Guideline

The management and treatment of children with acute SARS-CoV-2 infection (COVID-19)

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Author/custodian	Director, Infection Management and Prevention Service			**Review date**	31/03/2025
Supersedes	4.0				
Applicable to	All Clinical Staff				
Authorisation	Executive Director Clinical Services				

Purpose

Most children with a positive SARS-CoV-2 PCR are asymptomatic or suffer from a mild respiratory illness. A small proportion may present with a disease that spans from acute respiratory illness to an acute viral syndrome resembling adult SARS-CoV-2 respiratory disease. Rarely a delayed hyperinflammatory response state called Paediatric Multisystem Inflammatory Syndrome Temporally Associated with COVID-19 (PIMS-TS, also called "multisystem inflammatory syndrome in children [MIS-C]) can occur. This guideline describes the presentation and management of severe acute **COVID-19 lung disease**. PIMS-TS is covered in CHQ-GDL-63400 Paediatric Inflammatory Multisystem Syndrome Temporally Associated with COVID-19 .

Scope

This guideline covers the clinical presentation, investigations and treatment modalities for children diagnosed with SARS-CoV-2 respiratory disease and applies to all medical, nursing and allied health staff working in a CHQ department (includes general ward, ED and HDU/PICU) where children with confirmed and provisional COVID-19 infection may be admitted. It does not specifically cover the initial assessment. management and placement of children presenting with respiratory illnesses with suspected SARS-CoV-2 to ED.

Related documents

Procedures, Guidelines, Protocols

- CHQ-PROC-63002 Infection Control Guidelines for the Management of Patients with Known or Suspected Coronavirus (COVID-19)
- CHQ-PROC-63317 Donning and Doffing of Personal Protective Equipment (PPE) (health.qld.gov.au)
- CHQ-PROC-63110 Implementation of Standard, Transmission and Protective Based Precautions
- CHQ-PROC-63326 Respiratory pandemic sub-plan

- CHQ-GDL-00759 Community Acquired Pneumonia - Emergency management in children
- Queensland Health: Information for Queensland clinicians and healthcare workers - novel coronavirus (COVID-19)

For national guidance from the Communicable Diseases Network Australia (CDNA): https://www1.health.gov.au/internet/main/publishing.nsf/Content/cdna-song-novel-coronavirus.htm

And on testing: https://www.health.gov.au/sites/default/files/documents/2020/03/phln-guidance-on-laboratory-testing-for-sars-cov-2-the-virus-that-causes-covid-19.pdf

Other (Provide to family on discharge)

Fact Sheet: Paediatric inflammatory multisystem syndrome (For parents and guardians)

Guideline

Management of Acute Severe COVID Disease

For advice on the management of PIMS-TS (MIS-C) see CHQ-GDL-63400 Paediatric Inflammatory Multisystem Syndrome Temporally Associated with COVID-19

Clinical Presentation

- Clinical findings include: fever, respiratory distress, hypoxia, cough, haemoptysis, chest pain, abdominal symptoms, and diarrhoea.
- Infants may present with abnormal breathing patterns / apnoea and hypoxia.
- In older children / adolescents the symptoms and signs may be very similar to adult COVID pneumonitis.
- Most children have a history of SARS-CoV-2 exposure, either in a family member or educational setting.

Diagnostic testing

- Infection is confirmed when a respiratory sample is positive for SARS-CoV-2 by PCR or RAT (if pre-test probability high)
- In symptomatic children it is extremely important to consider differential diagnoses and investigate as per usual practice. Detection of SARS-CoV-2 does not necessarily mean this is the cause of symptoms.
- Ensure multiplex respiratory PCR in addition to SARS-CoV-2 PCR is requested for admitted inpatients with respiratory symptoms. Treatment decisions are made on PCR positivity.
- If children have severe community acquired pneumonia investigate also as for severe community-acquired pneumonia and discuss with the ID team

Assessment of children for hospital admission

Where possible and safe, children with a provisional or confirmed COVID-19 diagnosis should be managed and quarantined at home, as risks of severe illness or death from COVID-19 are extremely low in children and young people. Even though vulnerable groups have a slightly higher risk, this also remains low. High risk groups may however require hospital assessment to ensure exclusion of other diagnoses eg febrile neonates, febrile neutropenia.

Consider medical admission to hospital if supportive care is required for example:

- haemodynamic instability
- hypoxia (SaO_2 on room air <92%)
- severe abdominal pain
- gastrointestinal symptoms requiring supportive care

ALERT

Previously healthy children who require admission to hospital with a provisional or confirmed COVID-19 diagnosis should be admitted under the on-call general paediatric team. Children with complex conditions requiring specialty input should be admitted under the most appropriate specialty.

All children admitted at high risk of disease progression with symptomatic COVID-19 or requiring respiratory support, should be discussed with the Infectious Diseases consultant on call.

General management

Respiratory support

- Give supplemental oxygen if necessary, starting with low flow nasal oxygen if O_2 saturations <92% or significantly below baseline.
- Follow CHQ guidelines for respiratory support as per the usual escalation pathway. High flow nasal prong oxygen therapy should be reserved for children who fail sub-nasal or mask oxygen therapy (see alert below). A senior clinician should review the patient to aid with respiratory support escalation.
- Avoid the use of nebulisers
  - Use metered dose inhalers with spacers where possible. Salbutamol delivered via metered dose inhaler and spacer is the preferred delivery mode. It can be used in conjunction with low flow nasal oxygen in hypoxic patients and allow faster more effective medication delivery.
  - Nebulised salbutamol should be reserved for patients in extremis, with consultant approval, with staff in appropriate Airborne-plus personal protective equipment (PPE). A negative pressure room is preferable but not essential.
  - Sodium chloride 0.9% nebulisation should not be used in COVID-19 positive patients.
  - Nebulised adrenaline should be reserved for croup patients with significant stridor at rest causing significant increased work of breathing or hypoxia at rest. It should have consultant approval, with staff in appropriate Airborne-plus PPE. A negative pressure room is preferable but not essential.

Antimicrobials

- Most children with COVID-19 do not need antibiotics. Prescribe antibiotics for bacterial pneumonia if suspicion of secondary bacterial infection (persistent and high fever, significantly elevated inflammatory markers, extensive consolidation or pleural effusion). Antibiotics should be prescribed in line with the CHQ-GDL-00759 Community acquired pneumonia guidelines.
- Do not overlook other causes such as sepsis in children who appear seriously unwell.
- When influenza is circulating within the community, consider oseltamivir if critically unwell pending respiratory multiplex PCR (or influenza GeneXpert) if symptom onset less than 48 hours ago. Cease if influenza PCR negative.

Other supportive measures

- Check vitamin D level and correct as per local dosing, if necessary
- Nasogastric fluids, intravenous fluid therapy, antipyretics should be as per routine practice in a child with a viral infection.

Pro-coagulant Risk

- In adults, COVID lung disease, is associated with a significant increased risk of coagulopathy, including pulmonary and elsewhere. Cases have also been described in older children / adolescents, so patients should receive prophylactic low molecular weight heparin and TED stockings, if over 12 years of age.
- If the patient has abnormal coagulation/D-dimer/fibrinogen results, discuss with the Haematology team.
- Infants and children under 12 years should only be started on prophylactic anticoagulation after discussion with Haematology
- Consider pulmonary embolism (PE) in the unwell patient with sudden worsening of hypoxaemia, arterial blood pressure or tachycardia. Echocardiography and possibly a CT chest angiography should then be performed urgently.
- For further guidance on thromboprophylaxis, refer to Appendix 6. Seek Haematologist advice.

Imaging

- All children requiring oxygen therapy should have a chest radiograph.
- There is no need for routine CT scanning, only CT scan if clinically indicated (eg for a particular diagnostic question)
- If there is concern about pulmonary embolism, then CTPA should be undertaken.
- CT should NOT be done for COVID diagnostics (over 1/3 will be normal in proven Covid) but consider if there are concerns about another diagnosis.
  - Ground glass opacities are the most common abnormality and compared to adults these are more likely to be unilateral. They are usually peripheral.
  - Pleural effusions and adenopathy are rare (< 0.5%)
  - The incidence of pulmonary embolism is not specified in any of the studies, and there is also no separation between infants and older children.

Cardiac Investigations

- All children with COVID lung disease should have a baseline ECG, and cardiac blood tests as outlined in Appendix 1.
- ECHO should be considered case by case depending on clinical presentation and findings.

Laboratory Investigation (Appendix 1)

- Thorough screen for other causes of symptomatic respiratory infection should be undertaken, as these may co-exist with SARS-CoV-2 infection.
- Monitor FBC, urea and electrolytes and liver function tests with frequency according to clinical severity.
- If patient is critically unwell, monitor coagulation, troponin and perform bedside echocardiography

Escalation of care

- Refer urgently for PICU assessment children who remain hypoxic despite low flow nasal oxygen, or who are haemodynamically unstable

ALERT

For any patients suspected of COVID-19 infection nasal high flow oxygen should only be used when indicated and necessary. Patients should be in a negative pressure room (or if none available, single rooms with door closed) with airborne plus precautions. Convert to low flow for transport through hospital corridors. Do NOT transport on high flow. Where possible, expedite management so escalating therapy given at definitive location.

COVID specific therapy (See also: http://covid19evidence.net.au)

Principles

- All children admitted because of symptomatic COVID-19 requiring oxygen should be discussed with the CHQ Infectious Diseases (ID) team, or outside CHQ, local Paediatric Infectious diseases team.
- Request SARS CoV-2 genotyping on samples from children symptomatic and at highest risk of disease progression
- Escalation of therapeutic care requiring COVID-specific therapies (excluding dexamethasone) should be discussed with the Infectious Diseases team.
- In the absence of randomised controlled trials in Australian children, severely unwell children will be considered for novel therapies with plausible effect on COVID-19. If required these treatment decisions should be made within an MDT and may be discussed with the Australia and New Zealand Paediatric Infectious Disease (ANZPID) COVID-19 Clinical Reference Group. This group has been convened to provide timely, consensus expert opinion on anti-viral and adjunctive therapy in the absence of paediatric trial data.

Treatment (see Flow chart Appendix 3)

Mild disease

- Most children with mild symptomatic disease (coryza, URTI, sore throat, fevers, cough) require only symptomatic care at home.
- Some children at high risk of progression to severe disease may be offered therapy within the first 5 days of symptoms. Refer to Appendix 2 for priority risk groups for consideration of antiviral or monoclonal antibody treatment (where available). Therapy is generally considered only for those in HIGH RISK category and within this category only provided for those at highest risk.
- Ensure Respiratory PCR panel requested on all children with mild disease admitted to hospital. Other seasonal respiratory viruses may be the cause of more symptomatic disease eg. RSV, influenza.

Moderate to Severe Disease

- **Corticosteroids.** All patients hospitalised for COVID 19 requiring oxygen and/or invasive ventilation should be considered for corticosteroid therapy. The decision to prescribe corticosteroids should take into account patient's pre-existing conditions, risks and benefits.
  - Corticosteroids **are not used** in non-severe COVID-19 disease, with the exception of acute croup or asthmatic presentations where steroids may be used as per standard practice using croup/asthma steroid dosing.
  - Adult type COVID disease in children ≥ 5 years with an oxygen requirement use dexamethasone as per flow chart (Appendix 3)
  - **Infants 1 month to 5 years** should be prescribed corticosteroids after discussion with the Paediatric Infectious Diseases (ID) specialist or MDT and considered on a case-by-case basis.
    - Dexamethasone dose: 0.15 mg/kg IV or oral (maximum 6 mg/day) once daily for 10 days or until day of discharge from hospital if this is before completion of 10 days.
  - **Neonates** should only be prescribed hydrocortisone after Paediatric ID Specialist / MDT discussion.
    - Hydrocortisone dose: 0.5 mg/kg IV every 12 hours for 7 days then 0.5 mg/kg IV once daily for 3 days. Stop course on hospital discharge.
  - Always start a proton pump inhibitor (PPI) as gastroprotectant whilst on systemic corticosteroids.
  - Monitor blood glucose level whilst receiving dexamethasone.

- **Remdesivir**.
  - **Mechanism of action:** Inhibits viral replication through inhibition of the SARS-CoV-2 RNA-dependent RNA polymerase
  - Consider Remdesivir for up to 3-day course for early use in very high-risk patients with mild symptoms within the first 5 days (for dosing and baseline monitoring, refer to Appendix 4).
  - Consider use of Remdesivir for up to 5-day course for mild to moderate disease within 10 days of symptom onset as per flow chart in Appendix 3 (for dosing, refer to Appendix 4).
  - Remdesivir should only start after MDT discussion with Paediatric ID / MDT and usually only 24 hrs after response to dexamethasone evaluated.
  - Remdesivir should not be initiated in patients who present to hospital and are more than 10 days after symptom onset.
  - Remdesivir should not be initiated if the patient is on non-invasive ventilation or has already been intubated /ventilated /ECMO, however if already receiving Remdesivir then subsequently intubated it may continue but review at 48 hours.
- **Monoclonal antibodies**
  - Monoclonal antibodies targeting the SARS-CoV-2 spike protein had shown clinical benefits against COVID-19 caused by variants predominant during the earlier stages of the pandemic. Emerging data show that anti-spike protein monoclonal antibodies demonstrate a significant decrease in their in-vitro neutralising activities against many newer circulating SARS-CoV-2 variants, particularly Omicron and its subvariants. It is unlikely that currently available monoclonals will be effective in treating individuals with currently circulating variants of COVID-19.
  - **Do not use:** Sotrovimab or Casirivimab plus Imdevimab (Ronapreve®)
  - Tixagevimab plus cilgavimab (Evusheld®) may be considered for known Omicron BA2 as *in vitro* evidence suggests that some efficacy remains for this variant. Consider in symptomatic children at very high risk of severe disease only on ID advice (for dosing and baseline monitoring, refer to Appendix 4).
  - **CHQ Approvals:** Use of Evusheld® in children <12 years of age and <40 kg is considered off label/off license- ID approval on IPA required (with appropriate annotations reflecting off label/off license use).
  - As new monoclonal antibodies become available for therapeutic use these will be added.
- **Nirmatrelvir and Ritonavir (Paxlovid®)**
  - **Mechanism of action:** the nirmatrelvir component blocks the activity of a protease enzyme that the coronavirus needs in order to replicate; ritonavir inhibits the cytochrome P450, family 3, subfamily A (CYP3A4)-mediated metabolism of nirmatrelvir, thereby providing increased plasma concentrations of nirmatrelvir.
  - Paxlovid® is TGA approved for the treatment of coronavirus disease 2019 (COVID 19) in adults 18 years of age and older. The FDA has authorized the emergency use of Paxlovid® for the treatment of mild-to moderate COVID-19 in adults and children 12 years of age and older weighing at least 40 kg and who are at high risk for progression to severe COVID-19, including hospitalization or death, under an EUA.
  - Paxlovid® should be considered only in exceptional circumstances for children and adolescents aged 12 years and over and weighing at least 40 kg who have mild COVID-19, who do not require oxygen and who are unvaccinated and have not had COVID-19 in last 6 months OR immunocompromised AND at high risk of deterioration within 5 days of symptom onset.

- Eligibility for Paxlovid® in children is based on the patient's individual risk of severe disease, including age, multiple risk factors, and COVID-19 vaccination status and requires agreement of child's treating specialist and ID consultant. See Appendix 2 for risk factors for progression to severe disease.
- **CHQ Approvals:** Paediatric use of Paxlovid® in Australia is considered off label/off license- ID approval on IPA required (with appropriate annotations reflecting off label/off license use).

ALERT

Due to significant drug interactions with Paxlovid®, every patient requires a complete medication history (including prescribed and non-prescribed medications, vitamin and herbal supplements) to be taken and a drug interaction check before administration of nirmatrelvir plus ritonavir.

Drug interactions should be checked in the COVID-19 drug interactions checker provided by the University of Liverpool. (Liverpool COVID-19 Interactions (covid19-druginteractions.org)

- **Molnupiravir**
  - **Mechanism of action:** Molnupiravir (Lavegrio®) works by inhibiting replication of the SARS-CoV-2 virus.
  - Molnupiravir is TGA approved for the treatment of coronavirus disease 2019 (COVID 19) in adults 18 years of age and older, Molnupiravir is not authorized for use in patients younger than 18 years of age because molnupiravir may affect bone and cartilage growth.
  - **CHQ Approvals:** Molnupiravir is not recommended. Paediatric use in Australia is considered off label/off license- ID approval on IPA required (with appropriate annotations reflecting off label/off license use).
- **Tocilizumab**
  - **Mechanism of action:** Recombinant, interleukin-6 receptor antagonist
  - Consider Tocilizumab for the treatment of COVID-19 in children and adolescents (Appendix 3):
    - who require supplemental oxygen, have received corticosteroids with or without Remdesivir and have evidence of systemic inflammation (CRP > 75 mg/L)
    - OR continue to deteriorate despite corticosteroids with or without Remdesivir and are within 24 to 48 hours of commencement of respiratory support (high-flow nasal oxygen, continuous positive airway pressure (CPAP) or non-invasive ventilation, or invasive mechanical ventilation) regardless of the CRP
  - Tocilizumab is in very short supply worldwide. Alternatives as below should be considered by COVID MDT.
  - Dose: infants (>1 month of age) and children
    - Limited dosing data in children <2 years of age. Seek Specialist advice.
    - < 30 kg:12 mg/kg as a single IV infusion,
    - ≥ 30 kg: 8 mg/kg (maximum 800 mg) as a single IV infusion.
    - See CHQ-PMG-01201 Intravenous Tocilizumab for Rheumatology for Tocilizumab administration and monitoring guidance.

- **Anti-cytokine monoclonal antibodies**
  - Baricitinib and Sarilumab should only be used, if possible, within randomised trials. Where no trial is open or available a decision to use any of these treatments should be discussed and agreed within the Multi-disciplinary team (MDT) and if required the ANZPID Clinical Reference Group (CRG).
- **Budesonide**
  - Inhaled Budesonide may be considered in children at very high risk of diseases progression with confirmed COVID-19 who do not require oxygen and who are not eligible for monoclonal antibody treatment.
  - Budesonide may decrease the requirement for supplemental oxygen in adults if taken within 14 days of onset of symptoms. It is unclear how much benefit might be seen in children.

Inpatient de-escalation of isolation and transmission-based precautions

- Children may be discharged home when clinically appropriate and hospital supportive care no longer required.
- Refer to De-escalation for Isolation and Personal Protective Equipment Requirements of CHQ patients post positive SARS-CoV-2 infection (COVID-19) - Inpatient and Outpatient (health.qld.gov.au) prior to ceasing patient isolation and transmission-based precautions for children requiring ongoing in hospital admission.

Consultation

Key stakeholders who reviewed this version:

- Infection Management and Prevention Service Director
- Paediatric Infection Specialists
- Pharmacist Advanced - Antimicrobial Stewardship
- Medicines Advisory Committee – endorsed 20/07/2023

Audit/evaluation strategy

Level of risk	Very High
Strategy	Improve the care of patients with suspected and confirmed COVID-19
Audit/review tool(s) attached	
Audit/Review date	Updated as required as new information regarding the pandemic becomes available
Review responsibility	Infection Management and Prevention Service.
Key elements / Indicators / Outcomes	

Work Instruction revision and approval history

Version No.	Modified by	Amendments authorised by	Approved by
1.0 14/04/2020	CNC Infection Management and Prevention Service	Director Infection Management and Prevention Service	Executive Director Clinical Services, QCH
2.0 10/12/2021	Pharmacist Advanced - AMS	Director Infection Management and Prevention Service	Divisional Director Medicine
3.0 21/01/2022	Haematologist, Pharmacist Advanced - AMS	Director Infection Management and Prevention Service	CHQ Medicines advisory committee (CHQMAC)
4.0 12/05/2022	Director, IMPS, Pharmacist Advanced - AMS	Divisional Director Medicine	Executive Director Medical Services
5.0 10/7/2023	Director, IMPS, Pharmacist Advanced - AMS	Divisional Director Medicine	Executive Director Medical Services

Keywords	COVID-19, Coronavirus, SARS CoV 2, Pandemic, HITH, remdesivir, tocilizumab, dexamethasone, hydrocortisone, sotrovimab, sarilumab, anakinra, budesonide, tixagevimab plus cilgavimab, Evusheld®, Ronapreve®, Casirivimab plus Imdevimab, baracitinib, paxlovid, nirmatrelvir, ritonavir, molnupiravir, tocilizumab, 63327
Accreditation references	NSQHS Standards (1-8): 3 Preventing and controlling to healthcare associated infections

Appendix 1: Acute COVID in children Investigation List

(in order of priority)

Bloods – initial	**Other - initial**
FBC and film	Viral Respiratory NPA PCR panel
Chem 20	SARS-Cov 2 PCR
CRP	SARS CoV 2 genotyping
Blood culture	Throat swab MCS
Glucose	CXR
	urine MC&S
Second Line – as required or advised	
SARS-CoV-2 serology	ECG
Coagulation and fibrinogen	
ASOT	ECHO
EBV & CMV serology	urine for pneumococcal & legionella antigens if > 3years of age
EBV, CMV, adenovirus & enterovirus blood PCR	
Vit D	
Triglycerides	
Ferritin	
Troponin	
Pro Bnp	
CK	
Amylase	
HBV/HCV/HIV and strongyloides serology and Quantiferon Gold before anti-cytokine therapy	

Appendix 2. Risk factors for progression to severe disease – Monoclonal antibody criteria

- Use this table to assess risk and eligibility for monoclonal antibody therapy and antiviral therapy in children **with mild disease** [i.e. Remdesivir, Paxlovid®, Evusheld®]
- Children rarely progress to severe disease. Although established adult COVID-19 risks do extend into younger age groups (i.e. age, non-white ethnicity, obesity, comorbidity) children remain at lower risk of severe disease than adults.
- Recent child specific data highlights risks to include **two or more co-morbidities**, those with **cardiac or neurological conditions and obesity**.
- Use of specific Covid-19 therapy in mild disease should be based on the patient's individual risk of severe disease, including age, multiple risk factors, and COVID-19 vaccination status.

<table>
<tr><th colspan="3">Paediatric risk factors for severe disease</th></tr>
<tr><th>Regardless of vaccination status</th><th colspan="2">Unvaccinated</th></tr>
<tr><th>Immunocompromised
High to Moderate Risk
In Priority order -Highest Priority first</th><th>Any one risk factor Plus Unvaccinated
High Risk</th><th>Any 2 or more comorbidities/ risk factors Plus Unvaccinated High Risk</th></tr>
<tr><td>Lung transplant recipient
Allogeneic stem cell transplant within 6 months
Allogeneic SCT on immunosuppression / chronic GVHD
Autologous stem cell Transplant within 3 months
Solid organ transplant within 1 year
SOT > 1 year post transplant & unvaccinated
Alemtuzumab within 3 months</td><td>Chronic lung disease
- CF (or bronchiectasis) with FEV1 <60%
- congenital tracheal stenosis
- chronic lung disease with O2 treatment
- pulmonary hypertension
- neuromuscular dis (with daytime resp support)
- tracheostomy with ventilation</td><td rowspan="4">Diabetes (insulin-dependent)

Severe asthma
Not fulfilling criteria

Chronic kidney disease
(GFR <15 ml/min/1.73m2)

Sickle cell disease

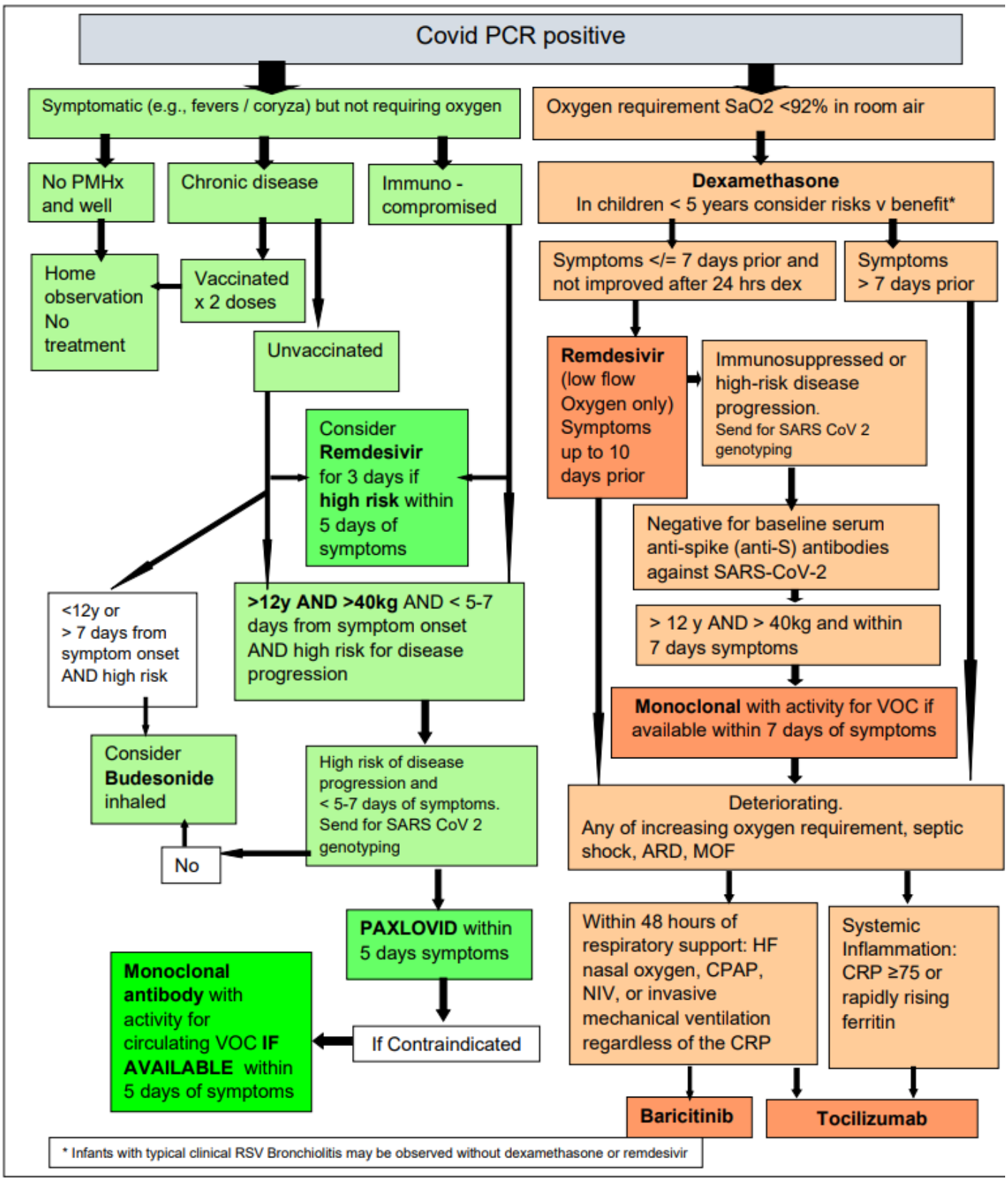
Complex genetic, metabolic disease, gastrointestinal or multiple congenital anomalies

Trisomy 21

All biologics and most disease- modifying antirheumatic drugs (DMARDs)</td></tr>
<tr><td>Allogeneic stem cell transplant within 12 months
Autologous stem cell Transplant within 6 months
Rituximab / obintuzumab plus additional immunosuppressive agents within 6 months
CAR-T within 12 months
High-dose corticosteroids (≥0.5 mg/kg/day or ≥20 mg/day prednisolone, or equivalent) for ≥ 4 weeks</td><td>Heart failure
- cardiomyopathy (requiring diuretics)
- shunt-dependent pulmonary blood flow
- pulmonary hypertension (PH) (requiring PH-specific therapy)
- single ventricle</td></tr>
<tr><td rowspan="2">Haematologic malignancy on active chemotherapy (as per Paediatric Oncologist)
Solid tumour on active highly intensive chemotherapy (as per Paediatric Oncologist)
Primary immune deficiency (as per Immunology consultant)
Other significantly immunocompromising conditions (as per Paed ID)
HIV with CD4 count < 50 cells/mm^3</td><td>Severe asthma
- in last 12 months, ≥1 severe exacerbation requiring ICU admission or iv treatment
OR high-dose inhaled corticosteroid to control symptoms
OR moderate-dose inhaled corticosteroid plus LABA to control symptoms</td></tr>
<tr><td>- Obesity (BMI ≥ 95th [CDC] / ≥ 97th [WHO] centile for age)

Complex life limiting neurodisability with respiratory involvement</td></tr>
<tr><td colspan="3">Unvaccinated = Not received at least 2 Covid vaccines or as defined by ATAGI (https://www.health.gov.au/news/atagi-statement-on-defining-up-to-date-status-for-covid-19-vaccination)</td></tr>
<tr><td colspan="3">Adapted from adult risk factors for sotrovimab and literature on risks for paediatric outcomes
*As guided by Paediatric Oncologist and see also Coronavirus advice (cclg.org.uk)</td></tr>
</table>

Appendix 3.



Appendix 4. Summary of disease-modifying therapies for COVID-19 in Paediatric patients

For Statewide guidelines and National Medical Stockpile notification and consent forms, refer to Queensland Health COVID-19 therapeutics webpage

Medication	Eligible patients	Contraindications	Dose and administration	Total duration	Special considerations
Dexamethasone IV or oral	Infants and children with O2 saturations <92% on RA **Excluded**: neonates	Risk versus Benefit considerations by Treating Consultant.	0.15 mg/kg IV or oral once daily (maximum 6 mg/day)	Up to 10 days	Always start proton pump inhibitor (PPI) as gastroprotectant whilst on systemic corticosteroids. For selection of appropriate PPI, see local guideline.
Hydrocortisone IV	Neonates, in consultation with Paediatric ID/ MDT discussion.		0.5 mg/kg IV every 12 hours for 7 days then 0.5 mg/kg IV once daily for 3 days.	Stop course on hospital discharge	
Budesonide inhaled	More than 4 years and less than 12 years old or > 7 days from symptom onset AND high risk (One or more risk factors for disease progression) **Excluded:** Patients on supplemental oxygen AND/OR already taking inhaled or systemic corticosteroids		**4 to 11 years of age:** Inhaled 400 microgram twice daily by dry powder inhaler **More than 11 years of age:** Inhaled 800 microgram twice daily by dry powder inhaler **Pulmicort ® Turbuhaler on the QH LAM**	Up to 14 days	
Remdesivir IV Inhibits viral replication through inhibition of the SARS-CoV-2 RNA-dependent RNA polymerase	O2 sat < 92% RA **Excluded:** O2 sat >92% on RA Patients requiring ventilation including NIV and ECMO. Evidence of multi-organ failure, including significant cardiomyopathy	Hypersensitivity to Remdesivir or excipients in the vial. ALT ≥ 10 ULN CrCl <30mL/min > 10 days after symptom onset Patients requiring ventilation	**Dosing recommendations for 3 day and 5 day course:** **< 40 kg**: Loading dose of 5 mg/kg then Maintenance dose of 2.5 mg/kg daily **≥ 40 kg:** Loading dose of 200 mg then Maintenance dose of 100 mg daily **Neonates:** Seek Paediatric ID advice. For neonatal dosing information, refer to ANMF Neomed monograph. **Reconstitution and administration:** Remdesivir | Paediatric Injectable Guidelines Online (rch.org.au)	Up to 3 days in mild disease. Up to 5 days in children requiring respiratory support For patient on CRRT (HD/CVVHD/F) – Refer to Renal drug database on CKN	CYP 450 drug interactions – in particular CYP 3A4 Liverpool COVID-19 Interactions (covid19-druginteractions.org) QT prolongation and severe bradycardia – for more info, www.CredibleMeds.org Liver dysfunction – baseline CHEM20 before starting Remdesivir. If ALT > 5 times ULN, monitor LFTs daily and Consult Paediatric ID specialist.

Medication	Eligible patients	Contraindications	Dose and administration	Total duration	Special considerations
Tocilizumab IV Recombinant, interleukin-6 receptor antagonist	Patients requiring oxygen delivery (may include mechanical ventilation) AND dexamethasone AND evidence of systemic inflammation	Active severe non-viral infection Tuberculosis ALT > 5 times ULN ANC< 2 x 10^9/L Live/ live-attenuated vaccines	**< 30kg**: 12 mg/kg **≥ 30kg:** 8 mg/kg (maximum 800 mg) **Reconstitution and administration:** See CHQ-PMG-01201 Intravenous Tocilizumab for Rheumatology	Single IV infusion	Refer to CHQ-PMG-01201 Intravenous Tocilizumab for Rheumatology
Anakinra SC or IV Recombinant interleukin-1 receptor antagonist	Only use in research setting. Upon advice of COVID MDT and the ANZPID CRG	Active severe non-viral infection Caution: Tuberculosis (active/latent) Live/ live-attenuated vaccines	Anakinra 2 mg/kg/dose (max 100 mg/dose) by subcutaneous injection every 6 hours on day 1, every 8 hours on day 2, every 12 hours on day 3, every 24 hours days 4 to 5.	Tapering course over 5 days. Can be given IV if critically unwell.	Dose adjust in severe renal impairment.
Baricitinib oral Janus kinase (JAK) inhibitor	Upon advice of COVID MDT	Active severe non-viral infection Tuberculosis (active/latent) Thrombosis Hb <80 g/L, Lymphocytes <0.2 x 10^9/L, ANC <0.5 x 10^9/L CrCl <15 mL/min Live/ live-attenuated vaccines	**Children 2 to <9 years:** Oral: 2 mg once daily **Children ≥9 years and Adolescents:** Oral: 4 mg once daily. Tablets can be crushed/dispersed in small amount of water before administration. For administration via NGT or Gastrostomy, disperse dose in a minimum of 15 mL water and flush well after administration	14 days or until hospital discharge	Dose adjust in severe renal impairment. Increases in ALT or AST are observed and drug-induced liver injury is suspected
Sarilumab IV Recombinant, interleukin-6 receptor antagonist	Upon advice of COVID MDT	Hypersensitivity to Sarilumab or excipients in the vial. Active severe non-viral infection Tuberculosis (active/latent) ANC< 2 x 10^9/L Platelets < 150 x 10^9/L ALT > 5 times ULN Live/ live-attenuated vaccines	**> 12 years and > 40kg**: 400 mg IV single dose infuse over 60 minutes.	Single IV dose	The sarilumab (Kevzara®) product is presented as subcutaneous pre-filled syringes (PFS). An intravenous (IV) formulation is not commercially available. Refer to NSW TAG Sarilumab drug guideline for more information.

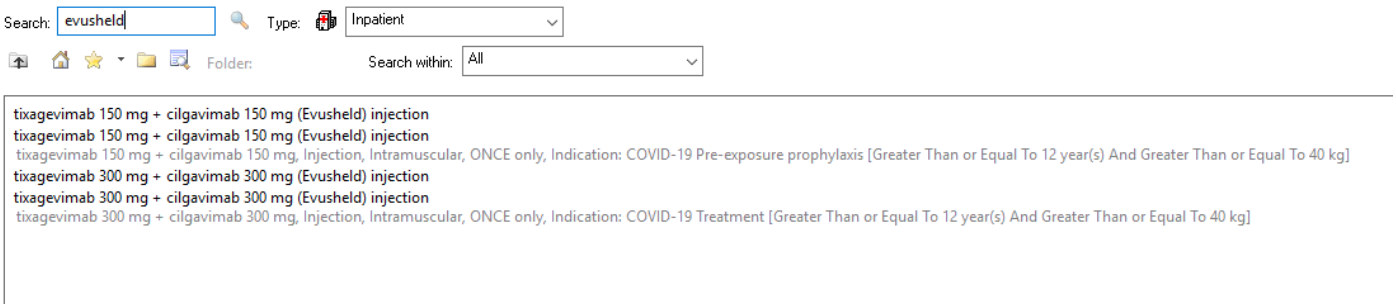
Medication	Eligible patients	Contraindications	Dose and administration	Total duration	Special considerations
Tixagevimab-Cilgavimab Intramuscular injection Recombinant human IgG1 monoclonal antibody combination targeting non-overlapping binding sites of the spike protein of SARS-CoV-2, preventing virus entry into cells, effectively neutralising the SARS-CoV-2 virus.	Considered in exceptional circumstances for children and adolescents aged 12 years and over and weighing at least 40 kg with mild COVID-19, not requiring oxygen and unvaccinated or immunocompromised and at high risk of deterioration within 5 days of symptom onset. (Appendix 3)	Hypersensitivity to Tixagevimab-Cilgavimab or excipients in the vial Platelet count less than 50 Clinically significant bleeding disorders Cardiovascular and thromboembolic events	**Do not shake the vials.** **Dose is administered undiluted.** **Do not mix contents in vials.** For guidance on maximal volume per intramuscular injection by age and muscle group, refer to CHQ-PROC-01039 Medication - Administration (health.qld.gov.au) For ieMR prescribing and administration workflow, refer to Appendix 5. <u>Dosing recommendations:</u> <u>NOT received a PrEP dose of Evusheld® in the previous 6 months:</u> • Two separate sequential injections: 300mg (=3mL) of tixagevimab and 300mg (=3mL) of cilgavimab. = a total dose of 600 mg of Evusheld® OR if discomfort due to injection is a concern • as four separate sequential injections of 150mg/1.5mL of tixagevimab and 150mg/1.5mL = a total dose of 600 mg of Evusheld® <u>Received a PrEP dose of Evusheld® in the previous 6 months</u>, consider an additional dose of 150mg of tixagevimab and 150 mg cilgavimab: Two separate sequential injections: 150mg/1.5mL of tixagevimab and 150mg/1.5mL of cilgavimab = a total dose of 300mg of Evusheld®	Single dose Deep intramuscular injections	Check FBC to confirm Platelet count above 50. Caution is advised with this route of administration in patients with a history of thrombocytopenia (platelet count <50) or who are anticoagulated. Seek Haematologist advice. Tixagevimab and cilgavimab should be administered at different injection sites, one in each of the gluteal muscles. Patients should be observed for 15 minutes after administration of their dose. No dose adjustments are required in patients with liver or kidney impairment (including dialysis).

Appendix 5. Tixagevimab and cilgavimab (Evusheld®) - Ordering in the ieMR®

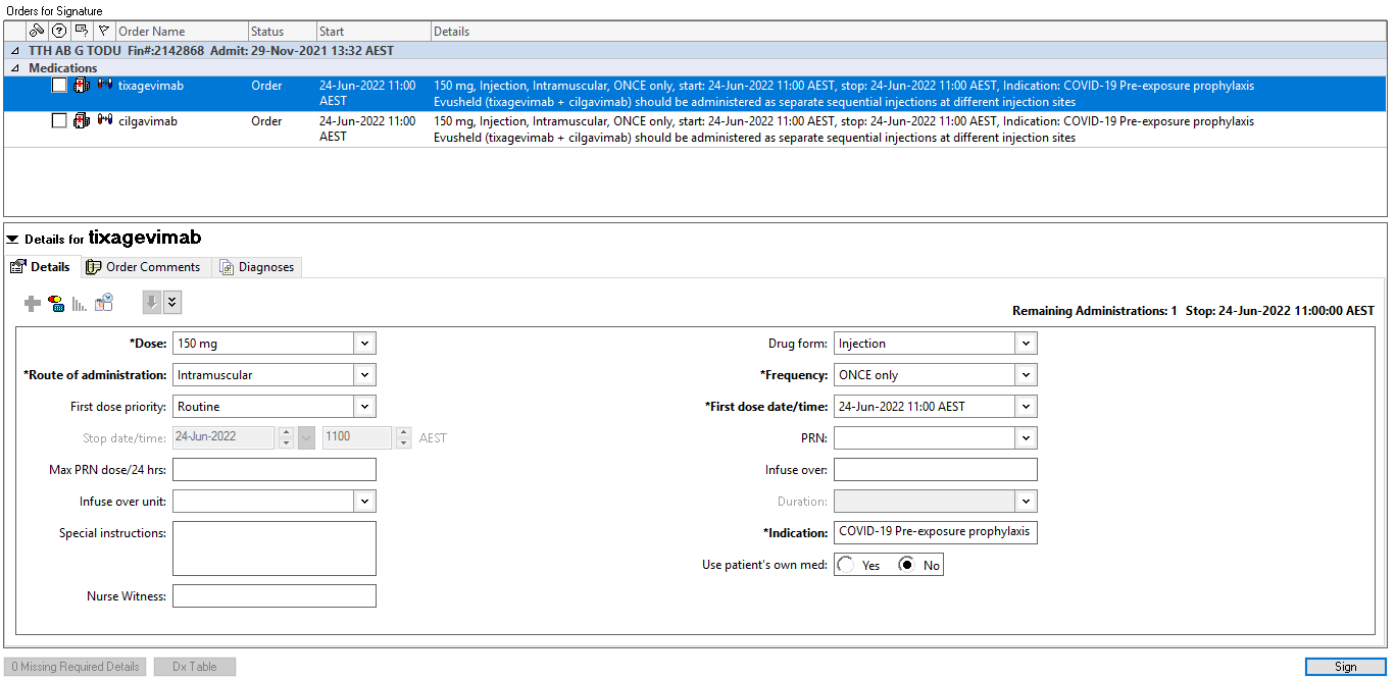
Tixagevimab and cilgavimab are ordered as a single combined therapy however, to allow each injection to be signed off as administered, they will drop into the MAR as separate orders.

Prophylaxis Dosing:

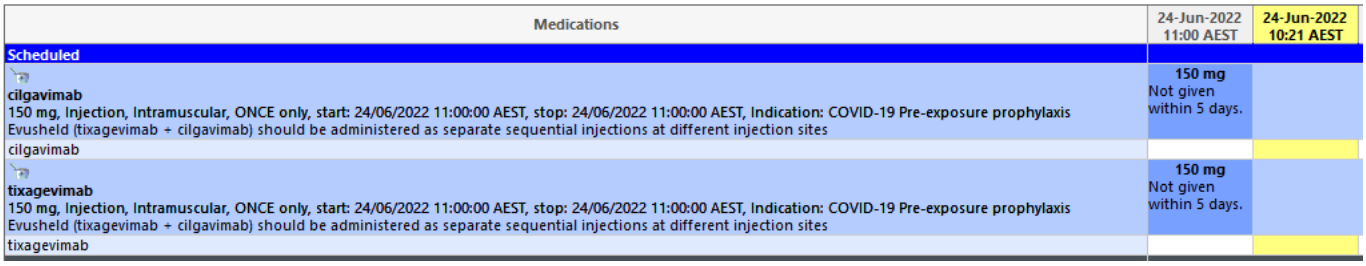
- **In the Orders window (150mg+150mg):**



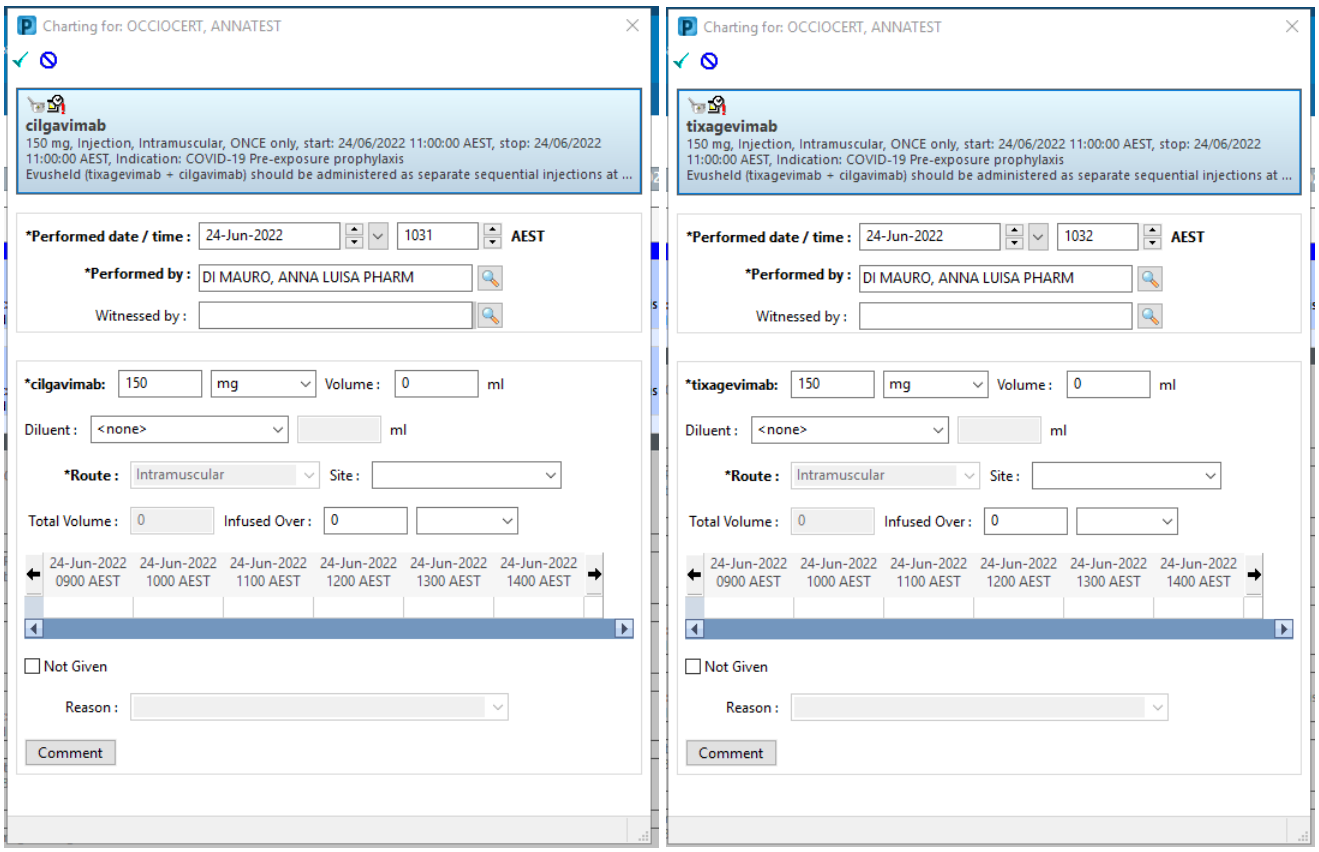
- **Orders appear separately on the scratchpad**:



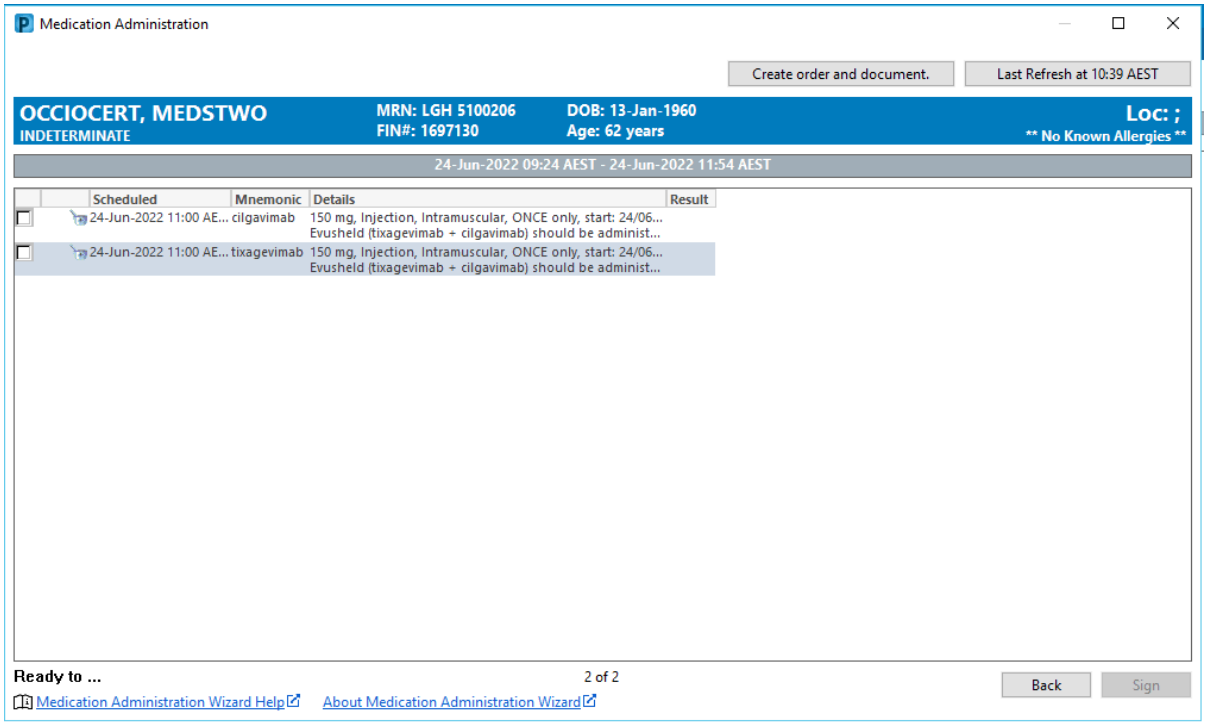
- **Orders on the MAR** – note that orders on the MAR are listed alphabetically and if there are other orders, they may not appear together.



- **MAR administration window**

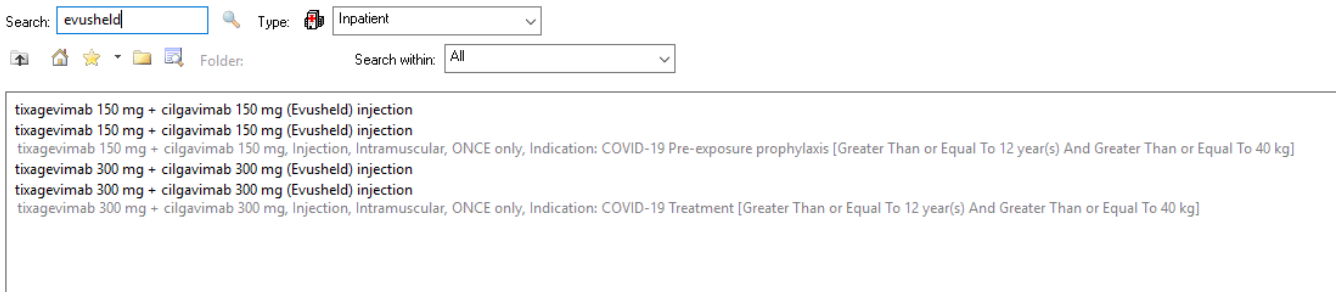


- **MAW window**

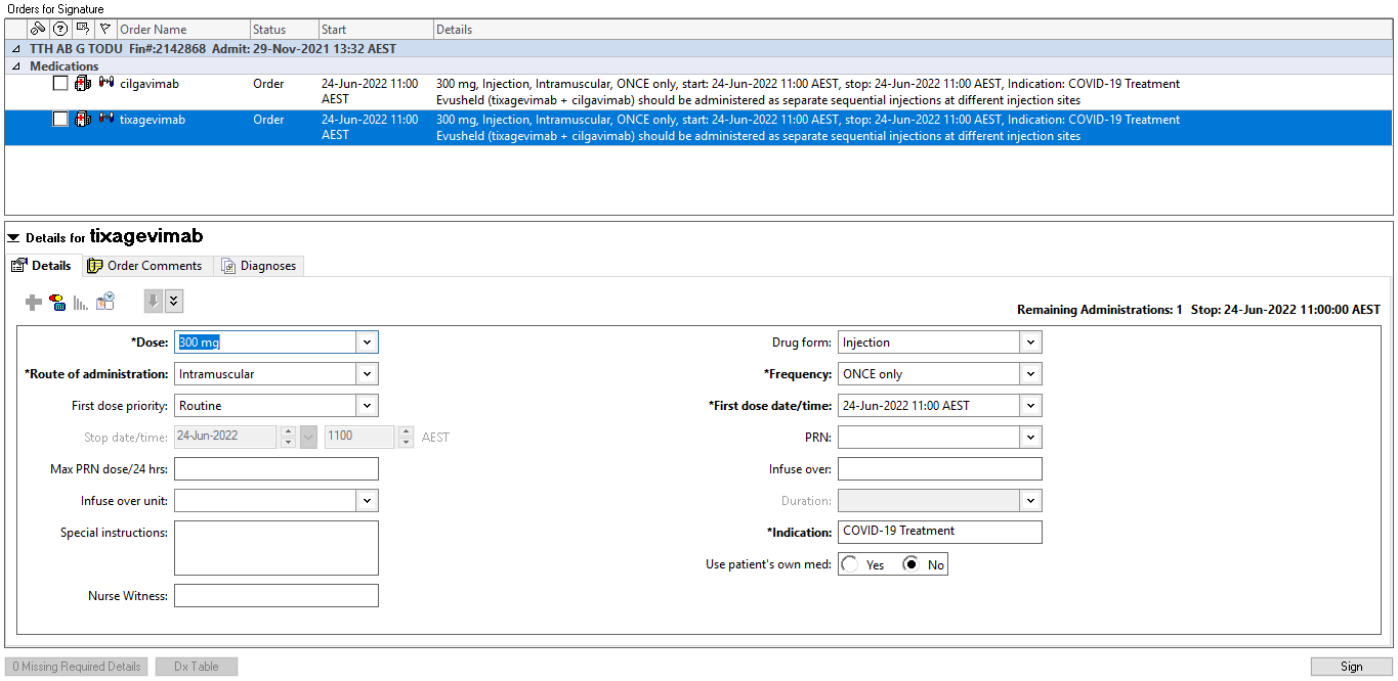


Treatment Dosing:

- **In the Orders window (300mg + 300mg):**



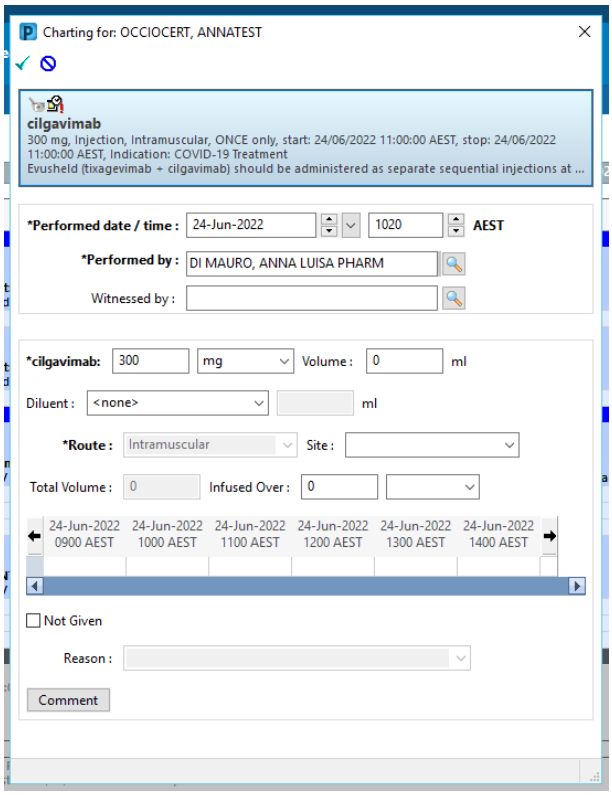
- **Orders appear separately on the scratchpad**:

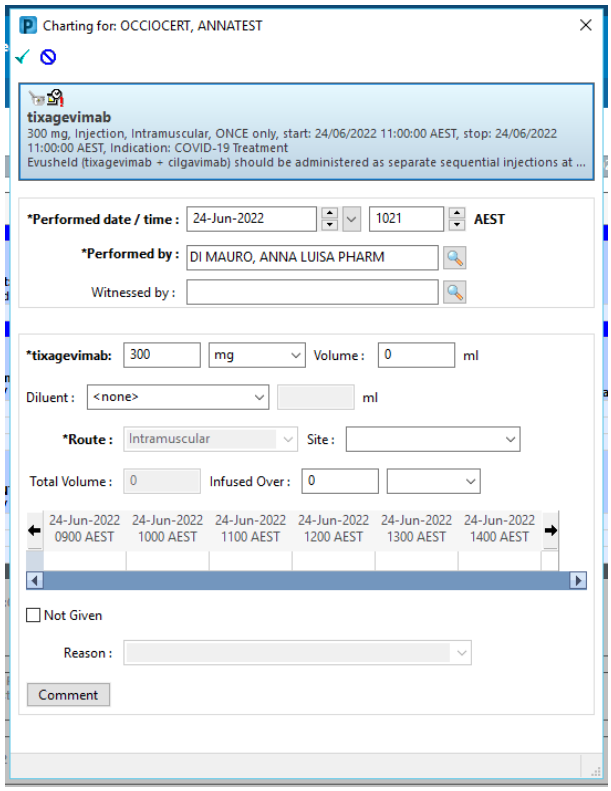


- **Orders on the MAR** – note that orders on the MAR are listed alphabetically and if there are other orders, they may not appear together.

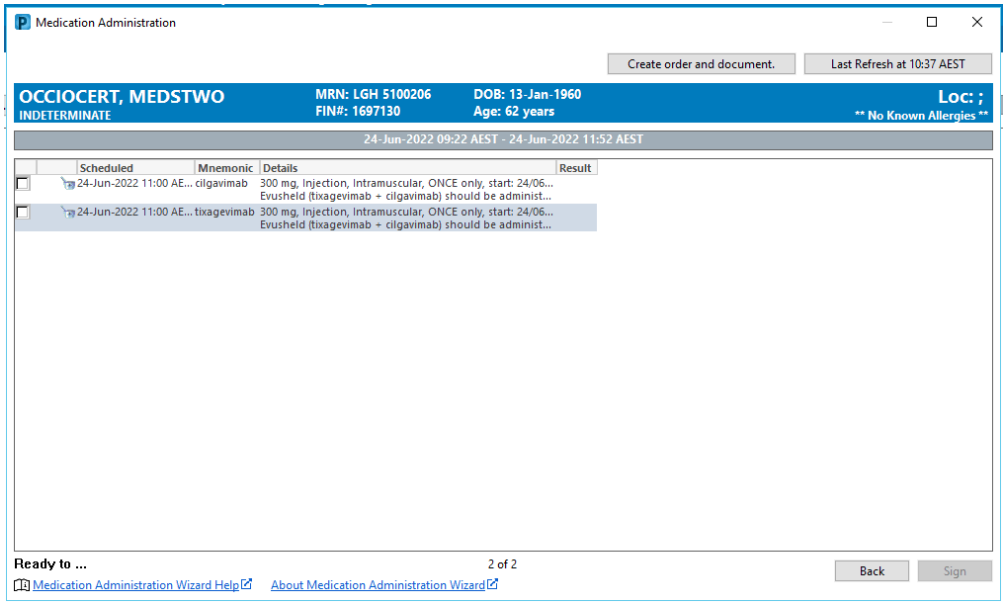
Medications	24-Jun-2022 11:00 AEST	24-Jun-2022 10:18 AEST
Scheduled		
cilgavimab 300 mg, Injection, Intramuscular, ONCE only, start: 24/06/2022 11:00:00 AEST, stop: 24/06/2022 11:00:00 AEST, Indication: COVID-19 Treatment Evusheld (tixagevimab + cilgavimab) should be administered as separate sequential injections at different injection sites	**300 mg** Not given within 5 days.	
cilgavimab		
tixagevimab 300 mg, Injection, Intramuscular, ONCE only, start: 24/06/2022 11:00:00 AEST, stop: 24/06/2022 11:00:00 AEST, Indication: COVID-19 Treatment Evusheld (tixagevimab + cilgavimab) should be administered as separate sequential injections at different injection sites	**300 mg** Not given within 5 days.	
tixagevimab		

- **MAR administration window**





- **MAW window**



Appendix 6. Haematology guidance for Thromboprophylaxis in Acute SARS-CoV-2 infection

Children's Health Queensland

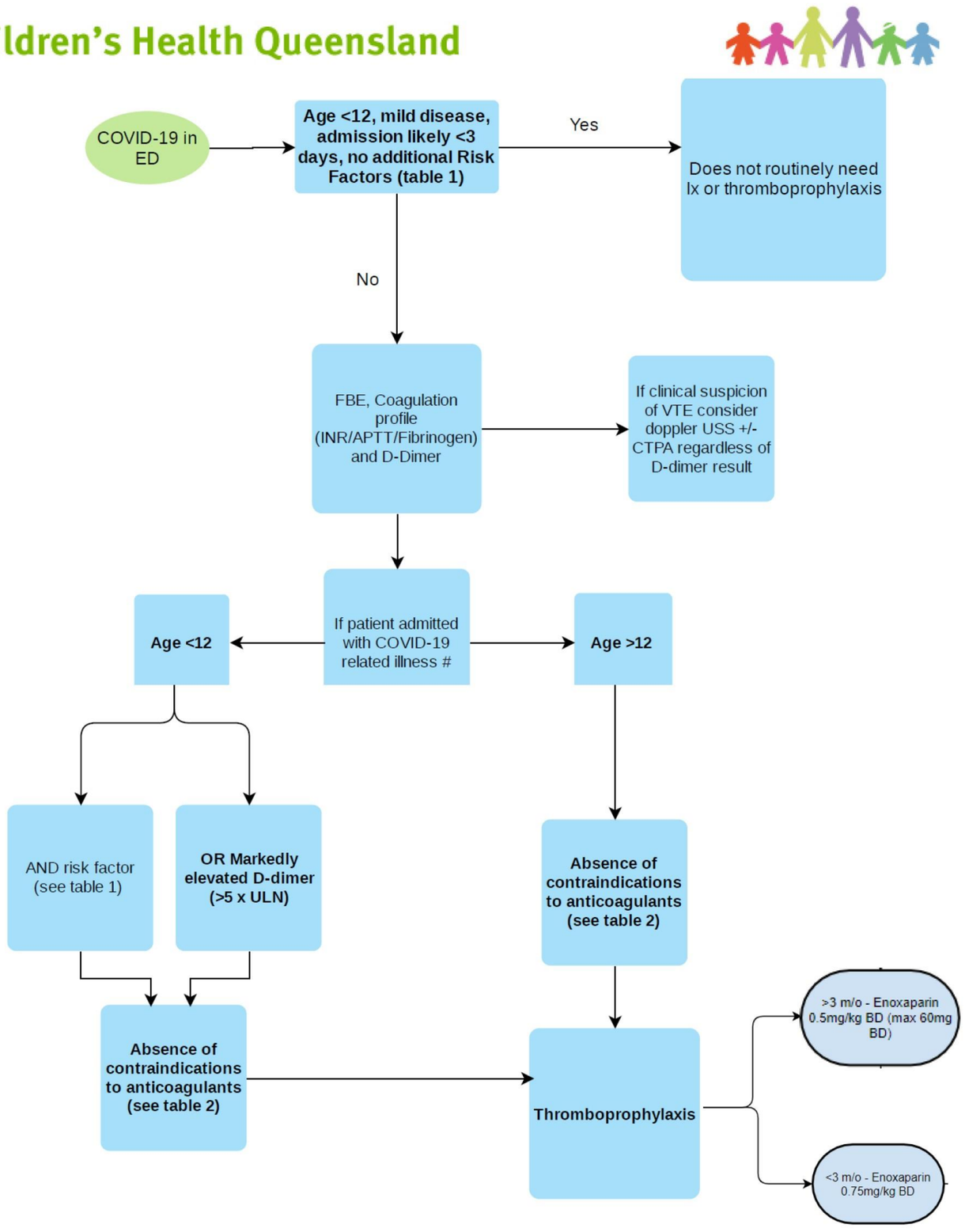


Table 1.
Admission to PICU Obesity (BMI >95th Centile) Oestrogen containing OCP CVC Length of stay anticipated > 3 days Immobility that is not longstanding Personal Hx of VTE Known thrombophilia First degree relative with VTE Active malignancy Recent surgery/trauma Severe dehydration
Underlying medical condition (Nephrotic syndrome, CF, Sickle cell disease, Cardiac disease, Chronic inflammatory disorder (eg JIA, IBD), post splenectomy)

Table 2. Contraindications to thromboprophylaxis
Stroke/intracranial haemorrhage Uncontrolled bleeding Likely to need surgery in <24/24 Congenital bleeding disorder Platelets <50x10^9/L Uncontrolled hypertension * Consider UFH if CrCl <30ml/min

Mechanical thromboprophylaxis
Consider mechanical thromboprophylaxis for all patients admitted for COVID-19 reasons - TED Stockings - And/or pneumatic calf compressors