



**The Australian and New Zealand Intensive
Care Society (ANZICS)**
COVID-19 Guidelines

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Disclaimer

The Australian and New Zealand Intensive Care Society (ANZICS) COVID-19 Guidelines have been developed to assist intensive care clinicians to prepare and plan critical care services in the event of a pandemic, to provide a safe working environment for staff and patients and to give guidance on the identification and treatment of patients with COVID-19 infection. The recommendations have been put together by a team of specialist Intensive Care doctors and nurses, with representative input from the College of Intensive Care Medicine, the Australasian Society for Infectious Diseases, the Australian College of Critical Care Nurses, and the Australian Society of Anaesthetists. The authors have made considerable effort to ensure the information contained within the recommendations is correct at the time of publication. Information provided has been sourced from the best available evidence and expert opinion. Further iterations of these guidelines will be published as new information comes to hand. The Society accepts no responsibility for any inaccuracies, information perceived as misleading, or the success or failure of any of the recommendations detailed in the document. The Australian and New Zealand Intensive Care Society is not liable for the accuracy or completeness of the information in this document. The information in this document cannot replace professional advice.

ANZICS COVID-19 Working Group

Introduction

The COVID-19 viral pandemic will likely represent an unprecedented challenge to intensive care services throughout Australia and New Zealand. We are fortunate to have world class intensive care services, with a highly trained and professional workforce who are ready and able to serve their communities at this time. This document aims to provide a series of recommendations and suggestions to ensure continued high-quality clinical care in the setting of a pandemic. High-quality evidence to guide medical decision making is currently lacking in many areas. However, we have drawn on previous pandemic experience and contemporary infection control literature in the Intensive Care Unit (ICU). We have developed a 'living document', which will be revised in an iterative process that will incorporate local and international knowledge as this disease progresses through the community. The most up to date document and all previous iterations will be found on the ANZICS website www.anzics.com.au.

As of today (16th March 2020), Australian and New Zealand ICUs do not have a high burden of patients with suspected or proven COVID-19. The current major challenge centres around preparing our units and staff for the expected surge in caseload, which may be complicated by supply chain issues and workforce challenges. The ANZICS community strongly supports all robust public health measures aiming to reduce community transmission, hence 'flattening the pandemic curve' to prevent intensive care services becoming overwhelmed. This is supported by high quality evidence and is essential to minimise load on limited ICU capacity for all patients, not just those with COVID-19, as well as to maintain the health, wellbeing, and sustainability of the intensive care workforce.

This document is arranged in three parts to provide guidance to critical care clinicians:

1. Planning for a Pandemic - An Operational Guide (**Page 6**)
2. Providing a Safe Working Environment - Staff Protection and Sustainability (**Page 15**)
3. Identification and Treatment of Patients with COVID-19 Infection – The Basics (**Page 26**)

Foreword

It is my very great pleasure to introduce the ANZICS COVID-19 Guidelines. We are living in extraordinary times with an enormous degree of uncertainty. It is in this setting that we are extremely grateful to a group of experts led by Associate Professor Steve McGloughlin for the urgent development of the ANZICS COVID-19 Guidelines. These Guidelines aim to provide a reliable and an easily accessible source of expert opinion and current best evidence to assist in managing the COVID-19 pandemic in Australia and New Zealand. The Guidelines reflect the work of 30 individuals, from a range of disciplines, including medical and nursing staff. We are fortunate to have had representation from the College of Intensive Care Medicine and the Australian College of Critical Care Nurses. We also acknowledge the tremendous effort delivered by the ANZICS staff in making this resource possible. The guideline development has by necessity been extremely urgent and while other guidelines delivered by ANZICS are usually months to years in the making. Through the remarkable effort of committed individuals, we have been able to publish within three weeks.

The guidelines follow three major themes to prepare and plan critical care services in the event of a pandemic, to provide a safe working environment for staff and patients and to give guidance on the identification and treatment of patients with COVID-19 infection

We acknowledge that as we gain experience in dealing with this pandemic, it may be prudent to deliver further iterations as more evidence becomes available. ANZICS will remain vigilant and promulgate all important new information. We have elected to make these guidelines available to all critical care professionals, in an endeavour to decrease the morbidity and mortality of this pandemic. We are acutely aware of the potential emotional and physical fatigue facing the critical care workforce and ask that we support one and other, as we stand together to serve our communities in these demanding times.

Anthony Holley
President, ANZICS

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Planning for a Pandemic

An Operational Guide for Intensive Care Units in Australia and New Zealand

GENERAL CONSIDERATIONS IN ICU PANDEMIC PLANNING

The doctors, nurses, allied health professionals and researchers who comprise the ANZICS membership stand ready to help the Australian and New Zealand communities during the COVID-19 pandemic. Our members provide high quality, compassionate and professional care to the most vulnerable members of our communities every day and this commitment will not change.

ANZICS strongly supports State, National and International efforts to reduce the spread of pandemic illness through effective public health measures (i.e. social distancing). This approach is supported by high quality evidence and significantly mitigates the impact on Intensive Care Unit (ICU) capacity, which is a finite resource. Such measures will have the greatest positive impact on the health and well-being of our communities.

The most important resource in Australian and New Zealand ICUs is experienced Intensive Care staff, who are trained to provide high quality care for critically ill patients. The delivery of this service must be supported by government policy and community behaviour.

We strongly recommend local ICU pandemic plans should be developed urgently by all healthcare organisations and that all plans should align with jurisdictional health department requirements.

Plans should adopt a phased and tiered response based on the impact of the pandemic on the capacity of the ICU to meet daily operational needs (See example and potential summary guide in Table 1).

Plans should include operational approaches to reduce routine ICU demand (Section 1), identify and increase physical ICU bed space capacity throughout the hospital (Section 2 and 3), and determine associated equipment and workforce requirements (Section 4).

A whole of system approach is recommended, involving entire organisations. Partnerships, such as between private and public hospitals, adult and paediatric ICUs, and through telehealth arrangements to support different level ICUs, should be considered to ensure just and equitable delivery of care for all critically ill patients

1. MEASURES TO REDUCE ICU DEMAND

The following measures should be considered to reduce the demand for critical care services and should be enacted before demand exceeds capacity:

Deferment or Cancellation of Non-Urgent Elective Surgery

This will vary between sites, and may be performed in a staged manner, with initial deferment of minor elective surgery and surgery requiring post-operative ICU/HDU care, escalating to deferment of all elective surgeries/procedures. We **recommend** that planning should involve ICU, surgery, anaesthesia and nursing services, with establishment of an appropriate process for the deferment of surgery. Decisions to proceed with elective surgery should be made utilising a shared decision-making model involving the ICU.

Development of Cooperative Agreements with Other Health Services

We **recommend** that agreements be created which facilitate the transfer and care of appropriate patients and minimise unnecessary transfers.

Approaches should include:

- Health services with reduced activity, but no pandemic responsibilities (e.g. day-surgery centres), to take on elective minor surgery
- The provision of telehealth support to sites which can deliver appropriate care to selected patients to reduce the need for transfer
- Private hospitals to take on urgent elective and non-time critical emergency surgery
- Opening of additional ICU capacity in sites outside the hospital (e.g. newly built but unfinished hospitals or previously decommissioned hospitals).
- Use of a centralised coordination and retrieval service which connects all ICUs within a region

Reserving ICU Admission for Patients Requiring ICU-Specific Interventions

We **recommend** that patients who only require monitoring be managed in alternate locations. ICU admission should be prioritised to those who require specific ICU interventions such as mechanical ventilation. This may necessitate the following:

- Extended stays in the Emergency Department or Recovery
- Admission to areas capable of HDU level monitoring (e.g. CCU)
- Additional support/supervision for ward staff to manage patients of higher acuity

'Non-ICU' Involvement in Rapid Response and Medical Emergency Teams

Approaches may include:

- MET call attendance and involvement by home teams
- Delegation of MET leadership roles to the medical or anaesthetic services, with ICU providing a supervisory role

Proactive Consideration of Treatment Goals

There should be early consideration of treatment goals to avoid ICU/HDU referrals or admissions in patients who are more appropriately managed on the ward. This may be facilitated by ensuring that all patients have documented goals-of-care or equivalent completed upon hospital admission.

2. MEASURES TO INCREASE ICU CAPACITY (INFRASTRUCTURE AND CAPACITY)

The following measures should be considered to increase the ICU capacity:

Physical ICU Spaces (Infrastructure)

We **recommend** all clinical areas with the physical infrastructure suitable to care for critically ill patients should be identified. These include (but are not limited to):

- Complex Care Units or other High Dependency Units
- Perioperative monitoring / recovery areas
- Coronary care units
- Uncommissioned or unstaffed ICU bays
- Decommissioned critical care areas (e.g. 'old' ICUs)

The following criteria are the College of Intensive Care Medicine (CICM) requirements for a high dependency area and may be considered in repurposing an area for the care of critically ill patients:

- Two oxygen outlets
- One air outlet
- Two suction outlets
- Twelve mains electricity outlets
- Appropriate physiological monitoring

Hospitals should work with ICUs to develop processes enabling the expeditious repurposing of these areas when needed and establish workforce models that allow critical care staffing of potentially physical disparate locations. The ability to meet the above standards may be limited in the advanced phases of a pandemic, necessitating adjustments based on the clinical needs of the patients and available resources.

Equipment

We **recommend** ICUs should quantify their current stock of equipment (e.g. ventilators, renal replacement therapy, intravenous infusion pumps) including consumables and disposables and assess potential requirements with increasing ICU load. ICUs should also identify available logistic channels for supply, storage, and procurement of additional equipment.

This may include:

- Equipment from operating theatres / perioperative environments
- Older but functional equipment not presently in use (e.g. old ventilators which can be operationalised by biomedical departments)
- Manufacturers and suppliers
- Hospital, state or national emergency stockpiles
- Jurisdictional procurement agencies

ICU Discharge Facilitation

We **recommend** processes to expedite discharge from ICU should be implemented. These may include additional support for ward staff to manage patients of higher acuity, or rapid decanting of patients to areas with greater clinical oversight (e.g. neurosurgical HDUs). Coordinated processes need to be established with all stakeholders to ensure ward staff are appropriately supported. Organisation-wide initiatives to optimise patient flow must be adopted, in conjunction with ICU-level efforts.

3. MEASURES TO INCREASE ICU CAPACITY (WORKFORCE AND STAFFING)

General Principles

Due to potential workforce shortages, it is likely that non-critical care trained medical, nursing and allied health staff will have to assist in the care of intensive care patients. This should occur with the relevant managerial authorisations, and under the supervision of critical care trained staff, utilising a team-based model of care.

Community initiatives should be implemented to support families of health care workers so that they can continue in the workforce. Initiatives to inform the public of the need to support health care workers to remain available to attend work are recommended.

ICUs and hospitals should prioritise meeting the minimum standards for staffing as per the College of Intensive Care Medicine guidelines. However, available resources may change depending on the demand placed upon a health service.

We **recommend** workforce planning should include consideration for pandemic specific requirements, such as additional workload from donning and doffing personal protective equipment (PPE), the need for additional rest days, and the need to allocate staff to key non-clinical duties such as enforcing infection control procedures.

We **recommend** the use of all available resources to optimise workforce capacity, by identifying and potentially redeploying nursing, medical, allied health and other staff (see below).

Nursing

We **recommend** all nursing staff capable of caring for critically ill patients should be urgently identified. These potentially include:

- Nursing staff with formal critical care training or experience, but not currently working in ICU (e.g. redeployed, in administrative or non-clinical roles, recently left workforce)
- Paediatric ICU nursing staff
- Nursing staff with experience of critically ill patients in other areas of the hospital (e.g. coronary care nurses)
- Nursing staff in departments with reduced clinical activity who are familiar with a critical care environment (e.g. anaesthetic nurses)

We **recommend** a formal rapid orientation program is provided, and these nurses should work under the supervision of an experienced ICU nurse.

We **recommend**, in addition, nurses without critical care experience may be suitably trained and are redeployed to assist with the following:

- Supervision of staff and visitors donning/doffing of PPE
- Routine nursing care - turning, washing
- Re-supply, storage and inventory of equipment
- Medication delivery and checking
- Documentation
- Maintaining bed management and patient flow information
- Supporting essential pandemic research projects

Medical

We **recommend** additional medical staffing for the ICU should be sourced by considering:

- Senior medical staff with critical care training, but not currently working in ICU
- Paediatric ICU medical staff
- Anaesthetic staff (due to a reduction in surgical activity)
- Junior medical staff with critical care experience
- Career medical officers with critical care experience

We **recommend** medical staff should be deployed in a manner that is aligned with their current scope of practice.

- Anaesthetic staff may be deployed as hospital 'resuscitators', making up intubation teams, to lead rapid response teams or to assist in intensive care ideally under the supervision of intensive care specialists
- Medical staff with critical care training may be deployed to manage HDU patients in repurposed clinical areas physically separate from the ICU, under the supervision of more experienced ICU staff
- Junior medical staff with little to no ICU training may assist with documentation and non-ICU clinical activities

Where medical staff are requested to perform duties outside their scope of practice due to severe workforce shortages (e.g. Anaesthetists taking on an Intensivist role), this should be at their discretion and with organisational reassurance regarding indemnity coverage as well as adequate supervision.

Allied Health

Physiotherapists with previous critical care experience should be identified by hospitals and facilitated to return to ICU.

Pharmacists with critical care experience should be identified and mobilised to assist the core ICU pharmacy staff.

Social workers may need to be redeployed to assist with families isolated from their critically ill loved ones.

Suitable volunteers with appropriate training and supervision in PPE may also fill appropriate support roles (e.g. assisting at ICU reception, directing families).

Additional Considerations

To ensure a sustainable workforce, we **recommend** the following:

- Streamlining of administrative processes (e.g. electronic health record training) which limit staffing flexibility and onboarding of new staff members
- Accommodation for staff unable to return home
- Staff reassurance regarding indemnity coverage for operating beyond their normal scope of practice (in a phase 3 or 4 scenario)
- Debriefing and psychological support; staff morale may be adversely affected due to the increased workload, anxiety over personal safety and the health of family members (refer to Staff Protection and Sustainability)
- The cancellation of pre-arranged annual leave during a pandemic should only be considered if absolutely necessary. Maintaining staff morale is imperative.

4. COMMUNICATION ISSUES

Communication is crucial to the successful delivery of safe and effective clinical services.

Information management plans should be established for effective and consistent dissemination of information to relevant stakeholders. These should include daily situation reports and regular updates on unit, organisational, regional and state responses.

A variety of information dissemination methods should be considered to account for physical distancing needed for infection control purposes. These may involve video and teleconferencing, electronic communication and social media platforms.

Effective lines of communication must be established to ensure that stakeholders are apprised of evolving clinical scenarios and changes in clinical practice guidelines and processes. ICU load and capacity must be measured in real-time and communicated to relevant in-hospital administrative and jurisdictional authorities. It is vital to track both patient outcomes and staff well-being. Specific stakeholders and considerations may include:

- Organisational chains of command
- State and national health authorities
- Clinical quality registries (e.g. ANZICS CORE)
- Inter-organisation communications (e.g. for transfers)
- Inter-departmental communications
- Professional organisations
- Patients and families
- Staff

5. GUIDANCE FOR DECISION MAKING ABOUT ICU ADMISSIONS AND TREATMENT

We **recommend** decisions regarding admission to ICU during a pandemic should reflect routine intensive care practice, where the clinical judgement of the treating Intensivist is paramount, and there is a shared decision-making process with other clinicians, patients and their families.

Where ICU admission is deemed appropriate, it is the responsibility of the ICU team, hospital administration and supervising jurisdiction to ensure that all available resources are utilised to facilitate timely admission and treatment.

In the event of an overwhelming demand for critical care services we **recommend** the following principles should be considered for admission to the ICU:

- The decision-making process should be open, transparent, reasonable and inclusive of patients, their families, ICU and non-ICU staff.
- Similar ICU admission criteria should apply to all patients across all jurisdictions, and equally to patients with pandemic illness and those with other conditions.
- Senior Intensive Care medical staff, recognising available resources, should consider the probable outcome of the patient's condition, the burden of ICU treatment for the patient and their family, patients' comorbidities and wishes, and likelihood of response to treatment.

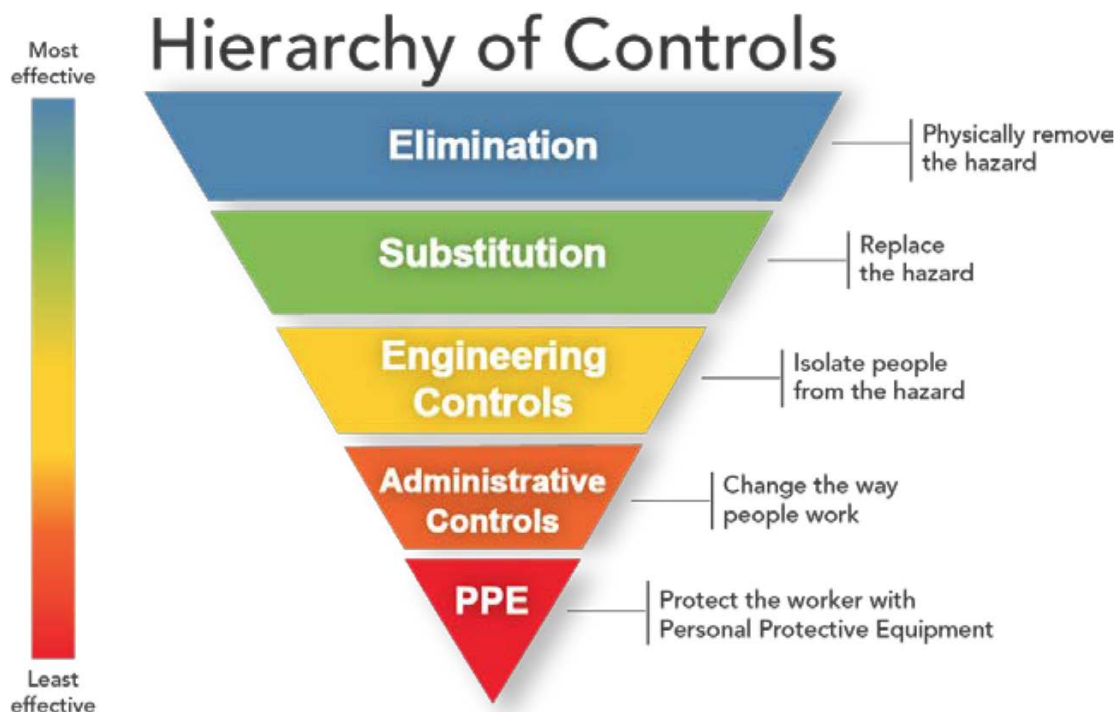
Table 1. Potential Strategies for a Phased and Tiered ICU Pandemic Plan

Phase	Impact	Strategies to consider
1	Minimal impact on daily operations Likely to occur when up to 10% of beds are occupied by patients with pandemic illness	<p>Review and test pandemic response plans, including:</p> <ul style="list-style-type: none"> • Infrastructure and equipment (Section 2) • Workforce training, planning and support (Section 3, Staff Protection and Sustainability) • Communication plans (Section 4) • Infection control (Refer to Staff Protection and Sustainability) • Diagnostics and treatment protocols (Refer to Identification and Treatment) • Transport and transfer policies (Refer to Staff Safety and Sustainability) • Ensure 'trigger points' to move to higher level response have been agreed in advance
2	Moderate impact on daily operations, with ICU at or near maximum capacity ICU is still able to meet demand for critical care and ventilated patients Likely to occur when up to 25% beds are occupied by patients with pandemic illness	<ul style="list-style-type: none"> • Measures to reduce demand and increase physical capacity (Section 1 and 2) • Repurpose alternative clinical areas for non-ventilated critical care patients (Section 2) • Address workforce and staffing needs (Section 3, Staff Protection and Sustainability) • Defer or divert non-emergent surgery to private hospitals or other services (Section 1) • Limit ICU involvement in non-clinical ICU services (e.g. Hospital TPN)
3	Severe impact on daily operations, with overall demand for critical care exceeding ICU capacity ICU at or near maximum capacity for ventilated patients Likely to occur when up to 50% beds are occupied by patients with pandemic illness	<ul style="list-style-type: none"> • Repurpose alternate clinical areas for ventilated patients (Section 1 and 2) • Reassess requirements and thresholds for ICU admission and discharge (Refer to Section 5) • Consider transfer of patients to other facilities or identify additional resources to be transferred into the hospital to facilitate on-going ICU care
4	Overwhelming impact on daily operations, with demand for critical care services significantly exceeding organisation-wide capacity ICU no longer able to meet demand for ventilated patients	<ul style="list-style-type: none"> • Delivery of care to critically ill patients in areas without pre-existing critical care infrastructure • Ongoing liaison with hospital and state health services

Providing a Safe Working Environment - Staff Protection and Sustainability

Infection Control

Controlling exposure to COVID-19 is the fundamental method of protecting health care workers. This can be represented by a hierarchy of controls. Engineering controls are designed to remove the hazard at the source, before it comes in contact with the worker. Administrative controls and Personal Protection Equipment (PPE) are frequently used with existing processes where hazards are not particularly well controlled.



Engineering Controls

Engineering Controls are designed to remove the hazard at the source, before it comes in contact with the worker. Patients are placed in higher order engineering control areas before using lower order areas. Patient care areas include:

Class N rooms are negative pressure isolation rooms used to isolate patients capable of transmitting airborne infection. A negative pressure room has a functional anteroom for donning and doffing PPE. Airborne PPE precautions are still required. Doffing is performed in the anteroom. There are a limited number of negative pressure bays and pods and/or rooms across Australia and New Zealand.

Class S rooms are standard rooms which can be used for isolating patients capable of transmitting infection by droplet or contact routes. Class S rooms have no negative pressure capability and therefore no engineering controls.

Open Cohort Areas have no negative pressure and no engineering controls.

We **recommend** COVID-19 patient's, ideally, be treated in a Class N negative pressure single room. If Class N rooms are not available then the preference should be Class S single rooms with clear areas demarcated for donning and doffing of PPE. Once all Class N and Class S single rooms are exhausted, patients will need to be cohorted in areas that are physically separate to areas containing non-COVID-19 patients. In an open ICU cohorted area with one or more COVID-19 patients, the whole area is recommended to require airborne PPE precautions.

Administrative Controls

Safety of staff is paramount to protect the individual health care worker and to ensure a viable workforce for the duration of the pandemic. In Australia the national infection control standards are the national standard AS/NZS 1715: 2009 and National Health and Medical Research Council, Australian Guidelines for the Prevention and Control of Infection in Healthcare.

In a pandemic we **recommend** transferring care of patients in the intensive care unit to an admitting intensive care specialist to limit the need for other medical team's attendance within the ICU.

We **recommend** that all patients are assessed for potential COVID-19 infection. Patient screening should be in line with the latest national recommendations for COVID-19 case definition and should include determination of clinical history, contact and travel history. Patients deemed at risk should be isolated and tested for COVID-19.

We **recommended** that all hospitals should keep a record of staff training in PPE compliance and competency; only staff who have been trained in PPE usage should care for patients with COVID-19.

We also **recommend** that each nosocomial health care worker COVID-19 infection is entered into the local incident management system as a sentinel event and should be managed as per established guidelines. It is recommended each observed breach in PPE usage is recorded in the incident management system as an occupational health and safety risk. An assessment of the breach is to be made and an infection control assessment to be performed as to whether the breach warrants a period of self-isolation. ANZICS recognises that breaches will occur despite best efforts and no blame should be apportioned to the individuals involved.

Visitors to ICU

Given the stress on families with a loved one in intensive care, processes around patient visits must be communicated clearly and compassionately to visitors with an emphasis on protection of patients, families and staff. We **recommend** that all visitors to ICU are screened for potential COVID-19 infection. Criteria should be based on national recommendations and include assessment of clinical history, contact and travel history. At a minimum, visitors with a temperature or respiratory symptoms should not be allowed to attend a patient. We **recommend** hospitals need to maintain a hospital visitor log to allow for contact tracing and activity mapping of confirmed cases. Communication to families and visitors should include posting visual alerts (e.g. posters) at the entrance and in strategic places (e.g., waiting areas, elevators) advising visitors not to enter the facility when ill.

We **recommend** visitors should be limited to immediate family for all ICU patients during the pandemic. If visitors are entering COVID-19 areas then we recommend they wear appropriate PPE and observe airborne precautions. As the pandemic progresses it may be appropriate to further restrict visiting. We **recommend** that visitors should not be present during any patient related procedures.

Personal Protection Equipment

In ICU there is an increased risk of dispersion of aerosolised virus into the healthcare environment due to the nature of critical illness, higher viral load and the performance of aerosol generating procedures. We therefore **recommend** that airborne PPE precautions should be used to care for all COVID-19 patients in intensive care. This includes the use of high flow nasal oxygen in non-ICU environments.

We **recommend** against the use of improvised, non-standard PPE, as poorly standardized PPE potentially poses a risk to the user.

We also **recommend** minimising aerosol generating procedures. If they must be performed, then they should be completed in a negative pressure room (class N room). If this is not available, then a single room (Class S) should be used. Aerosol generating procedures include:

- Intubation
- Extubation
- Bronchoscopy
- High flow nasal oxygen use
- Non-invasive ventilation (particularly with a poorly fitting mask)
- Procedures on screaming children
- Tracheostomy
- CPR prior to intubation

We **recommend against** the use of nebulised agents (e.g. salbutamol, saline) for the treatment of non-intubated COVID-19 patients due to the risk of aerosolization and transmission of infection to health care workers in the immediate vicinity.

Training in PPE

We **recommend** that all intensive care personnel (medical, nursing, allied health, cleaning and ward assistants) receive training in infection control and personal protection equipment. We **recommend** that all personnel receive individual N95 mask fit checking. We suggest N95 fit testing, if available, recognising that the evidence for fit testing effectiveness is limited and that the variation and supply of N95 mask types will make any recommendation on fit testing difficult to implement from a practical perspective.

Application of PPE

We **recommend** that when a unit is caring for a confirmed or suspected COVID-19 patient that all donning and doffing are supervised by an additional appropriately trained staff member.

Specific recommendations for airborne precautions should follow national infection control recommendations including fit checked N95 mask, goggles, impervious gown and gloves. In addition, the following can be **considered**:

- Hair cover for aerosol generating procedures (AGP).
- Shoes that are impermeable to liquids. Recurrent use of shoe covers is **not recommended** as repeated removal is likely to increase the risk of staff contamination.

Avoiding environment cross contamination:

The following is **recommended** to minimise the risk of contamination of staff via equipment:

- Avoid sharing ICU equipment. Preferentially use only single use equipment.
- Minimise personal effects in workplace
- No personal devices in COVID-19 areas
- Stethoscope use should be minimised

We **recommend** cleaning of clinical and non-clinical areas complies with national and jurisdictional standards for COVID-19. It is vital that staff providing cleaning and ancillary services are provided with appropriate training in PPE.

Powered Air Purifying Respirators (PAPR) are above the recommended standard for staff protection against COVID-19. However, in units where their use is already in place and appropriate training is available, they may be considered for AGP such as semi-elective intubations or prolonged continuous care of non-intubated patients.

Staff Care and Well Being

A focus on the care and protection of staff is absolutely vital for staff well-being and to ensure a safe, sustainable workforce and to maintain high quality clinical care. It should be recognised that intensive care staff will likely have an increased workload with a heightened anxiety both at work and at home.

In periods of social disruption, such as school closures, we **recommend** health care workers are supported by appropriate measures to ensure that they can still attend work. This could include access to additional paid leave being provided to partners of health care workers.

We **recommend** that hospitals have the following available for all staff in intensive care:

- Clean scrubs available to change into before each shift
- Showering facilities at the end of each shift.
- Provision of meals and drinks for frontline staff

The following could be considered

- Staff temperature reporting and temperature checks at the start of each shift.
- A dedicated roster to segregate “clean teams” from “COVID-19 teams”

Staff Illness

Staff who are ill should follow national guidelines in regard to self-isolation and testing for COVID-19. We **recommend** prioritising the testing for COVID-19 in health care workers to minimise the time away from the workforce.

Post Exposure Management

In event of an exposure, risk categorization of the staff member should be done in accordance with national guidelines. Based on risk of exposure the appropriate further management should be commenced immediately including quarantine period.

For either staff illness or post exposure management we **recommend** the provision of adequate psychosocial support for the staff member during quarantine or for the duration of their illness. On return to work a refresher infection control and prevention training should be offered for the staff member.

Staff Information and Education

Communication within departments, hospitals and the wider ICU community will be vital to ensuring maintenance of staff safety and quality critical care. We **recommend** that hospitals and ICUs utilise secure and approved platforms such as institutional email and messaging applications to inform staff of any changes in policy, workflow or other relevant information.

We **recommend** cancelling face-to-face meetings as much as possible. For meetings with operational, clinical or education value we recommend that secure video-conferencing applications are provided and utilised.

We **recommend** the use of interdisciplinary small group simulation to practice and improve clinical processes and staff training in PPE.

Consider the use of remote online education courses (BASIC and BASIC for Nurses) for upskilling critical care skills in junior medical and nursing staff.

Staff members who are at higher risk caring for COVID-19 patients

We **recommend** that staff who are judged to be of high risk should not enter the COVID-19 isolation area. This includes staff who are pregnant, have significant chronic respiratory illnesses or are immunosuppressed.

The international experience is that mortality is higher in older patients, particularly with comorbidities related to cardiovascular disease, diabetes mellitus, chronic respiratory diseases, hypertension and malignancy. Staff member risk decisions should be made on a case by case basis by the unit director with the support of the local occupational health and safety unit. We **recommend** that these staff would be reallocated to other roles and not enter COVID-19 areas.

Airway Management in COVID-19 Patients

We are aware multiple comprehensive guidelines are under development for airway management in COVID-19 patients and local guidelines should also be considered if appropriate. We **recommend** the following principles for intubation of a proven or suspected patient with COVID-19:

- Intubation should preferentially be performed in a negative pressure room (Class N) or if not available then a single room should be used (Class S).
- It is vital that airborne precautions PPE is used for all staff in attendance including:
 - Fit checked N95 mask
 - Goggles or face shield
 - Impervious gown
 - Gloves
- The procedure should be performed by the most qualified available staff with the minimum number of healthcare personnel present as are required to undertake a safe intubation.
- Video laryngoscopes should be used preferentially
- In order to minimise aerosol generation staff should consider:
 - Minimising the need for bag mask ventilation
 - Use of a viral filter on bag mask circuit
 - We suggest avoidance of High Flow Nasal Oxygen (HFNO) use to preoxygenate patients prior to intubation. If HFNO are applied they must be turned off prior to removal from the patient.
 - Post intubation, provision of positive pressure ventilation (either by bagging circuit or ventilator) be initiated only after confirming that the endotracheal tube cuff is inflated and after ensuring that an appropriate filter and waveform capnography device is in place.

Rapid Response, Medical Emergency and Code Blue Teams

Ward Preparation

We **recommend** ICU and other stakeholders at each hospital should have a specific plan for the management of clinical deterioration for potential and diagnosed COVID-19 patients on the ward. This should include a plan if a patient requires airway support on the ward or cardiopulmonary resuscitation (CPR). All hospitalised patients during the COVID-19 pandemic should have their goals of care clearly documented.

We **recommend** COVID-19 patients on the ward have a separate clear escalation plan in the event of a clinical deterioration. This plan should prioritise early involvement of senior ward medical and nursing staff and, if appropriate, early referral to ICU.

We **recommend** provision of clear guidelines on personal protective equipment in COVID-19 wards and normal wards during resuscitation.

MET Call or Code Blue

Where it is necessary that the MET or Code Blue team attends, we make the following **recommendations**:

- PPE must be available that is equivalent to that used in ICU, therefore airborne precautions including an N95 mask.
- Entry to a patient's room should be limited to vital staff.
- The patient should be assessed by the most senior medical staff available to determine appropriate management and disposition.
- If aerosol generating procedures (AGP) are required, these should ideally be performed in a negative pressure room, however this needs to be balanced with the safety of transporting the patient.
- CPR is an AGP and we recommend all staff should wear airborne PPE including an N95 mask before commencing chest compressions.

Patient Transport

The following is for transport of patients with COVID-19. If COVID-19 is widespread in the community, surgical masks should be considered for ALL patients irrespective of COVID-19 status.

In principal the movement of patients with COVID-19 should be limited with all efforts made to ensure the patient is initially admitted to the appropriate location. We **recommend** the following for patient transport:

- Non-intubated patients should be transferred wearing a surgical mask over their oxygen delivery device which may include nasal prongs, a Hudson mask or non-rebreather mask up to 15 litres.
- All staff must wear airborne PPE.
- Once a patient is admitted to the ICU, transport outside of the ICU should be limited. If transport is required, then coordination at a senior level is mandatory to ensure safety standards are maintained

- Hallways must be cleared where possible and only essential staff should accompany the patient. Staff not involved in the transfer should not come within 2 metres of the patient.
- Intubated patients should have closed circuits with a viral filter in situ.

Aeromedical transports

As with other transports the risk benefit of the transport must be carefully considered with the additional risks of COVID-19 contamination. All agencies involved with the transport as well as the accepting units shall be made aware of the potential/proven infection.

We **recommend** that all agencies responsible for the transport of critically ill patients develop a clear plan for the safe transport of COVID-19 patients. ANZICS will work with the relevant agencies to develop these guidelines.

Identification and Treatment of Patients with COVID-19 Infection – Fundamental Principles

COVID-19 Identification and Treatment

Testing for COVID-19 in ICU

We recommend local case definitions should be referred to when assessing the need to test for COVID-19, although a **high index of suspicion** for COVID-19 disease should be maintained at all times.

It is **vital** that hospitals have a system to identify at risk patients at their first point of contact with the health care system, such as the emergency department (ED). COVID-19 has presented with mild, moderate or severe illness. It can present atypically, with abdominal symptoms and diarrhoea. Severe illness can include pneumonia, ARDS, sepsis and septic shock requiring organ support.

Results of testing for COVID-19 in ICU patients should be **prioritised** and made available as quickly as possible. This is to enable appropriate care of patients and to reduce the burden on PPE utilisation.

If possible, testing should be made available via local hospital pathology services to expedite results. Testing of ICU staff should be **prioritised**, to maintain workforce, reassure potentially exposed staff and prevent nosocomial infection.

Exclusion of COVID-19 as a diagnosis should be in consultation with jurisdictional guidelines.

Routine management of COVID-19 associated respiratory failure

Early recognition and referral of patients with worsening respiratory function while on conventional oxygen therapies such as simple face masks or masks with reservoir bags is important to ensure timely and safe escalation of respiratory support. Early optimisation of care and involvement of ICU is **recommended**. The following therapies can be considered in caring for COVID-19 patients:

1. High flow nasal oxygen (HFNO) therapy (in ICU): HFNO is a **recommended** therapy for hypoxia associated with COVID-19 disease, as long as staff are wearing optimal *airborne* PPE.

The risk of airborne transmission to staff is low with well fitted newer HFNO systems when optimal PPE and other infection control precautions are being used. Negative pressure rooms are preferable for patients receiving HFNO therapy.

Patients with worsening hypercapnia, acidaemia, respiratory fatigue, haemodynamic instability or those with altered mental status should be considered for early invasive mechanical ventilation if appropriate.

2. Non-invasive ventilation: Routine use of non-invasive ventilation (NIV) is **not recommended**.

Current experience suggests that NIV for COVID-19 hypoxic respiratory failure is associated with a high failure rate, delayed intubation, and possibly increased risk of aerosolization with poor mask fit.

Deteriorating patients should be considered for early endotracheal intubation and invasive mechanical ventilation. If NIV is appropriate for an alternate clinical presentation of COVID-19 (e.g. concomitant COPD, APO), this should be provided using similar precautions as for HFNO. Negative pressure single rooms are preferable for patients receiving NIV. For all patients receiving NIV determine a clear plan for treatment failure.

3. Mechanical ventilation: Lung protective mechanical ventilation (MV) is **recommended** for management for acute respiratory failure.

Mechanical ventilation should be employed with the use of a low tidal volume strategy (4-8ml/kg predicted body weight) and limiting plateau pressures to less than 30 cmH₂O. Permissive hypercapnia is usually well tolerated and may reduce volutrauma. Higher levels of PEEP (greater than 15 cmH₂O) are **recommended**. Alternate modes of ventilation such as APRV may be considered based on clinician preference and local experience. Viral (rather than HME) filters should be utilised, and circuits should

be maintained for as long as allowable (as opposed to routine changes).

4. Neuromuscular blockade (NMB): NMB may be considered in the setting of worsening hypoxia or hypercapnia and in situations where the patient's respiratory drive cannot be managed with sedation alone resulting in ventilator dys-synchrony and lung decruitment.

5. Prone positioning: Current reports suggest prone ventilation is effective in improving hypoxia associated with COVID-19). This should be done in the context of a hospital guideline that includes suitable PPE for staff, and that minimise the risk of adverse events, e.g. accidental extubation.

6. Fluid management: A restrictive fluid management strategy is **recommended**. The aim is to reduce extravascular lung water. Where possible avoid 'maintenance' intravenous fluids, high volume enteral nutrition, and fluid bolus for hypotension.

7. Liberation from mechanical ventilation: Standard weaning protocols should be followed. HFNO and/or NIV (well fitted facemask with separate inspiratory and expiratory limbs) can be considered as bridging therapy post-extubation but must be provided with strict airborne PPE.

8. Tracheostomy: This represents an aerosolizing procedure and must be considered in clinical decision making. Optimal PPE should be utilised at all times.

9. Suctioning: Closed inline suction catheters are **recommended**. Any disconnection of the patient from the ventilator should be avoided to prevent lung decruitment and aerosolization. If necessary, the endotracheal tube should be **clamped and the ventilator disabled** (to prevent aerosolization).

10. Nebulisation: Use of nebulisers is **not recommended** and use of metered dose inhalers are preferred where possible.

11. Bronchoscopy: Diagnostic bronchoscopy is **not recommended**. It is not necessary for the diagnosis of viral pneumonia and should be avoided to minimise risk of aerosolization. Tracheal aspirate samples for diagnosis of COVID-19 are sufficient and BAL is not usually necessary.

12. Antibiotics: Although a patient may be suspected of having COVID-19, appropriate empirical antibiotics should still be administered within one hour of the identification of sepsis or septic shock. Some patients with COVID-19 infection will present with secondary bacterial lower respiratory infection.

13. Rescue Therapies:

Inhaled nitric oxide and prostacyclin: There is no evidence for routine use of inhaled nitric oxide, prostacyclin or other selective pulmonary vasodilators in acute respiratory failure. However, during emerging infectious disease outbreaks when resources are exhausted, inhaled nitric oxide and prostacyclin may be considered as a temporising measure when patients develop refractory hypoxemia despite prone ventilation, or in the presence of contraindications to prone ventilation or ECMO.

Recruitment manoeuvres: Although current evidence does not support the routine use of recruitment manoeuvres in non-COVID-19 ARDS, they could be considered in COVID-19 patients on a case by case basis. International experience suggests COVID-19 patients may respond well to these interventions and their application may be appropriate where the patient has not responded to other interventions. They should only be provided by clinicians experienced in undertaking these manoeuvres, dealing with their potential complications and using a closed system.

Extracorporeal life support (ECLS): Early VV-ECMO is **not recommended**. Current reports suggest that COVID-19 patients respond well to the ventilator strategies listed above. Established patient selection criteria for use of VV-ECMO in severe respiratory failure should be applied, with delivery of ECLS in expert centres with sufficient expertise and experience. Discuss with an ECMO specialist early.

Experimental therapies for COVID-19.

There are no proven pharmaceutical treatments for COVID-19 other than supportive care. All experimental therapies should be provided in the setting of a clinical trial. ANZICS encourages the routine collection of registry data on confirmed and suspected COVID-19 patients.

Corticosteroids are **not recommended** for routine use in acute respiratory failure with COVID-19. Some patients will have appropriate alternate clinical indications for the use of corticosteroids, such as the presence of septic shock.

Antiviral therapies are currently **not recommended** for routine use in acute respiratory failure with COVID-19. This remains an evolving area of research.

There are a number of other therapies being investigated for use in COVID-19, none of which can currently be recommended given the lack of high-quality evidence.

Research involving therapies for COVID-19 remains a **high priority**. Wherever possible research staff engaged in COVID-19 related clinical research should be protected from redeployment.

Bibliography

Australian Government Department of Health (2020a) Australian Health Sector Emergency Response Plan for Novel Coronavirus (COVID-19). Available at: <https://www.health.gov.au/resources/publications/australian-health-sector-emergency-response-plan-for-novel-coronavirus-covid-19> (accessed 16 March 2020).

Australian Government Department of Health (2020b) Environmental cleaning and disinfection principles for COVID-19. Available at: <https://www.health.gov.au/resources/publications/environmental-cleaning-and-disinfection-principles-for-covid-19> (accessed 16 March 2020).

Carding N (2009) Responding to pandemic influenza - The ethical framework for policy and planning. Available at: <https://www.hsj.co.uk/swine-flu/responding-to-pandemic-influenza-the-ethical-%20framework-for-policy-and-planning/5005219.article> (accessed 16 March 2020).

Centers for Disease Control and Prevention (2018) Centers for Disease Control and Prevention - Hierarchy of Controls - NIOSH Workplace Safety and Health Topic. Available at: <https://www.cdc.gov/niosh/topics/hierarchy/default.html> (accessed 15 March 2020).

College of Intensive Care Medicine of Australia and New Zealand (2016) IC-1 Minimum Standards for Intensive Care Units. Available at: https://www.cicm.org.au/CICM_Media/CICMSite/CICM-Website/Resources/Professional%20Documents/IC-1-Minimum-Standards-for-Intensive-Care-Units.pdf.

College of Intensive Care Medicine of Australia and New Zealand (2019) IC-13 Guidelines on Standards for High Dependency Units. Available at: https://www.cicm.org.au/CICM_Media/CICMSite/CICM-Website/Resources/Professional%20Documents/IC-1-Minimum-Standards-for-Intensive-Care-Units.pdf.

Department of Health, Commonwealth of Australia (2020) Australian Health Sector Emergency Response Plan for Novel Coronavirus COVID-19.

Gomersall CD, Tai DYH, Loo S, et al. (2006) Expanding ICU facilities in an epidemic: recommendations based on experience from the SARS epidemic in Hong Kong and Singapore. *Intensive care medicine* 32(7): 1004–1013. DOI: 10.1007/s00134-006-0134-5.

Grasselli G, Pesenti A and Cecconi M (2020) Critical Care Utilization for the COVID-19 Outbreak in Lombardy, Italy: Early Experience and Forecast During an Emergency Response. *JAMA: the journal of the American Medical Association*. DOI: 10.1001/jama.2020.4031.

Guan W-J, Ni Z-Y, Hu Y, et al. (2020) Clinical Characteristics of Coronavirus Disease 2019 in China. *The New England journal of medicine*. DOI: 10.1056/NEJMoa2002032.

Huang C, Wang Y, Li X, et al. (2020) Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *The Lancet* 395(10223): 497–506. DOI: 10.1016/S0140-

6736(20)30183-5.

Leung CCH, Joynt GM, Gomersall CD, et al. (2019) Comparison of high-flow nasal cannula versus oxygen face mask for environmental bacterial contamination in critically ill pneumonia patients: a randomized controlled crossover trial. *The Journal of hospital infection* 101(1): 84–87. DOI: 10.1016/j.jhin.2018.10.007.

Li G and De Clercq E (2020) Therapeutic options for the 2019 novel coronavirus (2019-nCoV). *Nature reviews. Drug discovery* 19(3): 149–150. DOI: 10.1038/d41573-020-00016-0.

Liew MF, Siow WT, MacLaren G, et al. (2020) Preparing for COVID-19: early experience from an intensive care unit in Singapore. *Critical care / the Society of Critical Care Medicine*. DOI: 10.1186/s13054-020-2814-x.

MacLaren G, Fisher D and Brodie D (2020) Preparing for the Most Critically Ill Patients With COVID-19. *JAMA*. DOI: 10.1001/jama.2020.2342.

Murthy S, Gomersall CD and Fowler RA (2020) Care for Critically Ill Patients With COVID-19. *JAMA: the journal of the American Medical Association*. DOI: 10.1001/jama.2020.3633.

NHMRC (2019) Australian Guidelines for the Prevention and Control of Infection in Healthcare (2019). Available at: <https://www.nhmrc.gov.au/about-us/publications/australian-guidelines-prevention-and-control-infection-healthcare-2019> (accessed 15 March 2020).

Pang J, Wang MX, Ang IYH, et al. (2020) Potential Rapid Diagnostics, Vaccine and Therapeutics for 2019 Novel Coronavirus (2019-nCoV): A Systematic Review. *Journal of clinical medicine research* 9(3). DOI: 10.3390/jcm9030623.

Sprung CL, Danis M, Iapichino G, et al. (2013) Triage of intensive care patients: identifying agreement and controversy. *Intensive care medicine* 39(11): 1916–1924. DOI: 10.1007/s00134-013-3033-6.

Standards Australia (2009) *Selection, use and maintenance of respiratory protective equipment - AS/NZS 1715-2009*. Available at: <https://www.standards.org.au/standards-catalogue/sa-snz/publicsafety/sf-010/as-slash-nzs--1715-2009> (accessed 16 March 2020).

Standards New Zealand (2009) *Selection, use and maintenance of respiratory protective equipment - AS/NZS 1715-2009*. Available at: <https://www.standards.org.au/standards-catalogue/sa-snz/publicsafety/sf-010/as-slash-nzs--1715-2009> (accessed 16 March 2020).

Tan TK (2004) How severe acute respiratory syndrome (SARS) affected the department of anaesthesia at Singapore General Hospital. *Anaesthesia and intensive care* 32(3): 394–400. DOI: 10.1177/0310057X0403200316.

Wang T, Du Z, Zhu F, et al. (2020) Comorbidities and multi-organ injuries in the treatment of COVID-19. *The Lancet*. DOI: 10.1016/S0140-6736(20)30558-4.

Wax RS and Christian MD (2020) Practical recommendations for critical care and anesthesiology teams caring for novel coronavirus (2019-nCoV) patients. *Canadian journal of anaesthesia = Journal canadien d'anesthésie*. DOI: 10.1007/s12630-020-01591-x.

World Health Organization (2020a) Clinical management of severe acute respiratory

infection when novel coronavirus (nCoV) infection is suspected. Available at:
[https://www.who.int/publications-detail/clinical-management-of-severe-acute-respiratory-infection-when-novel-coronavirus-\(ncov\)-infection-is-suspected](https://www.who.int/publications-detail/clinical-management-of-severe-acute-respiratory-infection-when-novel-coronavirus-(ncov)-infection-is-suspected) (accessed 16 March 2020).

World Health Organization (2020b) Infection prevention and control during health care when novel coronavirus (nCoV) infection is suspected. 2020. Available at:
[https://www.who.int/publications-detail/infection-prevention-and-control-during-health-care-when-novel-coronavirus-\(ncov\)-infection-is-suspected-20200125](https://www.who.int/publications-detail/infection-prevention-and-control-during-health-care-when-novel-coronavirus-(ncov)-infection-is-suspected-20200125).

Xie J, Tong Z, Guan X, et al. (2020) Critical care crisis and some recommendations during the COVID-19 epidemic in China. *Intensive care medicine*. DOI: 10.1007/s00134-020-05979-7.

Zhou F, Yu T, Du R, et al. (2020) Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study. *The Lancet*. DOI: 10.1016/S0140-6736(20)30566-3.