COVID-19 (Coronavirus disease 2019): Clinical management of inpatients with probable or confirmed COVID-19

Purpose of Guideline: to ensure best practice is maintained in the care of inpatients with probable or confirmed COVID-19.

For COVID-19 case definition, please refer to MOH guidelines.

Please also refer to other ADHB guidelines relevant to COVID-19, which include

- Screening Tool- Acute Respiratory Infection
- COVID-19 (Coronavirus disease 2019): guide to early identification, infection prevention and management
- Best use of Personal Protective Equipment Guide
- Shared Goals of Care
- COVID-19 Palliative Care Resources
- Resuscitation guidelines during COVID-19 response: Adult medical emergency team calls
- Influenza and Influenza-Like Illness – Prevention of In-Hospital Spread
- COVID-19 Rapid Testing Criteria
- "I'm sick. What should I do?"

General Information and Screening:

- This guideline applies to patients presenting with probable or confirmed COVID-19 infection.
- All patients presenting to ADHB inpatient services should be assessed using the Screening Tool- Acute Respiratory Infection.
    - Patients with both new or worsening symptoms of acute respiratory infection and high risk criteria (HRC) for COVID-19 should be considered to have COVID-19 and use of this guideline considered.
    - Patients with symptoms and no HRC for COVID-19: if SARS-CoV-2 negative, are unlikely to have COVID-19 and should instead be managed as per the ADHB policy "Influenza and Influenza-Like Illness – Prevention of In-Hospital Spread" or other disease specific policies and guidelines (see A-Z Communicable Diseases Table)
    - Patients with neither symptoms or HRC should be managed using standard and transmission based precautions as is appropriate for the clinical situation.
    - Patients without symptoms but who have HRC for COVID-19 exposure should receive treatment as indicated for their presenting condition, and be managed and placed in precautions as determined by the Screening Tool - Acute Respiratory Infection. This includes:
        - Minimum of daily monitoring for the development of COVID-19 symptoms
        - Scheduled swabs for those inpatients from managed isolation and quarantine facilities (MIQF) even if asymptomatic (day 0, 3 and 12 from entry to NZ) and surveillance swabs for those who work at the border
        - Minimum of neutral-pressure single room, contact and droplet precautions for routine care
        - Airborne infection isolation room (AIIR, or negative pressure) single room, contact and airborne precautions for aerosol-generating procedures (AGPs)
- In addition to those with a positive contact screen, the following groups should be particularly encouraged and supported to be tested:

- Those more likely to have severe consequences if they were to contract COVID-19. This group includes: seniors (those who are over 70 years old), Māori, Pacific peoples, and those who have significant pre-existing conditions.
- Health care workers and aged care residential staff. All patients in this group with symptoms consistent with COVID-19 should be tested. Please see flow chart "I'm sick. What should I do?" from the COVID HIPPO webpage.

Placement of Patients with Probable or Confirmed COVID-19

Presentation	Precautions	Viral testing	Placement and Services Involved
Patients with mild ILI AND no 'higher index of suspicion criteria' AND well enough to be discharged	Contact and droplet precautions* For AGP, contact and airborne precautions ***Contact and airborne precautions in Level 3 and 4**	SARS-CoV-2	• Assess in CDU, rooms 1, 3 or 4 (neutral pressure). • Complete eReferral to Auckland Regional Public Health (ARPHS) for notification of results. Ensure up-to-date phone number on referral. • If known COVID positive or probable case, see COVID HIPPO website for discharge process (managed isolation/quarantine facility).
Patients with mild ILI AND 'higher index of suspicion criteria' OR COVID-19 AND well enough to be discharged	Contact and airborne precautions	SARS-CoV-2	• Prioritise placement in CDU rooms 21, 22, 23 (AIIR/negative pressure) then 1, 3,or 4 (neutral pressure) • Complete eReferral to Auckland Regional Public Health (ARPHS) for notification of results. Ensure up-to-date phone number on referral. • If known COVID positive or probable case, see COVID HIPPO website for discharge process (managed isolation/quarantine facility).
Patients requiring admission with ILI AND no 'higher index of suspicion criteria' AND SpO2 ≥ 92% on room air AND haemodynamically stable	Contact and droplet airborne precautions* For AGP, contact and airborne precautions ***Contact and airborne precautions in Level 3 and 4**	SARS-CoV-2 Additional respiratory panel (SARS-CoV-2, influenza and RSV) may be requested	• Assess in CDU, preferred rooms 21, 22 or 23 then 1, 3 or 4. • Admit to the COVID ward, Purple General Medicine team. • Discuss with COVID coordinator (021 195 6238) or ID consultant on-call afterhours. • If pre-existing lung disease, or Non-invasive ventilation (NIV) for another condition (e.g. OSA) discuss with Respiratory Service. A non-vented mask and viral filter should be used on machine. • Confirmed COVID-19 positive patients may be cohorted in multi-bed room if required. Prioritise AIIR (negative pressure room). • If COVID-19 negative and low clinical suspicion of COVID-19, maintain Contact and Droplet precautions until respiratory symptoms have resolved for ≥24 hours.
Patients requiring admission with ILI AND 'higher index of suspicion criteria' OR COVID-19	Contact and airborne precautions	SARS-CoV-2 Additional respiratory panel may be requested	• Prioritise placement in CDU rooms 21, 22, 23 (AIIR/negative pressure) then 1, 3,or 4 (neutral pressure) • Placement dependent on clinical stability. If haemodynamically stable and SpO2 ≥ 92%, admit to the COVID ward, Purple General Medicine team. • Discuss with COVID coordinator (021 195 6238) or ID consultant on-call afterhours. • Discuss and notify DCCM regarding ward placement and escalation plan. • Document escalation plan and ceiling of treatment. • If pre-existing lung disease, or Non-invasive ventilation (NIV) for another condition (e.g. OSA) discuss with Respiratory Service. A non-vented mask and viral filter should be used on machine • Prioritise AIIR (negative pressure room) • If requiring ≥4L/min oxygen via nasal prongs or reservoir mask to maintain SpO2 ≥ 92%, or CXR changes, may be best placed on ward 7A (which may be the COVID ward) and discussed with Respiratory, with consideration given to non-invasive ventilation (NIV)
Patients presenting with a primary issue under another service but who also have ILI AND no 'higher index of suspicion criteria' E.g. abdominal pain for surgical review but also have a cough and sore throat	Contact and droplet precautions until respiratory symptoms resolved for 24 hours For AGP, contact and airborne precautions ***Contact and airborne precautions in Level 3 and 4**	SARS-CoV-2 Additional respiratory panel (SARS-CoV-2, influenza and RSV) maybe requested	• Admit under service most appropriate to main presenting issue.

Patients presenting with a primary issue under another service but who also have ILI AND 'higher index of suspicion criteria' E.g. abdominal pain for surgical review but also have a cough and sore throat and MIF worker	Contact and airborne precautions	SARS-CoV-2 Additional respiratory panel (SARS-CoV-2, influenza and RSV) maybe requested	• Admit under service most appropriate to main presenting issue. • Prioritise placement in CDU rooms 21, 22, 23 (AIIR/negative pressure) then 1, 3,or 4 (neutral pressure) • Ideally admit to the COVID ward, may require assistance from Purple General Medicine team. • Discuss with COVID coordinator (021 195 6238) or ID consultant on-call afterhours.

Symptoms of COVID-19

- The mean incubation period is 5-6 days (or shorter for the Delta variant) but can be up to 14 days.
- Symptoms include

    - Fever 45-98%
    - Cough 65-80%
    - Fatigue 45-70%
    - Shortness of breath 20-65%
    - Sputum 25-55%
    - Rhinorrhoea 5%
    - Sore throat 5-15%
    - Nausea/vomiting 5%
    - Diarrhoea 5%
    - Anosmia 25-40%

- Most cases are mild but approximately 15% of adult cases develop severe disease requiring hospitalisation and 5% require ICU admission.
- Atypical symptoms may be seen, particularly in the elderly and children
- New variants may present atypically
- In severe cases, the median time from onset of symptoms to acute respiratory distress syndrome (ARDS) is 8-12 days, and from onset to ICU admission 10-12 days.
- Risk factors for more severe disease include:

    - Age >55 years
    - Chronic respiratory disease
    - Cardiovascular disease
    - Hypertension
    - Diabetes
    - New onset SOB and fever >3 days
    - Chronic kidney disease
    - Malignancy
    - Immunocompromised states
    - Obesity
    - Smoking

Investigations for Inpatients with Probable or Confirmed COVID-19:

- Nasopharyngeal swab.
    - For patients being discharged with mild symptoms in the absence of confirmed disease, send swab for COVID-19 only, give isolation advice, and make eReferral to ARPHS to enable an automated text message result to be sent.
    - For patients being admitted, send for SARS-CoV-2. For patients without HIS criteria, ARPHS referral is not required if the patient is likely to have their result communicated to them as an inpatient.
    - The FilmArray respiratory PCR panel (which includes many viral and some bacterial pathogens but not SARS-CoV-2) should only be requested if it will materially change management. This occurs in liaison with the on-call Microbiologist.
    - Rapid testing is available for critically unwell patients and other selected situations (e.g. urgent surgery required). See COVID-19 Rapid Testing Criteria in the LabPLUS Test Guide on HIPPO.

- Routine blood testing
    - FBC – lymphopenia and mild thrombocytopenia are common.
    - U&E, LFT, Mg^{2+} – electrolyte disturbances can occur with COVID-19.
    - CRP – if <40, associated with a lower risk of progression to severe disease.
    - CK, LDH, D-dimer, ferritin – not routinely required but high values may be associated with a higher risk of progression.
    - Troponin, BNP – if myocarditis is thought possible. Consider echocardiogram if elevated.
    - Arterial blood gas (ABG) – if oxygen saturations <92%.
    - Consider HIV test.
- Tests for alternate diagnoses – blood cultures, urinary antigens for *S. pneumoniae,* sputum for culture and atypical organism PCR.
- CXR.
    - Mild cases not requiring hospital admission may not require a CXR.
    - Patients being admitted for ILI, or probable or confirmed COVID-19 should have a portable CXR performed in their room.
        - May be unremarkable in early stages.
        - Unilateral changes may occur in mild or early disease.
        - The typical picture of COVID-19 is patchy ground glass opacities, predominantly peripheral and basal. May coalesce into more dense consolidation with increasing severity of illness.
        - Pleural effusions, masses, cavitation and lymphadenopathy are rare.
    - Repeat CXR only if clinically indicated.
- CT scanning.
    - Should not be used to screen for or diagnose COVID-19. Use only if it is expected to change management. Most COVID-19 patients do not need a CT.
    - If CT it is felt to be necessary or is required to exclude an alternative diagnosis, inform radiology that COVID-19 is suspected. The patient needs to wear a surgical mask with radiology staff wearing appropriate PPE, and appropriate cleaning required (see COVID-19 (Coronavirus disease 2019): guide to early identification, infection prevention and management).
- ECG.
    - Mild cases not requiring hospital admission may not require an ECG.
    - Patients being admitted for ILI, or probable or confirmed COVID-19, should have an ECG performed as cardiomyopathy and arrhythmias can occur.
- Bronchoscopy is aerosol generating and should be avoided in probable or confirmed COVID-19.
- Point of Care Ultrasound Scan (POCUS).
    - Not generally useful as POCUS findings are not specific to COVID-19.
    - POCUS may be useful for differentiating other causes (e.g. pleural effusion).
    - Infection Prevention and Control recommendations should be followed for safe use and disinfection of the POCUS machine.

Management of Inpatients with Probable or Confirmed COVID-19:

- Supportive care and close monitoring is key.
    - Monitor for complications, which may include hypoxaemic respiratory failure/ARDS, sepsis, cardiomyopathy, arrhythmia, acute kidney injury, secondary bacterial infections, and thrombotic complications including pulmonary emboli.
- Numerous risk stratification tools using demographic, clinical, laboratory, and radiological measures have been suggested to identify patients suitable for early discharge in an epidemic setting.
    - A period of monitoring in hospital for 24-48 hours will be suitable for most patients in the current setting or dependent on where they are in illness trajectory
    - Certain patients, such as those <50 years old without comorbidities may be suitable for early discharge
- Probable or confirmed COVID-19 patients who are considered for discharge should firstly be discussed with ARPHS and then the Regional Isolation and Quarantine Coordination Center (RIQCOORD) to arrange isolation in a managed quarantine facility with discharge. See the MIFQ patient discharge process on the COVID HIPPO webpage
- Request early DCCM review for deteriorating patients. Discuss any patient with DCCM who has a RR>30, oxygen saturation <92% on air, or hypotension refractory to initial fluid boluses.
    - Aim to ascertain the appropriate ceiling of treatment and avoid inappropriate escalation of care. This must be reviewed regularly by the medical team.
    - The ADHB Goals of Care form (available in the clinical forms library) should be used as a basis for discussion with the patient and/or whanau and for documentation of appropriate treatment in the event of deterioration.
    - See the Shared Goals of Care webpage on HIPPO
- Resuscitation - Refer to the Resuscitation Guidelines during COVID-19 response.
    - Safe PPE use must be prioritised for staff involved in resuscitation.
- IV fluids – use IV fluids as you would in any unwell patient.
    - e.g. 1-2L IV fluid per day if no oral intake.
    - Avoid maintenance fluids where possible.
    - If hypotensive, administer small fluid boluses (e.g. 250mL) and refer to DCCM for consideration of vasopressor therapy if not responding after 2-3 boluses.
- Supplemental oxygen
    - See the 'Key Points when Prescribing Supplemental Oxygen to patients with probable or confirmed COVID-19' guideline on the COVID HIPPO webpage
    - If saturations <92% on room air, check an arterial blood gas (ABG).
    - Titrate oxygen therapy to target oxygen saturation of 90-92% if no underlying chronic lung disease or ≥86% if known COPD.
    - Place a surgical mask over any oxygen delivery device, if possible.
    - Initiate oxygen therapy with low-flow nasal prongs (0.5-3L/min).
    - If oxygen target not met with nasal prongs, escalate to Hudson mask, or mask with reservoir bag (non-rebreather) at up to 10L/min.
    - Discuss with DCCM and Respiratory SMO for consideration of options for escalation including high-flow nasal prong oxygen ("Airvo"), non-invasive

ventilation, and intubation for invasive ventilation. These therapies should not be initiated without discussion with DCCM and Respiratory.
    - Non-invasive ventilation is aerosol generating and must be provided in an AIIR (negative pressure).
    - Patients established on non-invasive ventilation (NIV) at home for underlying conditions (e.g. COPD, OSA, obesity hypoventilation) need to be discussed with the Respiratory SMO and managed in an AIIR (negative pressure room). A non-vented mask and viral filter should be used on their machine.
    - Avoid nebulisers and high flow nasal oxygen devices if possible, as these are potentially aerosol generating – use metered dose inhalers via spacer as an alternative. If required they should be provided in an AIIR (negative pressure).
- Self-proning
    - Some experts are encouraging that hospitalized patients with COVID-19 spend as much time as is feasible and safe in the prone position, while receiving oxygen or non-invasive modalities of support, such as high-flow oxygen via nasal prongs or NIV. This should only be attempted by patients who are able to self-prone under verbal supervision from staff.
    - Data remains limited on the optimal indications for and duration of pronation, and assessment of response. Use of prone positioning should not delay intubation and mechanical ventilation in a deteriorating patient. It also may be difficult and potentially harmful in the elderly, those who are frail, or those with cognitive impairment. Please discuss with the COVID Co-ordinator.
- Medical therapies
    - Secondary bacterial infection is uncommon in confirmed COVID-19 but antibiotic therapy should be provided in cases where an alternate diagnosis, such as community-acquired pneumonia is being considered. There is evidence that unnecessary antibiotics can cause harm in COVID-19. See ADHB Script guidelines and review at 48 hours.
    - Inhaled budesonide 800 µg bd for 14 days may be used in patients >65 years who do not require oxygen or dexamethasone; or in patients >50 years with comorbidities (eg, hypertension, heart disease, diabetes, obesity, asthma or lung disease, hepatic impairment, stroke or neurological impairment, immunosuppression) who do not require oxygen or dexamethasone.
    - Dexamethasone 6mg once daily, IV or oral, should be given to patients with a requirement for oxygen (SpO2 <92% on room air), or invasive or non-invasive ventilation, until discharge or up to 10 days. Steroids are not indicated in patients with mild disease or those not requiring oxygen. Consider PPI prophylaxis with use.
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    - Do not use therapies proven to be of no benefit including hydroxychloroquine, chloroquine, oseltamivir, lopinavir-ritonavir or azithromycin.
    - Continue ACE inhibitors and angiotensin receptor blockers if already on these, and no other reason to stop (e.g. hypotension, AKI).
    - Interleukin 6 receptor antagonists (e.g. tocilizumab) have been shown to improve outcomes in critically unwell patients, and may also have benefits in

hospitalised patients with an oxygen requirement who are not critically unwell. Tocilizumab may be accessed via a NPPA to Pharmac prior to release of the widened access via special authority. All of the following criteria for use are required:
    - Patient has confirmed (or strongly clinically suspected) COVID-19; and
    - Oxygen saturations of <92% on room air, or requiring supplemental oxygen; and
    - Patient has laboratory markers of significant inflammation (eg, raised CRP, ferritin or procalcitonin); and
    - Patient is receiving adjunct systemic corticosteroids, or systemic corticosteroids are contraindicated; and
    - Tocilizumab is administered as a single dose of 8mg/kg IV (actual body weight) with maximal dose of 800mg.
  - Remdesivir (200mg IV on Day 1 then 100mg IV q24h on Days 2 – 5) may reduce time to recovery with moderate COVID-19. Patients must meet PHARMAC eligibility criteria, essentially requiring supplemental oxygen (oxygen saturations ≤92% on room air) without organ dysfunction or need for ventilation, dialysis or ECMO. Supply is available from Auckland Hospital Pharmacy on receipt of a signed Access Form (link here).
  - There is no clear evidence that convalescent plasma improves outcomes in hospitalised patients with COVID-19. The RECOVERY trial has reported no difference in 28 day mortality. The REMAP-CAP trial has reported no benefit in severely unwell patients.
  - Consideration of all other alternative treatments should be in the context of a clinical trial.
    - Consider enrolment in ASCOT study once open.
    - Consider enrolment in REMAP-CAP for patients in DCCM/CVICU.
- Thrombosis management.
  - Patients with COVID-19 have an increased risk of thrombosis.
  - Moderately unwell patients (hospitalised but not in ICU) should receive full-dose therapeutic anticoagulation with low-molecular weight heparin (e.g. enoxaparin 1mg/kg twice daily, adjusted for renal function if necessary – equivalent to VTE treatment) as there is a mortality benefit.
  - Severely unwell patients (in ICU or similar severity) should NOT receive full-dose therapeutic anticoagulation as there is no benefit and high likelihood of harm. The current evidence supports standard low-dose thromboprophylaxis (e.g. enoxaparin 20-40mg once daily) in this situation. Enrolment in a clinical trial (e.g. the anticoagulation arm of REMAP-CAP) is advised if available.
  - Patients who receive therapeutic anticoagulation on the ward and subsequently deteriorate to the point they require ICU care could be discussed with the Haematology and COVID teams. The current evidence supports continuing therapeutic anticoagulation in these patients but this may be the subject of future research; consider trial enrolment if available.
  - Critically ill COVID-19 patients may have laboratory evidence of mild coagulopathy on laboratory testing. This can be due to a coagulopathy or the presence of an inhibitor. In the absence of bleeding, therapeutic anticoagulation should be continued if established.

    - Haematology opinion is recommended in patients with low platelet count (<50 x10^9), low fibrinogen level (<1.0g/L) or significant renal impairment (creatinine <30mL/min).
    - For patients unable to receive chemical therapeutic anticoagulation or thromboprophylaxis, intermittent pneumatic compression (IPC) should be used, providing there are no contraindications. There is no added benefit of combining IPC with pharmacological thromboprophylaxis in critically ill patients.
- Symptom control and Palliative Care
    - Patients who are for active ward management but for whom DCCM admission is not likely to be in their interests or feasible should have symptom control available as appropriate (see Palliative Care Webpage – COVID-19 pink tile for symptom control advice).
    - Patients who are deemed to be in the last few days to hours of life should be managed to a high standard – please follow the guidance in the Last Days of Life Care plan to ensure high quality care.
    - Referral to specialist Palliative Care services should be made in the usual way via the e-referral on the palliative care webpage. Urgent advice should be sought through the palliative care triage phone 29163/021 227 3529.

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