Guidance on the use of personal protective equipment (PPE) in hospitals during the COVID-19 outbreak

Background

This guidance was developed by the Infection Control Expert Group (ICEG) and endorsed by the Australian Health Protection Principal Committee (AHPPC) to provide guidance on the use of personal protective equipment (PPE) in hospital settings during the COVID-19 outbreak.

These recommendations are based on *current evidence, current status of COVID-19 in Australia*, risk assessment and expert advice. This guidance will be updated as new information becomes available.

This guidance is intended for health care workers in hospital settings including emergency department (ED), intensive care unit (ICU), operating suite, surgery, general medical and surgical wards and obstetrics.

For current case definitions and testing criteria see *Communicable Diseases Network Australia (CDNA) National Guidelines for Public Health Units*.

NOTE: For clinical care of, or procedures on, patients who are NOT suspected of having COVID-19, i.e. business as usual, the usual infection prevention and control precautions, including PPE if required, should be observed, according to clinical circumstances.

Additional COVID-19 specific precautions are not required.

CURRENT EVIDENCE

Evidence relating to transmission of COVID-19 in hospitals is of variable quality, sometimes contradictory and cannot, necessarily, be extrapolated to the Australian context. Many uncertainties remain. The following advice is based on the best available evidence and the current epidemiology of COVID-19 in Australia, where community transmission is minimal, except in limited geographic areas.

- **Asymptomatic COVID-19** is apparently not uncommon but its incidence and role in transmission are unknown
    - It can occur at all ages
    - Fairly high rates of asymptomatic infection have been reported in the context of outbreaks in closed settings (e.g. cruise ship, aged care facility) or high community prevalence (e.g. China, New York)
- **Presymptomatic transmission** is well documented but the duration of infectivity before onset of symptoms is uncertain
- Relationships between **viral RNA load, infectivity and the stage and severity** of disease are uncertain
    - The presence on viral RNA does not necessarily indicate viable/infectious virus
    - Viral RNA load is variably reported as higher in the early than later stages of disease or increasing with late clinical deterioration

- There is varying evidence and much debate about the degree, if any, of **airborne vs droplet transmission** of COVID-19 but the relevance to the type of respiratory protection required in different settings is uncertain
    - There is strong evidence that COVID-19, like most respiratory viral infections, is predominantly transmitted by droplets
    - Clinical and epidemiological evidence suggest that airborne transmission is rare, but some aerosol-generating procedures (AGPs) can increase the risk
    - Some fine particle (<5 micron) aerosols are produced by infected patients, but the quantity of virus in these particles is significantly less than that in large droplets
    - The transmission dynamics of COVID-19 differ from those of the few infectious diseases for which airborne transmission is recognised e.g. TB, measles and varicella

CURRENT STATUS OF COVID-19 IN AUSTRALIA

- By international standards, Australia has a high (and increasing) rate of testing and a low percentage of positive results (currently 1.6%)
- More than 60% of total cases in Australia have been acquired overseas
- The number of cases and deaths from COVID-19 in Australia are in marked contrast to that in many parts of Europe, the United Kingdom and North America
- Since the introduction of travel restrictions and social distancing measures the daily number of new infections in Australia has fallen dramatically
- Community transmission is modest and limited to a few localised sites
- The case fatality rate in Australia, overall, is <1% and the median age of death is 78.5 years
- Limited data are available about COVID-19 cases in healthcare workers. Of those for which information is available, a significant proportion were not occupationally-acquired

These data indicate that current containment measures in community and health care settings in Australia are effective if consistently observed.

General guidance on procedures performed on patients who are **NOT** suspected or confirmed cases of COVID-19

During the COVID-19 outbreak, PPE for the care of patients who are not suspected or confirmed cases of COVID-19 should be used in line with the *Australian Guidelines for the Prevention and Control of Infection in Healthcare (2019)*[1].

AGPs performed on non-COVID-19 patients in operating theatre, emergency department, endoscopy suite etc.

Given the relatively low prevalence of COVID-19 in Australia, standard precautions, in addition to standard operating theatre attire or personal protective equipment appropriate for the procedure, are adequate for the performance of AGPs on patients who are not suspected or confirmed cases of COVID-19. A surgical mask, theatre gown, gloves, eye protection (and head covering only if required as regular theatre attire) should typically be worn. A P2 respirator is not necessary in this context.

See page 6 for a list of AGPs.

[1] https://www.nhmrc.gov.au/about-us/publications/australian-guidelines-prevention-and-control-infection-healthcare-2019#block-views-block-file-attachments-content-block-1

NOTE: For AGPs performed on patients who are NOT suspected or confirmed cases of COVID-19, P2 respirators are not necessary, i.e., a surgical mask is sufficient.

General guidance on procedures performed on patients who are suspected or confirmed cases of COVID-19

Management of hospital patients in whom COVID-19 is NOT suspected

PPE required for each patient encounter depends on the specific clinical circumstances, but similar principles apply to all.

Standard precautions are required for all patients regardless of known COVID-19 status. This includes hand hygiene (5 Moments) and risk assessment to determine the level of PPE required, if any.

Cough etiquette and respiratory hygiene must be observed at all times.

Physical distancing during the COVID-19 outbreak: stay at least 1.5 m away from other people including:

- patients, except when unavoidable, e.g. during physical examination/care AND
- members of the public, hospital visitors and other staff e.g. in wards, clinics and nonclinical areas e.g. during meetings, tea breaks etc.

Management of patients with acute respiratory symptoms and/or suspected or proven COVID19

- Patients with acute respiratory symptoms should be asked to wear a surgical mask upon presentation to hospital AND
- Placed in a single room with the door closed or in a physically separated closed area designated for suspected COVID-19 cases OR
- If an AGP is to be performed, the patient should be placed in a negative pressure room (or an isolation room with door closed if a negative pressure room is not available)

If transfer outside of the room is necessary, the patient should wear a surgical mask during transfer and follow respiratory hygiene and cough etiquette.

Environmental hygiene

- In addition to routine cleaning, frequently touched surfaces should be cleaned frequently or whenever visibly soiled, with detergent/disinfectant wipes or a detergent product, using disposable or laundry safe cloth

Advice on *Environmental cleaning and disinfection for health and residential care facilities* is available on the Department of Health website.

Transmission-based precautions

- **Contact and droplet precautions** should be used for the routine care of patients in quarantine/isolation or under investigation for COVID-19 or with confirmed COVID-19

    - The use of nebulisers should be avoided and alternative medication administration devices (e.g. spacers) used

- **Contact and airborne precautions** should be used when performing AGPs

NOTE: Previous advice to use airborne precautions for care of patients with severe coughing has been withdrawn because:

- **viral load does not necessarily correlate with clinical condition**
- **coughing generates droplets, predominantly**
- **surgical masks used by patient, if possible, and healthcare worker provide adequate protection.**

Contact and **droplet** precautions for use in routine care of patients with suspected or confirmed COVID-19

There is strong clinical and epidemiological evidence that the predominant mode of spread of COVID-19 is via **respiratory droplets** (produced during speaking, coughing, sneezing etc.):

- **Directly** during close face-to-face contact (within ~1.5 m) by exposure of the mucosae of mouth, nose or eyes OR
- **Indirectly** by touching surfaces or fomites contaminated by respiratory droplets and then touching the face

Use of personal protective equipment

The following PPE should be put on, in this order, before entering the patient's room:

- Long-sleeved fluid resistant gown
    - An apron is a suitable alternative in situations in which the risk of splash is low (e.g. specimens collection)
- Surgical mask (fluid resistant, level 2 or 3)
- Eye protection: face shield, wrap-around safety glasses or goggles
- Disposable non-sterile gloves when in contact with patient (use hand hygiene before donning and after removing gloves)

Use of boots or shoe covers is not recommended unless gross contamination is anticipated or required as standard attire in operating theatre or trauma room.

Long hair should be securely tied back.

A head covering is not required except as part of standard operating theatre attire or when performing a sterile/aseptic procedure (e.g. central line insertion).

Take care to avoid self-contamination, when removing PPE.

- Remove gloves without touching the outside of the glove and perform hand hygiene
- Remove gown, without touching the front of the gown, by folding it so that the external (exposed) side is inside; perform hand hygiene
- Remove eye protection and mask outside the patient's room. Do not touch the front of mask or eye covering; perform hand hygiene after each step

Unsoiled PPE can be discarded into general waste; if visibly soiled e.g. with blood or faeces, PPE should be disposed of as clinical/infectious waste. (**Note:** local jurisdictional regulations for waste disposal should be followed).

Only PPE marked as reusable should be reused after decontamination and reprocessing according to the manufacturer's instructions. All other PPE must be disposed of after use.

Contact and **airborne** precautions during aerosol-generating procedures in the care of patients with COVID-19

The only modification for **airborne precautions**, is the use of a **particle filter (P2/N95) respirator** or equivalent instead of a surgical mask.

Principles of use of P2/N95 respirators in care of patients with suspected or confirmed COVID-19

- P2/N95 respirators should be used only in the context of patient care using airborne precautions
- Health care professionals who use P2/N95 respirators should be trained in their correct use
- Unless used correctly, protection against airborne pathogen transmission will be compromised
- The minimum standard of use of a P2/N95 respirator is **careful fit-checking** with each use
    - An airtight protective seal is difficult to achieve for people with facial hair that underlies the mask at its edges
        - Facial hair which impedes achieving a seal should be removed or an alternative respirator protection, e.g. powered air-purifying respirator (PAPR) - considered (see below)
    - If available, a range of P2/N95 respirators may need to be fit-checked to find one that achieves a protective seal (i.e. passes fit-check)
        - If a suitable P2/N95 respirator cannot be found and alternative respirator - e.g. PAPR - should be considered
    - **Fit-testing** is recommended as the gold-standard (AS/NZS 1715:2009) for use of P2/N95 respirators, but it has not been widely applied in Australia
        - Despite increased awareness and demand, in the context of COVID-19, fit-testing of all healthcare professionals, who need to use P2/N95 respirators, will be difficult due to limited supplies and range of types/sizes available
        - **NOTE: Fit-testing does not guarantee that a respirator will not leak, particularly if a different type or size is used – this reinforces the need to fit-check with each use**

Transmission-based precautions, as outlined—including appropriate use of P2/N95 respirators—will provide high level protection of health care workers caring for patients with suspected or confirmed COVID-19.

Powered air-purifying respirators (PAPR)

- PAPRs are an alternative to P2/N95 respirators in selected circumstances:
  - A number of different types of relatively lightweight, comfortable PAPRs is available
  - PAPRs should only be used by healthcare professionals trained in their use, including safe removal with other PPE
  - PAPRs should be used according to the manufacturer's instructions
  - If a health care professional is required to remain in the patient's room continuously for a long period to perform multiple procedures e.g. more than one hour, the use of a PAPR may be considered for additional comfort and visibility
  - PAPRs designed for use in other settings outside of health care are not recommended
  - Manufacturer's instructions for reprocessing of reusable PAPR components and management of filters should strictly followed

Care is required with removal of a PAPR, which is associated with a risk of self-contamination.

Only PPE marked as reusable should be reused after decontamination and reprocessing according to the manufacturer's instructions. All other PPE must be disposed of after use.

Aerosol-generating procedures

AGPs during the care of patients with suspected or confirmed COVID-19 are associated with a risk of transmission. The following *examples* are illustrative of a range of AGPs.

Instrumentation or surgical procedures on the respiratory tract including:

- Insertion or removal of endotracheal tube
- Intentional or inadvertent disconnection/reconnection of closed ventilator circuit
- High frequency oscillatory ventilation (HFOV)
- Open oropharyngeal or tracheal suctioning
- Upper respiratory instrumentation or surgery
  - e.g. bronchoscopy, tracheotomy, ear nose throat surgery
- Surgical or post mortem procedures on respiratory tract involving high-speed devices
- Intercostal catheter insertion for relief of pneumothorax
- Thoracic surgery that involves entering the lung

Other procedures that can generate respiratory aerosols

- Manual or non-invasive ventilation (NIV);
  - Bi-level positive airway pressure ventilation (BiPAP)
  - Continuous positive airway pressure ventilation (CPAP)
- Collection of induced sputum
- High flow nasal oxygen (HFNO)
- Transoesophageal echocardiography

Cardiopulmonary resuscitation (CPR) is a special circumstance:

- Chest compression and defibrillation during resuscitation are not considered AGPs
- First responders can commence resuscitation without the need for airborne precautions while awaiting the arrival of clinicians to undertake airway manoeuvres

PPE in specific hospital settings

Intensive care unit (ICU)

- Contact and **droplet** precautions should be used for general care of COVID-19 patients in ICU e.g. a patient not requiring ventilation or AGPs
- Contact and **airborne** precautions should be used for care of COVID-19 patients in ICU requiring AGPs
    - The risk of aerosol transmission is reduced once the patient is intubated with a closed ventilator circuit
    - The use of P2/N95 respirators is recommended for AGPs, in the ICU. However, if a healthcare professional is required to remain in an ICU patient's room continuously for a long period (e.g. more than one hour) to perform multiple AGPs, the use of a PAPR may be considered, as an alternative, for greater comfort and visibility
    - ICU staff caring for patients with COVID-19 (or any other potentially serious infectious disease) should be trained in the correct use of PPE, including the use of P2/N95 respirators or PAPRs, preferably by an infection prevention and control professional or other suitably qualified personnel

Wards, including care of critically ill patients outside of the ICU setting

- Contact and **droplet** precautions should be used for care of COVID-19 patients in general wards
- Contact and **airborne** precautions should be used for care of COVID-19 patients in general wards, when performing an AGP
    - AGPs should be performed in a negative pressure room (or a standard isolation room with door closed)
    - the number of persons present in the room should be minimised

Emergency departments

- Contact and **droplet** precautions should be used for routine care of COVID-19 patients in the emergency department except when an AGP (including passage of an endotracheal tube) is required
- Contact and **airborne** precautions should be used for care of COVID-19 patients when performing an AGP
    - AGPs should be performed in a negative pressure room (or a standard isolation room with door closed)
    - the number of persons present in the room should be minimised

Operating suite

NOTE: For procedures performed on patients in an operating suite who are NOT suspected or confirmed cases of COVID-19, the usual surgical PPE for the clinical circumstances should be used, i.e., surgical mask, theatre cap, gown, gloves and eye protection.

The principles of routine infection prevention and control during elective surgery should be strictly adhered to, including avoidance of unnecessary entry and exit from the operating theatre during surgery.

The number of people in the theatre should be limited to those required for clinical or educational purposes.

- Surgical procedures for patients with suspected or confirmed COVID-19 should be performed only in an emergency

Separate guidelines are available for use of PPE by anaesthetic and surgical staff, caring patients with suspected or proven COVID-19 in the operating suite, during different types of surgery or procedures.

The same general principles apply as outlined above:

- Standard precautions apply to the care of all patients including use of PPE based on risk assessment
- **Contact** and **droplet** precautions for anaesthetic or surgical procedures not involving AGPs in patients with suspected/confirmed COVID-19
- Contact and **airborne** precautions for anaesthetic or surgical procedures involving AGPs with suspected/confirmed COVID-19

Labour ward

For care of a pregnant woman, with suspected or confirmed COVID-19, during labour:

- The woman should be asked to wear a surgical mask, if tolerated
- **Contact and droplet precautions** should be observed by labour ward staff, in addition to standard precautions
- The woman's partner **or** other support person (one only) may attend the delivery even if s/he is in quarantine, as a close contact. Precautions required to protect labour ward staff:
    - On entering the hospital, the partner/support person should: perform hand hygiene and put on surgical mask (to protect staff); in the labour ward put on a gown (to protect clothes from blood/liquor)
    - On leaving the labour ward, remove gown and perform hand hygiene; remove mask and perform hand hygiene when leaving premises

Where can I get more information?

For the latest advice, information and resources go to www.health.gov.au

Call the National Coronavirus Health Information Line on 1800 020 080. The line operates 24 hours a day, seven days a week. If you require translating or interpreting services, call 131 450.

The telephone number of your state or territory public health authority is available on the coronavirus page at www.health.gov.au/state-territory-contacts