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

**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-WI-80135 Paediatric Respiratory Care during the COVID-19 Pandemic for all acute and chronic inpatients with respiratory disease.
- CHQ-PROC-63002 Infection Control Guidelines for the Management of Coronavirus (MERS, SARS or Novel Coronavirus)
- CHQ-PROC- 63317 Donning and Doffing of Personal Protective Equipment (PPE)
• CHQ-PROC-63110 Standard, Transmission and Protective Based Precautions
• Respiratory pandemic sub-plan
• Queensland Paediatric Consensus Statement: Respiratory therapies in ED during the COVID-19 outbreak
• CHQ-PROC- 63317 Donning and Doffing of Personal Protective Equipment (PPE)
• CHQ-GDL-00759 Community Acquired Pneumonia - Emergency management in children
• Queensland Health: Information for Queensland clinicians and healthcare workers - novel coronavirus (COVID-19)


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 an oxygen requirement.
• 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
• In symptomatic children it is extremely important to consider differential diagnoses and investigate as per usual practice. Detection of SARS-CoV-2 dose 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
• 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 before admission to the Virtual COVID Ward to ensure exclusion of other diagnoses eg febrile neonates, febrile neutropenia.

If a child with a COVID-19 diagnosis is suitable for care at home, community care and support will be provided either by the CHQ Virtual COVID Ward or primary care after risk stratification by Health Direct when activated. The Virtual COVID Ward will reinforce the importance of self-isolation and facilitate safety netting and the identification of the deteriorating child. Agreement to quarantining at home is an essential pre-requisite for Virtual management of COVID-19 and will be monitored. Refer to Virtual COVID Ward pathways.

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

- haemodynamic instability
- hypoxia (SaO2 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 with COVID-19 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 O₂ 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 allows faster, more effective medication delivery.
  - Nebulised salbutamol should be reserved for patients in extremis, with consultant approval, ideally in a negative pressure room with staff in appropriate Airborne-plus personal protective equipment (PPE).
- 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, ideally in a negative pressure room with staff in appropriate Airborne-plus PPE.

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.
- Influenza is currently very rare; only when influenza 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 5. Seek Haematologist advice.

Imaging

- Imaging should follow the CHQ guidelines for imaging in a child with respiratory illness during COVID-19.
- All children requiring oxygen therapy should have a chest radiograph.
- There is no need for routine CT scanning, only CT scan if clinically indicated
- CT could be considered if there is a diagnostic dilemma, e.g. to delineate consolidation from lymphadenopathy / effusion etc.
- If there is concern about pulmonary embolism, then CT PA 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 per 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.
• Establish SARS-CoV-2 serostatus ASAP.
• 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. See guideline for use of respiratory therapies here. Nasal high flow oxygen should only be used in suspected or confirmed COVID-19 cases if strict airborne precautions are adhered to. Consultant approval should be sought. Patients should be in a negative pressure room, or otherwise a single room with the door closed. 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 will be discussed with the CHQ Infectious Diseases team.
- Escalation of therapeutic care requiring COVID-specific therapies (excluding dexamethasone) should be discussed with the COVID MDT (see below) and when required expert groups such as the ANZPID COVID-19 Clinical Reference Group. See National COVID-19 clinical evidence taskforce guidance.
- COVID MDT includes senior medical representatives from Infectious Diseases, the child’s treating team, rheumatology, intensive care, immunology. Decisions should be made by at least 2 consultants in addition to treating SMO.
- 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. These treatment decisions will 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)

- **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.
  - 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 use of Remdesivir for mild to moderate disease within 10 days of symptom onset as per flow chart in Appendix 3 (for dosing, refer to Appendix 4). In exceptional circumstances Remdesivir may be considered in early use for very high-risk patients with mild disease.
  - Remdesivir should only start after MDT discussion with Paediatric ID / MDT
  - 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.
Sotrovimab

- **Mechanism of action:** Recombinant human IgG1 monoclonal antibody targeting the spike protein of SARS-CoV-2.
- Sotrovimab 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 or immunocompromised AND at high risk of deterioration within 5 days of symptom onset.
- These children would not require hospital admission for symptoms of acute COVID (as by definition they would have mild disease) but will need admission to a health care facility for administration of Sotrovimab.
  - Eligibility for Sotrovimab 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.
  - Administration of Sotrovimab will be facilitated by the COVID Virtual ward and arranged on an individualised basis in the most appropriate available setting at the time (for example: either ED Orange zone or 9A) and managed either by General Paediatrics/Virtual wards or the subspeciality team primarily responsible for child’s care.
  - Patient / parent information, consent and administration will follow [QH Statewide processes](#).
  - The recommended dose is 500 mg as a single dose intravenous infusion over 30 minutes with 60 minutes observation post completion of infusion.

Casirivimab plus Imdevimab (Ronapreve®)

- **Mechanism of action:** Recombinant human mAbs that bind to nonoverlapping epitopes of the spike protein RBD of SARS-CoV-2.
- Consider using Casirivimab plus Imdevimab (Ronapreve®), in exceptional circumstances, in children and adolescents aged 12 years and over and weighing at least 40 kg at high risk of deterioration (see [Appendix 2](#) and for dosing information, [Appendix 4](#)) AND
  - who do not require oxygen and who are unvaccinated or immunocompromised AND at high risk of deterioration within 7 days of symptom onset. These children would not require hospital admission for symptoms of acute COVID (as by definition they would have mild disease). Patient / parent information, consent will follow QH Statewide processes when available as per Sotrovimab as above.
  - with moderate to critical COVID-19 and SARS-CoV2 antibody negative AND at high risk of deterioration with MDT discussion. **Note:** Ronapreve® does not neutralize Omicron variant and is not recommended when this variant is confirmed or strongly suspected.
Monoclonal antibody therapy is a limited resource and is currently reserved for those at
the very highest risk of disease progression. Fulfilling eligibility criteria does not automatically result in its prescription. Use 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 and requires agreement of child’s treating specialist and paediatric ID consultant.

- **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 and children
    - < 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 COVID Multi-disciplinary team (MDT) and where possible 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. Home isolation to continue until the child is at least 10 days from the onset of the acute illness and will follow current QH Public health guidelines.
- Prior to ceasing patient isolation and transmission-based precautions for children requiring ongoing in hospital admission, the case should be discussed with ID Consultant.
  - The child has been afebrile for the previous 72 hours
  - Symptoms of the COVID-19 illness have resolved for >24 hours
  - The child is at least 10 days from the onset of the acute illness
  - PCR testing is negative on two samples taken at least 24 hours apart after the resolution of symptoms
    - Children with conditions that may result in viral shedding for a prolonged period of time (e.g. because of immune status and medications) should be taken into consideration
    - In children with symptoms such as chronic cough the treating team should make an assessment as to whether the signs and symptoms of COVID-19 have resolved.
    - A small proportion of children may have illness that has completely resolved but their respiratory specimens remain persistently PCR positive. A decision on release from isolation for these people should be made on a case-by-case basis after consultation between the treating team and ID.
    - Follow up should include the child being reviewed seven days after release from isolation to ensure full symptom resolution.

Consultation

Key stakeholders who reviewed this version:
- Infection Management and Prevention Service Director
- Paediatric Infection Specialists
- PICU SMO
- Director, General Paediatrics SMO
- Emergency SMOs
- Medical Lead, CHQatHome
- Clinical Pharmacist Lead- Antimicrobial Stewardship
- Director of Pharmacy
- Medicines Advisory Committee – endorsed 20/01/2022
Audit/evaluation strategy

<table>
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<th>Level of risk</th>
<th>Very High</th>
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<td>Strategy</td>
<td>Improve the care of patients with suspected and confirmed COVID-19</td>
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<td>Audit/review tool(s) attached</td>
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<td>Audit/Review date</td>
<td>Updated as required as new information regarding the pandemic becomes available</td>
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<tr>
<td>Review responsibility</td>
<td>Infection Management and Prevention Service.</td>
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Work Instruction revision and approval history

<table>
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<th>Version No.</th>
<th>Modified by</th>
<th>Amendments authorised by</th>
<th>Approved by</th>
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<tr>
<td>1.0 14/04/2020</td>
<td>CNC Infection Management and Prevention Service</td>
<td>Director Infection Management and Prevention Service</td>
<td>Executive Director Clinical Services, QCH</td>
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<td>2.0 10/12/2021</td>
<td>Clinical Pharmacist Lead - AMS</td>
<td>Director Infection Management and Prevention Service</td>
<td>Divisional Director Medicine</td>
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<tr>
<td>3.0 21/01/2022</td>
<td>Haematologist Clinical Pharmacist Lead - AMS</td>
<td>Director Infection Management and Prevention Service</td>
<td>CHQ Medicines advisory committee (CHQMAC)</td>
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Keywords

COVID-19, Coronavirus, SARS CoV 2, Pandemic, HITH, remdesivir, tocilizumab, dexamethasone, hydrocortisone, sotrovimab, sarilumab, anakinra, budesonide, Ronapreve®, Casirivimab plus Imdevimab, baracitinib, 63327

Accreditation references

NSQHS Standards (1-8): 3 Preventing and controlling to healthcare associated infections
ISO 9001:2015 Quality Management Systems: (4-10)
Appendix 1: Acute COVID in children Investigation List

(in order of priority)

<table>
<thead>
<tr>
<th>Bloods</th>
<th>Other</th>
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<tbody>
<tr>
<td>FBC and film</td>
<td>Viral Respiratory NPA PCR panel</td>
</tr>
<tr>
<td>Chem 20</td>
<td>SARS-Cov 2 PCR</td>
</tr>
<tr>
<td>CRP</td>
<td></td>
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<tr>
<td>Blood culture</td>
<td>Throat swab MCS</td>
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<tr>
<td>Glucose</td>
<td>CXR</td>
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<tr>
<td>SARS-CoV-2 serology</td>
<td>urine MC&amp;S</td>
</tr>
<tr>
<td>ASOT</td>
<td>urine for pneumococcal &amp; legionella antigens if &gt; 3years of age</td>
</tr>
<tr>
<td>EBV &amp; CMV serology</td>
<td></td>
</tr>
<tr>
<td>EBV, CMV, adenovirus &amp; enterovirus blood PCR,</td>
<td></td>
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<tr>
<td>Vit D</td>
<td></td>
</tr>
<tr>
<td>Coagulation and fibrinogen</td>
<td>ECG</td>
</tr>
<tr>
<td>D-dimer</td>
<td>(ECHO)</td>
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<tr>
<td>LDH</td>
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<tr>
<td>Triglycerides</td>
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<tr>
<td>Ferritin</td>
<td></td>
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<td>Troponin</td>
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<tr>
<td>Pro Bnp</td>
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<tr>
<td>CK</td>
<td></td>
</tr>
<tr>
<td>Amylase</td>
<td></td>
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<tr>
<td>HBV/HCV/HIV and strongyloides serology and Quantiferon Gold before anti-cytokine therapy</td>
<td></td>
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</table>
Appendix 2. Risk factors for progression to severe disease – Monoclonal antibody criteria

- Use this table to assess eligibility for monoclonal antibody therapy (Sotrovimab or Ronapreve®) in children.
- 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.
- Monoclonal antibody therapy is a limited resource and is currently reserved for those at the very highest risk of disease progression. Fulfilling eligibility criteria does not automatically result in its prescription. Use 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>
<thead>
<tr>
<th>Paediatric risk factors for severe disease</th>
<th>Any one risk factor Plus Unvaccinated = Moderate to High Risk</th>
<th>Any 2 or more comorbidities / risk factors Plus unvaccinated = High Risk</th>
</tr>
</thead>
</table>
| **Immunocompromised (Vaccinated or unvaccinated)** | 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 | Diabetes (insulin-dependent) |
| **Primary or acquired immunodeficiency:** | Heart failure  
- cardiomypathy (requiring diuretics)  
- shunt-dependent pulmonary blood flow  
- pulmonary hypertension (requiring PH-specific therapy)  
- single ventricle | Severe asthma  
Not fulfilling criteria |
| Haematologic neoplasms*:  
leukaemias, lymphomas,  
myelodysplastic syndromes,  
haematopoietic stem cell  
transplant (until immune recovery) | **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 | Chronic kidney disease  
(GFR <15 ml/min/1.73m2) |
| • Post-transplant: solid organ (on immuno-suppressive therapy),  
• Other significantly immunocompromising conditions (discuss w ID/immunology consultant)  
• Immunosuppressive Rx (current or recent) including: Chemotherapy, High-dose corticosteroids (≥0.5 mg/kg/day or ≥20 mg/day prednisolone, or equivalent) for ≥14 days  
Primary or acquired immunodeficiency | **Obesity** (BMI ≥95th [CDC] / ≥97th [WHO] centile for age)  
**Complex life limiting neurodisability** with respiratory involvement | Complex genetic, metabolic disease, gastrointestinal or multiple congenital anomalies |
| Unvaccinated = Not received ≥2 Covid vaccines | All biologics and most disease-modifying antirheumatic drugs (DMARDs) |

*As guided by Paediatric Oncologist and see also Coronavirus advice (cclg.org.uk)
Appendix 3. Treatment Flow chart

Covid PCR positive

Symptomatic but not requiring oxygen
- No PMH and well
- Chronic disease
- Immuno-compromised

Home observation no treatment

Vaccinated x 2 doses

Unvaccinated

Consider in exceptional circumstances - Remdesivir if very high risk within 5 days of symptoms

<12 years or > 7 days from symptom onset AND high risk

>12 years AND >40kg AND < 5-7 days from symptom onset AND high risk for disease progression

Consider Budesonide inhaled

MDT agreement that high risk of disease progression and < 5-7 days of symptoms

Sotrovimab within 5 days symptoms

Ronapreve within 7 days symptoms

Oxygen requirement SaO2 <92% in room air

Dexamethasone
In children < 5 years consider risks v benefit

Symptoms <= 7 days prior

Symptoms > 7 days prior

Remdesivir (low flow Oxygen only) Symptoms up to 10 days prior

Immunosuppressed or high-risk disease progression

Negative for baseline serum anti-spike (anti-S) antibodies against SARS-CoV-2

> 12 years AND 40kg and within 7 days symptoms

Ronapreve* within 7 days of symptoms

Deteriorating.
Any of increasing oxygen requirement, septic shock, ARD, multi organ failure

Within 48 hours of respiratory support: HF nasal oxygen, CPAP, NIV, or invasive mechanical ventilation regardless of the CRP

Systemic inflammation: CRP ≥75 or rapidly rising ferritin

Baricitinib

Tocilizumab OR Sarilumab depending on availability

*Not recommended when Omicron variant confirmed
### Appendix 4. Summary of disease-modifying therapies for COVID-19 in Paediatric patients

<table>
<thead>
<tr>
<th>Medication</th>
<th>Eligible patients</th>
<th>Contraindications</th>
<th>Dose and administration</th>
<th>Total duration</th>
<th>Special considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dexamethasone IV or oral</td>
<td>Infants and children with O2 sat &lt;92% on RA Excluded: neonates</td>
<td>Risk versus Benefit considerations by Treating Consultant.</td>
<td>0.15 mg/kg IV or oral once daily (maximum 6 mg/day)</td>
<td>Up to 10 days</td>
<td>Always start proton pump inhibitor (PPI) as gastroprotectant whilst on systemic corticosteroids. For selection of appropriate PPI, see local guideline.</td>
</tr>
<tr>
<td>Hydrocortisone IV</td>
<td>Neonates, in consultation with Paediatric ID/ MDT discussion.</td>
<td></td>
<td>0.5 mg/kg IV every 12 hours for 7 days then 0.5 mg/kg IV once daily for 3 days.</td>
<td>Stop course on hospital discharge.</td>
<td></td>
</tr>
<tr>
<td>Budesonide inhaled</td>
<td>More than 4 years and less than 12 years old or &gt; 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</td>
<td></td>
<td>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</td>
<td>Up to 14 days</td>
<td></td>
</tr>
<tr>
<td>Remdesivir IV</td>
<td>O2 sat &lt; 92% RA Excluded: O2 sat &gt;92% on RA Patients requiring ventilation including NIV and ECMO Evidence of multi-organ failure, including significant cardiomyopathy</td>
<td>Hypersensitivity to Remdesivir or excipients in the vial, ALT ≥ 5 ULN CrCl &lt;30mL/min &gt; 10 days after symptom onset Patients requiring ventilation</td>
<td>&lt; 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</td>
<td>5 days.</td>
<td>CYP 450 drug interactions – in particular CYP 3A4 QT prolongation</td>
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<tr>
<td>Tocilizumab IV</td>
<td>Patients requiring oxygen delivery (may include mechanical ventilation) AND dexamethasone AND evidence of systemic inflammation</td>
<td>Active severe non-viral infection Tuberculosis LFT &gt; 5 ULN ANC&lt; 2 x 10^9/L Live/ live-attenuated vaccines</td>
<td>&lt; 30kg: 12 mg/kg ≥ 30kg: 8 mg/kg (maximum 800 mg)</td>
<td>Single IV infusion</td>
<td>Note: Critical medication shortage (October 2021)</td>
</tr>
<tr>
<td>Medication</td>
<td>Eligible patients</td>
<td>Contraindications</td>
<td>Dose and administration</td>
<td>Total duration</td>
<td>Special considerations</td>
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<tr>
<td>Anakinra SC or IV</td>
<td>Only use in research setting. Upon advice of COVID MDT and the ANZPID CRG</td>
<td>Active severe non-viral infection Caution: Tuberculosis (active/latent) Live/ live-attenuated vaccines</td>
<td>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.</td>
<td>Tapering course over 5 days. Can be given IV if critically unwell.</td>
<td>Dose adjust in severe renal impairment.</td>
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<td>Recombinant interleukin-1 receptor antagonist</td>
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<td>Baricitinib oral</td>
<td>Upon advice of COVID MDT</td>
<td>Active severe non-viral infection Tuberculosis (active/latent) Thrombosis Hb &lt;80 g/L, Lymphocytes &lt;0.2 x 10⁹/L, ANC &lt;0.5 x 10⁹/L CrCl &lt;15 mL/min Live/ live-attenuated vaccines</td>
<td>Children 2 to &lt;9 years: Oral: 2 mg once daily Children 29 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.</td>
<td>14 days or until hospital discharge</td>
<td>Dose adjust in severe renal impairment. Increases in ALT or AST are observed and drug-induced liver injury is suspected</td>
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<td>Janus kinase (JAK) inhibitor</td>
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<td>Sarilumab IV</td>
<td>Upon advice of COVID MDT</td>
<td>Hypersensitivity to Sarilumab or excipients in the vial. Active severe non-viral infection Tuberculosis (active/latent) ANC&lt; 2 x 10⁹/L Platelets &lt; 150 x 10⁹/L AST/ALT &gt; 5 times ULN Live/ live-attenuated vaccines</td>
<td>&gt; 12 years and &gt; 40kg: 400 mg IV single dose infuse over 60 minutes.</td>
<td>Single IV dose</td>
<td>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.</td>
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<td>Recombinant, interleukin-6 receptor antagonist</td>
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<td>Sotrovimab IV</td>
<td>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 2)</td>
<td>Hypersensitivity to Sotrovimab or excipients in the vial</td>
<td>&gt; 12 years and &gt; 40kg: 500 mg IV single dose infuse over 30 minutes with 60 minutes observation post completion of infusion. <strong>Reconstitution and administration:</strong> [Sotrovimab</td>
<td>Single IV dose</td>
<td>Mild to moderate infusion reactions possible – slow infusion or stop and manage/ monitor accordingly. Anaphylactic reactions are rare.</td>
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<tr>
<td>Recombinant human IgG1 monoclonal antibody targeting the spike protein of SARS-CoV-2.</td>
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<td><a href="rch.org.au">Paediatric Injectable Guidelines Online</a></td>
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<tr>
<td>Medication</td>
<td>Eligible patients</td>
<td>Contraindications</td>
<td>Dose and administration</td>
<td>Total duration</td>
<td>Special considerations</td>
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<td>Casirivimab plus Imdevimab (Ronapreve®) IV</td>
<td>Considered in exceptional circumstances, in seronegative children and adolescents aged 12 years and over and weighing at least 40 kg at high risk of deterioration (appendix 2)</td>
<td>Hypersensitivity to casirivimab and imdevimab or excipients in the vials</td>
<td>&gt; 12 years and &gt; 40kg:&lt;br&gt;<strong>Treatment and post exposure prophylaxis (single dose):</strong>&lt;br&gt;Give 600 mg casirivimab and 600 mg imdevimab (combined dose of 1200 mg) as a single dose&lt;br&gt;<strong>Ongoing prophylaxis (once every 4 weeks after loading dose):</strong>&lt;br&gt;300 mg casirivimab and 300 mg imdevimab (combined dose of 600 mg)&lt;br&gt;<strong>Note:</strong> Off label use as Treatment for COVID-19 – high dose Ronapreve® recommended – see Paediatric ID specialist advice on dosing.&lt;br&gt;Dose preparation and administration: AIDH - CASIRIVIMAB PLUS IMDEVIMAB (hcn.com.au)</td>
<td>See dose recommendations for details</td>
<td>No dose adjustment for renal or liver impairment.&lt;br&gt;Mild to moderate infusion reactions possible – slow infusion or stop and manage/monitor accordingly.&lt;br&gt;Anaphylactic reactions are rare.&lt;br&gt;&lt;br&gt;&lt;br&gt;<strong>Medication safety alert:</strong>&lt;br&gt;Casirivimab plus imdevimab (Ronapreve®) comes as two vials – use both to prepare the dose.&lt;br&gt;1 vial contains 1332 mg/11.1 mL of casirivimab (120 mg/mL)&lt;br&gt;1 vial contains 1332 mg/11.1 mL of imdevimab (120 mg/mL). The vials are labelled 20 mL, but only contain 11.1 mL.&lt;br&gt;At QCH, Ronapreve® doses to be compounded by Pharmacy in aseptic production unit.</td>
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Appendix 5. Haematology guidance for Thromboprophylaxis in Acute SARS-CoV-2 infection

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/Intracerebral haemorrhage
Uncontrolled bleeding
Likely to need surgery in <24/24
Congenital bleeding disorder
Platelets <50x10^9/L
Uncontrolled hypertension
* Consider UFH if CO2 >30%L/min

Mechanical thromboprophylaxis
For all patients admitted for COVID-19 reasons
- TED Stockings
- Antifibrinolytic or pneumatic calf compressors