



Recommended Guidance for Prioritization and Conservation of Personal Protective Equipment (PPE)

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Personal protective equipment (PPE), including respirators (like N95s), facemasks (such as surgical masks), face shields and other eye protection, gowns, and gloves, are in short supply in Rhode Island and across the United States. At this time, we are exploring every opportunity available to obtain additional PPE. However, until the time that appropriate PPE is available, we provide guidance on the prioritization and conservation of PPE.

Prioritization of Personal Protective Equipment

- PPE should be prioritized for all inpatient settings and settings that provide care for patients who are high-risk (i.e. nursing homes).
- N95s should be distributed to settings which engage in aerosol-generating procedures (i.e. intubation).
- In all healthcare settings, including nursing homes, staff who engage with patients should wear a facemask, if at all possible.
- Prioritization for PPE should be given for settings with known outbreaks (i.e. nursing homes and other congregate group settings).

Extended Use and Limited Reuse of N95 Respirators and other Facemasks

The Centers for Disease Control and Prevention (CDC) has released guidance for **extended use** and **limited reuse** of N95 respirators in healthcare settings¹. The following guidance is based on these recommendations:

- **In all healthcare settings, including nursing homes, staff who engage with patients should wear a facemask. A single facemask should be used as long as the mask is not visibly soiled or wet.** If it is visibly soiled or wet, it should be discarded. A face mask is expected to last three working days.
- **Minimize the number of individuals who need to use PPE.** This includes having the minimum number of individuals who require PPE to care for a patient and limit individuals when seeing or “rounding” on a patient (i.e. limiting students).
- **Use alternatives to N95 respirators if indicated and feasible.** This may include surgical face masks.
- **Implement practices allowing extended use and/or limited reuse of N95 respirators for known COVID-19+ patients.**
- **Prioritize the use of N95 respirators for staff who care for patients at the highest risk of acquiring or experiencing complications of infection.**

Extended use of N95 respirators refers to wearing the same respirator for several patients (all infected with COVID-19 who are placed together in dedicated rooms) without removing the mask between patients. The following guidance pertains to extended use of N95 respirators:

- N95 respirators should be discarded after any aerosol-generating procedures.

- N95 respirators should be discarded if there is any contamination, or concern of contamination, with blood, respiratory or nasal secretions, or other bodily fluids.
- N95 respirators should be saved and reused (see below) after exit from the care area of isolated patients.
- Consider use of a cleanable face shield over an N95 respirator and/or other steps (e.g. masking patients) to reduce surface contamination.
- Perform correct hand hygiene with soap and water or an alcohol-based hand sanitizer before and after touching or adjusting the respirator.
- Discard any respirator that is obviously damaged or becomes hard to breathe through.

Limited reuse refers to using the same N95 respirator for multiple patients but removing it (doffing) after each encounter. There is no determination of “maximum possible number of safe reuses” for an N95 respirator which may be affected by multiple variables. Some data have suggested limiting reuses to no more than five uses per device. Any manufacturer recommendations should be followed.

- N95 respirators should be discarded after any aerosol-generating procedures.
- N95 respirators should be discarded if there is any contamination, or concern of contamination, with blood, respiratory or nasal secretions, or other bodily fluids.
- N95 respirators should be discarded following close contact with any patients co-infected with another infectious disease requiring contact precautions.
- Consider use of a cleanable face shield and/or other steps (e.g. masking patients) to reduce surface contamination.
- Place used N95 respirators in a designated storage area, or in a clean breathable container, such as a paper bag, between uses. Stored respirators should not touch each other, and the name of the person using the respirator should be clearly identified on the respirator and/or on the outside of the bag. Storage containers should be disposed of or cleaned regularly.
- Perform correct hand hygiene with soap and water or an alcohol-based hand sanitizer before and after touching or adjusting the respirator.
- Use a pair of clean (non-sterile) gloves when donning the used N95 respirator and performing a user seal check. Discard gloves after the respirator is donned.
- Discard any respirator that is obviously damaged or becomes hard to breathe through.

The N95 respirator should immediately be discarded if it is contaminated or there is a concern for contamination.

Decontamination and Reuse of Discarded Respirators

Discarded N95 respirators that **retain their integrity** should be considered for decontamination and reuse in crisis situations such as COVID-19. Although N95 respirators are not approved for routine decontamination, limited research suggests that several methods may be effective in decontaminating N95 respirators while maintaining their integrity. This is based on current CDC guidance (www.cdc.gov/coronavirus/2019-ncov/hcp/ppe-strategy/decontamination-reuse-respirators.html). RIDOH encourages healthcare settings to pursue one of these strategies to conserve N95 respirators:

- The Food and Drug Administration (FDA) has issued an Emergency Use Authorization (EUA) for the use of the Battelle CCDS Critical Care Decontamination System™ for use in decontaminating compatible N95 respirators. This approach uses a self-contained decontamination device that uses vapor phase hydrogen peroxide (VPHP) for decontamination of N95 respirators. This is the only current approach evaluated by the FDA. Other devices and approaches are being evaluated by the FDA.
- Vaporous hydrogen peroxide has also been described in other studies to be effective^{2, 3, 4}
- Ultraviolet germicidal irradiation^{5, 6, 7}
- Microwave generated steam⁷
- Microwave steam bags⁸
- Moist heat incubation⁷
- Other proposed approaches that have not been evaluated included liquid hydrogen peroxide and ethylene oxide decontamination. Autoclave, dry heat, isopropyl alcohol, soap, dry microwave irradiation and bleach should **not** be used due to degradation of the respirator material.

Per the CDC, vaporous hydrogen peroxide, ultraviolet germicidal irradiation, and moist heat are the most promising decontamination methods. If decontamination is considered, these methods do not appear to break down filtration or compromise the material. Please see the CDC website on this topic for more information including a breakdown of N95 respirator model and decontamination method (<https://www.cdc.gov/coronavirus/2019-ncov/hcp/ppe-strategy/decontamination-reuse-respirators.html>).

Steps in Donning a Decontaminated N95 Respirator

- Clean hands with soap and water or an alcohol-based hand sanitizer before and after touching or adjusting the N95 respirator.
- Avoid touching the inside of the N95 respirator.
- Use a pair of clean (non-sterile) gloves when donning and performing a user seal check.
- Visually inspect the N95 respirator to determine if its integrity has been compromised.
- Check that components such as the straps, nose bridge, and nose foam material did not degrade, which can affect the quality of the fit and seal.
- If the integrity of any part of the N95 respirator is compromised, or if a successful user seal check cannot be performed, discard the N95 respirator and try another filtering facepiece respirator (FFR).
- Users should perform a user seal check immediately after they don each N95 respirator and should not use an N95 respirator on which they cannot perform a successful user seal check.

References

- ¹ www.cdc.gov/niosh/topics/hcwcontrols/recommendedguidanceextuse.html
- ² Bergman, M., et al., Evaluation of Multiple (3-Cycle) Decontamination Processing for Filtering Facepiece Respirators. *Journal of Engineered Fibers and Fabrics*, 2010. **5**(4): p. 33-41.
- ³ Battelle. Final Report for the Bioquell Hydrogen Peroxide Vapor (HPV) Decontamination for Reuse of N95 Respirators. 2016; Available from: <https://www.fda.gov/emergency-preparedness-and-response/mcm-regulatory-science/investigating-decontamination-and-reuse-respirators-public-health-emergenciesexternal icon>.
- ⁴ Kenney, Patrick, et al. Hydrogen Peroxide Vapor sterilization of N95 respirators for reuse. *medRxiv* (2020).
- ⁵ Fisher, E.M. and R.E. Shaffer, A method to determine the available UV-C dose for the decontamination of filtering facepiece respirators. *Journal of Applied Microbiology*, 2011. **110**(1): p. 287-295.
- ⁶ Mills, D., et al., Ultraviolet germicidal irradiation of influenza-contaminated N95 filtering facepiece respirators. *American Journal of Infection Control*, 2018. **46**(7): p. e49-e55.
- ⁷ Heimbuch, B.K., et al., A pandemic influenza preparedness study: use of energetic methods to decontaminate filtering facepiece respirators contaminated with H1N1 aerosols and droplets. *American Journal of Infection Control*, 2011. **39**(1): p. e1-e9.
- ⁸ Fisher, E.M., J.L. Williams, and R.E. Shaffer, Evaluation of microwave steam bags for the decontamination of filtering facepiece respirators. *PLoS One*, 2011. **6**(4).