

Care of adult patients with COVID-19 in acute inpatient wards

A model of care for NSW Health clinicians

This document outlines a model of care to guide acute inpatient clinical staff to care for adult patients who have COVID-19.

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Introduction

Adult patients aged 16 years and older who have tested positive to COVID-19 may need to be managed in acute inpatient wards if their condition requires clinical interventions and monitoring that cannot be delivered in the community.

Care can be provided in dedicated COVID-19 wards, respiratory wards, general medical wards, or other spaces that have been deemed locally appropriate to deliver COVID-19 inpatient care outside of the intensive care unit (ICU).

The team responsible for the care of a person with COVID-19 should be multidisciplinary, but will vary according to local resourcing, geographic location and service models.

Purpose

This document outlines a model of care to guide acute inpatient clinical staff to care for adult patients who are positive for COVID-19. It will help clinicians to:

- understand the admission processes and considerations for patients who require care on acute inpatient wards outside of the ICU
- assess acute clinical severity and implement evidence-based care at the appropriate time for patients who have COVID-19
- to support the safe transfer of those who may be at risk of requiring admission to intensive care
- detect clinical deterioration and escalate appropriately

- allocate appropriate staffing resources and skills to manage patients safely and effectively
- safely and appropriately discharge patients following the acute phase of their illness with referral for rehabilitation in either an outpatient or inpatient setting, where appropriate.

This model of care should be read in conjunction with the following state and national documents addressing infection prevention and control and clinical care of people with COVID-19:

- [Coronavirus Disease 2019 \(COVID-19\) National Guidelines for Public Health Units, Communicable Disease Network of Australia \(CDNA\)](#)
- [Recognition and management of patients who are deteriorating](#), NSW Health
- [National COVID-19 evidence taskforce clinical guidelines for the treatment of COVID-19](#)
- [COVID-19 Infection Prevention and Control Manual, Clinical Excellence Commission](#)

Methodology

This guidance is based on current evidence. It is supported by expert clinical consensus of a multidisciplinary team. It was developed in consultation with senior clinicians from the Agency for Clinical Innovation's COVID-19 communities of practice (respiratory, intensive care, rehabilitation and palliative care), the Clinical Excellence Commission (CEC), the Ministry of Health and Hospital in the Home (HITH).

Governance

Use of this guideline and other policy documents will be underpinned by local factors, including location and demographics, as well as service factors, such as leadership, governance, resources and policies/procedures.

Delta variant of concern

- The Delta variant is a variant of concern (VOC) that poses issues for disease control and management due to increased transmissibility, severity and vaccine resistance.
- The Delta may be associated with more severe acute disease and is more likely to affect younger people.
- Risk of a hospital admission is approximately doubled in those with the COVID-19 Delta variant when compared with the Alpha strain. The risk of admission is particularly increased in those with comorbid conditions.
- The Delta VOC is predominantly transmitted through infected droplets and aerosols via the respiratory route. The dominant mode of virus transmission is through infected aerosols and droplets released while breathing and coughing.
- The addition of respiratory support with either oxygen, high-flow nasal prong humidified oxygen (HFNPO₂) and CPAP (continuous positive airway pressure) adds limited additional risk. This has subsequent follow-on implications for locating these patients within the acute inpatient ward environment; particularly when aerosol-generating procedures (AGPs) are being performed.
- The CEC's [COVID-19 Infection Prevention and Control Manual](#) and [Respiratory guidelines for the management of aerosol generating procedures \(AGPs\)](#) should be used by acute inpatient clinical staff to support decision making around these issues.

Admission to hospital

When patients require admission to hospital, all efforts should be made to ensure timely patient flow, in line with local policies and procedures. Local sites should be aware of escalation criteria from their HITH teams, virtual hospital and special health accommodation (SHA) facilities. Consideration should be given to the following:

- Have local processes in place that enable early escalation for deteriorating patients in the community who may require admission to hospital.
- Consider direct admissions via assigned inpatient COVID-19 care teams to relieve pressure on the emergency department. This will be aided by a clear and direct communication between the senior clinician caring for the patient in the community and the admitting medical officer (nominated acute COVID consultant).
- Infection prevention and control protocols around patient placement, patient transfers within the hospital and disposition decisions. This should be based on time since testing positive to COVID-19 and symptom onset, as well as vaccination status
- Processes that facilitate effective communication with patients and their families and carers.

Establishing COVID-19-specific wards

Establishing COVID-19-specific wards can support the safe and effective care of patients with COVID-19. Some essential considerations in setting up these specific wards are as follows:

- Cohorted areas should be established to care for appropriate patients beyond single or negative pressure room environments.
- A dedicated area for aerosol-generating procedures with negative pressure capability. Alternatively, at least single rooms and the ability to isolate patients must be available.
- De-isolation plans should be established to facilitate patient flow.
- Equipment should be available to facilitate the care of patients who are positive for COVID-19, including respiratory support equipment and personal protective equipment (PPE).

- Dedicated PPE donning and doffing areas.
- A dedicated medical admissions and discharge officer to facilitate patient flow as a medical decision maker.
- An operational manager/nurse unit manager (NUM).
- Rostering for medical and nursing that considers the skill mix required to provide care to patients with COVID-19.
- Appropriate multidisciplinary staffing that is considerate of the ratios required to provide safe care.
- Break areas for staff that facilitate social distancing.

Acute respiratory wards for COVID-19 care

There may be local sites who have the capability to provide respiratory support monitoring and therapies in a ward setting to prevent admission to intensive care. These include:

- HFNPO₂
- CPAP
- non-invasive ventilation (NIV)
- continuous pulse oximetry
- prone positioning.

These wards can deliver specialised care as they have the equipment and skilled staff to deliver it safely. This includes:

- specialised medical staff (e.g. respiratory physicians) with experience and knowledge in prescribing and managing these therapies
- nursing staff with extended skills in managing respiratory supports, and detecting and monitoring clinical deterioration in these patients
- staffing ratios and the skill mix required to safely and effectively deliver this care
- development of teams to support prone positioning.
- Care on these wards should be underpinned by local policies that support this care, clinically and operationally.

Assessment of clinical severity

On admission to hospital, assessment of the clinical severity of patients with COVID-19 is crucial to identifying and implementing the appropriate evidence-based care. Assessment should include any limitations of therapy, and these should be defined and documented. Where appropriate, referrals to palliative care teams should be actioned.

The following table outlines the criteria for clinical severity for adult patients who have COVID-19.

	Moderate	Severe	Critical
Oxygen saturation (SpO₂)	<ul style="list-style-type: none"> SpO₂>92% (>88% at risk hypercapnia) Requires any oxygen (O₂) up to 4L/min O₂ by nasal prongs to maintain SpO₂ 	<ul style="list-style-type: none"> SpO₂>92% (>88% at risk hypercapnia) Requires O₂ by HFNPO₂ up to 0.4 or CPAP to maintain SpO₂ 	<ul style="list-style-type: none"> SpO₂>92% (>88% at risk hypercapnia) Requires CPAP +/- FiO₂ 0.6 or NIV or mechanical ventilation to maintain SpO₂
Arterial blood gas (ABG) values	Not indicated	PaO ₂ :FiO ₂ <300mmHg	<ul style="list-style-type: none"> PaO₂:FiO₂<200mmg Hypercapnic respiratory failure
Respiratory rate	10–25 bpm	8–10 breaths/min, or 26–30 breaths/min	<8 breaths/min or >30 breaths/min
Pulse	50–120 bpm	40–50 bpm or 120–140 bpm	<40 bpm or >140 bpm
Systolic blood pressure (SBP)	100mmHg – 180mmHg	90–100mmHg or 180–200mmHg	<90mmHg or >200mmHg
Glasgow coma scale (GCS)	15	15	<15

To note:

- All patients with severe acute COVID-19 are at high risk of further deterioration and a clear discussion regarding escalation of care should be maintained with intensive care clinicians.
- The benefit from the addition of proning and CPAP is likely to be seen at pressures of 10–12cm and with an FiO₂ titrated to target SpO₂ (92–96% in most patients; 88–92% in patients with chronic obstructive pulmonary disease (COPD), obesity, neuromuscular disease or chest wall deformity).**
- A deterioration beyond these parameters should alert the clinician to consider the need for intensive care admission and the need for invasive mechanical ventilation. Delaying this may result in serious complications and mortality.

Medical therapies

The appropriate evidence-based medical therapies used in the management of COVID-19 should be implemented, based on the assessment of clinical severity. Details on drug regimes can be found in the [NSW Health interim guidance on use of antiviral and immunomodulation therapy in COVID-19](#).

Information regarding COVID-19 drug therapies and prescribing processes (such as drug guidelines, patient information leaflets and consent processes) can be

found on the [NSW Therapy Advisory Group COVID-19 Resources web page](#). Further information regarding local prescribing processes and drug availability can be obtained from the local Drug and Therapeutics Committee or pharmacy department.

The following table outlines the evidence-based therapies that should be considered in the acute management of COVID-19, based on severity.

	Moderate	Severe	Critical
Dexamethasone, 6mg/d PO/ IV for up to 10 days	Start	Start or continue	Start or continue
Baricitinib 4mg/d PO for 10 days or hospital discharge*	Start	Start or continue	Continue (do not start if requiring invasive ventilation)
Remdesevir 200mg IVI day 1 then 100mg/d IV for 5d	Start	Start or continue	Continue (do not start if requiring invasive ventilation)
Tocilizumab/Sarilumab*	Consider in pregnancy, pregnant and breastfeeding women who require supplemental oxygen and have evidence of systemic inflammation	Start if unable to use Baricitinib	Start

* Not for use in pregnancy

critical shortage single dose only, do not use if on Baricitinib; or if it has been administered.

To note:

For all patients on regular dexamethasone, check blood glucose for the development of hyperglycaemia in all patients for the first 24 hours (post meals), and then as clinically indicated. All patients should receive standard deep vein thrombosis (DVT) prophylaxis.

Respiratory support

When caring for patients with COVID-19, clinicians need to determine an oxygen saturation (SpO₂) target range for if/when supplemental O₂ is required:

- 92–96% in most patients
- 88–92% in patients at risk of hypercapnia

	Moderate Requires any oxygen	Moderate Requires oxygen by HiFO ₂ or mask up to FiO ₂ 0.4	Severe Requires CPAP 10cm (12cm if BMI>30)	Critical Requires referral to intensive care for invasive mechanic ventilation
Target SpO₂	Up to 4L/min O ₂ by nasal prongs or FiO ₂ 0.35 by venturi mask required	Up to FiO ₂ 0.4 (4-6L/min) required	Up to FiO ₂ 0.6 (8-10L/min O ₂) required	Unable to maintain SpO ₂ . Continue CPAP plus O ₂ at 10L/min, transfer to ICU
ABG	As clinically indicated	FiO ₂ 0.40 required to maintain target SpO ₂ – consider ABG. PaO ₂ :FiO ₂ <300mmHg	ABG recommended. PaO ₂ :FiO ₂ <300mmHg	ABG required. PaO ₂ :FiO ₂ <200mmHg or acute hypercapnoea
Prone	Not indicated	Min >3hrs/24 (aim for at least 8hr)	Min >3hrs/24 (aim for at least 8hr)	Min >3hrs/24 (aim for at least 8hr)
Setting	Medical ward	Medical ward	Specialist respiratory ward or ICU	ICU
Nurse: Patient ratio*	1:4	1:4	1:2	Ratios deemed locally appropriate within intensive care units

* Patients with higher complexity and requiring more interventions might need to be managed 1:1 with an additional healthcare worker to provide additional care.

To note:

- In patients with acute hypercapnic respiratory failure/acute COVID-19 pneumonia (especially those with a background of COPD, obesity and neuromuscular disease), early use of NIV support may be indicated instead of HFNPO₂ or CPAP.
- This should be carried out in a specialist respiratory ward that has expertise in the care of NIV, or in an ICU. More information on the use of NIV in these patients can be found in the [Intensive Care NSW Non-invasive ventilation guidelines](#).
- A local framework of care should be developed that is appropriate and safe to care for these patients.

Risk of deterioration

Early assessment by senior clinicians for identification of patients with COVID-19 who have a higher risk of deterioration and mortality should be prioritised. This should be clearly documented in patient medical records. The risk for mortality and acute deterioration of an admitted patient with COVID-19 can also be calculated by the [ISARIC4C risk calculator](#).

Patients who are deemed at risk should be monitored carefully for clinical deterioration. Concerns should be escalated with intensive care teams as early as possible.

The following additional risk factors for deterioration should also be factored into clinical decision making:

High-risk factors
<ul style="list-style-type: none"> • Age >65yrs • Male sex • Obesity (especially those <55yrs) • Diabetes • Chronic disease (chronic respiratory disease, cardiac disease, chronic kidney disease, active malignancy, history of serious mental health disease) • Pregnancy • Immunosuppressed; active haematological malignancy, solid organ transplant, known immunocompromised condition, use of oral corticosteroids in the last month • People who identify as Aboriginal, Torres Strait Islander Pacific Islander, or other minority groups • People from African, sub-continental, and other non-European backgrounds

Further investigations:

- In patients who are deteriorating, clinically relevant investigations should be undertaken.
- A chest x-ray should be performed if this has not already been done.
- A routine CT chest is not required.

The following additional investigations should be performed to inform the risk of poor outcome. They should be performed at the time of admission and their repeated frequency, as clinically indicated:

	Risk of poor outcome
Lymphopenia <1.1 x10 ⁹ /mL	3.3
Platelets <150 x10 ⁹ /mL	2.4
CRP>10mg/L	4.4
Procalcitonin*>0.5ng/mL	7.0
AST >40IU/L	2.4
Creatinine (new acute kidney injury) eGFR<90	2.6
D-dimer# >0.5mg/L	3.4
LDH>250U/L	5.8

* Procalcitonin is an indicator of bacterial sepsis. It is not elevated in COVID-19 pneumonia alone.

D-dimer and fibrinogen may provide useful information in acute deterioration with COVID-19, or in those with suspected DVT/PE or disseminated intravascular coagulation. It should be measured when clinically indicated.

To note:

- Cardiac complications may occur and may be responsible for acute deterioration with COVID-19.
- High sensitivity serum troponin is a valuable indicator of myocardial damage and should be measured when clinically indicated if there is evidence of cardiac symptoms or haemodynamic instability.

Once investigations are completed, these should be reviewed by the senior medical officer so that the patient's care plan can be guided and actioned.

Clinical escalation and transfer of care to intensive care units

When patients with COVID-19 deteriorate and reach an agreed maximum level of care which can be provided safely in the ward environment, referral to intensive care is recommended.

The level of care that can be provided on inpatient wards, and criteria for admission to ICU, will differ according to local resourcing and capabilities. Nevertheless, consideration should be given to:

- establishing good communication processes with intensive care units to facilitate early review by intensive care clinicians
- processes to transfer patients earlier in the trajectory of their deterioration; to ensure safe care is delivered in the right clinical environment
- structures, such as joint rounds or daily huddles to discuss patients who may require admission to ICU to establish a patient-centred treatment and escalation plan.

Limitations of therapy and end of life

- On admission, appropriate discussions about limitations of care should be undertaken and documented.
- Advanced care plans should be completed (where appropriate), in conjunction with the patient and their support people.
- If intensive medical therapy fails, or the patient has reached their agreed ceiling of therapeutic intervention, prioritise symptom control and end-of-life care is provided. This should be done in conjunction with any pre-existing treatment teams that were involved in the patient's ongoing care prior to testing positive to COVID-19 and being admitted to hospital, and with the palliative care team as appropriate.
- Local pathways should be followed, where available.

Discharge from hospital

- Clinical teams caring for patients should regularly consider the clinical status of patients who may be suitable for discharge back into the community. This should be facilitated at the earliest opportunity.
- This may include discharging patients to HITH services or a sub-acute facility, if appropriate.
- Clear step-by-step instructions about how to discharge to these services will need to be developed locally.

The following should be considered to assess readiness for discharge back into the community:

Criteria	Y / N
Able to maintain SpO ₂ >92% on room air	
Able to attend to own activities of daily living safely	
Pre-existing conditions are stable with care teams in place in the community	
Cognitively intact	
Support in the home environment from a carer or service already in place	
Follow-up plan is in place	
Regular GP is aware of discharge and ongoing care plan	
If still regarded as being infectious with COVID-19 but clinically stable for discharge, handover to COVID HITH or community medical officer	

Follow-up investigations and referral to rehabilitation

Patients who have been admitted to the acute inpatient environment will likely require ongoing care to support their recovery. The following investigations should be considered:

- All hospitalised patients who have required oxygen during their admission should have follow-up in three to six months by the appropriate care team or COVID-19 outpatient clinic, if one is in place locally.
- Lung function should be measured at follow-up, including spirometry and gas exchange (DLCO). Persistent lung damage is more likely to occur in those who were more severely ill during the acute phase.

Managing long-term symptoms

- The incidence of hospitalised patients who are positive for the Delta strain of COVID-19 experiencing long-term symptoms is high.
- Regardless of intubation, those requiring hospitalisation (50%) are likely at risk of developing two or more 'long-term COVID' symptoms at six months.
- Attention to physical, mental, and emotional syndromes should be carefully considered.
- Persistence of symptoms following acute COVID-19 is common. In particular, symptoms of fatigue have been reported in up to 50% of patients and breathlessness in 16% of patients, up to 16 weeks following discharge.

- If the patient is experiencing ongoing significant symptoms post discharge, referral to pulmonary rehabilitation services that provide programs such as the [Rehabilitation following COVID-19 in the pulmonary rehabilitation setting](#) should be considered.
- Recovery for some patients with COVID-19 may be slow and require support from rehabilitation services. Once symptoms are resolving, some patients who are more fragile may require referral to inpatient or outpatient rehabilitation services that provide rehabilitation for COVID-19 patients.
- More information can be found in the [Multidisciplinary rehabilitation communication and referral for patients diagnosed with, or recovering from COVID-19 guideline](#).

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