

Strategies for Optimizing the Supply of Personal Protective Equipment

GUIDANCE AS OF APRIL 2, 2020

On Feb. 29, the Centers for Disease Control and Prevention (CDC) released updated guidance detailing a series of strategies to optimize the supply of personal protective equipment (PPE) in health care settings when there is limited supply ([Strategies to Optimize the Supply of PPE and Equipment \[www.cdc.gov/coronavirus/2019-ncov/hcp/ppe-strategy/index.html\]](https://www.cdc.gov/coronavirus/2019-ncov/hcp/ppe-strategy/index.html)). This guidance is intended for use by infection prevention and control program leaders and health care workers (HCW).

General Recommendations to Minimize Use of PPE

These measures are adapted from CDC guidance and consist of suggestions to minimize exposure to patients with known or suspected COVID-19 to reduce the need for use of PPE in general.

- Limit the number of patients going to hospital or outpatient settings by instructing those with mild or moderate symptoms who do not require a higher level of care to remain at home.
- Cancel elective and non-urgent procedures and appointments for which PPE (e.g., surgical facemasks) are typically worn.
- Limit face-to-face HCW encounters with patients (e.g., telemedicine, phone triage).
- Explore the use of barriers such as glass or plastic windows in reception areas (e.g., intake desk at emergency department, triage station, information booth, pharmacy drop-off/pick-up windows).
- Maximize the use of re-usable equipment rather than disposable (e.g., cloth gowns that may be laundered, washable goggles, or reusable face shields).
- Minimize numbers of HCW entering patient rooms (e.g., have only one rounding provider enter to evaluate patient).
- Exclude HCW not directly involved in patient care (e.g., food delivery, environmental services) from the patient care area while the patient is present.
- Exclude visitors to patients with known or suspected COVID-19.
- Patients with laboratory-confirmed COVID-19 may be cohorted together in the same room to facilitate the extended use of PPE (see below).
- Patients with suspected COVID-19 and laboratory-confirmed COVID-19 may be housed in the same unit (e.g., a hospital ward) in separate single rooms to facilitate the extended use of PPE (see below).
- Cluster patient care activities that require PPE as much as possible (e.g., vitals, bathing).
- Decrease length of hospital stay for medically stable patients with COVID-19.

Crisis Capacity: Optimizing the Supply of PPE

These are strategies that are not commensurate with contemporary U.S. standards of care but may need to be considered during periods of known PPE shortages. These include extended use of PPE, reuse of PPE, and use of expired PPE. Once PPE supplies are replenished, facilities and providers should revert to the recommended standards of care.

General recommendations for PPE in care of COVID-19 patients:

- When N95 respirators, PAPRS, and other NIOSH-approved respirators are in short supply, HCWs evaluating and caring for patients with suspected or confirmed COVID-19 should wear a facemask, eye protection (face shield or goggles), gown, and gloves for routine care.
- Prioritize N95 respirators and PAPRs for aerosol-generating procedures (AGPs) and for critically ill patients in the ICU with known or suspected COVID-19.
- Perform hand hygiene with alcohol-based hand rub or soap and water before and after all patient contact, contact with potentially infectious material, and before putting on and upon removal of PPE, including gloves.
- Diligent environmental cleaning and disinfection of facilities using products EPA-approved for viral pathogens is recommended.

General considerations during extended use and reuse of PPE:

- Extended use refers to wearing the same item of PPE for multiple patient encounters without removing the PPE between patients.
- Reuse refers to use of the same item of PPE for multiple patient encounters with removal and storage of the item between patients.
- HCWs should perform diligent hand hygiene before and after donning, doffing or adjusting any piece of PPE intended for extended use or reuse.
- HCWs should take extreme care not to inadvertently touch any piece of PPE worn on the head (N95, facemask, eye protection) to avoid contamination.
- Any piece of PPE which is typically disposable but is being used for extended use or reuse should be restricted for use by a single person and should not be shared between HCWs.
- Any piece of PPE being used for extended use or reuse should be inspected prior to use for visible signs of soiling or damage and discarded if present.
- Any piece of PPE which no longer fastens securely should be discarded.
- N95 respirators, facemasks and eye protection should be carefully stored between uses in a clean, breathable storage container such as a paper bag or cardboard box.
- HCWs should leave the patient care area before removing their PPE.

N95 Respirators:

Extended use of N95 respirators:

- The HCW should change their gown (if disposable) and gloves between individual patients while taking care not to touch the respirator (and eye protection) to avoid contamination.

- May be used in situations where patients are cohorted (e.g., multiple patients in the same room or multiple single rooms within the same unit such as a hospital ward).
- The HCW may use this approach to move between a room containing a laboratory-confirmed COVID-19 patient and a room containing a suspected COVID-19 patient as long as they do not touch the respirator and change their gown and gloves as above.

Limited reuse of N95 respirators:

- Wear gloves when performing a seal check on a previously used respirator and discard gloves afterwards.
- When doffing, perform hand hygiene and remove the respirator by the straps without touching the inside.
- The respirator manufacturer should be contacted for recommendations on the maximum number of reuses for that particular N95 model.
- If no manufacturer guidance is available, data suggest no more than 5 reuses per device.
- During both extended use and reuse of N95s, the mask should be removed if it becomes soiled, wet, damaged, or hard to breathe through.

Expired N95 respirators (beyond manufacturer-designated shelf life):

- Expired N95 respirators released from some U.S. stockpiles are preferred instead of reuse. List is available at [Release of Stockpiled N95 Filtering Facepiece Respirators Beyond the Manufacturer-Designated Shelf Life \(www.cdc.gov/coronavirus/2019-ncov/release-stockpiled-N95.html\)](https://www.cdc.gov/coronavirus/2019-ncov/release-stockpiled-N95.html).
 - These models have been evaluated and found to continue to perform in accordance with NIOSH performance standards despite exceeding their shelf life.
- Other expired N95 respirators may be used for training and fit testing, or for use during routine patient care when supplies are limited, with the following caveats:
 - HCWs should perform a seal check prior to use and monitor the integrity of components such as the nose bridge and straps for degradation that may impact the fit and seal. See CDC guide on how to perform a seal check at [Filtering out Confusion: Frequently Asked Questions about Respiratory Protection \(www.cdc.gov/niosh/docs/2018-130/pdfs/2018-130.pdf\)](https://www.cdc.gov/niosh/docs/2018-130/pdfs/2018-130.pdf).
 - Expired N95s are not recommended for use in surgical settings or during high-risk AGPs (e.g., intubation, bronchoscopy).

Alternative respirators (i.e. NIOSH-approved industrial N95 respirators, N95 respirators approved in other countries using standards similar to NIOSH):

- Alternative respirators may be considered for use in clinical settings when PPE supplies are short.
- CDC has provided a list of countries with approval standards for N95 respirators that provide equivalent protection to NIOSH-approved respirators at [Strategies for Optimizing the Supply of N95 Respirators: Crisis/Alternate Strategies \(www.cdc.gov/coronavirus/2019-ncov/hcp/respirators-strategy/crisis-alternate-strategies.html\)](https://www.cdc.gov/coronavirus/2019-ncov/hcp/respirators-strategy/crisis-alternate-strategies.html).
- Respirators with front-facing exhalation valves are not appropriate for use in situations where a sterile field must be maintained (e.g., during an invasive procedure in an operating room) because the valve allows unfiltered exhaled air to escape into the sterile field.

- A non-surgical respirator (e.g., not waterproof) may be combined with a face shield in operative or procedural settings to help block splashes and sprays of bodily fluids.

Decontamination of N95 Respirators:

- CDC and NIOSH do not recommend decontamination and reuse of disposable N95 as standard of care but recognize that this may need to be considered as a crisis capacity strategy when supplies are low.
- Effective decontamination should reduce the pathogen burden, maintain the respirator function and present no residual chemical hazard.
- If information from the manufacturer or a third party is available showing that respirators can be successfully decontaminated without impacting respirator function, these decontaminated respirators can be worn for any patient care activities.
- If this information is absent or insufficient, decontaminated respirators may still be worn for routine patient care but should not be worn by HCWs during AGPs.
- Information on the various types of decontamination methods and their known effect on respirator performance can be found at [Decontamination and Reuse of Filtering Facepiece Respirators \(www.cdc.gov/coronavirus/2019-ncov/hcp/ppe-strategy/decontamination-reuse-respirators.html\)](https://www.cdc.gov/coronavirus/2019-ncov/hcp/ppe-strategy/decontamination-reuse-respirators.html).

Storage Approach for N95s

- One strategy suggested by CDC to avoid the need for decontamination and mitigate contact transfer of pathogens from an N95 respirator to the wearer during reuse is to store the respirator in a breathable paper bag at the end of each shift and defer reuse for 5 days (based on research showing that SARS-CoV-2 can survive on various surfaces for up to 72 hours).
- If supplies permit, each HCW could be issued five respirators which they may wear in sequence with a minimum of 5 days between use of each, providing they put on, take off, care for them and store them properly each day.
- Healthcare workers should treat N95s as though they are still contaminated and follow the precautions outlined in reuse recommendations.

Facemasks:

Extended use/reuse of facemasks:

- The mask should be removed if it becomes soiled, wet, damaged, or hard to breathe through.
- Reuse of facemasks may be limited by the type of fastening (e.g., elastic ear hooks may be more robust than ties that are more liable to tearing).

Eye protection (face shields or goggles):

Extended use/reuse of eye protection:

- Prioritize eye protection for care activities where splashes and sprays are anticipated, typically during AGPs.
- Eye protection should be removed and cleaned if it becomes visibly soiled or difficult to see through.
- Refer to recommended manufacturer instructions for cleaning eye protection.
- If instructions are unavailable, suggest:
 - Wear gloves and use a clean cloth saturated with neutral detergent solution or cleaning wipe.
 - Carefully wipe the inside of the face shield or goggles, followed by the outside.
 - Allow to fully dry (air dry or use clean absorbent towels).
 - Remove gloves and perform hand hygiene.

Isolation gowns:

Extended use/reuse of gowns:

- The same gown (disposable or reusable) may be worn by a HCW when interacting with multiple patients known to be infected with the same pathogen when cohorted only as long as there are no known additional co-infections that may be transmitted by contact (e.g., *Clostridioides difficile*).
- Reuse of disposable gowns is discouraged due to the high likelihood of contamination when doffing and donning the used gown. Cloth gowns should be laundered between uses.
- Disposable sterile surgical gowns should be prioritized for surgical and other sterile procedures.
- Gowns should be prioritized for use during care activities where splashes and sprays are anticipated, typically AGPs.
- Gowns should also be prioritized for high-contact patient care activities such as dressing, bathing/showering, transferring, providing hygiene, changing linens, changing briefs or assisting with toileting, device care or use, and wound care.
- Facilities may consider suspending the use of gowns for patients who are known to be colonized with common multidrug resistant organisms (MDRO) such as MRSA and VRE who **do not** have:
 - Open wounds
 - Uncontained secretions
 - Incontinent diarrhea

AND the facility is not currently undergoing an outbreak of other endemic multidrug organisms.

 - Care should be taken to maintain diligent hand hygiene and environmental cleaning standards if gown use is suspended as above.
- Gowns should still be used per standard infection prevention protocols for patients colonized or infected with other MDR pathogens (including but not limited to: ESBL-producing organisms,

carbapenem-resistant Enterobacteriaceae, MDR *Pseudomonas aeruginosa*, *Candida auris*) and patients with other infections transmitted by contact (e.g. *Clostridioides difficile*).

Additional considerations if PPE supplies are completely depleted:

- Exclude HCW at higher risk for severe illness from COVID-19 from contact with known or suspected COVID-19 patients.
 - Includes those of older age, those with chronic medical conditions, and those who may be pregnant.
- Designate HCW who have clinically recovered from laboratory-confirmed COVID-19 to provision of care to known or suspected COVID-19 patients.
 - Individuals who have recovered from COVID-19 infection may have developed some protective immunity but this has not yet been confirmed.

Supply Chain

During expected or known PPE shortages:

- Work continually with your supply chain managers to find PPE. When supplies are replenished, revert to the contingency standard that applies.
- Contact your regional [Health Care Coalition](http://www.health.state.mn.us/communities/ep/coalitions/index.html) (www.health.state.mn.us/communities/ep/coalitions/index.html) to request PPE support and coordinate optimization strategies.

References:

- [CDC Coronavirus Disease 2019 \(COVID-19\): Strategies to Optimize PPE and Equipment](http://www.cdc.gov/coronavirus/2019-ncov/hcp/ppe-strategy/index.html) (www.cdc.gov/coronavirus/2019-ncov/hcp/ppe-strategy/index.html)
- [Minnesota Department of Health: Health Advisory: COVID-19 Infection Prevention and Control in Healthcare](http://www.health.state.mn.us/communities/ep/han/2020/mar13ic.pdf) (www.health.state.mn.us/communities/ep/han/2020/mar13ic.pdf)
- [CDC Personal Protective Equipment \(PPE\) Burn Rate Calculator](http://www.cdc.gov/coronavirus/2019-ncov/hcp/ppe-strategy/burn-calculator.html) (www.cdc.gov/coronavirus/2019-ncov/hcp/ppe-strategy/burn-calculator.html)
- [MDH: Patient Care Strategies for Scarce Resource Situations](http://www.health.state.mn.us/communities/ep/surge/crisis/standards.pdf) (www.health.state.mn.us/communities/ep/surge/crisis/standards.pdf)

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