



**FEMA**



# Personal Protective Equipment (PPE) Preservation Planning Tool Guide

Supply Preservation Support Team  
Healthcare Resilience Working Group

CURRENT AS OF 12/21/2020

**Release 1.1**



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# Introduction

## Overview

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The *PPE Preservation Planning Tool Guide* is an instructional guide, to be used with the *PPE Preservation Planning Tool (PPEPP Tool)*, embedded below; together, the *PPE Preservation Planning Toolkit*. The *PPEPP Tool* is designed for user inputs leading to estimates of the benefits of preservation practices you may implement. This tool guide is designed to guide healthcare facilities, first responder services, and other impacted organizations in the following activities:

- (a) **Assess** personal protective equipment (PPE) availability and preservation practices
- (b) **Understand** and **implement** strategies for preventing PPE shortages or addressing realized PPE shortages by maximizing the duration and utility of existing PPE supplies
- (c) **Access** additional resources (see [Additional Resources](#))

## How to Use this PPE Preservation Planning Toolkit

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The *PPE Preservation Planning Toolkit* will guide your facility or organization through a series of PPE preservation and PPE supply planning steps to enhance supply resilience in the event of a surge of coronavirus disease 2019 (COVID-19) patients or to respond more effectively in the midst of an existing surge. The toolkit shows PPE usage and supply duration for these scenarios: without implementation of preservation strategies, with implementation of one set of preservation strategies (“now”), and with implementation of a more extensive set of preservation strategies (“now” and “soon”). *Steps 6 through 8* require the *PPEPP Tool* for full functionality. All steps are guided in this document.

In each step, fill in the information to the best of your knowledge and seek input from those who may have more information on PPE supplies and preservation strategies and on your organization’s practices. When necessary or useful, use the additional resources linked into the section or listed in the resource list to better understand preservation options, alternatives, and supply duration. Take the recommended actions that are feasible for your facility or organization to preserve existing supplies and, where needed, to access additional available supplies.



# Introduction (continued)

## Time needed

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Although time for using this tool will vary based on the size and complexity of the organization and the familiarity of the user with the organization and the concepts, initial estimates are (a) 15-30 min for orientation and preparation for using it; (b) 15-30 min for entering the information in tabs 1-5 to become familiar with and anticipate use of the preservation strategies; and (c) one to two hours for entering the information in tabs 6-8 to enable estimation of the use (burn) rate and impact of preservation strategies on duration of supplies.

## Differentiation from related tools

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The purpose of the *PPE Preservation Planning Toolkit* is to enable planning for preservation strategies for PPE. The estimates of supply duration may also be used for planning purposes or reporting of this value, albeit with recognition that the purpose is general planning, and not primarily to make accurate predictions of supply duration.

The [National Institute for Occupational Safety and Health \(NIOSH\) PPE Tracker App](#), the [CDC Burn Rate Calculator](#), and the [EMS PPE Supply Estimator](#) are tools for estimating burn (use) rate of PPE based on historical usage or on use practices for PPE supplies, which can serve as a basis for estimating duration of supplies for planning or reporting. The first two of these tools depend on an assumption of a continuing burn rate based on the historical pattern of use. The third depends on user input of supply use practices. Effects of implementing preservation practices could be estimated retroactively by tracking the historical use or effects of practices after implementation. This *Toolkit*, in contrast, relies for estimation of use rates and supply duration on a choice of (a) direct knowledge or estimation and entry of staff-member-specific use rates or (b) estimation of staff-member-specific use rates based on user-modifiable assumptions and built-in algorithms; and it allows for proactive estimation of the impact of preservation practices based on assumptions and algorithms. The tools can be used complementarily for estimation and planning purposes, but would not necessarily be expected to provide identical results, given the differences in purposes and methods. For a table comparing the various tools, see the *PPE Preservation Planning Toolkit Fact Sheet*.



# Action Guide

- ❑ **Step 1 (Tool Tab 1)** – Provide Facility/Organization Information
  - Provide your facility or organization type and area information for contextual purposes.
- ❑ **Step 2 (Tool Tab 2)** – Reduce Personal Protective Equipment Use
  - Implement or extend PPE use reduction strategies
  - Purchase equipment/supplies and install for use
- ❑ **Steps 3-4 (Tool Tabs 3/4)** – Reuse Personal Protective Equipment
  - Implement or extend PPE reuse strategies
  - Identify the nearest publicly available Critical Care Decontamination System (CCDS) that can decontaminate used disposable N95 respirators for safe reuse
  - Consider acquiring one of the sterilizers with an issued Food and Drug Administration (FDA) emergency use authorization (EUA) to decontaminate disposable N95 respirators
- ❑ **Step 5 (Tool Tab 5)** – Repurpose Alternate Personal Protective Equipment
  - Implement or extend PPE repurposing strategies
  - Acquire reusable PPE to replace disposable PPE
  - For elastomeric half-mask respirators (EHMRs) and powered air-purifying respirators (PAPRs), ensure that your facility or organization meets 29 CFR 1910.134
  - Establish cleaning, disinfecting, or laundering agreements or capabilities within your facility or organization for reusable PPE
- ❑ **Step 6 (Tool Tab 6)** – Determine Reduction Factors
  - Assess to what degree implementing various implementation strategies would lead to PPE reduction
- ❑ **Step 7 (Tool Tab 7)** – Determine PPE Needs
  - Identify your current-state PPE usage without preservation strategies and potential changes with existing or further implementation of PPE preservation strategies



## Action Guide

- ❑ **Step 8 (Tool Tab 8)** – Assess Supply Access & Limitations
  - Identify your supply requirements with consideration of PPE preservation strategies you do, can, will, or might implement
- ❑ **Step 9** – Place Orders
  - Place PPE orders with your usual vendor(s)
  - Share your projected PPE requirements with the vendor
  - Proactively seek approved or authorized reusable equipment
- ❑ **Step 10** – If Needed: Communicate with Health Departments
  - *In the event of a projected or existing emergency shortage, communicate your PPE needs to your local and state health departments.*



# Preserve PPE



## Provide Facility/Organization Information (Tool Tab 1)

Provide your facility/organization type and area information for contextual purposes.

**Instructions\*:** Indicate your facility/organization type, facility/organization size, state/territory/tribe, and area type information. While this information will not directly be used in the tool, if your organization chooses to voluntarily provide this information to centralized planning organizations, the added facility context will be useful to understand PPE needs.

*Facility/Organization Type*

*Facility/Organization Size*

*State/Territory/Tribe*

*Area Type (Urban/Suburban/Rural)*

\*Facility information can be chosen from a drop-down menu in the *PPEPP Tool*.



# Preserve PPE

## 2

### Reduce Personal Protective Equipment Use (Tool Tab 2)

Enhance PPE preservation strategies\* throughout your facility or organization in accordance with the PPE reduction best practices. Begin by identifying which of the following PPE preservation practices your facility or organization is using or could use more, considering them in the context of any emergency declaration and supply stress situation (conventional, contingency, crisis).

**Instructions:** Indicate how often\*\* your facility or organization leverages the following strategies and whether it could do more to reduce PPE usage. Implement strategies you are not using and expand on strategies you are using. Minimizing contact is essential to provider protection.

	<i>Never/ Seldom</i>	<i>Sometimes</i>	<i>Often/ Always</i>	<i>Could do more</i>
<b>CONVENTIONAL: ENGINEERING, PHYSICAL BARRIERS</b>				
Use barrier controls				
Use remote camera-based observation				
Placing of medical equipment (e.g., IV towers, ventilators) outside patient rooms to minimize need for entry				
<b>CONVENTIONAL: WORK PRACTICES, ADMINISTRATIVE CHANGES, TECHNOLOGY</b>				
Use source control: masks for patients suspected or confirmed w infectious agents				
Implement telemedicine				
Use automated or “no-contact” delivery of food and supply to patients				
Reduce number of providers contacting patient, or frequency of contact				
Cohort patients				
<b>CONTINGENCY</b>				
Extend use of undamaged, non-visibly-soiled PPE				

\*See *Resources & Appendix* for resources related to PPE preservation.

\*\**PPEPP Tool* PPE frequencies are displayed with a drop-down menu.





# Preserve PPE

## 3

### Reuse Personal Protective Equipment (Tool Tab 3)

Increase PPE preservation strategies within your facility or organization by reusing PPE. Begin with identifying which strategies and systems you are currently using, and expand your usage of the systems and strategies you are not frequently using.

#### **A. Extend use, including decontamination and limited reuse**

Recognize access to and utilize the following options to decontaminate and reuse PPE. Begin to implement these options where your responses are “never/seldom” or “sometimes”.

**Instructions:** Indicate how often\* your facility or organization is using the following strategies and whether it could do more to reuse or extend use of PPE.

<i>Strategy</i>	<i>Never/ Seldom</i>	<i>Sometimes</i>	<i>Often/ Always</i>	<i>Could do more</i>
<b>CONVENTIONAL</b>				
Use reusable respirators (see Repurpose section)				
Use reusable (non-disposable) eye protection				
Use cotton and/or polyester washable gowns				
<b>CONTINGENCY: Decontamination and storage (for crisis use)</b>				
Disinfect and store N95 respirators for later reuse				
<b>CRISIS: Extended use, including decontamination and limited reuse</b>				
Use PPE beyond the manufacturer’s expiration date				
Disinfect/ wash and reuse disposable gloves (during wearing)				
Disinfect and reuse N95 respirators				
Use paper bag method: reuse rotating set of N95 respirators per worker				
Disinfect/ clean/ reuse disposable face shields				

\*PPEPP Tool PPE frequencies are displayed with a drop-down menu.



# Preserve PPE

## 4

### Reuse Personal Protective Equipment (Tool Tab 4)

#### *B. Decontaminate and reuse N95s*

Recognize access to and utilize the following decontamination systems that are authorized by FDA to decontaminate certain compatible disposable N95 filtering facepiece respirators (FFRs), for use under crisis conditions, or to decontaminate them and store them for later reuse, under contingency conditions. Consider using a deployed CCDS or purchasing a sterilizer with an FDA-authorized decontamination system\* to decontaminate compatible disposable N95 respirators, if you do not currently have access to one. CDC/NIOSH's National Personal Protective Technology Laboratory provides decontamination assessment results.\*\*

**Instructions:** For the PPE reuse strategy of disinfecting/reusing N95 respirators, indicate whether you have access to, are using, and will consider using or increasing use of the following methods authorized by an FDA-issued EUA.

<i>System</i>	<i>Have access</i>	<i>Using</i>	<i>Will consider using/ increasing use</i>
Battelle Critical Care Decontamination System (CCDS) ***			
Technical Safety Services VHP			
Stryker Sustainability Solutions VHP Decontamination Systems			
Steris steam decontamination cycle in AMSCO Medium Steam Sterilizer			
Duke Decontamination System			
Sterilucent, Inc. Sterilization System			
Stryker Sterizone VP4 N95 respirator decontamination cycle			
Advanced Sterilization Products (ASP) STERRAD Sterilization System			
STERIS Sterilization Systems for decontamination of N95 respirator			
Other:			

\*[Emergency Use Authorization \(EUA\) information, and list of all current EUAs](#) and [Coronavirus \(COVID-19\) Update: FDA Reissues Emergency Use Authorizations Revising Which Types of Respirators Can Be Decontaminated for Reuse](#)

\*\* [NPPTL Respirator Assessments to Support the COVID-19 Response](#)

\*\*\* [BATTELLE CCDS™ FAQ](#)



## Preserve PPE

# 5

### Repurpose Alternate Personal Protective Equipment (Tool Tab 5)

Use alternate types and sources of PPE as much as possible to increase the duration that PPE supplies last (See [PPE Preservation Best Practices](#)) Consider purchasing reusable PPE to alleviate strain on disposable PPE supplies. Establish cleaning, disinfecting, or laundering agreements or capabilities within your facility or organization for reusable gloves, respirators, coveralls, and gowns. For EHMRs and PAPRs, ensure that the facility and organization meets 29 CFR 1910.134.

**Instructions:** Indicate how often\* your facility or organization’s repurposes PPE that is “traditionally” used for non-healthcare or non-first-responder communities (even if recently becoming more common in healthcare/first-responder communities), and whether you could do more.

<i>PPE</i>	<i>Never/ Seldom</i>	<i>Sometimes</i>	<i>Often/ Always</i>	<i>Could do more</i>
<b>CONVENTIONAL</b>				
Use elastomeric half-mask respirators (EHMRs)				
Use elastomeric full-face respirators				
Use powered air-purifying respirators (PAPRs)				
Use chemical- or particulate-resistant reusable coveralls (e.g., polyethylene)				
Other:				
Other:				

\*PPEPP Tool PPE frequencies are displayed with a drop-down menu.



# Prepare PPE Supplies

## 6

### Determine Reduction Factors (Tool Tab 6)

Implementing various preservation strategies (outlined in the Preserve PPE section) will lead to reduction of PPE use at varied factors. The user can indicate whether they plan to use a particular preservation strategy now or soon and see how PPE reduction factors are altered. Determining reduction factors requires using the accompanying *PPEPP Tool*<sup>(1)</sup> – the table below is a sample\* of strategies and is not exhaustive.

**Instructions:** Indicate whether you plan to implement the given preservation strategy now/soon/none. If implementing now or soon, indicate the proportion of patients or staff, depending on the strategy, that will be driving use of the preservation strategy. Columns to the right will then show resulting reduction factors. Adjust the assumptions that guide reduction factor calculations in columns N through X of the *PPEPP Tool*.

Strategy	Preservation category	Implementation or enhancement potential Now/Soon/None	Reduction factor for patients to whom applied	Proportion of patients (for which PPE now used) or applicable staff using method
<b>General (all PPE)</b>				
Implement telemedicine	Reduce	Soon	1.00	0.50
<b>Gloves</b>				
Disinfect/ wash/ reuse disposable gloves (during wearing)	Reuse	Now	0.97	0.50
<b>N95 (or other) FFRs</b>				
Use elastomeric half-mask respirators (EHMRs)	Repurpose	Soon	0.95	1
<b>Face shields/ eye protection</b>				
Use reusable (non-disposable) eye protection	Reuse	None	0.80	1
<b>Gowns</b>				
Use cotton and/or polyester washable gowns	Reuse	None	0.98	1

\* Table data is demonstrative, not indicative of what actual inputs should be. Columns in green should be filled out by the user depending on facility preferences and needs. Not all strategies are shown in the sample table.

\*\* Not all table columns or rows are shown above, which is illustrative. The *PPEPP Tool* displays combined reduction factors across implemented/ implementable strategies.

\*\*\* Sample Data



# Prepare PPE Supplies

## 7

### Identify Impacted Population (Tool Tab 7a or Tab 7b\*)

Develop a list of workers and volunteers who may come into contact with COVID-19 patients or patient locations. Additionally, identify other personnel who will need PPE for you to conduct business, including custodial staff, security personnel, administrative staff, and clientele to whom you provide PPE. This list will inform the total amount of PPE your facility and/or organization needs. Examples include (but are not limited to) those in the list below.

Facility / Organization	
	<b>PATIENT/ CLIENT CARE</b>
	Hospital – larger, with ED
	Hospital – larger, with ED
	Hospital – smaller, without ED
	Hospital – smaller, without ED
	Emergency department (stand-alone)
	Urgent-care clinic/ center/ facility
	Assisted-living facility
	Emergency Medical Services (EMS)
	Nursing home
	Hospice-care facility
	Dental office
	Outpatient specialty facility (specify)
	Home-care service
	<b>FIRST-RESPONDER</b>
	Emergency medical services
	Fire department/ Hazmat response
	Law enforcement
	Local emergency management
	Search and rescue
	Other:

Personnel Requiring PPE	
	<b>CLINICAL CARE STAFF</b>
	Licensed practical nurses
	Nurse practitioners
	Nurses
	Physical therapists
	Physician assistants
	Physicians
	Respiratory therapists
	<b>FIRST-RESPONDER STAFF</b>
	Dispatch/911
	Emergency medical technicians
	Firefighters
	Hazardous materials personnel
	Law enforcement officers
	<b>GENERAL STAFF</b>
	Administrative staff
	Custodial staff
	Laboratory personnel
	Maintenance/ utilities/ IT staff
	Security personnel
	<b>CLIENTELE</b>
	Patients/residents
	Companions
	Other:

\*These populations will be incorporated to assess PPE needs and supply status (Tabs 7 and 8). Tab 7a is for manual entry of daily use rates while Tab 7b affords analytical calculation from assumptions you provide.



## Prepare PPE Supplies

### 1 Assess PPE Needs (Tool Tab 7a or 7b\*)

Identify immediate PPE needs with consideration of all groups requiring PPE identified in *Step 7: Identify Impacted Population*. Indicate PPE needs for use of disposable equipment; the *PPEPP Tool* then can provide estimates with implementation of PPE strategies identified for use “now” or “soon” in the “Reduction Factors” section. PPE needs addressed include gloves, N95 FFRs, surgical masks, face shields, and gowns.

**Instructions:** List your facility’s impacted population groups from *Step 7* in the personnel category column and note how many members of each impacted group use PPE at the facility. Note daily PPE usage for varied kinds of PPE for each group may vary. Enter the number of PPE units per box for each kind of PPE. Outputs will include PPE needs per day under three scenarios as noted in *Step 8*.

Personnel Category**	Number of Personnel	Gloves Used		N95 FFRs		Surgical Masks		Face Shields		Gowns	
		Per Person	Total	Per Person	Total	Per Person	Total	Per Person	Total	Per Person	Total
Administrative Staff											
Custodial Staff											
Nurses											
Physicians											
Patients											

Total daily PPE needs are calculated under the data table in Tab 7a or 7b for the three scenarios of without preservation strategies, with “Now” preservation strategies, and with “Now” and “Soon” preservation strategies.

\*Tab 7a represents a manual calculation; Tab 7b represents an analytic calculation. If you have the required information needed to fill out Tab 7a (i.e., daily PPE usage for each personnel category), it is easier to complete than Tab 7b.

\*\*Personnel categories shown are illustrative. Use the personnel categories you identified in *Step 7: Identify Impacted Population*.



# Prepare PPE Supplies

## 8

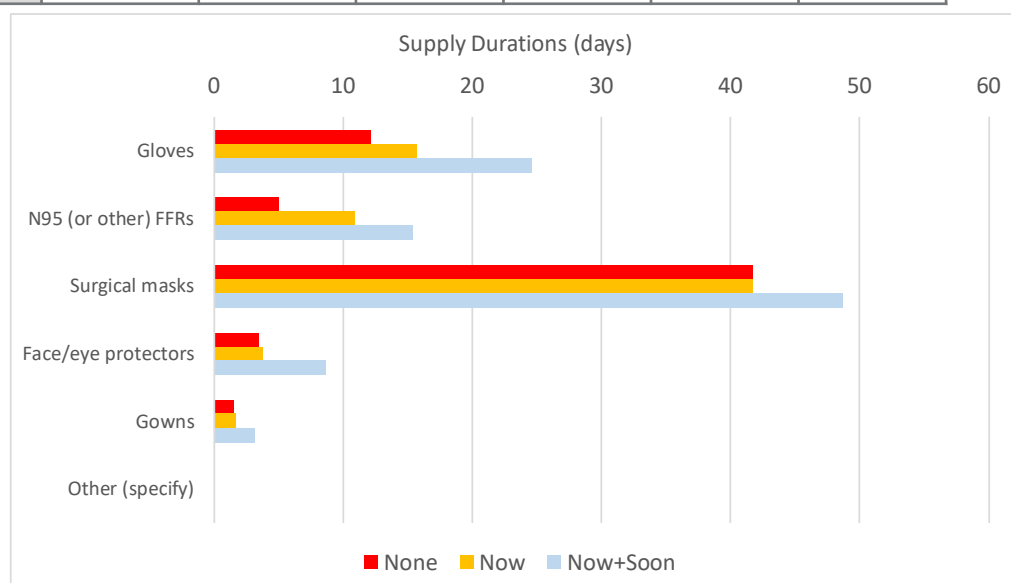
### Assess Supply Access & Limitations (Tool Tab 8a or 8b\*)

Identify the duration of your supply of PPE. Three scenarios are modeled to show the impact of preservation strategies on supply duration: without preservation strategies, with “Now” strategies, and with “Now” and “Soon” strategies.

**Instructions:** Enter your organization’s supply on hand of varied kinds of PPE and the *PPE Preservation Planning Tool*<sup>(1)</sup> will provide an estimate of supply duration. Three scenarios of preservation strategies are shown: without preservation strategies, with preservation strategies marked as implementing “Now,” and with preservation strategies marked as implementing “Now” and “Soon.”

	Supply (items, pairs, or boxes)	Supply Durations (days)				
		< 1	1 – 2.9	3 – 6.9	7 – 13.9	≥ 14
Gloves						
N95 or other FFRs						
Surgical masks						
Face/eye protectors						
Gowns						

Sample supply  
duration outputs  
from tool for  
illustrative purposes



\*Tab 8a represents a manual calculation; Tab 8b represents an analytical calculation. If you have the required information needed to fill out Tab 8a (i.e., PPE usage for varied personnel categories), it is recommended to use the manual Tab 8a.



# Prepare PPE Supplies

## 9

### Place Orders

Place PPE orders with your usual vendor(s). Share your forecasted PPE requirements with the vendor and proactively seek NIOSH-approved reusable equipment.

## 10

### If Needed: Communicate with Health Departments

If PPE orders are significantly delayed with commercial vendors and your facility or organization is facing critical shortages of PPE (e.g., less than seven days of supply on-hand), communicate your anticipated PPE needs to your local and state health department(s) to elevate to the state emergency management agency for a resource request to FEMA. In your notification, include the following information:

- PPE orders placed with commercial vendor(s)
- Supplemental PPE requirements, specifically PPE that you have been unable to acquire through commercial vendors





# Additional Resources

## PPE Resources

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- PPE Preservation Planning Tool (*assessing and planning use*)
- [PPE Preservation Best Practices](#)
- [Respirators for Healthcare during COVID-19: Authorized Use & Avoiding Fraudulent Products](#)
- [CCDSs](#)
- [CCDS FAQs](#)
- [CDC Burn Rate Calculator](#) (*calculate current use rates; estimate supply duration*)
- [NIOSH PPE Tracker App](#) (*calculate current use rates; estimate supply duration*)
- [EMS PPE Supply Estimator](#) (*calculate current use rates; estimate supply duration*)
- [Addressing PPE Needs in Non-Healthcare Setting](#)
- [Battelle CCDS FAQ and Operational Sites](#)
- [NPPTL Respirator Assessments to Support the COVID-19 Response](#)

## Other Relevant Resources

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- [Using Telehealth to Expand Access to Essential Health Services during the COVID-19 Pandemic](#)
- [Alternate Care Sites Toolkit](#)
- [Workforce Virtual Toolkit](#)

## For More Information

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For questions or concerns regarding this toolkit, contact the Healthcare Resilience Working Group at [Covid.Healthcareresilience@hhs.gov](mailto:Covid.Healthcareresilience@hhs.gov).



# Appendix

## Personal Protective Equipment Preservation Strategy Summary

Strategy	Reference
<b>General (all PPE)</b>	
Use barrier controls	
Use remote camera-based observation	
Place medical equipment (e.g., IV towers, ventilators) outside room (of those for whom PPE is needed) to minimize need for entry	
Use source control: mask patients suspected or confirmed with COVID-19 or other infectious agents	<a href="#">Interim Infection Prevention and Control Recommendations for Healthcare Personnel During the Coronavirus Disease 2019 (COVID-19) Pandemic (see Implement Universal Source Control Measures)</a>
Implement telemedicine	<a href="#">Using Telehealth to Expand Access to Essential Health Services during the COVID-19 Pandemic</a>
Use automated or “no-contact” food and supply delivery	
Reduce number of providers contacting patient	
Cohort patients	<a href="#">Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings (pg. 58-60)</a>
<b>Gloves</b>	
Disinfect/ wash and reuse disposable gloves (during wearing)	<a href="#">Strategies for Optimizing the Supply of Disposable Medical Gloves</a>
<b>N95 Respirators</b>	
Use elastomeric half-mask respirators (EHMRs)	<a href="#">Respirators for Healthcare during COVID-19: Authorized Use &amp; Avoiding Fraudulent Products</a>
Use elastomeric full-face respirators	
Use powered air-purifying respirators (PAPRs)	
Disinfect and reuse N95s	<a href="#">Strategies for Optimizing the Supply of N95 Respirators</a> <a href="#">NPPTL Respirator Assessments to Support the COVID-19 Response</a>
Use the paper bag method to reuse N95s	<a href="#">Decontamination and Reuse of Filtering Facepiece Respirators</a>
<b>Face Shields/ Eye Protection</b>	
Use reusable eye protection	<a href="#">Strategies for Optimizing the Supply of Eye Protection</a>
Disinfect/ wash and reuse disposable face shields	
<b>Gowns</b>	
Use reusable cotton and/or polyester washable gowns	<a href="#">Strategies for Optimizing the Supply of Isolation Gowns</a>
Use chemical- or particulate-resistant reusable coveralls (e.g., polyester)	