Discussion Brief: Using particulate respirators for TB Infection Control

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The World Health Organization recommends that in addition to Administrative and Environmental Infection Control procedures such as proper cough etiquette and ventilation, personal protective equipment such as N95 and FFP2 respirators should be worn by health workers working with TB patients (Annex 7, 2009).

More than 100 resources and discussions have been posted so far by GHDonline members, raising important practical questions such as: Which respirators protect against TB and how effective are they? How should a respirator be worn? Can a respirator be re-used safely? How long can respirators be worn? What are the costs of various models and do members have recommendations for suppliers?

Key Points

- Health workers interacting with TB patients should wear particulate respirators that meet the highest standards such as those set by the United States Centers for Disease Control and Prevention/National Institute for Occupational Safety and Health (see references). FFP2 is not a NIOSH approval designation.
- Surgical masks do NOT protect against TB droplet nuclei. However, surgical masks may be used by TB patients to reduce the generation of infectious aerosols.
- It is critical to learn how to properly fit-test and wear respirators.
- The weakest links of respirators are the elastic bands, or "underwear elastics" which get easily stretched out, thus not producing a good face seal. Bands may last for as long as 2 weeks if respirator is used once or twice a day and put on carefully.
- A respirator can be used repeatedly if it is structurally intact and fits well. Often, the respirator filter will continue to work well, but the elastic bands which secure the respirator to the face become loose, creating a face seal leak. If this happens, the respirator should be thrown away.
- Length of usage depends on many factors.
    - Moderator Paul Jensen, PhD, PE, CIH, of the CDC, says: "I generally use two N95 or FFP2 respirators (with exhaust valves) per week. I use one in the morning and another one in the afternoon. I wrap each one in a paper towel and allow them to dry over night. Occasionally, the cheap, blue rubber bands will break in less than one week. "
    - As a general rule, a respirator may be used every day for one week, provided that it has not been damaged or soiled. If used less often it may last longer.
- Another concern about long-term respirator use is that they become vehicles for the transmission of contact-born infection such as staph, C. diff, and other hospital pathogens. If a respirator is put on and removed with hands that have had contact with other surfaces. Porous respirators cannot be cleaned, and so become carriers of these bacteria over time. Moderator Edward Nardell, MD, recommends attention to hand washing before and after touching the respirator and storage by hanging them exhaled breath moisture can dry between uses, and not in plastic bags which would encourage bacterial or fungal growth.
- Respirators should not be shared by different individuals.
- Under some circumstances, a non-disposable (elastomeric) industrial canister respirator may be a better choice than disposable respirators. They cost $25-35 each, but if they have plastic covered canisters they can be wiped clean with alcohol and used almost indefinitely because of better elastic straps. Although they present an unusual appearance, patients seem to get used to them quickly. They do interfere with verbal communications.
- Moderator Grigory Volchenkov, MD, shares price and vendors info of N95 or FFP2 respirators in Russia: for 3M 9320 = 67 Roubles (2.2 US$), for 3M 9322 (with exhalation valve) = about 90 Roubles (3 US$). Least expensive 3M respirators in Moscow: http://www.mona.ru/; Kimberly Clark sells a little bit more expensive analogs. Russian made FFP2 respirators (Alina P) are marketed at price 0.6 US$.
- Roland Berry Ann, Deputy Director, National Personal Protective Technology Laboratory (NPPTL) gives the following recommendations:
    - The service life of all filters on NIOSH-approved respirators is limited by considerations of hygiene, damage, and breathing resistance. All filters should be replaced whenever they are damaged, soiled, or causing noticeably increased breathing resistance.
    - N-series filters generally should be used and reused subject only to considerations of hygiene, damage, and increased breathing resistance. However, for dirty workplaces that could result in high filter loading (i.e., 200 mg), service time for N-series filters should only be extended beyond 8 hours of use (continuous or intermittent) by performing an evaluation in specific workplace settings that demonstrates: (a) that extended use will not degrade the filter efficiency below the efficiency level specified in 42 CFR 84, or (b) that the total mass loading of the filter(s) is less than 200 mg. These

determinations would need to be repeated whenever conditions change or modifications are made to processes that could change the type of particulate generated in the user's facility.

Key References

- Center for Disease Control (CDC), NIOSH-Approved N95 Particulate Filtering Face piece Respirators with manufacturers instructions.
- The CEN EN149 European standard: information put together by 3M, a maker of respirators and other supplies.
- TB Respiratory Protection Program In Health Care Facilities Administrator's Guide U.S. CDC, September 1999
- NIOSH Respirator Trusted-Source Information Page provides detailed recommendations for N95: where, for how long, etc.
- Respirator Fit Testing and Face Masks and Respirators: Protection Factors, Selection, Fit Testing, and Respirator Demonstrations by Drs. Jensen and Volchenkov
- Biscotto CR, Pedroso ER, Starling CE et al. Evaluation of N95 respirator use as a tuberculosis control measure in a resource-limited setting. International Journal of Tuberculosis and Lung Disease, 2005, 9(5):545–549
- Table A7.3 Key findings from systematic review on respirators, in the annexes of the WHO policy on TB infection control in health-care facilities, congregate settings and households, July 2009 (page 39)

Enrich the GHDonline Knowledge Base

Please consider replying to this discussion with the following information

- Suggestions of models and suppliers of N95 respirators by country, region (with web links or contacts if possible)
- Advice on performing fit testing
- Brands and suppliers of non-disposable (elastomeric) respirators

Recommendations

You may also be interested in the following content in GHDonline communities

- How long can N95 masks be reused for? And N95 reportedly prevent 75% respiratory infections
- How long can one use a disposable personal respiratory protection (Discussion)
- How effective are masks? (Discussion)
- N95, FFP2 respirators: length of usage (Discussion)
- Repeated Usage of Mask Protection (Discussion)
- How to know which respirator has the correct qualifications? (Discussion)
- Content found on GHDonline for N95