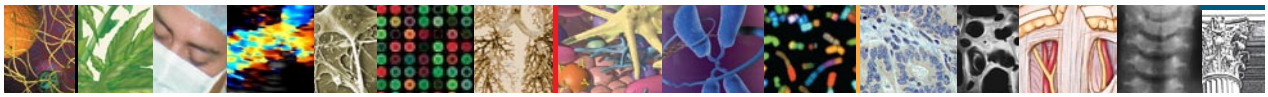

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Perspective

Novel H1N1 Influenza and Respiratory Protection for Health Care Workers

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Your hospital has been seeing a large number of patients with influenza-like symptoms, many of whom turn out to be infected with the novel H1N1 influenza A virus. You have been asked to consult on the case of a 28-year-old woman who is in an isolation room because of an influenza-like presentation and shortness of breath. You put on a gown, carefully clean your hands with hand soap or an alcoholic gel, pull on gloves, and reach for a mask. Guidelines from the Centers for Disease Control and Prevention (CDC) recommend the use of an N95 filtering facepiece respirator. Some states and many professional groups have suggested that a standard surgical mask is satisfactory in this situation, except when a clinician is performing high-risk procedures, such as airway suctioning, in which case the N95 is still recommended. What should the hospital and its infection-control officer provide when you reach into the box for a respiratory protective device? What should be available to others who will enter this room, including nurses, respiratory technicians, cleaners, and food servers?

On September 3, 2009, the Institute of Medicine (IOM), which has conducted studies on personal protective equipment for health care workers,[1] released a report entitled *Respiratory Protection for Healthcare Workers in the Workplace against Novel H1N1 Influenza A*.[2] The report was based on our IOM committee's review of the scientific evidence about the efficacy of personal respiratory protection measures, medical masks, and respirators.

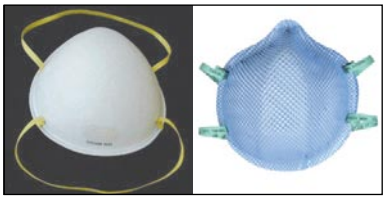
Seasonal influenza usually peaks in the winter months, and each year in the United States there are about 36,000 deaths and 200,000 hospitalizations associated with influenza.[3] Seasonal influenza disproportionately attacks the very young and the elderly, in addition to persons who have chronic conditions or are immunocompromised. The novel H1N1 influenza A virus, by contrast, has generally been affecting young and middle-aged people, including pregnant women. This population includes most active members of the workforce, including health care workers.

Health care workers have long relied heavily on surgical masks to provide protection against influenza and other infections. Yet there are no convincing scientific data that support the effec-

tiveness of masks for respiratory protection. The masks we use were not designed for such purposes, and when tested, they have proved to vary widely in filtration capability, allowing penetration of aerosol particles ranging from 4 to 90%.[4] These masks — which are open on the sides, top, and bottom — may be useful in source control when worn by a patient, but even then, there is evidence that material escapes around the mask's margins after a sneeze or forcible cough. By contrast, respirators cover the nose and mouth (at a minimum) and are designed to purify the air that the wearer breathes in, either by filtering it or by providing an independent air supply.

A key issue that should inform decisions about the type of mask to wear is the mode or modes of transmission of the infection in question — whether it is spread through contact exposure (physical contact between people or between a person and a contaminated surface), droplet-spray exposure (close proximity to coughing or sneezing people), airborne exposure (inhalation of small particles), or some combination of these. Our IOM committee reviewed evidence showing that airborne exposure plays some role in the transmission of novel H1N1 influenza A virus, as seen in animal models and in outbreaks in humans. The extent of such transmission and how it compares with that of transmission through contact or droplet-spray exposure is uncertain. However, the evidence for some degree of airborne transmission increases the importance of good respiratory protection.

It has been demonstrated that N95 respirators filter out 95 to 99% of relevant aerosol particles. Although these respirators function best when they are individually fitted, unfitted respirators do have efficacy. The available evidence indicates that the tight fit and enhanced filtration capacity of these devices offer better protection against aerosol particles than do surgical masks.



The efficacy of any respiratory device, of course, depends on user compliance. We know that in this country, workers' tolerance for wearing most types of respiratory protective devices is poor and often declines over the course of a work shift; in one study, no more than 30% of workers tolerated these devices consistently throughout an 8-hour workday, citing difficulties with speaking and communication, discomfort, and other physical problems.[5] The study did not find a difference between medical masks and respirators in terms of user compliance. Much more research is required if we are to understand the factors that hinder or foster compliance with the use of personal protective equipment — and to develop the next generation of equipment for improved respiratory protection.

There is a pressing need for research in respiratory protection, particularly for randomized, controlled trials on the effectiveness of masks versus respirators. Such trials should focus on the high-filtration-capacity masks, which the Food and Drug Administration does not currently distinguish from masks with little or no filtration capacity during its approval process. In addition, the health care professions must support a culture of safety in our institutions, not only for patients, but also for health care workers, and this must include better compliance with respiratory protection.

Our committee did not examine the supply of respirators and masks, but we have heard that such protective gear — particularly N95 respirators — is currently in short supply, despite previous IOM recommendations that the devices be made widely available.[1] Until the supply increases, health care institutions will have to place priority on the highest-risk areas, such as enclosed spaces in the respiratory care unit, patients' rooms, and ambulances. In addition, personal equipment for respiratory protection should be considered just one component of a set of occupational safety and health measures designed to reduce workers' risk of exposure through all possible pathways. These measures include the use of negative-pressure rooms, isolation of patients, standard practices for hand hygiene, frequent air exchange without the use of recirculated air, and ultraviolet lighting.

The IOM committee has recommended that current CDC guidelines for respiratory protection be maintained. (For details, see the CDC's H1N1 Flu Web site at www.cdc.gov/h1n1flu/guidelines_infection_control.htm.) Until more data are available, the committee recommends that clinicians reach for the N95 respirator when confronting patients with influenza-like illnesses, particularly in enclosed spaces.

Left, courtesy of the Centers for Disease Control and Prevention; right, courtesy of Moldex

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From the IOM Committee on Respiratory Protection for Healthcare Workers in the Workplace Against Novel H1N1 Influenza A (K.I.S., B.R., L.R.G.); the University of Texas System, Austin (K.I.S.); the University of North Carolina School of Public Health, Chapel Hill (B.R.); and New York University School of Medicine, New York (L.R.G.).

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