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Major article

Respiratory protection policies and practices among the health care workforce exposed to influenza in New York State: Evaluating emergency preparedness for the next pandemic

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Background: New York State hospitals are required to implement a respiratory protection program (RPP) consistent with the Occupational Safety and Health Administration respirator standard. Guidance provided during the 2009 novel H1N1 pandemic expanded on earlier recommendations, emphasizing the need to keep staff in all health care settings healthy to maintain services.

Methods: New York State hospitals with emergency departments having more than 1,000 visits annually were invited to participate; 23 hospitals participated. Health care workers, unit managers, and hospital managers were interviewed regarding knowledge, beliefs, and practices of respiratory protection. Interviewees were observed donning and doffing an N-95 respirator as they normally would during patient care. Written RPPs for each hospital were evaluated.

Results: The majority of the hospitals surveyed had implemented an RPP, although unawareness of the policies and practices, as well as inadequacies in education and training exist among health care workers.

Conclusion: Health care workers and other hospital employees may be unnecessarily exposed to airborne infectious diseases. Having an RPP ensures safe and effective use of N-95 respirators and will help prevent avoidable exposure to disease during a pandemic, protecting the health care workforce and patients alike.

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Influenza, commonly referred to as the *flu*, is an infectious respiratory illness that is transmitted from person to person through close contact and direct touch, indirect touch, and respiratory droplets. Four influenza pandemics have occurred since 1918. The Centers for Disease Control and Prevention (CDC) estimates that, during the 2009 pandemic, 43 million to 89 million people contracted the novel H1N1 strain of influenza, and between 8,870 and 18,300 died as a result.¹

During the spring and winter of 2009, New York State (NYS) hospitals experienced a surge in emergency department (ED) visits, as well as inpatient hospital admissions, because of an increase in cases presenting with influenza-like illness.² Figures 1 and 2 indicate the impact of influenza virus (including 2009 H1N1) on NYS

hospitals from January 2007 through December 2010. Figures were generated using NYS hospital discharge data.³

The increases seen in 2009 placed an additional burden on the health care system, emphasizing the need to keep staff in all health care settings healthy to maintain services. The CDC released interim guidance on infection control measures to prevent transmission of the 2009 H1N1 virus in health care settings.⁴ The guidance expanded on earlier recommendations and emphasized a comprehensive approach that includes all persons whose occupational activities involve contact with patients or potentially contaminated material in a health care setting.⁴ The guidance indicated that the 2009 influenza virus was transmitted from person to person through close contact in ways similar to other influenza viruses, although studies indicated that H1N1 may be spread via smaller airborne particles.⁴ As a result, appropriate airborne infectious disease precautions were recommended.

A respirator is a personal protective device that is worn on the face, covers the nose and mouth, and used to reduce the user's risk of inhaling airborne contaminants. Air-purifying respirators (APR) use filters to remove airborne particles and sorbent media to remove gases and vapors as the user inhales. There are 3 main

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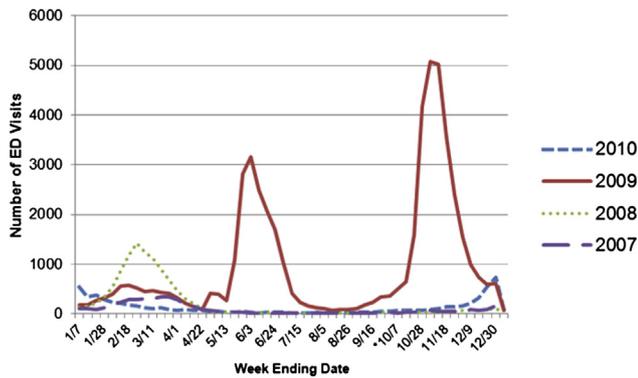


Fig 1. Number of emergency department visits by week based on New York State hospital discharge data from 2007 through 2010. *If H1N1 was suspected but not confirmed, “487.XX” was designated as the appropriate ICD-9 code. As of October 1, 2009 (week ending 10/7), cases of confirmed H1N1 were assigned the ICD-9 of “488.1.”

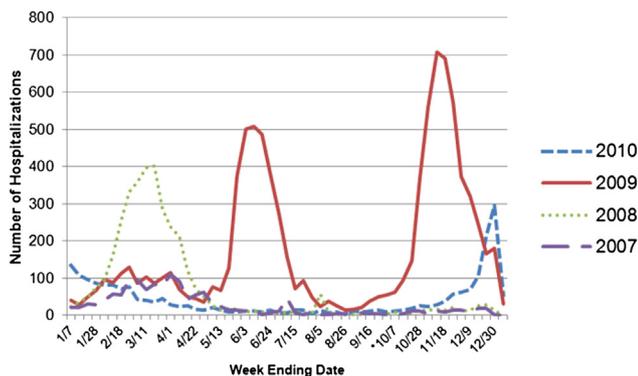


Fig 2. Number of inpatient admissions by week based on New York State hospital discharge data from 2007 through 2010. *If H1N1 was suspected but not confirmed, “487.XX” was designated as the appropriate ICD-9 code. As of October 1, 2009 (week ending 10/7), cases of confirmed H1N1 were assigned the ICD-9 of “488.1.”

categories of APRs: particulate-filtering facepiece respirators, elastomeric respirators, and powered air-purifying respirators (PAPRs).

The N-95 respirator is a particulate filtering facepiece and is one of the most commonly used respirators in health care settings. The National Institute for Occupational Safety and Health’s (NIOSH) respirator approval criteria defines the term N-95 as a filter class that removes at least 95% of the “most-penetrating” sized airborne particle during a NIOSH standardized test procedure.⁵

The Occupational Safety and Health Administration (OSHA) requires employers who use respirators to develop and administer a written respiratory protection program (RPP). Elements of the RPP include policies and procedures for fit testing, employee training, employee medical clearance, appropriate selection of respirators for the assigned task, proper maintenance of respirators, record keeping, program evaluation, and designation of an administrator to oversee the program.

The CDC guidelines recommend that facilities implement a “hierarchy of controls” to prevent exposure to influenza. The hierarchy prioritizes protective measures based on their likelihood of reducing the risk of exposure. It also serves to reduce reliance on respiratory protection in the event of a shortage. Top priorities in this hierarchy are those measures that can eliminate the source of potential exposure. The use of PPE, including respirators, is for protection from exposures that cannot otherwise be eliminated or controlled.

Respirators are particularly useful in situations where the other elements of the hierarchy of controls are inadequate or infeasible.

Examples include exposure to undiagnosed cases during triage in a pandemic, within ambulances when patients are symptomatic, and when performing medically necessary aerosol-generating procedures on infectious cases.

METHODS

Sampling strategy

The population surveyed for this project was health care workers (HCW), unit managers (UM), and hospital managers (HM) in NYS hospital EDs that see more than 1,000 patients annually (based on 2006 NYS hospital discharge data).³ Approval for this research was granted by the NYS Department of Health Institutional Review Board.

Acute care hospital recruitment

In NYS, there are 223 hospitals with ED facilities. For this project, hospitals with over 1,000 ED visits for 2006 were considered. There are 213 hospitals that had over 1,000 ED visits in 2006.

The 213 hospitals that were identified as being eligible to participate were mailed initial recruitment materials with information and background on the project. Follow-up calls were then made to the hospitals. Twenty-three hospitals agreed to participate. Site visits were conducted, and potential participants were identified by the infection control practitioners at each facility through convenience sampling.

Data collection

Standardized questionnaires developed by NIOSH were used in the interviews. Participants were all asked a series of questions concerning their general demographic information and knowledge of their facility’s risk assessment, medical evaluation protocols, fit testing procedures, RPP training, evaluation of the RPP, infection control practices, and workplace safety.

A respirator demonstration tool provided by NIOSH was used when observing interviewees don and doff N-95 respirators. During the respirator demonstration, staff observed participants donning the N-95 respirator and recorded their actions using the respirator demonstration tool. Participating facilities provided us with their written RPPs, which we reviewed for all essential components required by OSHA.

Site visit staff entered the de-identified data into a Microsoft Access database provided by NIOSH after the site visits. Analyses were performed using SAS 9.2 (SAS Institute, Cary, NC).

RESULTS

During the site visits, we completed 127 questionnaires of HCWs, 31 questionnaires of UMs, and 40 questionnaires of HMs. A total of 115 respirator demonstrations was observed (a mean of five per facility).

As shown in [Table 1](#), whereas all hospitals visited had respiratory protection policies present, 2 hospitals lacked a defined RPP (8.7%), and many were missing key components. Less than half of the programs reviewed contained a plan to evaluate the effectiveness of the RPP (47.8%) or a designated RPP administrator (39.1%). Only 69.6% of hospitals had the need for medical evaluation and clearance fully stated in the RPP, with 21.7% partially stating it. The fit-testing component of an RPP should provide guidance in choosing the brand, model, and size of respirator that provides the best fit for each individual employee, as well as instructions for proper wear procedures. This was only fully included in 65.2% of

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