

Strategies for Optimizing Personal Protective Equipment: Facemasks, Gowns, N95 Respirators and Eye Protection

Optimizing PPE strategies

Limited availability of personal protective equipment (PPE) has complicated medical care of patients with suspected or documented COVID-19 (and other transmissible conditions) worldwide. The Centers for Disease Control and Prevention (CDC) has issued guidance on [strategies for optimizing PPE](#), in which a series of strategies or options are offered to optimize the supplies of PPE. Surge capacity is a useful framework to approach a decreased supply of PPE during COVID-19 response. Three general levels have been used to describe surge capacity and can be used to prioritize measures to conserve facemask supplies along the continuum of care.

- **Conventional capacity:** measures consist of providing patient care without any change in daily contemporary practices. This set of measures, consisting of engineering, administrative, and PPE controls should already be implemented in general infection prevention and control plans in healthcare settings.
- **Contingency capacity:** measures may change daily standard practices but may not have any significant impact on the care delivered to the patient or the safety of healthcare personnel (HCP). These practices may be used temporarily during periods of expected shortages.
- **Crisis capacity:** strategies that are not commensurate with U.S. standards of care. These measures, or a combination of these measures, may need to be considered during periods of known shortages.

Strategies for Optimizing the Supply of Facemasks

Contingency capacity

- Extended use of facemasks for multiple encounters with different patients, without removing it between encounters
 - Must remove and discard facemasks if soiled, damaged, or hard to breathe through
- Restrict facemasks to use by HCP, rather than patients for source control
 - Have patients with symptoms of respiratory infection use tissues or other barriers to cover their mouth and nose.

Crisis capacity

- Use facemasks beyond the manufacturer-designated shelf life during patient care activities
- Implement limited re-use of facemasks where in HCP uses same facemask for multiple encounters with different patients but removing it after each encounter
 - The facemask should be removed and discarded if soiled, damaged, or hard to breathe through
 - Not all facemask can be re-used (facemask with elastic ear hooks may be more suitable)
- When no facemasks are available
 - Use a face shield that covers the entire front (that extends to the chin or below) and sides of the face with no facemask
 - Consider use of ventilated headboards
 - HCP use of homemade masks (not considered PPE, capability to protect is unknown, use caution)

More information on optimizing the supply of facemasks from the CDC can be found [here](#).

Strategies for Optimizing the Supply of Isolation Gowns

Contingency capacity

- Shift gown use towards cloth isolation gowns
 - Reusable (i.e., washable) gowns are typically made of polyester or polyester-cotton fabrics. Gowns made of these fabrics can be safely laundered according to [routine procedures](#) and reused.
- Use of expired gowns beyond the manufacturer-designated shelf life for training
- Consider use of coveralls
- Use gowns or coveralls conforming to international standards

Crisis capacity

- Extended use of isolation gowns
 - Consideration can be made to extend the use of isolation gowns (disposable or cloth) such that the same gown is worn by the same HCP when interacting with more than one patient known to be infected with the same infectious disease when these patients housed in the same location (i.e., COVID-19 patients residing in an isolation cohort). This can be considered only if there are no additional co-infectious diagnoses transmitted by contact (such as *Clostridioides difficile*) among patients. If the gown becomes visibly soiled, it must be removed and discarded as per [usual practices](#).
- Re-use of cloth isolation gowns
- Prioritize gowns
 - During care activities where splashes and sprays are anticipated, which typically includes aerosol generating procedures
 - During high contact patient care activities like dressing, bathing/showering, transferring, providing hygiene, changing linens, changing briefs or assisting with toileting, device care or use, wound care
- When no gowns are available
 - Consider using gown alternatives that have not been evaluated as effective like disposable lab coats, reusable patient gowns, reusable lab coats, disposable aprons

More information on optimizing the supply of isolation gowns from the CDC can be found [here](#).

Strategies for Optimizing the Supply of N95 Respirators

Contingency capacity

- Use of N95 respirators beyond the manufacturer-designated shelf life for training and fit testing
- Extended use of N95 respirators
 - Extended use refers to the practice of wearing the same N95 respirator for repeated close contact encounters with several patients, without removing the respirator between patient encounters
 - Extended use may be implemented when multiple patients are infected with the same respiratory pathogen and patients are placed together in the same unit.
- Limited re-use of N95 respirators
 - [Re-use](#) 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. This practice is often referred to as “limited reuse” because restrictions are in place to limit the number of times the same respirator is reused.

Crisis capacity

- Use of respirators beyond the manufacturer-designated shelf life for healthcare delivery
 - However, respirators beyond the manufacturer-designated shelf life may not perform to the requirements for which they were certified. Over time, components such as the straps and nose bridge material may degrade, which can affect the quality of the fit and seal.
- Use of respirators approved under standards used in other countries that are similar to NIOSH-approved N95 respirators

More information on extended and limited reuse from the CDC can be found [here](#).

Strategies for Optimizing the Supply of Eye Protection**Contingency capacity**

- Shift eye protection supplies from disposable to re-usable devices (i.e., goggles and reusable face shields).
 - Ensure appropriate cleaning and disinfection between users if goggles or reusable face shields are used.
- Implement extended use of eye protection.
 - Eye protection should be removed and reprocessed if it becomes visibly soiled or difficult to see through.
 - HCP should take care not to touch their eye protection. If they touch or adjust their eye protection, they must immediately perform hand hygiene.

Crisis capacity

- Use eye protection devices beyond the manufacturer-designated shelf life during patient care activities
- Prioritize eye protection for selected activities such as:
 - During care activities where splashes and sprays are anticipated, which typically includes aerosol generating procedures.
 - During activities where prolonged face-to-face or close contact with a potentially infectious patient is unavoidable
- Consider using safety glasses (e.g., trauma glasses) that have extensions to cover the side of the eyes

More information on optimizing supply of eye protection from the CDC can be found [here](#).

COVID-19: Long Term Services & Supports (LTSS) Staff Personal Protective Equipment (PPE) Contingency Planning

- LTSS agencies and facilities understand their PPE inventory, supply chain, and utilization and they are working locally to address PPE needs.
- Agencies and facilities may operate at multiple levels of capacity, depending on the type of PPE (i.e. agency is at contingency capacity for masks, but crisis capacity for eye protection).
- Agencies and facilities must continue to implement control measures to reduce the number of people interacting with patients/residents, maximize telehealth services, reduce face-to-face contact by staff, cohort patients/residents and dedicate personnel for care.

| PATIENT/RESIDENT | PPE TYPE | CONVENTIONAL CAPACITY <i>NO LONGER APPLICABLE</i> | CONTINGENCY CAPACITY | CRISIS CAPACITY |
|------------------------------------|-----------------------|---|--|--|
| No Exposure No Symptoms | MASK | <ul style="list-style-type: none"> • Surgical/medical facemask | <ul style="list-style-type: none"> • Surgical/medical facemask: extended use/re-use all shift* | <ul style="list-style-type: none"> • Surgical/medical facemask preferred- extended use/re-use all shift* • When no approved facemask is available: <ul style="list-style-type: none"> » Face shield with available mask » Non-NIOSH approved mask (e.g. non-medical or handmade) |
| | EYE PROTECTION | <ul style="list-style-type: none"> • Routine precautions | <ul style="list-style-type: none"> • Routine precautions | <ul style="list-style-type: none"> • Routine precautions |
| | GOWN | <ul style="list-style-type: none"> • Routine precautions | <ul style="list-style-type: none"> • Routine precautions | <ul style="list-style-type: none"> • Routine precautions |
| | GLOVES | <ul style="list-style-type: none"> • Routine precautions | <ul style="list-style-type: none"> • Routine precautions | <ul style="list-style-type: none"> • Routine precautions |
| Exposed No Symptoms | MASK | <ul style="list-style-type: none"> • N95 | <ul style="list-style-type: none"> • Surgical/medical facemask: extended use/re-use all shift* • N95 only with aerosol-generating procedures | <ul style="list-style-type: none"> • Surgical/medical facemask - extended use/re-use all shift* • When no approved facemask is available: <ul style="list-style-type: none"> » Face shield with available mask » Non-NIOSH approved mask (e.g. non-medical or handmade) |
| | EYE PROTECTION | <ul style="list-style-type: none"> • Goggles/face shield | <ul style="list-style-type: none"> • Extended use/re-use goggles or face shield | <ul style="list-style-type: none"> • Extended use/re-use safety glasses |
| | GOWN | <ul style="list-style-type: none"> • Isolation | <ul style="list-style-type: none"> • Use expired or cloth isolation gowns • Change in between residents | <ul style="list-style-type: none"> • Extended use/re-use of disposable or cloth gowns • Dedicated to resident or room with like residents (no additional infection ex: C.diff) • Consider coveralls for healthcare • When no gowns are available: consider reusable/washable patient gowns, lab coats (worn backwards) |
| | GLOVES | <ul style="list-style-type: none"> • Disposable | <ul style="list-style-type: none"> • Medical grade, nonsterile • Change in between residents | <ul style="list-style-type: none"> • Non-medical, industrial |

| | | | | |
|---|-----------------------|---|--|--|
| COVID-19+ Confirmed/ Suspected | MASK | <ul style="list-style-type: none"> • N95 | <ul style="list-style-type: none"> • N95: extended use within isolation status; limited re-use* | <ul style="list-style-type: none"> • Surgical/medical facemask - extended use/re-use all shift* • N95 only with aerosol-generating procedures |
| | EYE PROTECTION | <ul style="list-style-type: none"> • Goggles/face shield | <ul style="list-style-type: none"> • Extended use/re-use goggles or face shield | <ul style="list-style-type: none"> • Extended use/re-use safety glasses |
| | GOWN | <ul style="list-style-type: none"> • Isolation | <ul style="list-style-type: none"> • Use expired or cloth isolation gowns • Change in between patients | <ul style="list-style-type: none"> • Extended use/re-use of disposable or cloth gowns • Dedicated to patient or room with like patients (no additional infection ex: C.diff) • Consider coveralls for healthcare • When no gowns are available: consider reusable/washable patient gowns, lab coats (worn backwards) |
| | GLOVES | <ul style="list-style-type: none"> • Disposable | <ul style="list-style-type: none"> • Medical grade, nonsterile • Change in between patients | <ul style="list-style-type: none"> • Non-medical, Industrial |

****unless contaminated (wet, soiled, damaged)***