism, especially during a pandemic, during which frequent staff shortages are more pronounced despite increased need for staff (34).

Our findings show that there is a significant rate of non-compliance, at least for our urban academic ED. Respiratory infection control in the ED is challenging due to patient crowding, inadequate staff coverage, low resources, and the high proportion of immuno-compromised patients (35). Additional challenges to compliance include the presence of trainees rotating through the department, and an increased reliance on traveling nursing staff who may not be familiar with local policy or may be overwhelmed with other tasks. In the event of a severe pandemic during which 30% of the health care workforce is expected to become ill, compliance with transmission-based precautions will become increasingly dif-

ficult due to shortages in health care providers, nursing staff, and environmental services staff to provide cleaning and disinfection. Limiting factors to compliance also include logistical problems such as the number of private rooms available in the ED, the available supplies of personal protective equipment such as surgical masks, and the volume of patients in the ED. For example, one challenge during the SARS epidemic was fulfilling increased demand for personal protective equipment and biohazard bags (36). Policies to enforce strict isolation are costly and time intensive and these policies may prevent health care workers from entering those patient rooms with the same frequency due to the burden of mask and gown use, with a potential impact on patient care and satisfaction (37). Clearly, there is a need for solutions to the many challenges faced in properly employing CDC droplet precautions in the ED, including effective educational strategies.

Early intervention is one key solution. During periods of high volume and ED crowding, patients may wait in the waiting room for significant periods of time, a situation promoting respiratory spread of disease. In most cases in our ED, a clinical provider (i.e., ED technician) is the first person to greet the patients when they arrive. One recommendation is to empower and encourage these non-physician health providers, using triage protocols, to deploy droplet precautions, such as providing patients who have recognized symptoms of respiratory infections with a surgical mask and assigning them a private room. Other recommendations during busy influenza weeks include cohorting patients with influenza-like illness (ILI) in a holding area when private rooms are not available, and visible signage at patient check-in requesting patients' voluntary use of surgical masks (provided for those patients with symptoms of ILI [e.g., cough, fever, myalgia]). Ideally, these measures would be supplemented with educational campaigns for staff, patients, and visitors, focusing on appropriate infection control procedures, especially hand washing and proper use of masks. Many permutations of strategies such as these are still being used in regions that were affected by SARS (28). Active monitoring of compliance by supervisors may also improve adherence to infection control precautions.

Due to the potential severe consequences of nosocomial transmission of influenza, and the fact that EDs care for patients who are at risk of severe influenza, including those with underlying cardiovascular or pulmonary disease, patients who are immunosupressed, and the very old and very young, further work needs to be done to improve infection control for ILI in the ED. Further research should be undertaken to determine the factors that increase transmission of influenza in the ED setting as well as obstacles to providing appropriate isolation of patients with ILI to promote guidelines for the most efficient and cost-effective means to decrease transmission in the ED setting. Because overcrowding increases patient proximity and may prevent early identification and isolation of patients with ILI, future studies should focus on the effect of ED boarding on droplet- and airborne-based transmission in the ED.

Limitations

One major limitation of this study is that we examined only confirmed cases of influenza at a single institution. Ideally, all patients with suspected influenza should be placed in droplet precautions during the influenza season. Our numbers represent a fraction, though we believe it to be a representative one, of the entire patient cohort who should have received droplet precautions during the course of their ED visit.

Also, because we assessed compliance based on charting documentation, it is possible that there was under- or over-reporting of droplet precautions. Although there is a section of the chart in which to document isolation precautions, this section is not mandatory and staff members were not specifically instructed to complete it. Furthermore, we were unable to measure other important elements of droplet precautions for those patients assigned to a private room, such as appropriate hand hygiene and use of surgical masks by ED staff. We did not measure cases of ED-based transmission. This makes it uncertain what the transmission rate would be for those non-compliant with precautions, and what impact other factors may have on transmission, such as immunization rates of patients and staff.

In addition, factors that affect compliance may vary at different institutions, and compliance rates may be different in non-urban, community institutions, or those that have established protocols for respiratory chief complaints.

CONCLUSION

Given the possibility of a higher-volume influenza season at best or an upcoming influenza pandemic at worst, EDs will play a significant role in containment of index cases and prevention of transmission of influenza within the hospital and into the community, both by their infection control compliance and by staff and patient education. Passive reminders to ED staff may help to improve compliance, however, more research studies should be undertaken to determine what interventions have the most significant impact, including active protocols, changes to hospital policies and procedures, or simple educational interventions. The electronic medical record may be a useful tool for improving compliance with

transmission-based precautions, by implementing direct reminders on order sets and informational mailings to staff, and by tracking ED compliance.

REFERENCES

1. Brankston G, Gitterman L, Hirji Z, Lemieux C, Gardam M. Transmission of influenza A in human beings [see comment]. Lancet Infect Dis 2007;7:257–65.
2. Centers for Disease Control and Prevention (CDC). Droplet precautions (2007). Available at: http://www.cdc.gov/ncidod/dhqp/gl_isolation_droplet.html. Accessed July 1, 2009.
3. Centers for Disease Control and Prevention (CDC). Interim guidance for the use of masks to control influenza transmission (2005). Available at: http://www.cdc.gov/flu/professionals/infectioncontrol/maskguidance.htm. Accessed July 1, 2009.
4. Centers for Disease Control and Prevention (CDC). Infection control guidance for the prevention and control of influenza in acute-care facilities (2008). Available at: http://www.cdc.gov/flu/professionals/infectioncontrol/healthcarefacilities.htm. Accessed July 1, 2009.
5. Centers for Disease Control and Prevention (CDC). Novel influenza A (H1N1) virus infections among health-care personnel - United States, April–May 2009. MMWR Morb Mortal Wkly Rep 2009;58:641–5.
6. Seto WH, Tsang D, Yung RWH, et al. Effectiveness of precautions against droplets and contact in prevention of nosocomial transmission of severe acute respiratory syndrome (SARS). Lancet 2003; 361:1519–20.
7. Teleman MD, Boudville IC, Heng BH, Zhu D, Leo YS. Factors associated with transmission of severe acute respiratory syndrome among health care workers in Singapore. Epidemiol Infect 2004; 135:797–803.
8. Nishiura H, Kuratsuji T, Quy T, et al. Rapid awareness and transmission of severe acute respiratory syndrome in Hanoi French Hospital. Am J Trop Med Hyg 2005;73:17–25.
9. Yin WW, Gao LD, Lin WS, et al. Effectiveness of personal protective measures in prevention of nosocomial transmission of severe acute respiratory syndrome [Chinese]. Zhonghua Liu Xing Bing Xue Za Zhi [Chin J Epidemiol] 2004;25:18–22.
10. Loeb M, McGeer A, Henry B, et al. SARS among critical care nurses, Toronto. Emerg Infect Dis 2004;10:251–5.
11. Loeb M, Dafoe N, Mahony J, et al. Surgical mask vs N95 respirator for preventing influenza among health care workers: a randomized trial. JAMA 2009;302:1865–71.
12. American College of Emergency Physicians. FAQ's for emergency departments in epidemic or pandemic influenza outbreaks (2009). Available at: http://www.acep.org/PrintFriendly.aspx?id=45423. Accessed July 17, 2009.
13. Chaudhry B, Wang J, Wu S, et al. Systematic review: impact of health information technology on quality, efficiency, and costs of medical care [see comment]. Ann Intern Med 2006;144:742–52.
14. Weiner SG, Brown SF, Goetz JD, Webber CA. Weekly E-mail reminders influence emergency physician behavior: a case study using the Joint Commission and Centers for Medicare and Medicaid Services Pneumonia Guidelines. Acad Emerg Med 2009;16:626–31.
15. Salgado CD, Farr BM, Hall KK, Hayden FG. Influenza in the acute hospital setting [erratum appears in Lancet Infect Dis 2002;2:383]. Lancet Infect Dis 2002;2:145–55.
16. Stott DJ, Kerr G, Carman WF. Nosocomial transmission of influenza. Occup Med (London) 2002;52:249–53.
17. Aledort JE, Lurie N, Wasserman J, Bozzette SA. Non-pharmaceutical public health interventions for pandemic influenza: an evaluation of the evidence base. BMC Public Health 2007;7:208.
18. Gamage B, Moore D, Copes R, Yassi A, Bryce E; BC Interdisciplinary Respiratory Protection Study Group. Protecting health care workers from SARS and other respiratory pathogens: a review of the infection control literature. Am J Infect Control 2005;33:114–21.
19. Jefferson T, Foxlee R, Del Mar C, et al. Interventions for the interruption or reduction of the spread of respiratory viruses. Cochrane Database Syst Rev 2007;(4):CD006207.
20. Karanfil LV, Conlon M, Lykens K, et al. Reducing the rate of nosocomially transmitted respiratory syncytial virus. Am J Infect Control 1999;27:91–6.
21. Vayalumkal JV, Streitenberger L, Wray R, et al. Survey of isolation practices at a tertiary care pediatric hospital. Am J Infect Control 2007;35:207–11.
22. Aragon D, Sole ML, Brown S. Outcomes of an infection prevention project focusing on hand hygiene and isolation practices. AACN Clin Issues 2005;16:121–32.
23. Boyce JM, Pittet D; Healthcare Infection Control Practices Advisory Committee, Society for Healthcare Epidemiology of America, Association for Professionals in Infection Control, Infectious Diseases Society of America, Hand Hygiene Task Force. Guideline for hand hygiene in health-care settings: recommendations of the Healthcare Infection Control Practices Advisory Committee and the HICPAC/SHEA/APIC/IDSA Hand Hygiene Task Force. Infect Control Hosp Epidemiol 2002;23(12 Suppl):S3–40.
24. Daugherty EL, Perl TM, Needham DM, Rubinson L, Bilderback A, Rand CS. The use of personal protective equipment for control of influenza among critical care clinicians: a survey study. Crit Care Med 2009;37:1210–6.
25. Kidd F, Heitkemper P, Kressel AB. A comprehensive educational approach to improving patient isolation practice. Clin Perform Qual Health Care 1999;7:74–6.
26. Leclair JM, Freeman J, Sullivan BF, Crowley CM, Goldmann DA. Prevention of nosocomial respiratory syncytial virus infections through compliance with glove and gown isolation precautions. N Engl J Med 1987;317:329–34.
27. Macartney KK, Gorelick MH, Manning ML, Hodinka RL, Bell LM. Nosocomial respiratory syncytial virus infections: the cost-effectiveness and cost-benefit of infection control. Pediatrics 2000;106:520–6.
28. Seto WH, Tsang D, Yung RW, et al. Effectiveness of precautions against droplets and contact in prevention of nosocomial transmission of severe acute respiratory syndrome (SARS). Lancet 2003; 361:1519–20.
29. Gawn J, Clayton M, Makison C, Crook B. Evaluating the protection afforded by surgical masks against influenza bioaerosols: gross protection of surgical masks compared to filtering facepiece respirators. Health and Safety Executive 2008 Research Report RR619. Available at: http://www.hse.gov.uk/research/rrhtm/rr619.htm. Accessed August 4, 2009.
30. Centers for Disease Control and Prevention (CDC) Interim guidance for infection control for care of patients with confirmed or suspected novel influenza A (H1N1) virus infection in a healthcare setting (2009). Available at: http://www.cdc.gov/h1n1flu/guidelines_infection_control.htm. Accessed July 17, 2009.
31. Varia M, Wilson S, Sarwal S, et al. Investigation of a nosocomial outbreak of severe acute respiratory syndrome (SARS) in Toronto, Canada. CMAJ 2003;169:285–92.
32. Scales DC, Green K, Chan AK, et al. Illness in intensive care staff after brief exposure to severe acute respiratory syndrome. Emerg Infect Dis 2003;9:1205–10.
33. Ho AS, Sung JJ, Chan-Yeung M. An outbreak of severe acute respiratory syndrome among hospital workers in a community hospital in Hong Kong. Ann Intern Med 2003;139:564–7.
34. Ehrenstein BP, Hanses F, Salzberger B. Influenza pandemic and professional duty: family or patients first? A survey of hospital employees. BMC Public Health 2006;6:311.
35. Rothman RE, Irvin CB, Moran GJ, et al. Respiratory hygiene in the emergency department. Ann Emerg Med 2006;48:570–82.
36. Lateef F. SARS changes the ED paradigm. Am J Emerg Med 2004;22: 483–7.
37. Kirkland KB Weinstein JM. Adverse effects of contact isolation. Lancet 1999;354:1177–8.

ARTICLE SUMMARY

1. Why is this topic important?

There is increasing concern with the potential for hospital-based transmission of influenza because of increased emergency department (ED) crowding and the novel H1N1 pandemic. Given the constraints of time and resources in the ED, it is imperative to develop effective educational interventions to reduce ED-based transmission of influenza.

2. What does this study attempt to show?

This study attempts to show the low overall compliance with infection control precautions for patients with influenza in a high volume urban academic ED. It also attempts to show that a low resource intervention using an EMR may improve compliance.

3. What are the key findings?

Our study demonstrates that baseline compliance with infection control guidelines for influenza overall was poor but improved significantly with the use of a lowtech resource electronic tool that could be implemented in any ED with an EMR.

4. How is patient care impacted?

Improved compliance with infection control precautions, in theory, will reduce ED transmission of influenza in patients, staff, and visitors, some of whom are at risk for severe influenza. Further study should be undertaken to determine the impact of various interventions on ED-based transmission of influenza.