

Strategies for Reuse and Extended Use of Personal Protective Equipment (PPE) During COVID-19 Outbreak

This guidance is intended for medical directors, health care administrators, and professionals working in infectious disease, infection prevention and control, occupational health and safety, materials management and procurement.

In times of severe shortages, such as during the coronavirus disease 2019 (COVID-19) outbreak, consider contingency measures for reuse and extended use of personal protective equipment (PPE). **In general, extended use is preferred over reuse to reduce the risk of self-contamination from repeated donning (wearing) and doffing (removal) of the same equipment.** Policies on reuse and extended use of PPE should be developed in consultation with your respiratory protection program and occupational health and infection control departments with input from public health partners.

Reuse of PPE

Reuse refers to the practice of using the same PPE for multiple encounters with patients but doffing between each of those encounters. The equipment is safely stored in between patient encounters. Previously used PPE should never be taken outside of patient care areas unless the item is decontaminated or placed in a clean breathable container.

Reuse of eye protection (e.g., disposable face shields or goggles):

- Disposable face shields and non-disposable eye protection should be decontaminated and reused whenever possible provided that the integrity of the equipment remains intact and visibility is not compromised.
- Avoid touching eye protection when wearing as it should be considered contaminated. Immediately wash hands or use hand sanitizer after touching or adjusting eye protection during patient care.
- Eye protection should be decontaminated when visibly soiled or each time it is removed prior to reusing it. Store in a clean paper bag or other container between use.
 - Wipe the inside and outside of the shield with an Environmental Protection Agency (EPA)-registered hospital disinfectant and allow for drying before re-donning.
 - Suggest using Professional Disposables International, Inc. (PDI) Super Sani-Cloth wipes (or other alcohol-based wipes).
- For detailed information on cleaning and disinfecting eye protection, see: [cdc.gov/coronavirus/2019-ncov/hcp/ppe-strategy/eye-protection.html](https://www.cdc.gov/coronavirus/2019-ncov/hcp/ppe-strategy/eye-protection.html)

Reuse of isolation gowns:

- During shortages of isolation gowns, consider using washable gowns that are laundered after use.
- Reuse of single-use isolation gowns is difficult due to breakage of ties when removing, and should be avoided.
- Cloth gowns could be considered for reuse without washing if there was minimal to no direct physical contact with the patient or nearby surfaces (e.g., bedrails).
- If single-use gowns must be reused, care should be taken to minimize contact with the outside of the gown to limit self-contamination.

Reuse of face masks:

- For non-COVID-19 scenarios:
 - If a face mask is used for encounters during which droplet precautions were not needed, it may be reused with appropriate donning and doffing between each patient so long as it is not visibly soiled, damaged, wet or hard to breathe through.
- When caring for confirmed or possible COVID-19 patients or other infections requiring droplet precautions:
 - Face masks may be reused with appropriate donning and doffing between each patient so long as they are not visibly soiled, damaged, wet or hard to breathe through.
When reusing face masks, avoid touching the inside surface and use a face shield during patient care, if possible, to limit contamination.
 - After use with patients with confirmed or possible COVID-19, masks should be considered contaminated. As there are no recommended decontamination procedures for masks, between use, masks should be doffed appropriately, folded so that the outside surface is inwards and stored in a clean space.

Reuse of N95 respirator masks (N95s):

- In periods of short supply, N95s should be prioritized for use with patients in intensive care units or during aerosol-generating procedures, including:
 - Endotracheal intubation and extubation
 - Non-invasive ventilation (BiPAP/CPAP)
 - Manual ventilation before intubation
 - Open suctioning
 - Bronchoscopy
 - Nebulizer treatments
 - High-flow oxygen via mask
 - Sputum induction
 - Tracheotomy
- N95s can be reused if they remain functional¹ and are used in accordance with your facility's protocols. Reuse should be avoided after encounters with a higher risk of contamination (e.g., performing aerosol-generating procedures).
- When reuse is necessary, a barrier such as a full-face shield should be worn over the N95 to limit contamination.
- If performing aerosol-generating procedures, practice extended use of N95s over reuse. If reuse cannot be avoided, use a barrier such as a full-face shield (preferable) or face mask over the N95 to limit contamination.²
- Avoid touching the inside of the respirator and use clean gloves when donning a *used* N95 and performing a user seal check.
- Between use, N95s (labeled with the provider's name on the strap) should be stored in a clean paper bag.
- When available, N95s can be decontaminated and reused using certain procedures such as:
 - UV light — see Nebraska Medicine protocol at nebraskamed.com/sites/default/files/documents/covid-19/n-95-decon-process.pdf.

¹Functional means that the N95 has maintained its physical integrity and when used properly provides protection (exposure reduction) consistent with the assigned protection factor for this class of respirator.

²Use of a surgical mask over an approved N95 has not been evaluated or approved by the National Institute for Occupational Safety and Health (NIOSH).

- Vaporized hydrogen peroxide — see [fda.gov/emergency-preparedness-and-response/mcm-regulatory-science/investigating-decontamination-and-reuse-respirators-public-health-emergencies](https://www.fda.gov/emergency-preparedness-and-response/mcm-regulatory-science/investigating-decontamination-and-reuse-respirators-public-health-emergencies).
- Hot air (75 °C, 30 min, 20 cycles) — see stanfordmedicine.app.box.com/v/covid19-PPE-1-2.
- For more detailed guidance on N95 reuse and decontamination, see resources below.

Extended use of PPE

Extended use refers to the practice of wearing the same equipment for repeated encounters with patients without removing the PPE. This approach could be used while seeing multiple patients with confirmed or possible COVID-19.

- Eye protection, isolation gowns, face masks and N95s can be considered for extended use. Gloves should be changed between each patient, if possible, or perform hand hygiene (wash hands or use hand sanitizer) with gloves before and after donning and doffing if unable to change out.
 - Gowns and gloves should be changed between patients if the patient is on contact precautions for different pathogens (e.g., *Candida auris*).
- Extended use of PPE should be done in conjunction with cohorting of patients as described below.
 - Areas designated for donning and doffing should be identified for high- and moderate-risk units if extended use PPE is adopted.
- The maximal amount of time PPE can be worn continuously is not well defined. Studies show that N95s remain effective for up to 8 hours of continuous use. However, provider tolerability may limit this to shorter durations.
 - PPE equipment should be removed if the integrity is damaged, visibly soiled, wet or becomes difficult to breathe through.

Cohorting as a strategy to maximize PPE supplies

- Facilities should identify high-, moderate-, and low-risk units and begin cohorting patients accordingly.
- High-risk units (ICUs):
 - Includes patients with confirmed or possible COVID-19 who are likely to require ongoing aerosol-generating procedures (e.g., intubation, frequent suctioning or high-flow oxygen delivery).
 - Use negative pressure rooms or spaces when possible to reduce contamination of PPE.
 - PPE in these units should include eye protection, isolation gown, N95 and gloves.
 - Powered air-purifying respirators (PAPRs), when available, should be prioritized to these high-risk units. See University of Washington’s medicine resources (link below) for a PAPR hood decontamination protocol.
 - If PPE resources are limited
 - Eye protection and N95s can extend use between patients.
 - Isolation gowns should be changed between patients if supplies permit (can extend use if patient is not on contact precautions for other pathogens).
 - Gloves should be changed between patients if possible.
- Moderate-risk units:
 - Should include patients with confirmed or possible COVID-19 who are not critically ill and do not require ongoing aerosol-generating procedures.
 - Confirmed COVID-19 positive patients can be cohorted in the same room. If possible, isolate patients with possible COVID-19 in individual rooms until diagnosis can be confirmed.
 - PPE in these units should include face mask, eye protection, gown and gloves.

- If an aerosol-generating procedure is to be performed in moderate-risk units, the patient should be moved to an airborne isolation room and appropriate PPE including an N95 should be donned.
- Low-risk units:
 - Should include all other patients admitted to the hospital without confirmed or possible COVID-19 and no aerosol generating procedures are being performed.
 - PPE requirements should follow standard precautions in accordance with hospital PPE-conserving protocols.

Resources on PPE conservation:

- CDC’s Strategies to Optimize the Supply of PPE and Equipment
[cdc.gov/coronavirus/2019-ncov/hcp/ppe-strategy/index.html](https://www.cdc.gov/coronavirus/2019-ncov/hcp/ppe-strategy/index.html)
- CDC’s Recommended Guidance for Extended Use and Limited Reuse of N95 Filtering Facepiece Respirators in Healthcare Settings
[cdc.gov/niosh/topics/hcwcontrols/recommendedguidanceextuse.html](https://www.cdc.gov/niosh/topics/hcwcontrols/recommendedguidanceextuse.html)
- CDC’s Decontamination and Reuse of Filtering Facepiece Respirators
[cdc.gov/coronavirus/2019-ncov/hcp/ppe-strategy/decontamination-reuse-respirators.html](https://www.cdc.gov/coronavirus/2019-ncov/hcp/ppe-strategy/decontamination-reuse-respirators.html)
- Nebraska Medicine COVID-19 Resources for Providers (for example policies and procedures)
nebraskamed.com/for-providers/covid19
- University of Washington Medicine COVID-19 Resource Site (for example policies and procedures)
covid-19.uwmedicine.org/Pages/default.aspx

The NYC Health Department may change recommendations as the situation evolves.

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