

Optimising the supply of personal protective equipment (PPE) | Queensland Health

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Purpose

This guideline provides recommendations to support optimising the supply and rational use of personal protective equipment (PPE) in the context of a disrupted supply chain.

Scope

This guideline provides information for all Queensland Health Hospital and Health Service (HHS) employees (permanent, temporary, and casual) and all organisations and individuals acting as its agents (including visiting Medical Officers and other partners, contractors, consultants and volunteers) and all Queensland licensed private health facilities. This guideline may also be used by other health and care organisations and high-risk communal

settings such as Residential Aged Care Facilities (RACF), disability accommodation services, primary care providers, homeless accommodation facilities, boarding schools and correctional facilities. Compliance with this guideline is not mandatory, however, sound reasoning should exist for departing from the recommended principles within a guideline.

Related documents

This document should be read in conjunction with the below.

Standards, procedures and guidelines

- [Australian Guidelines for the Prevention and Control of Infection in Healthcare](#)
- [Queensland Health infection prevention and control guidelines for the management of COVID-19 in healthcare settings](#)
- [Escalation of personal protective equipment usage in healthcare delivery, community health and in-home care settings, and for healthcare delivery in correctional services](#)
- [Escalation of personal protective equipment usage in residential aged care and disability accommodation services](#)
- [Queensland COVID-19 vaccine rollout PPE advice](#)
- [Fit testing of particulate filter respirators in respiratory protection programs](#)

Background

For this guidance, Queensland Health is adopting the approach used in the Centers for Disease Control and Prevention's (CDC) [Optimizing personal protective equipment supplies](#). This CDC guidance uses a framework of three tiers of PPE supply capacity strategies:

1. **Conventional capacity:** strategies in place (1) as part of infection prevention and control plans and in accordance with existing guidance.
2. **Contingency capacity:** strategies to be used when there is supply chain disruption and/or during a surge in consumption when shortage is expected (1).
3. **Crisis capacity:** strategies only to be used when supplies do not meet the need or usage rate (1). Crisis strategies must only be used as a last resort when conventional and contingency strategies have been used and have not been sufficient.

Once the availability of PPE returns to normal, conventional capacity strategies must be resumed. This includes respiratory protection programs and fit testing, which should be carried out as per the Queensland Health guidance [Fit testing of particulate filter respirators in respiratory protection programs](#).

Conventional capacity strategies

Conventional capacity strategies promote use of PPE in accordance with established infection prevention and control guidance. These strategies involve recognition of PPE as the lowest line of defence in the [hierarchy of controls](#).

Besides PPE, other methods of control to reduce the risk of exposure to infectious respiratory pathogens such as COVID-19 should be in place. These measures include but are not limited to:

- Consistent application of standard precautions
- Consistent application of transmission-based precautions as appropriate
- Timely recognition of those with suspected or confirmed transmissible infection
- Appropriate use of isolation rooms, and cohort areas
- Ensuring adequate ventilation
- Workflow design
- Physical barriers
- Suitable policies, training and communication

For further information refer to the Infection Control Expert Group's guidance [Minimising the risk of infectious respiratory disease transmission in the context of COVID-19: the hierarchy of controls](#).

The following strategies to reserve supply, reduce use and substitute products should be used as part of conventional capacity strategies.

Reserve supply

Management of all aspects of the supply chain should be in effect (2).

For Queensland Health facilities:

- The COVID-19 Supply Chain Surety Division has implemented monitoring and reporting of supply of critical items including PPE. Each HHS should maintain situational awareness of state-level PPE supply.

For non-Queensland Health facilities:

- Establish and maintain a diversified chain of suppliers for Therapeutic Goods Administration (TGA) listed PPE, including surgical masks, N95/P2 respirators, eye protection and long-sleeved fluid-resistant gowns and plastic aprons.
- Ensure suppliers understand the facilities' range of supply needs and can demonstrate ability to maintain supply during surge periods.

For all facilities (Queensland Health and non-Queensland Health):

- A governance structure should be established with a dedicated, senior resource assigned specific accountability for PPE monitoring and ordering.
- Local monitoring and management of PPE. This should include measures at all levels of the supply chain, from the initial distribution and storage to patient care areas.

- All facilities should evaluate burn rates of PPE during usual business and consider predicted burn rates during surge periods and across several COVID prevalence/facility outbreak scenarios. A PPE burn rate calculator is available here: <https://www.cdc.gov/coronavirus/2019-ncov/hcp/ppe-strategy/burn-calculator.html> Additional information for RACFs is available here: <https://www.health.gov.au/news/announcements/protecting-older-australians-covid-19-update-3-february-2022>.
- Orders of PPE should be based on current and future predicted demand
- PPE stock should be rotated to avoid stock expiring.
- Storage of P2/N95 respirators and surgical masks should be secure. Managers should remove these items from general stock storage areas to a more secure location, for example, a locked medication room.
- Balance the stock security with the need for staff access to PPE. PPE should always be available to be used by staff who require it.
- Where there is a need to supply surgical masks or P2/N95 respirators for patient or visitor use, staff members should supervise PPE allocation. Patients and visitors should not have direct access to PPE.

Ensure appropriate use

Strategies to ensure appropriate PPE use include but are not limited to:

- Staff education:
 - Ensure staff understand the principles of PPE use and how to choose appropriate PPE.
 - Ensure staff perform a transmission risk assessment to identify appropriate PPE selection (2) for each clinical interaction or non-clinical activity, guided by Queensland Health guidance.
- Bundling of care activities (2) to reduce the number of room visits.
- Using intercom systems or phones to communicate with patients in isolation.
- Using telehealth for outpatients (2) or for clinical review of patients/residents if clinically appropriate.
- Use of physical barriers to assist physical distancing when direct contact is not required. For example, the use of screens at public-facing administrative desks.
- Limit traffic of visitors and visiting staff to areas where PPE is required (2).

However:

- Any strategy employed regarding the use of PPE should not reduce the safety of health workers or patients/residents.
- PPE should always be available to be used by staff when clinically indicated.

Substitute products

Consider using alternative products:

- Reusable gowns, including splash-resistant gowns, may be considered in certain areas that currently use single-use items.
- Plastic aprons instead of long-sleeved disposable gowns where appropriate.
- Re-usable eye protection instead of single-use eye protection (ensure that manufacturer guidance is followed for the cleaning and re-use of eye protection).
- The use of a face shield may enable the use of face masks with lower levels of fluid resistance where clinically indicated. Ensure the face shield covers the eyes, mouth and nose.
- Where possible, ensure that staff are fit tested for more than one type of P2/N95 respirator.

Use of PPE past shelf-life for training and fit testing

PPE past its expiry date or the shelf-life designated by the manufacturer should not be discarded. These items may be kept and considered for use as part of training and/or respirators used for fit testing. If expired respirators are to be used for fit testing the elastic bands should be inspected to ensure their integrity: if the elastic bands are compromised the fit of the respirator may not be as expected.

Contingency capacity strategies

Contingency capacity strategies are intended to be initiated in response to situations where it is anticipated that PPE usage may outstrip supply. For example, when there are supply chain disruptions or during surges in activity. These strategies are intended to conserve available supplies without compromising safety.

Extended use

Extended use is wearing the same PPE for repeated patient interactions without removing and replacing the PPE. Before extended use is considered, all efforts should be made, by other methods, to remove or reduce the necessity for PPE.

The extended use of some forms of PPE may be considered in the context of shortage where a local risk assessment of the situation has occurred (3) and there are processes for training staff in extended use. This strategy is most appropriate in a setting where COVID-19 patients are cohorted together in the same ward or waiting area.

Extended use is most appropriate for respirators, masks or eye protection, where a surgical mask, P2/N95 respirator and/or eye protection is left in-situ for multiple patient interactions as these items do not come directly into contact with a patient. Extended use of gowns may be used only in cohort areas, where patients affected with the same infective organism are being cared for in one area.

Workers must not be prevented from eating and drinking or taking a toilet or other break in order to extend the use of PPE items.

If this strategy is initiated there are some considerations for each type of PPE that should be addressed locally before implementation, see below.

P2/N95 respirators

P2/N95 respirators should be:

- discarded if contaminated with blood or bodily fluids (3).
- removed before proceeding to care for patients other than those who are isolated for COVID-19, or on leaving the cohort area (3).
- replaced if it becomes hard to breathe through or no longer holds its shape or no longer conforms to the wearer's face (3).

Some guidelines state that respirators can be worn for up to 4 to 6 hours unless damaged soiled or contaminated (2, 4). It is likely that a worker will remove or change a P2/N95 respirator for reasons such as eating or drinking or leaving the patient care area before it is not performing correctly.

The worker should be reminded to occasionally check their respirator to ensure that the correct fit is maintained. To prevent self-contamination, hand hygiene must be performed before and after the wearer touches the front of the respirator to adjust the fit or maintain comfort (3).

When extending use of a P2/N95 respirator, a face shield should be used as eye protection, in preference to safety goggles, to prevent contamination of the respirator from splashes or sprays, and during aerosol-generating procedures (1, 5).

Clear instructions and training about the criteria for changing a P2/N95 respirator should be provided to staff who will be using the respirators in an extended use area. Hand hygiene must be performed immediately before and immediately after removing a respirator.

Surgical masks

Surgical masks should be:

- discarded if contaminated with blood or bodily fluids (3).
- removed before proceeding to care for patients other than those who are isolated for COVID-19 (3).
- removed when it becomes wet or damp, or hard to breathe through (3).

Surgical masks are designed to be worn for extended periods of time. They are generally well tolerated on the face. Some guidelines state that surgical masks can be worn for 4 to 6 hours unless damaged, soiled, or contaminated (2, 4). It is likely that a worker will remove or change a mask for reasons such as eating or drinking or leaving the patient care area before the mask is not performing correctly. Masks should not be pulled down around the chin and neck and then re-worn. Hand hygiene must be performed immediately before and immediately after removing a mask or adjusting for fit or comfort.

Eye protection

Eye protection is worn to protect the wearer's eyes from sprays and splashes. Appropriate eye protection includes reusable safety goggles, single-use face shields or reusable frames fitted with single-use lenses. Regular prescription or other similar glasses are not considered eye protection. Reusable eye protection should be cleaned and disinfected as per local procedure for non-critical medical devices before it is reused. Refer to [ICEG guidelines on cleaning and disinfection of protective eyewear in health and residential care facilities](#) for further guidance.

Eye protection should:

- be reprocessed or discarded if visibly contaminated with blood or body fluids.
- be removed before proceeding to care for patients other than those who are isolated for COVID-19.

Gowns

Extended use of gowns should only be considered in cohort areas. The following may be considered in the context of supply shortages relating to long-sleeved fluid-resistant gowns:

- a plastic apron may be worn over the long-sleeved gown when providing care.
 - when using this option, if splash protection is not required a reusable/non-fluid-resistant long-sleeved gown may be used.
 - the plastic apron and gloves must be changed, and hand hygiene performed between contact with each patient.
- the long-sleeved gown must be removed or changed:
 - when leaving the patient care area.
 - when proceeding to care for patients other than those who are isolated for COVID-19.
 - when visibly soiled with blood or body fluids.
 - following extensive patient contact. For example, providing care such as dressing large or complex wounds; hygiene cares for incontinent clients; hygiene cares or pressure area care when a client is fully dependent; urinary catheter cares.

Gloves

Reuse or extended use of gloves should not be considered.

Risk-stratify annual fit testing

Prioritise fit testing for those who have not been previously fit tested, whose fit-tested respirator is not available for use, or who have had significant weight loss or weight gain (1) ($\geq 9\text{kg}$ has been associated with significant change to fit) (6).

Those whose annual fit testing is delayed must be educated and reminded of the importance of performing a fit check every time they put on or adjust a respirator (1).

Prioritise the use of any available soon-to-expire or expired respirator stock for use in fit testing.

Crisis capacity strategies

Crisis capacity strategies are not to be considered unless all conventional and contingency strategies have failed or are unavailable. Every effort must be made to avoid the need to use crisis capacity strategies. These strategies diverge from the standard recommendations for PPE usage but may need to be considered when all other strategies have failed and supply is not able to meet current or imminently expected demand.

When making a local decision about implementing crisis capacity strategies, a rapid risk assessment should be undertaken. This risk assessment should consider the current local risks of disease transmission and the risk controls currently in place. It should then consider what additional controls can be implemented to mitigate risks associated with a variance in PPE use. Refer to [Additional controls](#) below.

A worker cannot be compelled to work without the standard of PPE required to ensure their safety. Where crisis capacity strategies are implemented, any participation of workers must be voluntary. The worker must have been transparently informed of the associated risks without coercion or compulsion. Consultation and engagement with Workplace Health and Safety representatives and union representatives should occur. It is further noted that such a request by an employer may only be made when all available Commonwealth and State escalations have occurred, and an internal disaster has been declared.

Additional controls

If initiating crisis capacity strategies, it is important to minimise face-to-face clinical contact where safe to do so. Where such contact is required, maximise source control through prioritising placement of a surgical mask on the source patient where safe to do so and use additional controls to reduce the risk of transmission.

When there is insufficient supply of PPE, additional controls should also be implemented wherever practicable. These may include (but are not limited to):

- Utilise and optimise the use of virtual or telehealth models to deliver healthcare (1, 2).
- Postponing elective and non-urgent admissions and procedures (7).
- Improving the ventilation of the indoor space by opening windows or doors or increasing the fresh air intake of heating, ventilation and cooling (HVAC) systems.
- Consider the use of portable air purifiers.
- Maximise source control (use of a surgical mask on the source patient where this is safe for the patient).
- Consider use of additional devices such as individual patient ventilation (e.g., the [McMonty Medihood](#)) or [ventilated headboards](#) (1).

Refer to [Minimising the risk of infectious respiratory disease transmission in the context of COVID-19: the hierarchy of controls](#) for further guidance about controls for preventing the transmission of COVID-19.

Prioritise PPE

Prioritise PPE for those tasks with the highest risk of exposure to infection. Consider factors such as:

- The infectious status of the patient.
- Whether aerosol-generating procedures are to be carried out (1), the patient is displaying aerosol-generating behaviours or other patient factors increasing the risk of transmission are present. Refer to appendix 7 of the [Infection prevention and](#)

[control guidelines for the management of COVID-19 in healthcare settings](#) for further information about factors increasing the risk of transmission.

- The nature and duration of patient contact.
- Environment or situations where multiple infected patients are cohorted together.
- Less controlled care settings, such as emergency departments or fever clinics.
- Inadequate ventilation.
- Healthcare worker has risk factors for developing severe COVID-19 infection, or lives with those who have risk factors for severe COVID-19 infection.

Alternative PPE and extended use/limited reuse

P2/N95 respirators

When P2/N95 respirators are not available, or when a respirator a worker is fit tested for is not available, the following should be considered, in the following order:

1. When there are respirators available, but they are not those that the worker/s is/are fit tested to, consider whether it is feasible to immediately undertake fit testing.
2. Consider whether there are any alternative respiratory protection devices available that offer appropriate protection and are TGA listed for use in healthcare, for example powered air-purifying respirators (PAPR). Consider whether it is feasible to immediately undertake fit testing for these devices. Clear procedures and training for the safe donning and doffing and cleaning of these devices must be available.
3. Consider the use of P2/N95 respirators or PAPR that are not TGA listed, or elastomeric respirators for respiratory protection. If not TGA listed for use in healthcare, these devices must meet standards for respiratory protection, such as being suitable for use as a P2 respiratory protection device under *Australian/New Zealand Standard 1716:2012 Respiratory protective devices*. Such devices are usually designed for use in industrial settings and may not be fluid resistant. Consider whether it is feasible to immediately undertake fit testing for these devices. Clear procedures and training for the safe donning and doffing and cleaning of these devices must be available.
4. Where fit testing has not been able to be carried out and it is not feasible to immediately undertake fit testing, consider use of P2/N95 respirators or PAPR that have been successfully fit checked (8).
5. Consider the limited re-use of available fit tested P2/N95 respirators if extended use strategies are not sufficient to extend supply. A limited reuse strategy is an escalation of extended use and involves the reuse of a respirator by an individual worker for multiple patient encounters, removing and storing it between encounters. If this approach is initiated, ensure:
 - Usual careful hand hygiene practices must be used when donning and doffing
 - When not on the face, the respirator is stored in a paper bag (3, 9, 10), marked with the worker's name, the date, and should be marked each time of reuse.
 - It is recommended that the respirator is not used more than five times (1), that is, not donned and doffed more than five times.

- Use of a face shield to limit the contamination of the respirator while in use is recommended (1)
- 6. Consider extended use and limited reuse of successfully fit checked respirators
- 7. Consider use of fit tested respirators beyond their expiry date or the shelf-life designated by the manufacturer. A sample of these devices should be inspected to assess their physical integrity, e.g., the elasticity of the straps.
- 8. The below two options should only be considered when none of the above options are feasible for any available workers and care is required to be provided in person:
 - consider methods to improve the fit of the respirator. This may include methods to tighten the straps such as tying, or the use of tapes to improve a problem area of a seal against the face (limited evidence (11)). Use these methods in combination with a face shield.
 - As a last resort option only, improve fit of surgical mask (mask brace or adjust straps or use a cloth mask over the top of the surgical mask) with addition of face shield (1, 12, 13)

Surgical masks

During crisis capacity, limited reuse of surgical masks can be considered, following guidance as described for P2/N95 respirators.

- A limited reuse strategy is an escalation of extended use and involves the reuse of a surgical mask by an individual worker for multiple patient encounters, removing it between encounters.
 - Usual careful hand hygiene practices must be used when donning and doffing.
 - When not on the face, the surgical mask should be stored in a paper bag, marked with the worker's name, the date, and should be marked each time of reuse.
 - It is recommended that the surgical mask is not used more than five times (1).
 - Consider the use of a face shield to limit the contamination of the surgical mask while in use (1).
- Surgical masks that fasten with ties may not be able to be undone without tearing, so may not be suitable for limited reuse (7).

Protective eyewear

During crisis capacity, consider the limited reuse of disposable protective eyewear or face shields by a single worker. After safe doffing and performing hand hygiene, the worker should wipe the protective eyewear/face shield with a detergent wipe or a detergent & disinfectant wipe after use. Hand hygiene should then be performed again. The worker should write their name on the protective eyewear/face shield to prevent use by other workers. Between uses, the protective eyewear/face shield should be stored in a paper bag. The protective eyewear/face shield should be discarded if damaged or if visibility is obscured(7). A local decision should be made as to the suitability of cleaning and disinfecting protective eyewear and face shields, as some makes may not be able to be cleaned effectively or may become unusable after cleaning.

Gowns and aprons

During crisis capacity, a long-sleeved gown can be used for extended periods in a COVID-19 management area where only confirmed COVID-19 patients are managed.

During crisis capacity, long-sleeved gowns should only be used in situations with high physical contact activities, for example providing care such as dressing large or complex wounds; hygiene cares for incontinent clients; hygiene cares or pressure area care when a client is fully dependent; urinary catheter cares. Prioritise use of fluid-resistant gowns for procedures or situations where blood or body fluid exposure is anticipated.

A plastic apron rather than a long-sleeved gown should be used for low physical contact activities, for example, medication administration, observation, meals delivery.

Gloves

During crisis capacity, gloves should only be used when undertaking procedures when healthcare worker hand contact with blood or body fluids, non-intact skin, or mucous membranes is likely/anticipated. Gloves should not be reused, and extended use should not be considered for gloves.

Requests for assistance from external agencies

During times of supply chain disruption, Hospitals and Health Services (HHSs) may receive requests for assistance from external agencies, such as residential aged care facilities (RACF).

For certain agencies, there are already agreed upon processes regarding how emergency supplies can be accessed, such as RACFs and disability services. Specific details regarding the escalation process for these agencies is provided below.

For other agencies, a local decision can be made as to whether a HHS can supply the products. If this is not possible, it is recommended other government sector agencies and non-government organisations who have a state or federal government sector lead utilise internal escalation pathways. If a resolution cannot be identified through internal escalation, state agencies should submit a request for assistance to the State Health Emergency Coordination Centre (SHECC).

General Practices, Aboriginal and Torres Strait Islander Controlled Health Services, community pharmacies and other community-based health services should contact their [local Primary Health Network](#) (PHN) provider for information about access to Australian Government Department of Health PPE supplies.

Process for RACFs

1. RACF/NDIS requests assistance from the Australian Government (Commonwealth) Department of Health who will seek to source stock from the National Medical Stockpile (NMS). Providers refer to <https://consultations.health.gov.au/health-grants-and-network/03c624b7/>.
2. Should the Australian Government Department of Health not be able to supply the required stock or deliver it in the required timeframe, they can seek assistance from Queensland Health on the RACF's behalf by contacting the State Health Emergency Coordination Centre (SHECC).

3. SHECC will forward the request to the Queensland Health Vulnerable Facilities Team for triaging.
4. If it is determined that Queensland Health assistance is required, SHECC will contact Queensland Health COVID-19 Supply Chain Surety Division who will either contact the nearest HHS to provide stock or will look to provide stock from the nearest warehouse/distribution centre.

Process for disability service providers

1. The provider should contact provider.support@ndis.gov.au to escalate their need for PPE. They are also encouraged to reach out to National Disability Services who support local solutions for providers of National Disability Services ([National Disability Services \(nds.org.au\)](http://NationalDisabilityServices.nds.org.au)).

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Definitions and abbreviations

Term/abbreviation	Definition / Explanation / Details	Source
HHS	Hospital and Health Service	
P2/N95 respirator	P2/N95 respirators are designed to form a very close seal around the nose and mouth to protect the wearer from exposure to airborne particles, including pathogenic biological airborne particulates such as viruses and bacteria. These respirators have been tested for particulate filtration to ensure they remove a minimum of 95% solid and liquid aerosols that do not contain oil. P2/N95 respirators are a single use item.	Queensland Health Infection prevention and control guidelines for the management of COVID-19 in healthcare settings
PPE	Personal protective equipment	
RACF	Residential aged care facility	
Surgical mask	Surgical masks are single use, fluid-resistant, disposable and loose-fitting protection devices that create a physical barrier between the mouth and nose of the wearer and the immediate environment but do not achieve a close seal to the wearer's face.	Queensland Health Infection prevention and control guidelines for the management of COVID-19 in healthcare settings
TGA	Therapeutic Goods Administration	

Document approval details

Endorsement

PPE Working Group 4 April 2022

COVID-19 Health System Response Advisory Group 11 April 2022

Document custodian

PPE Working Group, Working Group of the COVID-19 Health System Response Advisory Group (CRG).

Approval officer

Sean Birgan, COVID-19 Health System Response Lead

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Version Control

Version	Date	Comments
Conserving personal protective equipment (PPE) V0.4	7 March 2020	Produced by COVID-19 IMT with input of Statewide Infection Clinical Network.
Conserving personal protective equipment (PPE) V1.1-2.0	18 November 2021 – 14 December 2021	Review and update conducted by Rebecca Adams, CNC Infection Prevention and Control, Healthcare Improvement Unit. Addition of referencing. Addition of document approval details, version control and custodianship, related documents, definitions. Consulted: Statewide Infection Clinical Network, COVID-19 IMT, COVID-19 Supply Chain Surety Division.
Optimising the supply of personal protective equipment (PPE) V0.1-1.0	9 February 2022 – 4 April 2022	Review and update conducted by a sub-group of the PPE Working Group. Addition of strategies for crisis capacity, framework of three tiers applied (conventional, contingency, and crisis capacity tiers). V0.1 Initial draft V0.2 Consultation with sub-group of PPE Working Group V0.3 Consultation with whole of PPE Working Group and Statewide Infection Clinical Network V0.4-0.5 Post-consultation with PPE Working Group and Statewide Infection Clinical Network. Consultation with WHS Advisory Committee V0.6 Post WHS Advisory Committee consultation V0.7 Final draft. Endorsed PPE Working Group 4 April 2022, CSRG 11 April 2022. V1.0 Final version
Optimising the supply of personal protective equipment (PPE) V1.1	1 June 2022	Removal of reference to the dimensions of a face shield as it is outside the intended scope of this document to provide recommended specifications for PPE. This minor change approved by Chair, PPE Working Group 1 June 2022.

Contact area

PPE Working Group PPEWorkingGroup@health.qld.gov.au