

Recommendations for Personal Protective Equipment Use During an Avian Influenza Pandemic

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Executive Summary

In order to further planning efforts at the University of Louisville for a potential avian influenza pandemic, documents from the World Health Organization (WHO), the Centers for Disease Control and Prevention (CDC), Occupational Safety and Health Administration (OSHA) and other entities were reviewed.

After consideration of the information collected, the following recommendations are offered:

Respiratory Protection:

- When available, N95 respirators should be utilized when in close contact with infected or suspected infected individuals. In the event N95 masks are not available, surgical/procedure masks should be used.
- Individuals with incidental contact with other people should use surgical/procedure masks. In the event a surgical/ mask is unavailable, a makeshift cloth mask should be used.
- People using N95 or surgical/procedure masks should be trained in their use, fit tested as appropriate, trained to perform a user seal test (fit check), and trained in good hygiene practices when using them. If people have not been trained or fitted for using the N95, they should utilize the surgical/procedures mask.
- Emergency responders should consider using the highest level of respiratory protection and fall back to lower levels only when resources have been expended or become unavailable.

- Both N95 particulate respirators and surgical/procedures masks should be considered disposable items and no attempts should be made to disinfect them for reuse. These masks should be disposed with infectious waste and not in the normal refuse.
- Prior to any respiratory protective equipment use, a training program must be developed. This program should be provided to all essential employees and any other employees who might have close contact with an infected or potentially infected individual prior to any sustained human to human transmission of the Avian Influenza Virus.
- Hand washing and disinfection must be an integral part of all training programs involving an infectious disease.

The WHO document is dated February 9, 2006.¹ The CDC refers the reader to their document that was published for SARS dated January 8, 2004.³ The OSHA Guidance reviewed is currently on their website, but the date of issuance is not found on the web page.⁴

PPE Guidelines from Governmental Agencies

All three organizations currently recommend the following personal protective equipment when treating or transporting patients suspected or confirmed to have avian flu:

- Disposable gloves that fit snugly over the gown cuff
- Impervious (fluid resistant) gowns are recommended, but a disposable full body isolation suit is an acceptable alternative to a gown. WHO recommends an impervious apron if an impervious gown is unavailable.
- Eye protection should be worn. The CDC recommendations go further to state that goggles or a face shield should be utilized.
- N95, N99 or N100 respirator should be used in accordance to the standards set forth in 29 CFR 1910.134. If these types of respirators are not successful in providing protection due to facial hair, a powered air purifying respirator (PAPR) may be utilized instead. The WHO recommends that if insufficient particulate respirators are available, workers should use surgical or procedure masks.

Additionally, the WHO and CDC recommend that the **patient** be supplied with a surgical/procedure mask to wear during the period of contact with healthcare workers as a means of source containment of infectious particles.

The highest level of protection available should be utilized during the treatment and transportation of a patient suspected of having Avian Influenza. This does not include incidental contact between people who are not treating/transporting suspected or confirmed avian flu patients. People trying to prevent the spread of an infection spread

through large droplet exposure should use a surgical/procedure masks to prevent infection.

Additionally, if a shortage of N95 respirators occurs during an influenza pandemic, people delivering health care or transporting patients should utilize procedure/surgical masks. The CDC has even gone so far as posting procedures, developed by staff at the University of Pittsburgh, on their website for using a Hanes T shirt as a makeshift mask in the event that respirators become unavailable.

While different research and regulatory groups are evaluating different options, protocols should require that anyone who comes into direct contact with a potential or confirmed patient infected with Avian Flu should wear respiratory protection in the way of a N95 or surgical/procedure mask.. These recommendations also apply to patients suspected or confirmed to be infected with SARS

Comment [r1]: TB does not apply because it is strictly an airborne disease and does not require the additional PPE or contact isolation.

Researchers in Hong Kong surveyed over 250 hospital staff exposed to 11 SARS patients between 15 March and 24 March, 2003. Most of the 13 staff who became infected did wash their hands after patient care, and a handful also wore gloves or a paper mask, but none had used a surgical or N95 respirator. Analysis of the data showed that the use of surgical or N95 masks was the only measure to give statistically significant protection. However, not one of the 69 staff who had used all four recommended protection measures - wearing a N95 or surgical mask, gloves, gowns and washing their hands - contracted the virus.⁴

Service Life

The service life of the N95 respirator is an issue that has been brought up in several settings. I have researched the NIOSH web pages for standards related to service life of N95 respirators. The recommended service life of an N95 respirator is typically 8 hours. A N95 could be used for a longer period if the user does not find the mask to cause poor hygiene or increased breathing resistance.⁵ The effect of wearing an N95 respirator for periods of up to 8 hours will cause the wearer to tire more rapidly, become overheated and in some cases become annoyed by the continued use. This will make the worker less effective and could cause behaviors that may circumvent the mask's efficiencies and may, in fact, result in decreased use of other items of PPE.

The use of a N95 respirator should immediately cease when the respirator is damaged, soiled, or causing noticeably increased breathing resistance (causing discomfort to the wearer). Additionally, research efforts have been unable to locate any documentation on the service life of a procedure/surgical mask except for manufacturer recommendations. Prolonged use of the procedure/surgical mask results in the material matrix becoming increasingly moist which reduces the effectiveness of the mask. The manufacturers have indicated that masks are best changed when they become moist and that may occur in as little as one hour after use.

Decontamination/Reuse

The Institute of Medicine of the National Academies has reviewed information regarding the reuse of facemasks during an Influenza Pandemic. In their April, 2006 report they conclude that there is no method available to decontaminate a facemask and not compromise its effectiveness. Therefore, once a mask is suspected to be contaminated it should be discarded.⁷

Hygiene

Improper respirator use and poor hygiene is a potential problem that could impact respiratory protection. It is imperative to have effective procedures in place to protect mask wearers from avian influenza. Masks that do not fit properly, removal of the mask around potentially infected individuals and adjusting the mask with unwashed hands can all lead to potential infection. The best respirator or surgical/procedure mask will do little to protect the wearer who refuses or misunderstands how and when to use it correctly.

Adjusting a mask with hands that are contaminated with the influenza virus could allow the virus to enter the body by inhalation or via the mucous membranes of the eyes, nose or mouth.⁶ After adjusting a contaminated mask, the wearer could auto inoculate themselves when the mask is removed. It is imperative to assure that hands are clean and disinfected both prior to adjusting a mask and after the adjustments have been made. This can be performed through the performance of hand washing or use of hand sanitizers such as alcohol-based hand rubs. Hands should be washed when visibly soiled. For other times, hand sanitizers are appropriate.

Any effort to communicate PPE usage must provide information on the usefulness of the equipment, the limitations of the equipment, proper hygiene and must be delivered with candor, truthfulness and authority.

Powered Air Purifying Respirators (PAPRs)

Powered Air Purifying Respirators (PAPR) was not considered in this evaluation and recommendation for respiratory protection due to their unavailability en masse and their cost. This equipment does provide valuable respiratory and contact protection, but requires additional considerations such as the ability to disinfect after use and prior to reuse, recharging of the power supply, care and maintenance of the filtration cartridge, and use of appropriate hoods. Therefore, it is suggested that PAPRs be used in special circumstances and with prior planning.

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