# Cone Health Pediatric COVID Management Guidelines

**Updated September 2021**

| | Asymptomatic | | Acute Respiratory COVID | | MIS-C |
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| | Mild symptoms or no symptoms admitted for another reason. Includes pts with fever only<br>*NOTE: Monoclonal Ab shown to prevent progression of dz in asymptomatic adults* | | Respiratory symptoms including increased WOB, chest pain, URI symptoms, hypoxemia, respiratory failure<br>*NOTE: For children<5 and especially those with bronchioliotis pres, no evidence for anti-COVID therapies. Consider treating the same as bronchiolitis cause by other viruses* | | Fever > 48 hours<br>*Often have*: GI symptoms, Conjunctivitis<br>*May have*: LAD>1.5 cm, hand/feet swelling, rash, AMS/irritability/HA/ lethargy, shock-like presentation, neck pain<br>*Hx*: exposure 2-6 wks prior<br>May be COVID PCR+ or PCR- |
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| **Where?** | Ward (or PICU if underlying illness warrants)<br><br>*COVID status should not affect whether to admit or not | | No O2, low flow:<br>Ward<br><br>HFNC or progressive sx or significant respiratory distress:<br>PICU<br><br>If considering tertiary care transfer, discuss with PICU attending | | No significant VS changes, low flow O2:<br>Ward<br><br>HFNC need, hypotension:<br>PICU<br><br>Consider calling "Code Sepsis"<br><br>If considering tertiary care transfer, discuss with PICU attending |
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| **PPE** | N95, Gown, Gloves, Eye protection required (see "What PPE should I wear" sheet for details of pts with pending COVID test) | | | | Routine PPE (see Cone guidelines, changes over time) if COVID PCR- |
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| **Initial Tests** | Based on underlying condition (no tests solely because patient is COVID+) | | 1. CBC diff, CMP, Mag<br>2. *Inflammatory markers*: CRP, ESR, Ferritin, Fibrinogen, D-dimer<br>3. *Cardiac markers*: Troponin, BNP<br>4. *Coags*: PT/PTT<br>5. CXR, EKG<br>6. Chest CT – consider if PE suspected<br><br>Labs may be prioritized for younger patients/difficult draw | | First line<br>1. CBC diff, CMP<br>2. CRP, ESR<br>3. CXR<br><br>If either CRP>5 or ESR>40 &<br>one of ALC <1000, plt<150, Na<135:<br>4. *Coags*: PT/PTT<br>5. *Inflammatory markers*: Ferritin, Fibrinogen, D-dimer<br>6. *Cardiac markers*: Troponin, BNP<br>7. EKG, Echo*<br>8. COVID IgG (prior to IVIG)<br>*(may use Pediatric MIS-C order panel)* |

* Echo: attention to ventricular function, pericardial effusion, coronary artery dimensions
  - If hemodynamically unstable, ECHO stat
  - If hemodynamically stable, ECHO may be done once admitted

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| **Ongoing studies** | As needed | | • Trend CBC diff, CMP*, CRP, PT, PTT as needed<br>• Trend BNP, troponin, ferritin, fibrinogen, d-dimer if initial abnormal<br>• CXR – consider daily to start, then prn if worsening<br>• Can space all labs if improving<br><br>*LFTs must be <10x ULN when on Remdesivir but do not need daily checks | | • Daily CBC diff, CMP, CRP space as needed<br>• Trend BNP, troponin, ferritin, fibrinogen, d-dimer if initial abnormal<br>• Daily EKG<br>• Rpt Echo based on initial results<br>• Can space all labs if improving<br><br>No utility trending ESR once given IVIG |
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| **Treatment** | Do not routinely give remdesivir or steroids<br><br>Casirivimab/ Imdevimab (monoclonal Ab) not effective for the Omicron variant<br><br>Remdesivir x 3 doses or Sotrovimab (monoclonal ab) can be considered in high risk patients | | <u>If SpO2<94% on RA:</u><br>1. Optional: Remdesivir x 5d or ready for d/c (>12y), more useful within 48h of symptom onset<br>2. Dexamethasone until off O2 (max 10d)<br>3. LMWH (may be started after admission)<br>4. Consider GI prophylaxis<br><br>Consider flutter valve<br><br>Walk in room or up to chair<br><br>Consider nutritional intake and dietary consult<br><br>Convalescent plasma unlikely to benefit and monoclonal Ab not indicated<br><br>Tocilizumab & Anakinra may have selected uses, after consultation with rheumatology<br><br>No contraindication to ibuprofen<br><br>Consider trial of prone positioning – no strong evidence for or against in kids | | 1. IVIG 2 gm/kg<br>2. If ill appearing: Methylpred-nisolone 2 mg/kg/day for 5 days then taper over 2-3 weeks; if hemodynamically unstable consider pulse high-dose steroids (see chart below)<br>3. ASA 3-5 mg/kg/day once daily to max 81 mg/day (do not use if platelet count < 80K)<br>4. Consider GI prophylaxis<br><br>If ECHO with coronary artery z-score:<br>2.5-10 – start low dose ASA and discuss with cardiology<br>> 10 or moderate to severe LV dysfunction -- anticoagulation with enoxaparin (goal Factor Xa lvl 0.5-1);<br><br>If refractory symptoms after 1st IVIG, a 2nd dose is not routinely indicated, but steroids can be given if not already<br><br>Tocilizumab & Anakinra may have selected uses, after consultation with rheumatology |

1. **Residents/Medical Students**
    - Residents & med students should follow and examine these patients and round on them and write notes. Opt out policy based on UNC guidelines.
2. **Visitor policy**
    - For all patients (COVID and non-COVID) – # of visitors allowed varies, check with latest Cone guidelines; parents should wear a mask when any health care provider is in the room or if they are outside the patient's room
3. **Staff Cohorting**
    - If there are 2 or more COVID patients on the ward, one nurse will be assigned only to them. If there is a single patient, then a single RN may have both COVID and non-COVID patients
4. **Other (for COVID+ patients)**
    - Rooms should have flash lights so we do not have to transfer lights between rooms
    - Parent will have (or be provided) some tool (Ipad, Iphone) so that they may communicate (voice or video) with the healthcare team so that they do not have to enter the room unless necessary to directly interact with the patient.
    - A family handout related to COVID is saved to the resident computer by the window and we can hand out to each patient

*Other considerations*

1. Antibiotics if concern for concomitant bacterial infection/pneumonia (e.g., focal findings on CXR would suggest bacterial source since COVID pneumonia typically shows bilateral hazy infiltrates)
2. Acute COVID has a myriad of presentations (many are only correlations at this point). Consider all of these during ongoing care of the patient: myocarditis, AKI, encephalopathy

*MIS-C follow up at discharge*

1. Repeat ECHO at 2 weeks and 4-6 weeks
2. Continue steroid taper for 2-3 weeks
3. Low dose aspirin until platelet count < 450K and documented normal coronary arteries via f/u ECHO
4. Continue Enoxaparin if documented thrombosis or ejection fraction < 35% for at least 2 weeks, then f/u Heme (may extend if z-score>10 or ongoing LV dysfunction)
5. F/U with pediatric rheumatology and cardiology if ECHO abnormalities. May consider cardiac MRI in 2-6 months if significant LV dysfunction

*Acute Respiratory COVID follow up at discharge*

1. Continue Enoxaparin outpatient for 30d if markedly elevated D-dimer or superimposed VTE risk factors , then f/u Heme
2. Consider follow up with pulmonology (PFTs and 6 min walk test at 2 months)
3. Education about 4 main symptoms of DVT (swelling, redness, pain, warmth), PE (SOB, CP, tachycardia, cough/hemoptysis), CSVT (headache, nausea/vomiting, vision changes, focal neuro deficits)

## *Pharmacologic Therapies for COVID-19*

| Agent | Dosing and Regimen | Considerations | Adverse Effects and Interactions | Acute COVID-19? | MIS-C? |
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| **Remdesivir** | <40 kg: 5 mg/kg IV x1, followed by 2.5 mg/kg IV daily<br><br>≥40 kg: 200mg IV x1, followed by 100mg IV daily<br><br>Course: 5 days, but can shorten if ready for d/c earlier.<br><br>Approved >12y & >40kg. EUA for >3.5 kg < 40kg | Criteria (abbreviated): SpO2 <94% on RA, best early in course.<br><br>Do not start if hospitalized >10 days or intubated >5 days | Nausea, vomiting, elevation of hepatic transaminases.<br><br>CMET on D#3 if chemistry is needed<br><br>Consider discontinuation if ALT> 10x ULN | YES | NO |
| **Dexamethasone** | <40 kg: 0.15 mg/kg PO/IV daily<br>>40 kg: 6 mg PO/IV daily<br><br>If hemodynamically unstable, consider high-dose pulse steroids<br><br>For patient with asthma exacerbation in the setting of covid-19, start methylprednisolone 2 mg/kg/day divided twice daily (max: 30 mg/dose) | Continue until off O2 or for 10 days max. Do not d/c home on steroids unless taper required | | YES<br>Preferred | YES |
| Methylprednisolone | Mild: 1-2 mg/kg/day (mx 30mg BID)<br>Mod: 10 mg/kg/day (max 1g/dose)<br>Sev: 30 mg/kg/day (max 1g/dose)<br><br>If hemodynamically unstable, consider high-dose pulse steroids<br>Consider starting IV then transition to oral and taper | For MIS-c, Continue for 5 days (1-3 days for mod to high dose) then taper over 2-3 weeks | | YES | YES<br>Preferred |
| **IVIG** | 1-2 gm/kg/dose x1<br><br>Base on IBW for obese patient<br><br>maximum 70-100 gm/dose | Pre-medication is not required prior to IVIG administration | Increased risk for thrombosis or intravascular clot if other risk factors present; aseptic meningitis; hemolytic anemia | NO | YES |
| **Anakinra** | 4 mg/kg/day IV or SC<br><br>May consider increasing up to a maximum of 10 mg/kg/day<br><br>Use may be limited by pharmacy availability | IL-1 receptor antagonist<br><br>Use with caution if renal insufficiency is present. | Generally well-tolerated with favorable profile.<br><br>Administered in sepsis trials without untoward effects. Short half-life. | YES | YES |

| Anticoagulation | | |
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| **Low/Intermediate Risk (Prophylaxis dose)** | COVID confirmed, no documented VTE or concern for vascular access occlusion | Enoxaparin 0.5 mg/kg q 12 hours (max 30 mg/dose) (Goal anti-Xa: 0.2-0.4 units/mL)<br><br>Recommend only if CrCl>30 |
| **High Risk (Treatment dose)** | COVID confirmed, WITH documented PE/DVT, high clinical suspicion for VTE, progressive organ failure with clinical concern for possible microvascular thrombosis | Enoxaparin 1 mg/kg q 12 hours (Goal anti-Xa: 0.5-1 units/mL)<br>Recommend only if CrCl>30; otherwise heparin infusion |

## References


Evaluation and Management of COVID-19 and Related Syndromes at UNC Children's

CHOP Clinical Pathway for Evaluation and Treatment of Patients with Acute COVID-19 infection

American College of Rheumatology Clinical Guidance for Pediatric Patients with Multisystem Inflammat ory Syndrome in Children (MIS-C)