Centers for Disease Control and Prevention

Coronavirus Disease 2019 (COVID-19)

Strategies for Optimizing the Supply of N95 Respirators: Conventional Capacity Strategies

Conventional Capacity Strategies

In the continuum of care, the following measures can be categorized as conventional capacity, which consists of providing patient care without any change in daily practices. This set of controls should already be implemented in general infection prevention and control plans in healthcare settings.

Engineering Controls

Engineering controls reduce exposures for HCP by placing a barrier between the hazard and the HCP. Engineering controls can be very effective as part of a suite of strategies to protect HCP without placing primary responsibility of implementation on them (i.e., they function without HCP having to take an action).

Isolation in airborne infection isolation room

Patients with known or suspected COVID-19 (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, as recommended in the Interim Infection Prevention and Control Recommendations for Patients with Confirmed Coronavirus Disease 2019 (COVID-19) or Persons Under Investigation for COVID-19 in Healthcare Settings .

Use of physical barriers

Barriers such as glass/plastic windows can be an effective solution for reducing exposures among HCP to potentially infectious patients. This approach can be effective in reception areas (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 a healthcare facility. Other examples include the use of curtains between patients in shared areas and closed suctioning systems for airway suctioning for intubated patients.

Properly maintained ventilation systems

Another cornerstone of engineering controls are ventilation systems that provide air movement from 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

Administrative controls are employer-dictated work practices and policies that reduce or prevent hazardous exposures. Their effectiveness depends on employer commitment and HCP acceptance and consistent use of the strategies. Regular training, monitoring and reinforcement are necessary to ensure that policies and procedures are followed consistently. Many of these strategies should already be incorporated into existing infection prevention and control policies in healthcare settings

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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 visits or procedures, such as through the appointment reminder system. Postpone and reschedule those with signs and symptoms presenting for these non-acute visits.

Exclude all HCP not directly involved in patient care

Current CDC guidance recommends that, for COVID-19, only essential personnel enter the patient care area, and that facilities consider caring for these patients with dedicated HCP. Further limiting the numbers of healthcare personnel and patient contacts to those that are medically essential (e.g., excluding dietary personnel, environmental services) could limit the number of respirators used. The medically essential personnel would assume food delivery and environmental services.

Limit face-to-face HCP encounters with patient

Measures can be explored to limit face-to-face contact encounters between HCP and patients with confirmed or suspected COVID-19. HCP may consider bundling care activities to minimize room entries, and bundling may occur across HCP types (e.g., food trays are delivered by HCP performing other care). Alternative mechanisms for HCP and patient interactions include telephones, video monitoring, and video-call applications on cell phones or tablets.

Exclude visitors to patients with known or suspected COVID-19

Restrict visitors from entering the rooms of patients with known COVID-19 or suspected (PUI) COVID-19, as recommended in CDC's guidance. 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, before visitors enter patients' rooms 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 person 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. Instructions should include how to use facemasks. Patients with these symptoms should not wear 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. Cohorting has been used extensively for managing outbreaks of multidrug resistant organisms including MRSA, VRE, MDR-ESBLs, *Pseudomonas aeruginosa;* methicillin-susceptible *Staphylococcus aureus*, RSV, adenovirus

keratoconjunctivitis, rotavirus, and SARS. 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 respirators is implemented. For more information on cohorting of patients, refer to 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings .

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. This strategy can also limit the number of exposed HCP who need to be fit tested.

Telemedicine

Nurse advice lines and telemedicine can screen and manage patients with suspected COVID-19 without the need for the HCP to use respiratory protection. Promoting the use of 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 use of N95 respirators

It is important that HCP be trained on indications for use of N95 respirators. The OSHA Respiratory Protection standard requires employers to provide respirator training prior to requiring an employee to use a respirator in the workplace. 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 need to 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 on use of N95 respirators

Training employees on the proper use of respirators, including putting on and removing them, limitations on their use, and maintenance is essential for effective use of respiratory protection. HCP should be thoroughly trained before they are fit tested to ensure they are comfortable donning the respirator and know how to conduct a user seal check. HCP should be trained on the respirator they are expecting to use at work.

Just in time fit testing

Just-in-time fit testing refers to the capacity of healthcare facilities to do larger scale evaluation, training, and fit testing of employees when necessary during a pandemic. Facilities may adopt a plan to use the “just-in-time” method for fit testing, which has been incorporated into pandemic plans for many facilities. For large facilities, it may not be feasible to fit test all employees, especially if their job does not typically place them at risk for exposure to airborne infectious diseases such as tuberculosis. 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

In order to conserve the supply of N95 respirators, healthcare facilities should understand which of their HCP do and do not need to be in a respiratory protection program and thus medically evaluated, trained, and fit tested. If training and fit testing are conducted during two separate steps, it is possible to allow limited re-use of N95 respirators used by individual HCP during both steps. 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.

Qualitative fit testing

Respirator fit test methods are classified as either qualitative or quantitative, and there are multiple protocols of each classification that are NIOSH-recommended or meet the requirements of OSHA's Respiratory Protection Standard . A qualitative fit test is a pass/fail test to assess the adequacy of respirator fit that relies on the individual's sensory detection of a test agent. A quantitative fit test numerically measures the effectiveness of the respirator to seal with the wearer's face, without relying on the wearer's voluntary or involuntary response to a test agent. Quantitative fit tests involve adaptation of the respirator to the fit testing equipment, which can involve making holes in the respirator.

Many healthcare systems already use qualitative fit test methods for fit testing HCP. For those using quantitative fit test methods, considerations can be made to use qualitative fit test methods to minimize the destruction of an N95 respirator used in fit testing and allow for the re-use of the same N95 respirator by the HCP. Qualitative fit methods may also allow for rapid fit testing of larger numbers of HCP. Any switch in methods should be assessed to ensure proficiency of the fit testers in carrying out the test.

Personal Protective Equipment and Respiratory Protection

While engineering and administrative controls should be considered first when selecting controls, the use of **personal protective equipment (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 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. The following strategies in this section are traditionally used by some healthcare systems. If not already implemented, these strategies can be considered by healthcare settings in the face of a potential N95 respirator shortage before implementing the contingency strategies that are listed further below.

Surgical N95 respirators

Surgical N95 respirators (sometimes called medical respirators) are recommended only for use by HCP who need protection from both airborne and fluid hazards (e.g., splashes, sprays). These respirators are approved by NIOSH and regulated by the FDA and 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 faceshield should be worn over the standard N95 respirator.

Use of alternatives to N95 respirators

Use alternatives to N95 respirators where feasible. These include other classes of filtering facepiece respirators, elastomeric half-mask and full facepiece air purifying respirators, powered air purifying respirators (PAPRs) where

feasible. All of these alternatives will provide equivalent or higher protection than N95 respirators when properly worn. NIOSH maintains a searchable, online version of the certified equipment list identifying all NIOSH-approved respirators.

NIOSH approves other filtering facepiece respirators that are at least as protective as the N95. These include N99, N100, P95, P99, P100, R95, R99, and R100.

Elastomeric respirators are half-facepiece, tight-fitting respirators that are made of synthetic or rubber material permitting them to be repeatedly disinfected, cleaned, and reused. They are equipped with exchangeable filter cartridges. Similar to N95 respirators, elastomeric respirators require annual fit testing. Elastomeric respirators should not be used in surgical settings due to concerns that air coming out of the exhalation valve may contaminate the sterile field.

PAPRs are reusable respirators that are typically loose-fitting hoods or helmets. These respirators are battery-powered with blower that pulls air through attached filters or cartridges. The filter is typically a high-efficiency particulate air (HEPA) filter. Loose-fitting PAPRs do not require fit-testing and can be worn by people with facial hair. However, PAPRs should not be used in surgical settings due to concerns that the blower exhaust and exhaled air may contaminate the sterile field.

Facilities using elastomeric respirators and PAPRs should have up to date cleaning/disinfection procedures, which are an essential part of use for protection against infectious agents.

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