



# **COVID-19 PROTOCOLS FOR PICU**

The purpose of this protocol is to ensure the safety of patients who need pediatric critical care during the COVID-19 pandemic, while protecting staff from infection. The processes outlined here are aimed at meeting these goals:

1. Protection of staff from exposure and infection
2. Conservation of PPE and resources
3. Mitigation of stress on staff and patients/families
4. General information/algorithms for care and treatment

Information and recommendations on Covid-19 are changing rapidly as more epidemiologic, research and clinical data and research is made available. Updates will be found on the University website. <https://www.usahealthsystem.com/covid-19-employees>

If you notice anything that can be improved or have ideas for improvement in the PICU, please contact the PICU director or nurse managers. We want to hear from you as we are all in this together.

## **GENERAL PROCESSES FOR COVID CONFIRMED AND PUI**

### **ADMISSION PROCESS**

- All Patients under Investigation (PUI) or confirmed COVID patients that require PICU admission will be evaluated by the PICU attending as to best point of entry, ED vs direct admit.
  - Please remind all healthcare workers every time what are the requirements for PPE at the time that a patient is accepted to the PICU.
  - See attached admissions algorithm
- **Direct Admissions from an outside hospital:**
  - We will continue to adhere to all the same standards and protocols when accepting a patient from an outside hospital (OSH).
    - A PICU Attending will accept a patient based on PICU admission criteria
    - The information will be communicated to the charge nurse to determine bed and staff availability
  - Caretakers must be told about our visitor policy by the OSH. ( 1 visitor only)  
Send the facility a copy of our policy if necessary. This must be made clear so



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that we avoid unnecessary conflict and anxiety to families when additional visitors are not allowed in.

- Caretakers do not go to admissions office. They will all come directly to the PICU and the admission personnel will contact the family by phone.
- Please remind families with children on chronic home ventilators that they need to bring the patient's home ventilator and all the components for proper operation.
- For transport of all PUI or Covid positive patients:
  - Advise all OSH MDs and RN's that the transport staff must wear PPE.
  - Patients that are not intubated must wear an isolation mask
  - If 1 *family member* is in transport, they must wear an isolation mask
  - This applies to all forms of transfer/transport
- A Family member ( 1 visitor only) that arrives separately from the patient:
  - Once a patient is accepted the PICU staff will inform the visitors screening desk of their expected arrival. A mask will be given to them on arrival.
  - When the 1 family member arrives, the visitors desk personnel will inform the PICU and PICU staff will escort the 1 family to the PICU. They may not go there unescorted.
  - On arrival to PICU, the family member will be instructed on all visitor/PPE policies.
- **Direct admissions from a PCP:**
  - We do not routinely accept patients directly from a PCP office; they will need to be directed to the ER for triage.
    - Exceptions may exist on a patient by patient basis on complex chronic patients from our clinics that may be best served by direct admit as long as all PPE regulations are followed.
    - Please remind families with children on chronic home ventilators that they need to bring the patient's home ventilator and all the components for proper operation.

## TESTING

- Every patient with respiratory symptoms, known risk factors ( ex: travel, contact with covid patient) that requires admission needs to be tested.



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- If they are being admitted through the ED at CWH, the ED should perform a test prior to admitting to the floor
  
- **Please review the testing criteria and testing process:**
  - <https://usahealthsystem-rcgarkskyk9ln7qkrx.stackpathdns.com/uploads/pdfs/covid-19/testing-criteria-03122020-rev2.pdf>
  
  - <https://usahealthsystem-rcgarkskyk9ln7qkrx.stackpathdns.com/uploads/pdfs/covid-19/synergy-process.pdf>
  
- - There is no clear criteria to test and a high level of suspicion is not needed
  - Directions for collecting patient sample are in the COVID19 binder
    - NP swab or mid turbinate swab.
    - Leave in place for 2-3 seconds then rotate for 10-15 seconds
  - Cerner order PLUS paper form
    - Paper form must be signed by ordered provider
  
- Results will show up in Results Review as Microbiology Reference Lab COVID19.
- For any positive results, please contact Amy Hill at 251-415-1683 at Infection control and nursing supervisor on nights and weekends.
- Post test instructions: <https://usahealthsystem-rcgarkskyk9ln7qkrx.stackpathdns.com/uploads/pdfs/covid-19/pediatric-post-test.pdf>

## **Personal Protection Equipment**

PPE is one of the most important steps that must be done to decrease transmission and to protect staff. All PICU staff is to receive training in the appropriate way to Don and Doff PPE. Education will include watching a video, simulation training and competency checkoffs. (See attached PPE Competency and validation form).

### **What do you wear?**

- Review donning and doffing PPE:
  - <https://www.cdc.gov/coronavirus/2019-ncov/hcp/using-ppe.html>



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- PPE video:  
[http://repository.netecweb.org/pdfs/NETEC Personal Protective Equipment for COVID-19.mp4](http://repository.netecweb.org/pdfs/NETEC_Personal_Protective_Equipment_for_COVID-19.mp4)
- Additional resources: <https://netec.org/>
- Laminated donning and doffing guidelines are available in the COVID-19 binder to be placed at each patient room.
- See also attached eye protection algorithm
  
- **For PUI AND COVID Confirmed cases:**
  - <https://usahealthsystem-rcgarkskyk9ln7qkrx.stackpathdns.com/uploads/pdfs/covid-19/ppe-recommendations.pdf>
  - Droplet/Contact/Eye protection (Gown, surgical mask, gloves & eye protection) for all patients, UNLESS AN AEROSOLIZED PROCEDURE is being performed, which requires an N-95 mask/PAPR
    - Examples of why you would need an N-95 mask/PAPR:
      - ✓ Nebulized treatments
      - ✓ Deep suctioning and other respiratory therapies
      - ✓ High-flow nasal cannula
      - ✓ CPAP. BiPAP
      - ✓ Trach collar
      - ✓ Intubation
      - ✓ Ventilator patients
      - ✓ During bag-mask-valve care
      - ✓ CPR
  
- **For PUI or COVID confirmed cases:**
  - Requires a negative pressure room, when available
  - Will provide a HEPA filter machine if available

### **When do you wear it?**

**For all PUI or COVID-19 patients each time you enter the room.**

- PPE: gown, gloves, surgical mask, eye protection
  
- Aerosol generating procedure ( AIRBORNE) = Wear an N-95 mask or PAPR



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- Aerosol generating procedure: high flow, nebulized treatments, deep suction, open suction on the vent, CPR
- High flow is continuous aerosol generating, so airborne until d/c
- Intermittent nebs or deep suctioning – opportunity for intermittent airborne for the duration of the treatment and 2 hours after.
- Stop signs available in COVID-19 binder to put on door frame alerting staff of aerosol procedure (start and stop times can be written on the sign)
  
- **PPE during intubation:**
  - This is a high risk procedure so protect yourself first! <sup>8,15</sup>
  - See attached intubation algorithm. Please review intubation video which will demonstrate step by step instructions on sequence and connections:
    - <https://www.icloud.com/photos/#0L7OU7C2UKSJ7dvvhw1D1BeA>
  - All intubating equipment is being kept in a bag outside the room. It is customized for each patient. There is a checklist enclosed in each bag and is to be checked by RT staff daily. ( see Checklist attachment )
  - Limit staff to necessary personnel only. Good communication is the key to a smooth procedure with no breaks in infection control measures. Please always use the buddy system to ensure all PPE is donned and especially Doffed correctly.
    - 1 MD, 1-2 RT, 1-2 RN in the room. Depending on patient needs.
    - All other staff to be outside room to assist if needed or bring supplies.
    - Have all supplies ready to minimize ingress and egress.
    - Have ventilator set up and ready to use. All filters, waveform capnography and inline suction in place.
    - Have suction set up and functioning.
    - ETT aspirate to be obtained immediately after securing the tube while staff is still in PPE and to minimize all future disconnections.
    - Have NGT and duotubes ready to be placed if ordered.
  - When possible call anesthesia for them to use the glidescope for the procedure
    - **Inform anesthesia staff of patients age and weight**
    - Have propofol and succinylcholine ready for RSI
    - Most experienced staff to perform the intubation
  - When anesthesia is not available:
    - Wear PAPR if feasible
    - Wear N-95 mask plus face shield. Surgical bouffant cap, along with all standard PPE. Face shield is preferred over googles.
    - When procedure complete: ensure patient stability before leaving room.



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## ● PPE during extubation

- This also a high risk procedure. Patients are likely to cough repeatedly on extubation.
- **Best technique is to protect yourself is to wear appropriate PPE at all times**
  - Wear PAPR if feasible
  - Wear N-95 mask plus face shield. Surgical bouffant cap, along with all standard PPE. Face shield is preferred over goggles.
- Limit staff to necessary personnel only: 1 MD, 1 RN and 1 RT.
- Have all necessary medications and treatments, oxygen therapy etc in the room to limit entry and exits.
- Place and secure oxygen/HFNC tubing on patient prior to extubation.
- Additional staff to be outside the room to help as needed.

## ● PPE during Deep Sedation

- This is considered a high risk procedure as patients may need airway support.
- Use full PPE: N95/PAPR, gown, gloves, eye protection for the team in the room,

## Where do you find and store PPE in the PICU?

- PUI /Covid rooms have a PPE cart outside the rooms. Daily supplies will be stored here.
  - Top of the cart will be used to clean and dry eye protection before storing.
  - Keep clean at all time and clean after each use.
- Pink “Eye Protection” signs are available in the COVID19 binder
  - Goggles are not disposable, clean after each use
  - Surgical mask with face shields are available for staff that does not have goggles
- N95 masks can be used for an entire shift before sending for reprocessing
  - Using the label maker, create a label to place on one of the mask straps
    - Name, unit, date first worn, J number
  - Place N95 in brown paper bag with your name, unit, date first worn, J number and place in the reprocessing container in the soiled utility room at end of shift.
  - Place yellow isolation mask on top of N95
  - Discard yellow isolation mask upon leaving room
- PAPR hoods are to be used for the duration of your shift.
- Extra PPE stock:
  - In the front storage room – only pull out when unit supply is depleted
  - N95 masks are stocked in central supply. Charge nurse can call to request additional mask when needed.



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## VISITOR POLICY

- All visitors must wear a face mask in all areas on the hospital except while in the patient room
- For PUI or COVID confirmed cases:
  - Only 1 visitor can stay in the room (no PPE needed). This visitor can NOT leave the room with the exception of:
    - Visitors will be allowed to leave for bathroom purposes only. Bathrooms at the entrance of the PICU have been designated COVID (male bathroom - #1) or non COVID (female bathroom- #2).
    - If visitor leaves to use the bathroom, he/she must wear an insolation mask the entire time.
    - Staff to assure/ monitor that families remove and don all PPE correctly each time.
- All other patients:
  - Only 2 caregivers (total) per patient.
  - Only one may be in the hospital at a time and MUST be asymptomatic.
  - Each caregiver will have a turquoise/green (color may change) armband placed on their wrist.
    - Caregiver name written on the armband
    - ID will be checked against name on armband
  - All visitors will be screened for fever and URI symptoms prior to entering hospital
  - If visitor comes to door without appropriate armband they must leave the hospital
  - If 2<sup>nd</sup> visitor comes, one visitor must leave the hospital
  - If a family meeting is needed, it must be conducted over the phone
- The quiet room and waiting room are locked
  - For PICU patients (Not being tested/confirmed COVID19) having a procedure that requires visitor to step out, the visitor may be placed in the quiet room until the procedure is completed.
  - For PICU patients (**being tested/confirmed** COVID 19) having a procedure that requires visitor to step out, the visitor may be placed in the waiting room until the procedure is completed.
    - This room is larger and will allow for more social distancing should more than one patient have a procedure at any given time.
  - Visitors for Peds patients coming from the wards for a sedation must return to the patient's room.
- Bathrooms



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- Men's Room – Bathroom #1 will be for visitors of patients being test for or confirmed COVID19
  - Women's Room – Bathroom #2 will be for all other visitors
  - Numbers "1" and "2" will be placed on the doors
  - Please educate your visitors to use the appropriate bathroom
  - As always encourage hand hygiene when leaving any patient room, after using the bathroom, and upon entering the patient room.
- **Food for caregivers**
    - If the family cannot pay for meals, the manager or charge nurse is to call down to food services (same number 3-1070) and speak to the supervisor. They just need to let the supervisor know that the visitor is unable to pay and the meals will be sent at no cost.

## CLINICAL INFORMATION

### CLINICAL PRESENTATION

The spectrum of Covid-19 ranges from mild, self-limiting respiratory tract illness to severe progressive pneumonia, multiorgan system failure, and death.<sup>12</sup> The incubation period of SARS-CoV-2 infections ranges from 2 to 14 days, though most often ranges from 3 to 7 days.<sup>1</sup> Preliminary data from the CDC published in MMWR on April 6, 2020 suggests that the US data is similar thus far to the findings from the Chinese experience.<sup>16</sup>

Clinical findings in neonates: Non specific. They may present with temperature instability. Respiratory and cardiovascular symptoms: tachypnea, grunting, nasal flaring, work of breathing (WOB), apnea, cough, or tachycardia. Other findings: may include poor feeding, lethargy, vomiting, diarrhea, and abdominal distension.<sup>2</sup>

Based on Chinese experience of 2143 pediatric patients:<sup>3</sup>

1. Asymptomatic infection: without any clinical symptoms and signs and the chest imaging is normal.
2. Mild: symptoms include fever, fatigue, myalgia, cough, sore throat, runny nose, and sneezing. Some cases may have no fever, or have only digestive symptoms such as nausea, vomiting, abdominal pain and diarrhea.
3. Moderate: presents with pneumonia, frequent fever and cough, mostly dry cough, followed by productive cough, some may have wheezing, but no obvious hypoxemia.



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Some cases may have no clinical signs and symptoms, but chest CT shows lung lesions, which are subclinical.

4. **Severe:** Early respiratory symptoms such as fever and cough, may be accompanied by gastrointestinal symptoms. The disease usually progresses around 1 week, and dyspnea occurs, with central cyanosis. Oxygen saturation is less than 92%.

5. **Critical:** Children can quickly progress to acute respiratory distress syndrome (ARDS) or respiratory failure, and may also have shock, encephalopathy, myocardial injury or heart failure, coagulation dysfunction, and acute kidney injury. Organ dysfunction can be life threatening.<sup>3</sup>

### Risk factors criteria for development of severe disease:

1. Dyspnea and tachypnea
2. Persistent high fever for 3–5 days;
3. Lethargy, disturbance of consciousness, and other changes of consciousness;
4. Increased cardiac enzymes, liver enzymes, and LDH
5. Unexplainable metabolic acidosis;
6. Chest imaging findings :bilateral or multi-lobe infiltration, pleural effusion, or rapid progression during a very short period
7. Infants younger than 3 months;
8. Extrapulmonary complications;
9. Coinfection with other viruses and/or bacteria.

Along with underlying conditions (such as congenital heart disease, chronic respiratory tract disease, abnormal hemoglobin level, severe malnutrition, or with immune deficiency or immunocompromised status.<sup>1</sup>

### Radiology findings

**Adult CXR:** frequently shows focal or multifocal, unilateral, ill-defined air-space opacities in the middle and lower peripheral lung zones, with progressive multifocal consolidation over a course of 6 to 12 days involving one or both lungs.<sup>4</sup>

**Pediatric CXR:** images show multiple small patchy shadows and interstitial changes , remarkable in the lung periphery. Severe cases can further develop to bilateral multiple ground-glass opacity, infiltrating shadows, and pulmonary consolidation, with infrequent pleural effusion.<sup>5</sup>

In one study abnormalities on CT of the chest showed: Ground-glass opacity 56 (32.7%) Local patchy shadowing 32 (18.7%) Bilateral patchy shadowing 21 (12.3%) Interstitial abnormalities 2 (1.2%)<sup>6</sup>

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## Laboratory findings:

In one study : lymphocytopenia was present in 83.2% of the patients, thrombocytopenia in 36.2%, and leukopenia in 33.7%. Most of the patients had elevated levels of CRP or ESR; less common were elevated levels of procalcitonin, ALT,AST, CPK, and d-dimer.<sup>7</sup> Similar findings have been reported in subsequent studies.

## General care

### **BUNDLE CARE, LIMIT PROCEDURES PERFORMED ON THE PATIENT, LIMIT PERSONNEL GOING IN THE ROOM**

- Nurses and staff to bundle care to limit times going in the room when possible. This can only be done on stable patients. We cannot compromise patient care by limiting necessary care due to COVID. We protect the staff by using appropriate PPE
- Use phones as much as possible to communicate with patients and parents rather than going in the room.
- Patient phones have been placed in the rooms to facilitate communication
  - Parent can call dietary directly to order meal trays
  - Parent can call desk to notify nurse of needs before entering room
- Review need for blood draws on a daily basis.
  - Limit when clinically indicated
- Review need for diagnostic procedures daily. Limit when clinically indicated.
  - Bundle radiology tests to minimize exposure.
- Many patients will require medications around the clock and can be administered only by nursing. This standard of care must be maintained in order to assure that no increased morbidity or mortality occurs due to inappropriate limitations of care. When appropriate we can:
  - Review MAR daily and discontinue all medications no longer in use.
  - Switch all IV medications to PO and schedule administration of meds at the same time if possible to limit entries into the room
- In order to minimize exposure and cross infection across the hospital, the food tray should be delivered to the nurse by nutrition services staff and the nurse delivers the food tray into the patient's room.  
See attached management algorithm

## MANAGEMENT

### General supportive ICU care

- RESPIRATORY CARE:
  - <https://cpr.heart.org/en/resources/coronavirus-covid19-resources-for-cpr-training/oxygenation-and-ventilation-of-covid-19-patients>
  - 
  - Obtain CXR as per best practices. Radiology personnel to use appropriate PPE. Bundle radiology tests as much as possible.
  - CT chest should not be used to screen for or as a first-line test to diagnose COVID-19.
    - CT chest should be used sparingly and reserved for hospitalized, symptomatic patients with specific clinical indications for CT. Appropriate infection control procedures should be followed before scanning subsequent patients. <sup>11</sup>
  - Avoid nebulized treatments, when possible, since COVID can become aerosolized during these treatments for up to 2 hours.
  - Utilize MDIs if possible.
  - RT/ RN/MD to wear N-95/PAPR for all aerosolizing procedures.
- NIV
  - To be used as clinically indicated.
  - Keep HFNC to the lowest flow that produces a good clinical response.
  - Ensure a good seal when using masks. Full face mask preferred.
  - Staff to use N-95 masks/PAPR when delivering patient care.
  - Monitor closely as patients have been known to rapidly deteriorate and require intubation.
  - Ensure that all intubation equipment and supplies are in place or any patient that requires NIV
  - Advise Anesthesia staff as soon as it is clear a patient will require intubation.
- Invasive ventilation <sup>12-15</sup>
  - [file://hsfnas.usadir.usa.usouthal.edu/User\\$/rvidal/Downloads/WHO-2019-nCoV-clinical-2020.4-eng.pdf](file://hsfnas.usadir.usa.usouthal.edu/User$/rvidal/Downloads/WHO-2019-nCoV-clinical-2020.4-eng.pdf)
  - See above for PPE and procedure for intubation (see attached intubation algorithm).

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- Extubation is also a high risk procedure. All staff to wear full PPE. Be prepared for re-intubation as there are reports of significant extubation failures. Have all supplies and medications ready for re-intubation. (See attached algorithm for extubation).
- Use in line suctioning on all patients ( unit routine)
  - Avoid open suctioning whenever possible
- Provide ventilator management as per unit routines for patient with respiratory failure. Provide lung protective strategies.
  - Patient can progress very quickly to ALI. Monitor closely.
- Patients that have progressed to ALI/ARDS may require prone positioning, mucolytics, nitric, HFOV. Some patients have required ECMO or CRRT.
- Use diuretics as indicated. Keep lungs dry. Conservative fluid management when there are no signs of shock.
- Avoid use of systemic steroids for routine patients who are not critical.
  - Consider only in critical patient on the ventilator in which the use of steroids is considered a benefit > risk.
- CNS-SEDATION/ PARALYTICS:
  - We will continue to practice as is our unit routine following all best practices
  - Minimal sedation when possible to facilitate extubation as soon as clinically indicated.
  - Use paralytics as per usual practice when necessary for patients that have severe lung injury/ARDS, ventilator dysynchrony and to avoid accidental self extubation.
- CARDIOVASCULAR:
  - Some adults have been reported to have myocardial dysfunction requiring pressors and inotropes.
  - Consider ECHO when indicated. Have clear rationale as we want to avoid unnecessary testing and ingress of techs.
  - EKGs on patients that have a dysrhythmia (known or recently acquired).
    - Obtain on any patient with severe respiratory disease
    - Obtain in patients who viral specific therapy is being considered. (Some drugs will cause prolonged QT)
- INFECTIOUS DISEASE:
  - Patients may require antibiotics as clinically indicated and as per usual practice. Dual infections with other respiratory viral and bacterial infections have been found in COVID-19 patients:
    - Obtain, blood, urine, ETT cultures as indicated before antibiotics if possible
    - ETT cultures: PPE on all staff in room.
      - ETT aspirate to be obtained in all patients on intubation without disconnection through the inline suction if feasible.



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- For open culture aspiration, clamp ETT, pause ventilator, unclamp tube, obtain specimen, immediately place back on ventilator.
  - Provide antibiotics within 1 hour if septic shock is suspected
  - Consider treatment of viral coinfections. Confer with ID
- Carefully consider obtaining follow-up ETT aspirate cultures as this is a potentially aerosolizing procedure. Staff to wear N-95 masks and follow strict PPE.
- Consult Pediatric infectious disease on any patient that anti-viral/experimental therapy is being considered.
- RENAL:
  - AKI has been reported to occur. Obtain CMP's as indicated by severity.
  - Avoid nephrotoxic drugs
- HEPATIC:
  - Mild transaminitis has been reported to occur. Obtain CMP's as indicated by severity.
- HEMATOLOGIC:
  - Monitor for Lymphopenia, leukopenia. Worsening with increasing severity.
  - CRP, ESR, procalcitonin may or may not be elevated especially initially.
  - Patients may develop a coagulopathy. Elevated d-dimers.
  - Consider VTE prophylaxis if not contraindicated.
    - Adult data has shown increase incidence of PE.
- GASTROINTESTINAL:
  - Many pediatric patients have presented with nausea, vomiting or diarrhea
  - Stool Viral shedding may be prolonged and be present even after resolution of symptoms.
    - Discard all stools/diapers in red bags.
- ETHICAL CONSIDERATIONS:
  - Thus far the number of pediatric patients with Covid who have required hospitalization has been low. Most have not been critical. Triage decisions have not been reported in this population. However if scarcity of supplies occur and allocations decisions must be made at CWH during this pandemic contact the Ethics committee for consult.
  - CPR: [AHA recommendations](#)
  - <https://www.ahajournals.org/doi/10.1161/CIRCULATIONAHA.120.047463>
- PALS COVID CPR
  - [https://cpr.heart.org/-/media/cpr-files/resources/covid-19-resources-for-cpr-training/english/algorithm\\_pals\\_cacovid\\_200406.pdf?la=en&hash=1282FF0243988B173FDFBA63369608D15BBD25D9](https://cpr.heart.org/-/media/cpr-files/resources/covid-19-resources-for-cpr-training/english/algorithm_pals_cacovid_200406.pdf?la=en&hash=1282FF0243988B173FDFBA63369608D15BBD25D9)

### COVID-19 Specific care

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- **Consult Pediatric ID in all patients for whom viral specific therapy is being considered**
  - Very little evidence for routine drug therapy; medications may have associated adverse events thus therapy is only on select patients (severe infections in immunocompetent patients, immunocompromised, elderly, those with chronic medical conditions such as diabetes, heart disease, receiving immunosuppressive medications, chronic lung disease, chronic kidney disease).
  - If viral specific therapy is to be used (if not already obtained ) : EKG, blood gas, CMP, Mg, Phos, CBC, CRP, Coags and D-Dimer prior to initiation.
  - If specific therapy is to be initiated, written consent is to be obtained, inform parents that there is limited data for these therapies, and current standard of care is supportive.
    - There is a specific consent for designed for these agents
    - Pediatric ID have these available
  - Consider therapy in hospitalized **AND** COVID-positive **AND** with at least one of the following (for immunocompetent and high risk patients):<sup>2</sup>
    - New/increased supplemental oxygen requirement >4 hours; OR
    - Increase in baseline non-invasive or invasive ventilatory support requirements (e.g., increased ventilator pressures) with worsening trajectory > 8 hours
  - Determine immune status of the patients (Table 1)<sup>9</sup>

**Table 1. Immune status of patients**

<b>Category</b>	<b>Immunodeficiency/Characteristics</b>
<b><u>Severe</u></b>	<ul style="list-style-type: none"> <li>- SCID</li> <li>- allogeneic HCT (&lt;100 days <i>and</i> ALC&lt;100/mm<sub>3</sub>, or severe GVHD)</li> <li>- acute lymphoblastic leukemia in induction with ALC &lt;100/mm<sub>3</sub></li> <li>- relapsed/refractory acute lymphoblastic leukemia with ALC &lt;100/mm<sub>3</sub></li> <li>- recent T-cell specific therapy (e.g. Anti-Thymocyte globulin (ATG) [&lt;90 days], alemtuzumab [&lt;6 months])</li> <li>- HIV infection with CD4 count &lt;100/mm<sub>3</sub></li> </ul>
<b><u>Moderate</u></b>	<ul style="list-style-type: none"> <li>- Acute lymphoblastic leukemia in induction, consolidation or reinduction with ALC 100-300/mm<sub>3</sub></li> <li>- any other malignancy with ALC&lt;100/mm<sub>3</sub></li> <li>- bone marrow failure with ALC&lt;100/mm<sub>3</sub></li> <li>- other high-dose immunosuppression (discuss with ID)</li> <li>- HIV infection with CD4 count 100-200/mm<sub>3</sub></li> </ul>
<b><u>Mild or none</u></b>	<b><u>All other patients</u></b>

## DISCHARGE / TRANSFER PROCESS

- For COVID confirmed cases:
  - Patients diagnosed with COVID who are transferred to the wards or discharged home should remain in quarantine on wards or at home until symptom free and 2 weeks after discharge (whatever comes last)
  - Asymptomatic care takers should remain in quarantine with the patient for a minimum of 2 weeks after discharge.
  
- For PUI cases:
  - Once a patient meets the usual criteria for transfer or discharge, they can be transferred to the wards or discharged home, even if their COVID test is not back yet
  - They need to be quarantined at least until their test comes back negative
    - Household members need to be quarantined but they can be released from quarantine if the test is negative. If the test is positive they need to remain in quarantine until two weeks after the patient is asymptomatic or has been discharged (whatever comes last)
    - Provide handout on post-testing instructions, which includes information about quarantine and precautions: <https://usahealthsystem-rcgarkskyk9ln7qkrx.stackpathdns.com/uploads/pdfs/covid-19/pediatric-post-test.pdf>
  - They need to be placed on the White list in Cerner, to help track their test results
    - All information needs to be placed on the excel file in the shared drive (MyFile Share)
      - Residents > Pediatrics > COVID19 Tested folder
  - Once ready to discharge or transfer, both the patient and the caregiver need to put on a yellow surgical mask and are to be escorted out by PICU staff.

## References

1. Diagnosis, treatment, and prevention of 2019 novel coronavirus infection in children: experts' consensus statement Kunling Shen, Yonghong Yang, Tianyou Wang, et al. World Journal of Pediatrics <https://doi.org/10.1007/s12519-020-00343-7>

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2. Chinese expert consensus on the perinatal and neonatal management for the prevention and control of the 2019 novel coronavirus infection (First edition) Laishuan Wang, Yuan Shi, Tiantian Xiao et al. on behalf of the Working Committee on Perinatal and Neonatal Management for the Prevention and Control of the 2019 Novel Coronavirus Infection. *Ann Transl Med* 2020;8(3):47 | <http://dx.doi.org/10.21037/atm.2020.02.20>
3. Epidemiological Characteristics of 2143 Pediatric Patients With 2019 Coronavirus Disease in China. Yuanyuan Dong, Xi Mo, Yabin Hu, et al. *Pediatrics*. 2020; doi: 10.1542/peds.2020-0702
4. Coronavirus (COVID-19) Outbreak:What the Department of Radiology Should Know Soheil Kooraki, Melina Hosseiny, Lee Myers et al. *Journal of the American College of Radiology* Volume 17; Number 4, April 2020
5. Diagnosis and treatment recommendations for pediatric respiratory infection caused by the 2019 novel coronavirus. Zhi-Min Chen,Jun-Fen Fu,Qiang Shu,Ying-Hu Chen. *World Journal of Pediatrics* <https://doi.org/10.1007/s12519-020-00345-5>
6. Xia W, Shao J, Guo Y, Peng X, Li Z, Hu D. Clinical and CT features in pediatric patients with COVID-19 infection: Different points from adults. *Pediatr Pulmonol*. 2020 March
7. Clinical Characteristics of Coronavirus Disease 2019 in China W. Guan, Z. Ni, Yu Hu, W. et al. for the China Medical Treatment Expert Group for Covid-19. *NEJM* February 28, 2020 DOI: 10.1056/NEJMoa2002032
8. Staff safety during emergency airway management for COVID-19 in Hong Kong. Jonathan Chun-Hei CheungLap Tin HoJustin Vincent ChengEsther Yin Kwan ChamKoon Ngai Lam. Published Online February 24, 2020 <https://doi.org/10.1016>
9. St. Jude’s Hospital Guideline on Guideline for Management of COVID19 Infection in Immunocompromised Patients. Personal communication
10. <https://www.ashp.org/-/media/8CA43C674C6D4335B6A19852843C4052.ashx>
11. <https://www.acr.org/Advocacy-and-Economics/ACR-Position-Statements/Recommendations-for-Chest-Radiography-and-CT-for-Suspected-COVID19-Infection>
12. Clinical management of severe acute respiratory infection (SARI) when COVID-19 disease is suspected. WHO Interim guidance 13 March 2020.



## COVID-19 PROTOCOLS FOR PICU

[file:///hsfnas.usadir.usa.usouthal.edu/User\\$/rvidal/Downloads/WHO-2019-nCoV-clinical-2020.4-eng.pdf](file:///hsfnas.usadir.usa.usouthal.edu/User$/rvidal/Downloads/WHO-2019-nCoV-clinical-2020.4-eng.pdf)

13. <https://www.cdc.gov/coronavirus/2019-ncov/hcp/pediatric-hcp.html>
14. Intubation and Ventilation amid the COVID-19 Outbreak Wuhan's Experience. Lingzhong Meng, M.D., Haibo Qiu, M.D. et al. Anesthesiology 2020; XXX:00–00
15. Consensus guidelines for managing the airway in patients with COVID-19 Guidelines from the Difficult Airway Society, the Association of Anaesthetists the Intensive Care Society, the Faculty of Intensive Care Medicine and the Royal College of Anaesthetists T. M. Cook, et al. Anaesthesia 2020 doi:10.1111/anae.15054
16. Mortality and Morbidity weekly report April 6, 2020

[https://www.cdc.gov/mmwr/volumes/69/wr/mm6914e4.htm?s\\_cid=mm6914e4\\_w](https://www.cdc.gov/mmwr/volumes/69/wr/mm6914e4.htm?s_cid=mm6914e4_w)