

You work in a critical enterprise. Government, healthcare, finance, manufacturing—operations that can't close when a pandemic outbreak hits. You've read about planning for a pandemic and preparing for the worst. How can you best protect your employees when the pathogen causing the pandemic is in the air?

Respirators and Surgical Masks

Should a highly pathogenic strain of H5N1, avian flu, become efficiently transmitted from human to human, many people may naturally consider the use of masks to filter the air they breathe. The French Government is stockpiling 685 million N-95 respirators¹ for first responders, maybe you should too?

Think twice before running out and buying respirators or surgical masks for all your employees. Surgical masks are relatively porous and are primarily used to stop germs from *leaving* healthcare workers, rather than preventing germs from *entering* healthcare workers. A recent study on surgical masks concluded that these masks provide little protection if used against pandemic influenza:

“...surgical masks may let a significant fraction of airborne viruses penetrate through their filters, providing very low protection against aerosolized infectious agents...”²

In general, respirators offer significantly more protection than surgical masks. N-95 respirators are masks that are certified to block 95% of contamination when challenged with an aerosol containing 0.3 μ m particles. Flu viruses range from 0.02 μ m to 0.4 μ m in size, but are usually piggy-backing on a much larger particulate. N-95 respirators could prevent the wearer from inhaling a majority of airborne viruses, but complete protection cannot be assumed. In fact 5% of the test sized particles are expected to be inhaled even if the mask is functioning properly.

In a review of the Institute of Medicine's study on masks May of 2006, the President of the American Council on Science and Health, Dr. Elizabeth Whelan, noted that N-95 masks need to be fitted and replaced daily, which is not a practical solution for the general public. She also said:

“The virus is so incredibly tiny that it can defy even the most tightly-woven mask.”

“If indeed these masks offer any benefit, it is for preventing a sick person from spreading the virus through coughing and sneezing, as opposed to offering substantial protection to a person who is attempting to avoid infection.”³

Caution is advised for using N-95 for reasons other than its efficiency against viruses. Employers who stockpile a number of respirators, store them in a closet and then distribute them as a pandemic strikes are creating a false sense of security. According to new guidelines published by the U.S. Occupational Safety and Health Administration (OSHA), masks are one component of a larger strategy:

“OSHA requires that respirators must be used in the context of a complete respiratory protection program (RPP). This includes training, fit testing, and user seal checks to ensure appropriate respirator selection and use. To be effective, tight-fitting respirators must have a proper sealing surface on the wearer's face.”⁴

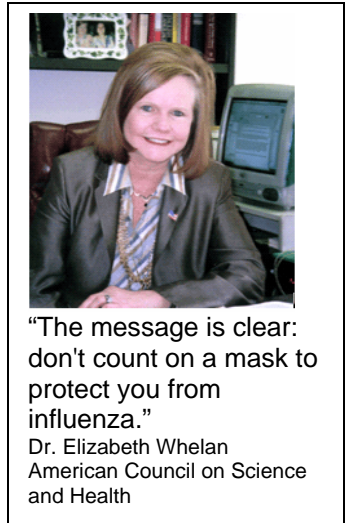
The National Institute for Occupational Safety and Health (NIOSH) says that respiratory protection is effective only if:

“The correct respirator is used, it's available when you need it, you know when and how to put it on and take it off, and you have stored it and kept it in working order in accordance with the manufacturer's instructions.”

“If you do not use a respirator correctly, it is very likely that it will not protect you and may even hurt you.”⁵

Even if you comply with technical requirements such as training and fitting, there are other more practical hurdles to overcome. Workers trying to accomplish typical office tasks may encounter significant difficulties while wearing a respirator:

“Breathing through a respirator is harder than breathing in open air. People with lung diseases such as asthma or emphysema, elderly people, and others may have trouble breathing. Some people with claustrophobia may not be able to wear a mask or hooded respirator. Some people with vision problems may have trouble seeing while wearing a mask or hood (there are special masks for people who need glasses).”⁶



Conclusion

In laboratory tests, some masks have demonstrated the ability to filter out particles that are the same size as viruses. The World Health Organization reminds us that further research is needed:

“No controlled studies to date have specifically assessed mask use in preventing influenza transmission in community settings.”⁷

Common surgical masks are not an effective barrier against inhalation of sub-micron microorganisms such as viruses.⁸ These disposable, loose fitting masks are not intended for this use. Respirators rated at N-95 or higher can offer significant protection against viruses⁹ although the protection is not absolute and is dependent upon the mask's custom fit and user training. When respirators are used as a stand alone protection measure, rather than part of a thorough pandemic plan, the masks are likely to lead to a false sense of security. Availability, disinfection and reusability of the masks also raise troubling issues.

The government agency that regulates respirators, NIOSH, provides excellent advice on the appropriate role respirators play in providing protection from airborne contamination:

“Respirators should only be used as a "last line of defense" when engineering control systems are not feasible. Engineering control systems, such as adequate ventilation or scrubbing of contaminants should be used to negate the need for respirators.”

The US Centers for Disease Control has recently added the use of N-95 respirators to its recommendations for care of patients with pandemic influenza. However, the CDC's Associate Director for Infection Control, Dr. Michael Bell says the government, "...**probably won't recommend N-95 respirators to the general public unless people are caring for family members or neighbors who have pandemic influenza.**"¹⁰

About the Authors

VIGILAIR Systems, Inc. is the leader in providing airborne contamination control solutions for hospitals. Installed within the ventilation system of a hospital, VIGILAIR® technology combines enhanced Ultraviolet Germicidal Irradiation (eUVGI), airflow simulation modeling and high efficiency filtration to provide predictable pathogen removal and destruction. VIGILAIR® installations can be found in the U.S., Canada, Mexico and Asia. In addition to healthcare, VIGILAIR serves cleanroom manufacturing and biodefense clients. VIGILAIR® is designated as an Approved Anti-terrorism Technology (ATT) by the Department of Homeland Security.

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