



**Kentucky Public Health**

Prevent. Promote. Protect.

# GUIDELINE FOR CONSERVATION OF RESPIRATORY PROTECTION RESOURCES

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KENTUCKY DEPARTMENT FOR PUBLIC HEALTH

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# Kentucky Department for Public Health:

## Guideline for Conservation of Respiratory Protection Resources

This is a condensed version of CDC's guidance on how to optimize supplies of N95 filtering facepiece respirators (commonly called "N95 respirators") in healthcare settings in the face of potential ongoing 2019 Novel Coronavirus (COVID 19) transmission in the United States. The recommendations are intended for use by professionals who manage respiratory protection programs, occupational health services, and infection prevention programs in healthcare institutions to protect healthcare personnel (HCP) from job-related risks of exposure to infectious respiratory illnesses.

N95 respirators are the personal protective equipment (PPE) most often used to control exposures to infections transmitted via the airborne route, though their effectiveness is highly dependent upon proper fit and use. Supplies of N95 respirators can become depleted during pandemics or when otherwise in high demand. [Existing CDC guidelines](#) recommend a combination of approaches to conserve supplies while safeguarding HCP in such circumstances. These existing guidelines recommend that healthcare facilities:

- Minimize the number of HCP who need to use respiratory protection through the preferential use of engineering and administrative controls;
- Use alternatives to N95 respirators (e.g., other classes of filtering facepiece respirators, elastomeric half-mask and full face piece air-purifying respirators, powered air-purifying respirators) where feasible;
- Implement practices allowing extended use and/or limited reuse of N95 respirators, when acceptable;
- Prioritize the use of N95 respirators for those HCP at the [highest risk of acquiring infection](#) or experiencing complications of infection. See [Appendix A](#) for difference between a surgical mask and N-95 respirators;

## Strategies for Optimizing the Supply of N95 Respirators

### Engineering Controls

- Reduce exposures for HCP by placing a barrier between the hazard and the HCP;
- Patients with known or suspected COVID 2019 (i.e., [person under investigation \[PUI\]](#)) should be placed in an airborne infection isolation room (AIIR) that has been constructed and maintained in accordance with current guidelines;
- Barriers such as glass/plastic windows can be an effective solution for reducing exposures among HCP to potentially infectious patients, (e.g. intake desk at emergency department, triage station, information booth, pharmacy drop-off/pick-up windows) where patients may first report upon arrival to healthcare facility;
- Other examples include the use of curtains between patients in shared areas and closed suctioning systems for airway suctioning for intubated patients;
- Ventilation systems that provide air movement in a clean (HCP workstation or area) to contaminated (sick patient) flow direction (along with appropriate filtration, exchange rate) that are installed and properly maintained.

### Administrative Controls

- Defined as employer-dictated work practices and policies that reduce or prevent hazardous exposures.

- Limit number of patients going to hospital or outpatient settings.
  - Consider developing mechanisms to screen patients for acute respiratory illness prior to their non-urgent care or elective procedure.
  - Postpone and reschedule those with signs and symptoms presenting for these non-acute visits.
- Exclude HCP not directly involved in patient care.
  - Limit the number of HCP who enter the patient's room to only those providing direct patient care.
  - Implement staffing policies to minimize the number of HCP who enter the room.
  - Consider excluding staff such as dietary and housekeeping employees.
- Limit face-to-face HCP encounters with patients.
  - Consider bundling care activities to minimize room entries.
  - Bundling may occur across HCP types.
    - Food trays delivered by HCP performing other care.
  - Consider alternative mechanisms for HCP and patient interactions.
    - Telephones, video monitoring, and video-call applications on cell phones or tablets
  - Exclude visitors to patients with known/suspected COVID-19.
    - Alternative mechanisms for patient and visitor interactions, such as video-call applications on cell phones or tablets should be explored.
    - Facilities can consider exceptions based on end-of-life situations or when a visitor is essential for the patient's emotional well-being and care.
    - If visitors must enter the room of a known or suspected COVID-19 patient, facilities should provide instruction on use of PPE according to current facility policy while in the patient's room.
  - Source control
    - Identify and assess patients who may be ill with or who may have been exposed to a patient with known COVID-19.
    - Patients with symptoms of suspected COVID-19 or other respiratory infection (e.g., fever, cough) presenting to care should use facemasks for source control until they can be placed in an airborne infection isolation room or a private room.
    - Patients with these symptoms should not use N95 respirators.
    - If these patients need to leave their room for services in other areas of the hospital (e.g., radiology), they should also wear facemasks for source control.
  - Cohorting patients
    - Cohorting is the practice of grouping together patients who are infected with the same organism to confine their care to one area and prevent contact with other patients.
    - Cohorts are created based on clinical diagnosis, microbiologic confirmation when available, epidemiology, and mode of transmission of the infectious agent.
    - When single patient rooms are not available, patients with confirmed COVID-19 may be placed in the same room.
    - Cohorting patients could minimize respirator use when extended wear of respiratory protective devices (RPDs) is implemented.
  - Cohorting HCP
    - Assigning designated teams of HCP to provide care for all patients with suspected or confirmed COVID-19 could minimize respirator use when extended wear of RPDs is implemented.
    - Can also limit the number of HCP exposed to 2019-nCoV and limit the number of HCP who need to be fit tested.
  - Telemedicine

- Nurse advice lines and telemedicine can screen and manage patients who may be infected with COVID-19 without the need for the HCP to use RPDs.
- These technologies and referral networks can help triage persons to the appropriate level of care, potentially reducing the influx of patients to healthcare facilities seeking evaluation.
- Training on indications for and proper use of N95 respirators.
  - It is also important that HCP be trained on indications for use of N95 respirators.
  - For example, HCP should use N95 respirators when caring for patients under airborne precautions for infectious diseases including COVID-19, tuberculosis, measles, and varicella.
  - HCP should generally not use N95 respirators when caring for patients under droplet precautions for infectious diseases except under certain circumstances (e.g., aerosol-generating procedures for influenza).
  - Training employees on the proper use of respirators, including putting on (“donning”) and removing them (“doffing”), limitations on their use, and maintenance is essential for effective use of respiratory protection.
  - If healthcare facilities are expecting to receive COVID-19 patients, they should begin training and start to plan for fit testing now. It is essential to have HCP trained and fit tested prior to receiving patients.
- Limiting respirators during training.
  - Healthcare facilities should be clear on which of their HCP do and do not need to be in a respiratory protection program and thus medically evaluated, trained, and fit tested.
  - Employees should be fit tested after they are comfortable donning the respirator and have passed a user seal check.
  - Employees should be trained on the respirator they are expecting to use at work. The respirator can be saved and used for fit testing and patient care.

## Personal Protective Equipment and Respiratory Protection

While engineering and administrative controls should be considered first when selecting controls, the use of PPE should also be part of a suite of strategies used to protect personnel. Proper use of respiratory protection by HCP requires a comprehensive program (including medical clearance, training, and fit testing) that complies with [OSHA’s Respiratory Protection Standard external icon](#) and a high level of HCP involvement and commitment. The program should also include provisions for the cleaning, disinfecting, inspection, repair, and storage of respirators used by workers on the job. Proper storage conditions can maximize shelf life of respirators. Additional strategies to be considered in the face of a potential N95 respirator shortage include:

## Conventional Capacity Strategies

- Surgical N95 respirators
  - Surgical N95 respirators (also referred as a medical respirator) are recommended only for use by HCP who need protection from both airborne and fluid hazards.
  - These respirators are not used or needed outside of healthcare settings.
  - In times of shortage, only HCP who are working in a sterile field or who may be exposed to high velocity splashes, sprays, or splatters of blood or body fluids should be provided these respirators.
  - Other HCP can use standard N95 respirators.
  - If surgical N95 respirators are not available, and there is a risk that the worker may be exposed to high velocity splashes, sprays, or splatters of blood or body fluids, then a face shield should be worn over the standard N95 respirator.

- Use of alternatives to N95 respirators where feasible
  - These include other classes of filtering face piece respirators, such as elastomeric half-mask and full face piece air purifying respirators and powered air purifying respirators (PAPRs).
  - All of these alternatives will provide equivalent or higher protection than N95 respirators.

### Contingency Capacity Strategies

In the continuum of surge capacity and standards of care, the following two measures can be categorized as contingency capacity, which may change daily practices but may not have any significant impact on the care delivered to the patient or the safety of the HCP. The following measures may be considered in the setting of a potential impending shortage of N95 respirators.

#### Use of Respirators after Their Intended Shelf Life

- In times of increased demand and decreased supply, consideration can be made to use N95 respirators past their intended shelf life.
- Prior to use of N95 respirators, the HCP should inspect the respirator and perform a seal check.
- Expired respirators may potentially no longer meet the certification requirements set by NIOSH.

#### Extended Use and Limited Use

In the setting of a potential N95 respirator shortage, consider implementing practices allowing extended use and/or limited reuse of N95 respirators, when acceptable. The decision to implement these practices should be made on a case-by-case basis taking into account known characteristics of COVID-19 and local conditions. Both Extended use and limited reuse have been recommended and widely used as an option for conserving respirators during previous respiratory pathogen outbreaks and pandemics.

- **Extended Use** refers to the practice of wearing the same N95 respirator for repeated close contact encounters with several different patients, without removing the respirator between patient encounters.
- **Reuse** refers to the practice of using the same N95 respirator by one HCP for multiple encounters with different patients but removing it (i.e. doffing) after each encounter.
  - Multiple workers should not share N95 and other disposable respirators.
  - The respirator is stored in between encounters to be put on again (i.e. donned) prior to the next encounter with a patient.
  - CDC recommends that the same worker can generally reuse a respirator classified as disposable as long as it remains functional and is used in accordance with local infection control procedures.
  - To maintain the integrity of the respirator, it is important for HCP to hang used respirators in a designated storage area or keep them in a clean, breathable container such as a paper bag between uses.
  - It is prohibited to modify the N95 respirator by placing any material within the respirator or over the respirator.



# Recommended Guidance for Extended Use and Limited Reuse of N95 Respirators in Healthcare Settings

## Implementation

- The decision to extend use or reuse N95 respirators should be made by the professionals who manage the institution's respiratory protection program, in consultation with their occupational health and infection control departments and the state/local public health departments.
- The decision to implement these practices should be made on a case-by-case basis taking into account the following:
  - Respiratory pathogen characteristics (e.g., routes of transmission, prevalence of disease in the region, infection attack rate, and severity of illness);
  - Local conditions (e.g., number of disposable N95 respirators available, current respirator usage rate, success of other respirator conservation strategies, etc.).
- Some healthcare facilities may wish to implement extended use and/or limited reuse before respirator shortages are observed.

**The following sections outline specific steps to guide implementation of these recommendations, minimize the challenges caused by extended use and reuse, and to limit risks that could result from these practices.**

## Respirator Extended Use Recommendations

- Extended use is favored over reuse.
  - Expected to involve less touching of the respirator
  - Less risk of contact transmission
- The respirator must maintain its fit and function.
- If extended use of N95 respirators is permitted, respiratory protection program administrators should ensure adherence to administrative and engineering controls to limit potential N95 respirator surface contamination.
  - Use of barriers to prevent droplet spray contamination.
  - Consider additional training and reminders (e.g., posters) for staff to reinforce the need to:
    - Minimize unnecessary contact with the respirator surface;
    - Adhere to strict hand hygiene practices;
    - Properly don and doff personal protective equipment.
- Healthcare facilities should develop clearly written procedures to advise staff to take the following steps to reduce contact transmission after donning:
  - Discard N95 respirators following use during aerosol generating procedures;
  - Discard N95 respirators contaminated with blood, respiratory or nasal secretions, or other bodily fluids from patients;
  - Discard N95 respirators following close contact with, or exit from, the care area of any patient co-infected with an infectious disease requiring contact precautions;
  - Consider use of a cleanable face shield (preferred) or a surgical mask over an N95 respirator and/or other steps (e.g., masking patients, use of engineering controls) to reduce surface contamination;
  - Perform hand hygiene with soap and water or an alcohol-based hand sanitizer before and after touching or adjusting the respirator (if necessary for comfort or to maintain fit);
  - Discard any respirator that is obviously damaged or becomes hard to breathe through.

## Respirator Reuse Recommendations

- If reuse of N95 respirators is permitted, respiratory protection program administrators should ensure adherence to administrative and engineering controls to limit potential N95 respirator surface contamination.
  - Use of barriers to prevent droplet spray contamination.
  - Consider additional training and/or reminders (e.g., posters) for staff to reinforce the need to:
    - Minimize unnecessary contact with the respirator surface;
    - Maintain strict adherence to hand hygiene practices;
    - Properly don and doff PPE.
- Healthcare facilities should develop clearly written procedures to advise staff to take the following steps to reduce contact transmission.
  - Discard N-95 respirators:
    - Following use during aerosol generating procedures;
    - Contaminated with blood, respiratory or nasal secretions, or other bodily fluids from patients;
    - Following close contact with any patient co-infected with an infectious disease requiring contact precautions.
  - Use a cleanable face shield (preferred) or a surgical mask over an N95 respirator and/or other steps (e.g., masking patients, use of engineering controls), when feasible to reduce surface contamination of the respirator.
  - Hang used respirators in a designated storage area or keep them in a clean, breathable container such as a paper bag between uses:
    - To minimize potential cross-contamination, store mask so they do not touch each other and clean or replace storage containers regularly;
    - Storage containers should be disposed of or cleaned regularly.
  - Clean hands with soap and water or an alcohol-based hand sanitizer before and after touching or adjusting the respirator.
  - Avoid touching the inside of the respirator.
  - Use a pair of clean (non-sterile) gloves when donning a used N95 respirator and performing a user seal check.
- Discard gloves after the N95 respirator is donned to ensure the respirator is sitting comfortably on your face with a good seal.
  - Healthcare facilities should provide staff clearly written procedures to:
    - Follow the manufacturer's user instructions, including conducting a user seal check;
    - Follow the employer's maximum number of donning (or up to five if the manufacturer does not provide a recommendation) and recommended inspection procedures;
    - Discard any respirator that is obviously damaged or becomes hard to breathe through;
    - Pack or store respirators between uses so that they do not become damaged or deformed.
  - Secondary exposures can occur from respirator reuse if respirators are shared. Thus, **N95 respirators must only be used by a single wearer.**
  - To prevent inadvertent sharing of respirators, healthcare facilities should develop clearly written procedures to inform users to:
    - Label containers used for storing respirators;
    - Label the respirator itself between uses with the user's name to reduce accidental usage of another person's respirator.

## Risks of Extended Use and Reuse of Respirators

- Some manufacturers' product user instructions differ.
  - i.e., "for single use only" versus
  - "Reuse if permitted by infection control policy of the facility"
- The most significant risk is of contact transmission is from touching the surface of the contaminated respirator.
- Contact transmission occurs through direct contact with others as well as through indirect contact by touching and contaminating surfaces that are then touched by other people.
- Respiratory pathogens on the respirator surface can potentially be transferred by touch to the wearer's hands.
- Respirators might also become contaminated with other pathogens acquired from patients who are co-infected with common healthcare-associated pathogens that have prolonged environmental survival.
- The types of medical procedures being performed can affect the risks of contact transmission when implementing extended use and reuse.
- Extended use can cause additional discomfort to wearers from wearing the respirator longer than usual.

## Discard N95 respirators

- Discard following use during aerosol generating procedures.
- Discard if contaminated with blood, respiratory or nasal secretions, or other bodily fluids from patients.
- Discard following close contact with any patient co-infected with an infectious disease requiring contact precautions.

## CDC Links

Healthcare Supply of Personal Protective Equipment

<https://www.cdc.gov/coronavirus/2019-ncov/hcp/healthcare-supply-ppe.html>

Recommended Guidance for Extended Use and Limited Reuse of N-95 Filtering Facepiece Respirators in Healthcare Settings

<https://www.cdc.gov/niosh/topics/hcwcontrols/recommendedguidanceextuse.html>

Strategies for Optimizing the Supply of N-95 Respirators

<https://www.cdc.gov/coronavirus/2019-ncov/hcp/respirator-supply-strategies.html>

CDC Guideline for Isolation Precautions

<https://www.cdc.gov/infectioncontrol/guidelines/isolation/appendix/type-duration-precautions.html>

Interim Infection Prevention and Control Recommendations for Patients with Confirmed 2019 Novel Coronavirus (2019-nCoV) in Healthcare Settings

<https://www.cdc.gov/coronavirus/2019-nCoV/hcp/infection-control.html>

## Understanding the Difference



**Surgical Mask**



**N95 Respirator**

### Testing and Approval

Cleared by the U.S. Food and Drug Administration (FDA)

Evaluated, tested, and approved by **NIOSH** as per the requirements in 42 CFR Part 84

### Intended Use and Purpose

Fluid resistant and provides the wearer protection against large droplets, splashes, or sprays of bodily or other hazardous fluids. Protects the patient from the wearer's respiratory emissions.

Reduces wearer's exposure to particles including small particle aerosols and large droplets (**only non-oil aerosols**).

### Face Seal Fit

Loose-fitting

Tight-fitting

### Fit Testing Requirement

No

Yes

### User Seal Check Requirement

No

Yes. Required each time the respirator is donned (put on)

### Filtration

Does NOT provide the wearer with a reliable level of protection from inhaling smaller airborne particles and is not considered respiratory protection

Filters out at least 95% of airborne particles including large and small particles

### Leakage

Leakage occurs around the edge of the mask when user inhales

When properly fitted and donned, minimal leakage occurs around edges of the respirator when user inhales

### Use Limitations

Disposable. Discard after each patient encounter.

Ideally should be discarded after each patient encounter and after aerosol-generating procedures. It should also be discarded when it becomes damaged or deformed; no longer forms an effective seal to the face; becomes wet or visibly dirty; breathing becomes difficult; or if it becomes contaminated with blood, respiratory or nasal secretions, or other bodily fluids from patients.



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# TYPES OF RESPIRATORY PROTECTION



**Elastomeric Half Facepiece Respirators** are reusable and have replaceable cartridges or filters. They cover the nose and mouth and provide protection against gases, vapors, or particles when equipped with the appropriate cartridge or filter.



**Elastomeric Full Facepiece Respirators** are reusable and have replaceable canisters, cartridges, or filters. The facepiece covers the face and eyes, which offers eye protection.



**Filtering Facepiece Respirators** are disposable half facepiece respirators that filter out particles such as dusts, mists, and fumes. They do NOT provide protection against gases and vapors.



**Powered Air-Purifying Respirators (PAPRs)** have a battery-powered blower that pulls air through attached filters, canisters, or cartridges. They provide protection against gases, vapors, or particles, when equipped with the appropriate cartridge, canister, or filter. Loose-fitting PAPRs do not require fit testing and can be used with facial hair.

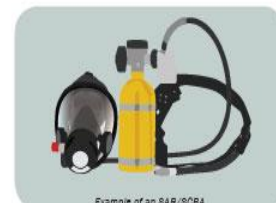


**Supplied-Air Respirators** are connected to a separate source that supplies clean compressed air through a hose. They can be lightweight and used while working for long hours in environments not immediately dangerous to life and health (IDLH).



Example of an open-circuit SCBA

**Self-Contained Breathing Apparatus (SCBAs)** are used for entry into or escape from environments considered to be IDLH. They contain their own breathing air supply and can be either open circuit or closed circuit.



Example of an SAR/SCBA

**Combination Respirators** can be either a supplied-air/SCBA respirator or supplied-air/air-purifying respirator. The SCBA type has a self-contained air supply if primary airline fails and can be used in IDLH environments. The air-purifying type offers protection using both a supplied-air hose & an air-purifying component and cannot be used for entry into IDLH environments.



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