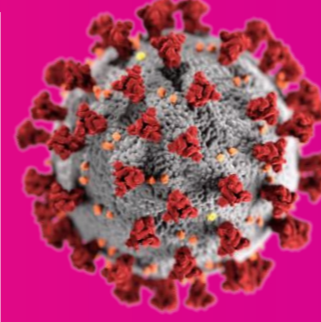




மக்கள் நல்வாழ்வு மற்றும் குடும்ப நலத்துறை



Child Health and Covid 19



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மக்கள் நல்வாழ்வு மற்றும் குடும்ப நலத்துறை

கொரோனா வைரஸ் (COVID-19)

24 மணி நேர கட்டுப்பாட்டு அறை

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Child Health and Covid 19



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Child Health and Comorbidities

1. Introduction

The rapid outbreak of coronavirus disease 2019 (COVID -19), which arose from severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection, has recently become a public health emergency of international concern [1]. COVID -19 has contributed to an enormous adverse impact globally.

In laboratory -confirmed c ases of coronavirus disease 2019 (COVID-19), patients with any comorbidities experienced poorer clinical outcomes than those without.

Comorbidity, patients reporting late to government health fac ilities and elderly and vulnerable turning up for treatment were among the factors which pushed the COVID -19 fatalities in the state.

It has been observed that majority of the patients who suffered from COVID -19 and died were comorbid.

Coronavirus infected persons having co-morbid conditions like diabetes, hypertension, cancer and HIV are more prone to death

What is COVID 19

COVID-19 is a respiratory disease caused by a novel (new) corona -virus named as SARS-CoV-2 which is genetically related to the previous generation of corona 6 virus which caused the SARS epidemic in 2003.

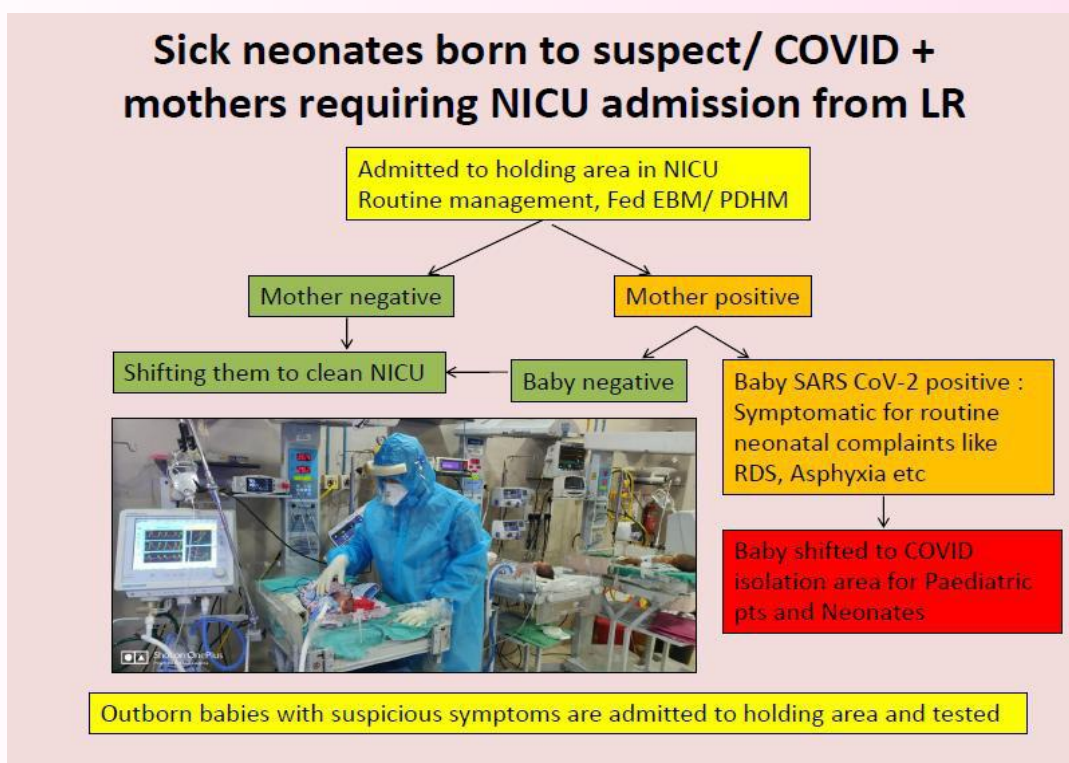
2. Mother and infant contact at birth

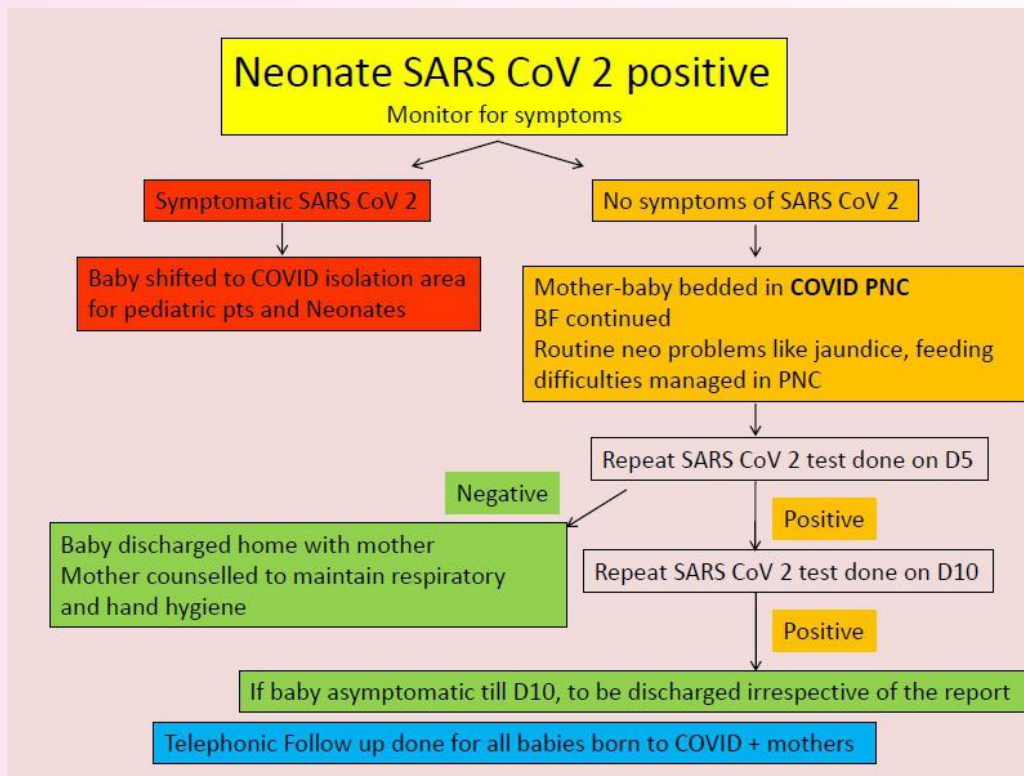
- The risks and benefits of temporary separation of the mother from her baby should be discussed with the mother by the healthcare team.
- A separate isolation room should be available for the infant while they remain a PUI.
- Mothers should not be separated from their infants unless the mother is too sick to care for her baby. If the mother is unable to care for the infant another competent family caregiver should be identified.
- Mother and infant should be enabled to remain together while rooming-in throughout the day and night and practise skin-to-skin contact, including kangaroo mother care, especially immediately after birth and during establishment of breastfeeding, whether they or their infants have suspected or confirmed COVID-19 virus infection.
- Neonates born to mothers with suspected or confirmed COVID-19 infection should put on a facemask and practice hand hygiene before each feeding or other close contact with her new-born and initiate breastfeeding within 1 hour of birth.
- Early and uninterrupted skin-to-skin contact between mothers and infants should be facilitated and encouraged as soon as possible after birth, while applying necessary measures for IPC.

How do people get COVID-19?

People can get COVID-19 from others who have the virus. The disease can spread from person to person through small droplets from the nose or mouth when a person with COVID-19 coughs, sneezes or speaks. People can catch COVID-19 if they breathe in these droplets from a person infected with the virus.

- This applies also to infants who are born preterm or low birth weight.
- Consider using engineering controls like physical barriers (e.g., a curtain between the mother and new -born) and keeping the new -born ≥ 6 feet away from the ill mother.
- If the newborn or infant is ill and requires specialist care (such as neonatal unit), arrangements should be made to allow the mother free access to the unit, with appropriate IPC measures.
- Reassuringly, there is no evidence at present of (antenatal) vertical transmission.
- All babies of Mother with suspected or confirmed COVID -19 need to also be tested for COVID-19.





Considerations

- If no other healthy adult is present in the room to care for the new -born, a mother who has confirmed COVID-19 or is a PUI should take care of the New born
- The facemask should remain in place during contact with the new -born. These practices should continue while the mother is on transmission-based precautions in a healthcare facility.

What are the symptoms of COVID-19?

Common symptoms are fever, tiredness, and dry cough. Some patients may have aches and pains, nasal congestion, runny nose, sore throat, or diarrhoea. These symptoms are usually mild and begin gradually.

Some people become infected but don't develop any symptoms (asymptomatic). Most people (about 80%) recover from the disease without needing special treatment.

Breast Feeding

- During temporary separation, mothers who intend to breastfeed should be encouraged to express their breast milk to establish and maintain milk supply.
- If possible, a dedicated breast pump should be provided. Prior to expressing breast milk, mothers should practice hand hygiene.
- After each pumping session, all parts that come into contact with breast milk should be thoroughly washed and the entire pump should be appropriately disinfected as per the manufacturer's instructions.
- This expressed breast milk should be fed to the new -born by a healthy caregiver.
- If a mother and new -born do room -in and the mother wishes to feed at the breast, she should put on a facemask and practice hand hygiene before each feeding.
- We recommend that mothers with suspected or confirmed COVID -19 should be encouraged to initiate and continue breastfeeding.
- From the available evidence, mothers should be counselled that the benefits of breastfeeding substantially outweigh the potential risks of transmission.

People with fever, cough, and difficulty in breathing should seek medical attention.

- WHO recognizes that the recommendation for an infected mother to be in close contact with her baby may appear to contradict other IPC measures that include isolation of persons infected with COVID-19 virus .
- However, the balance of risks is significantly different for infants than for adults. In infants, the risk of COVID -19 infection is low, the infection is typically mild or asymptomatic, and the consequences of not breastfeeding or separation of mother and child can be significant.
- At this point it appears that COVID-19 in infants and children represents a much lower risk to survival and health than the other infections and conditions that breastfeeding is protective against.
- This protection is especially important when health and other community services are themselves under pressure.
- In contrast, the risks associated with COVID -19 in adults are much higher and more severe.
- Improved communication is needed to address the uncertainties and confusion among programme managers, health workers and communities on this issue.
- Breastfeeding mothers should be helped to clean her chest with soap and water if she has been coughing on it before breastfeeding.
- All mothers should receive practical support to enable them to initiate and establish breastfeeding and manage common breastfeeding difficulties.

Any child, caregiver and/or pregnant woman suffering from flu like symptoms (fever, cough or shortness of breath) should be asked not to come to the session site and seek services as per existing guidelines related to COVID -19 and should be referred to health facilities through 108 from Home.

- This support should be provided by appropriately trained health care professionals and community-based lay and peer breastfeeding counsellors.
- If the mother is too unwell to breastfeed or express breastmilk, explore the best alternatives to breastfeeding a newborn or young infant, in priority order, as follows:
 - 1) donor human milk should be fed if available from a human milk bank;
 - 2) if supplies are limited, prioritize donor human milk for preterm and low birth weight newborns.
- In situations when severe illness in a mother prevents her from caring for her infant or prevents her from continuing direct breastfeeding, mothers should be encouraged and supported to express milk, and the breast milk provided safely to the infant, while applying appropriate IPC measures.
- In the event that the mother is too unwell to breastfeed or express breastmilk, explore, the viability of feeding with donor human milk.
- If this is not possible, consider wet nursing or appropriate Clinical management of COVID-19: interim guidance breastmilk substitutes, informed by feasibility, safety, sustainability, cultural context, acceptability to mother and service availability.

Who are prone to develop serious illness?

Older people, and those with underlying medical problems like high blood pressure, heart problems, or uncontrolled diabetes etc., are more likely to develop serious illness.

- Mothers who are not able to initiate breastfeeding during the first hour after delivery should still be supported to breastfeed as soon as they are able. Assistance should be provided after recovery for relactation to re-establish a milk supply and continue breastfeeding.

3. Guidelines for management of children with positive COVID 19

- COVID-19 caused by SARS -CoV-2 infection has been reported in children in lesser proportion compared with the total number of cases in the general population.
- The majority of SARS cases in children younger than 18 are thought to occur through household transmission, though some cases are hospital-acquired.
- Data from cases of COVID19 show milder symptoms among children compared with adults. Co-detection of other respiratory pathogens (Influenza, Respiratory Syncytial Virus, Mycoplasma pneumonia) has been described in children with COVID-19.
- Very few cases of death have been reported in children in the present pandemic of COVID 19.

Clinical Course

The incubation period for COVID -19 is thought to be 2to 14 days, with a median time of 4-5 days from exposure to onset of symptoms.

Most children with COVID-19 will experience the following:

- Fever
- Cough
- Fatigue
- Anorexia
- Shortness of breath
- Myalgia

- ✓ Headache, confusion, rhinorrhea, sore throat, hemoptysis, vomiting, and diarrhea have been reported but are less common.
- ✓ Atypical presentation is seen in children with medical co-morbidities and may have delayed presentation of fever and respiratory symptoms.

Illness Severity

The illness severity can be graded as per clinical features and laboratory data described in **Table 1**

- Mild to moderate (Mild symptoms up to mild pneumonia-81%)
- Severe (Dyspnoea, hypoxia, or >50% lung involvement on imaging- 14%)
- Critical (Respiratory failure, shock, or multi-organ system dysfunction-5%)

Preventive measures during COVID 19:

- It is advised to keep all surfaces clean and disinfected as far as possible
- We are also advised to wash our hands as frequently as possible with soap or alcohol based hand sanitizer.
- Social distancing to be followed.
- One should wear a facial mask to protect oneself from contracting COVID-19.

Table: 1

Mild to Moderate	Mild illness	Patients with uncomplicated URT viral infection may have non-specific symptoms such as fever, fatigue, cough, sore throat, nasal congestion, anorexia, malaise, muscle pain, or headache. Rarely, patients may also present with diarrhoea, nausea, and vomiting
	Pneumonia	Child with non-severe pneumonia who has cough or difficult breathing + fast breathing. Fast breathing < 2 months: ≥ 60; 2-11 months: ≥ 50; 1-5 years: ≥ 40, and no signs of severe pneumonia.
Critical	Acute respiratory distress syndrome (ARDS)	<p>Onset: within 1 week of a known clinical insult or new or worsening respiratory symptoms.</p> <p>Chest imaging: (radiograph, CT scan, or lung ultrasound) bilateral opacities, not fully explained by volume overload, lobar or lung collapse, or nodules.</p> <p>Origin of pulmonary infiltrates : respiratory failure not fully explained by cardiac failure or fluid overload. Need objective assessment (e.g. echocardiography) to exclude hydrostatic cause of infiltrates/edema if no risk factor present.</p> <p>Oxygenation impairment in children: Use oxygenation index (OI)= $([F_{iO_2} \times \text{mean airway pressure} \times 100]/P_{aO_2})$ or the oxygen saturation index(OSI)= $([F_{iO_2} \times \text{mean airway pressure} \times 100]/S_{pO_2})$, if PaO₂ not available, for assessment of O₂ impairment</p> <p>Mild ARDS</p> <p>Bilevel (NIV or CPAP) ≥ 5 cmH₂O via full face mask: PaO₂/FiO₂ ratio ≤ 300 mmHg or SpO₂/FiO₂ ratio ≤ 264</p> <p>Invasively ventilated: OI = 4 to 8 or OSI =5 to 7.5</p> <p>Moderate ARDS(invasively ventilated): OI = 8 to 16 or OSI</p>

		7.5 to12.3 Severe ARDS (invasively ventilated)=OI ≥ 16 or OSI ≥12.3
Critical	Acute respiratory distress syndrome (ARDS)	<p>Onset: within 1 week of a known clinical insult or new or worsening respiratory symptoms.</p> <p>Chest imaging: (radiograph, CT scan, or lungultrasound) bilateral opacities, not fully explained by volume overload, lobar or lung collapse, or nodules.</p> <p>Origin of pulmonary infiltrates : respiratory failure not fully explained by cardiac failure or fluid o verload. Need objective assessment (e.g. echocardiography) to exclude hydrostatic cause of infiltrates/edema if no risk factor present.</p> <p>Oxygenation impairment in children: Useoxygenation index (OI)= $([F_{iO_2} \times \text{mean airway pressure} \times 100]/P_{aO_2})$ or the oxygen saturation index(OSI)= $([F_{iO_2} \times \text{mean airway pressure} \times 100]/S_{pO_2})$, if PaO2 not available, for assessment of O2 impairment</p> <p>Mild ARDS Bilevel (NIV or CPAP) ≥ 5 cmH2O via full face mask: PaO2/FiO2 ratio ≤ 300 mmHg or SpO2/FiO2 ratio ≤ 264 Invasively ventilated: OI = 4 to 8 or OSI =5 to 7.5</p> <p>ModerateARDS(invasivelyventilated): OI = 8 to 16 or OSI 7.5 to12.3</p> <p>Severe ARDS (invasively ventilated)=OI ≥ 16 or OSI ≥12.3</p>

How cleaning with Soap makes the virus inactive:
 Since SARS-CoV-2 has an outer layer made up of lipids thus soap and alcohol can destroy the lipid envelop making the virus inactive.

- Among children who developed severe disease, the median time to develop dyspnoea ranged from 5 to 8 days, the median time to acute respiratory distress syndrome (ARDS) ranged from 8 to 12 days, and the median time to ICU admission ranged from 10 to 12 days.
- Clinicians should be aware that some children rapidly deteriorate within one week after the onset of illness.
- Case fatality is high for children with co-morbidities like cardiovascular disease, chronic respiratory disease, chronic kidney disease and immune compromised states.

The following conditions indicate a greater likelihood of severe disease:

- Age younger than 3 months
- Persistent high fever for 3-5 days
- Dyspnea: Respiration rate of >50 breaths/min in children aged 2 -12 months; >40 breaths/min in children aged 1 -5 years; >30 breaths/min in patients older than 5 years old (after excluding the effects of fever and crying).
- Poor mental response, lethargy, disturbance of consciousness
- Abnormally increased levels of enzymes, such as myocardial and liver enzymes and lactate dehydrogenase
- Unexplained metabolic acidosis.
- Chest imaging findings indicating bilateral or multi -lobe infiltration, pleural effusion, or rapid progression of conditions during a very brief period.

COVID-19 District Hot Spot / Non hot spot zones

- ✓ Containment zone/ Buffer Zone - Hot spot -Red
- ✓ Areas beyond buffer zone- Non Hot spot -Orange
- ✓ Non infected areas - Green

- Extra-pulmonary complications.
- Co-infection with other viruses or bacteria

Silent hypoxia

Many adult patients present with severe hypoxia without symptoms like breathing difficulty late into disease. Hence it is better to monitor oxygen saturation by pulse oximeter (finger pulse oximeter can also be used) frequently in all children presenting with signs and symptoms of COVID 19 even if the presentation is mild

4. Rare presentation of COVID 19

Cytokine storm syndrome (CSS) is a rare presentation of COVID 19 reported in some countries. Children with SARS-CoV-2-sometimes may present with multisystem inflammatory syndrome. The features of this syndrome include

1. Persistent fever
2. Evidence of poor function in a single organ or many organs, with specific clinical and laboratory features, in the absence of other known infections.
3. Some children may present with part or all of the features of Kawasaki disease
4. The PCR test and antibody test for SARS-CoV-2 may be positive or negative.

Outreach services:

- ✓ No outreach immunisation session to be conducted in the containment and buffer zone
- ✓ Modified Outreach session to be conducted beyond the containment / buffer zone with <500 population to limit the total beneficiaries to 10 to 15/session/ day

Basic workup:

Detailed history of onset of symptoms has to be obtained. History and medical documents should be recorded in Case investigation Form (CIF) and disease severity to be classified in COVID19 Positive children.

Diagnostic Testing;

- Diagnosis of COVID -19 requires detection of SARS -CoV-2 RNA by reverse transcription polymerase chain reaction (RT-PCR).
- Detection of SARS -CoV-2 viral RNA is better in naso -pharynx sample compared to throat sample. Infection with both SARS -CoV-2 and other respiratory viruses has been reported, and detection of another respiratory pathogen does not rule out COVID-19

Confirmed case - A child with laboratory confirmation of COVID-19 infection, irrespective of clinical signs and symptoms

Other Laboratory Investigations;

- Base line investigations include CBC, CRP, ESR, Serum Ferritin, SGPT, SGOT, Blood culture, Random blood glucose.
- Lymphopenia is the most common lab finding in COVID -19
- In severe cases: Coagulation profile, Baseline ECG, Myocardial enzyme spectrum, Blood gas analysis, Serum electrolytes need to be performed.

Birth dose vaccination:

- ✓ Birth dose vaccinations at delivery points in all health facilities (PHC/ UPHC / CHC/ SDH /DHQ/ MCH) should continue irrespective of district categorization

- Lymphopenia, neutrophilia, elevated SGOT, SGPT levels, high CRP, and high ferritin levels may be associated with severe illness.

Radiographic Findings:

- Chest X-rays of children with COVID -19 show patchy infiltrates consistent with viral pneumonia.
- Chest radiographs typically demonstrate bilateral air-space consolidation, though children may have unremarkable chest radiographs early in the disease.
- Chest CT images from children with COVID -19 typically demonstrate bilateral, peripheral nodular ground glass opacities.
- Because this chest CT imaging pattern is nonspecific and overlaps with other infections, the diagnostic value of chest CT imaging for COVID -19 may be low and dependent upon interpretations from individual radiologists.
- Given the variability in chest imaging findings, chest radiograph or CT alone is not recommended for the diagnosis of COVID-19.

Radiological findings per se should not be used to diagnose COVID 19

Investigation for Cytokine Storm Syndrome

Avoid MEN - touching Mouth Eyes Nose Instead follow WOMEN (Wash your hands , Obey Social Distancing , Mask up , Exercise & eat well , No unnecessary travelling)

Clinicians caring for children exhibiting features consistent with this case definition of (CSS) are urged to measure sequential inflammatory markers, which include:

- CBC/DC/ CRP and ESR
- Coagulation studies with D-dimer,
- Ferritin, liver function tests, and cytokine panel.
- In addition to PCR tests for SARS-CoV-2, antibody tests should be undertaken.
- Many of the children are antibody positive even when PCR negative.
- Serial echocardiography including detailed assessment of the coronary arteries should be performed because many children with this syndrome have low heart function and some have enlargement of the coronary arteries

5.Management of COVID-19 infection

5.1 Home management of mild COVID-19

- Asymptomatic or mild symptomatic COVID 19 positive children can be managed at home but isolation is necessary to contain virus transmission.
- They can remain monitored at home until their symptoms resolve and laboratory tests for COVID-19 virus are negative.
- Triaging for home -based care or health facility are based on symptoms and investigations
- Patients with mild COVID -19 need symptomatic treatment of fever with Paracetamol and adequate hydration with ORS and home available fluids.

Do you Know ?

Hand Hygiene is “Best” way to prevent the spread of germs in the health care setting

- If fast breathing is present, antibiotics need to be instituted.
- Counsel parents and patient about signs and symptoms of complicated disease and the need for seeking urgent care, if they develop any of these symptoms, through Tamil Nadu toll free number (104)

5.2 Management of moderate and severe COVID-19:

- Children with moderate or severe COVID 19 require admission in a health facility.
- Patients hospitalized with COVID -19 require regular monitoring of vital signs with a multi-channel monitor/pulse oximeter.
- Closely monitor patients with COVID -19 for signs of clinical deterioration, such as rapidly progressive respiratory failure and sepsis and respond immediately with supportive care interventions.
- **Oxygen therapy and monitoring**
- Give supplemental oxygen therapy immediately to children with respiratory distress, hypoxia or shock and target SpO₂ > 94%. Children with emergency signs (obstructed or absent breathing, severe respiratory distress, central cyanosis, shock, coma or convulsions) should receive airway management and oxygen therapy during resuscitation to target SpO₂ ≥ 94%. Use of nasal prongs or nasal cannula is preferred in young children, as they may be better tolerated. Avoid nebulization in children. Use metered dose inhalers.

Can a person cured of COVID-19 continue transmitting the virus?

- No. Once the person is completely cured of the disease he/she will not have an active viral load in his/her body.
- However, a person has to be tested twice and both the tests should be negative for the person to be labelled as cured.

- Hematology and biochemistry laboratory testing and ECG should be performed at admission and as clinically indicated to monitor for complications, such as acute liver injury, acute kidney injury, acute cardiac injury, or shock.
- Application of timely, effective, and safe supportive therapies is the cornerstone of therapy for patients who develop severe manifestations of COVID-19. If the child has a comorbid condition, it should be treated with specific management of that condition. Monitor for drug interactions.

6. Treatment of co-infections

- Give empiric antimicrobials to treat all likely pathogens causing SARI and sepsis as soon as possible, within 1 hour of initial assessment for patients with sepsis.
- Although the patient may be suspected to have COVID-19, administer appropriate empiric antimicrobials within 1 hour of identification of sepsis.
- Empiric antibiotic treatment should be based on the clinical diagnosis (community-acquired pneumonia, health care-associated pneumonia or sepsis), local epidemiology and susceptibility data, and national treatment guidelines.
- Empiric therapy should be de-escalated on the basis of microbiology results and clinical judgment.
- When there is ongoing local circulation of seasonal influenza, empiric therapy with Oseltamivir should be considered for the treatment of patients with influenza or at risk for severe disease.

Respiratory hygiene (cough etiquette)

All persons with signs and symptoms of a respiratory infection (regardless of presumed cause) must follow respiratory hygiene/cough etiquette

- Use conservative fluid management in patients with SARI when there is no evidence of shock as aggressive fluid resuscitation may worsen oxygenation, especially in settings where there is limited availability of mechanical ventilation

7. Management of critical COVID-19 -Acute respiratory distress syndrome (ARDS)

- Recognize severe hypoxemic respiratory failure when a patient with respiratory distress is failing to respond to standard oxygen therapy and prepare to provide advanced oxygen/Ventilatory support.
- Patients may continue to have increased work of breathing or hypoxemia even when oxygen is delivered via a face mask with reservoir bag (flow rates of 10 - 15 L/min, which is typically the minimum flow required to maintain bag inflation; FiO₂ 0.60-0.95).
- Hypoxemic respiratory failure in ARDS commonly results from intrapulmonary ventilation-perfusion mismatch or shunt and usually requires mechanical ventilation.
- Endotracheal intubation should be performed by a trained and experienced provider using airborne precautions. Patients with ARDS, especially young children or those who are obese may desaturate quickly during intubation.
- Pre-oxygenate with 100% FiO₂ for 5 minutes, via a face mask with reservoir bag, bag-valve mask, HFNO or NIV.
- Rapid-sequence intubation is appropriate after an airway assessment that identifies no signs of difficult intubation.

Contain Respiratory Spread:-Post visual alerts (in local languages) at the entrance to outpatient facilities (registration, emergency departments, outpatient clinics etc)

- Implement mechanical ventilation using lower tidal volumes (4-8 mL/kg), lower inspiratory pressures (lower level of plateau pressure < 28 cmH₂O) and lower target of pH is (7.15-7.30) permitted.
- Tidal volumes should be adapted to disease severity: 3-6 mL/kg in the case of poor respiratory system compliance, and 5 -8 mL/kg with better preserved compliance.
- A conservative fluid management strategy is to be used for children with ARDS without tissue hypo perfusion.
- In patients with moderate or severe ARDS, higher PEEP instead of lower PEEP is suggested.
- PEEP titration requires consideration of benefits (reducing atelecto -trauma and improving alveolar recruitment) vs risks (end-inspiratory over distension leading to lung injury and higher pulmonary vascular resistance).
- In younger children, maximal PEEP rates are 15 cmH₂O. Although high driving pressure (plateau pressure – PEEP) may more accurately predict increased mortality in ARDS compared with high tidal volume or plateau pressure, data from RCTs of ventilation strategies that target driving pressure are not currently available.

Dos of Respiratory hygiene

Cough/sneeze with a tissue paper or into your sleeve if no tissue is available

8. Guidelines for patients with ARDS who are treated with non-invasive or high-flow oxygen systems.

- High-flow nasal oxygen (HFNO) should be used only in selected patients with hypoxemic respiratory failure. Non-invasive ventilation (NIV) should be used only in selected patients with hypoxemic respiratory failure.
- Patients treated with either HFNO or NIV should be closely monitored for clinical deterioration.
- Adult HFNO systems can deliver 60 L/min of gas flow and FiO₂ up to 1.0. Paediatric circuits generally only handle up to 25 L/min, and many children will require an adult circuit to deliver adequate flow.
- Because of uncertainty around the potential for aerosolization, HFNO, NIV, including bubble CPAP, should be used with airborne precautions.
- Compared with standard oxygen therapy, HFNO reduces the need for intubation.
- Patients with hypercapnia (exacerbation of obstructive lung disease, cardiogenic pulmonary edema), hemodynamic instability, multiorgan failure and abnormal mental status should generally not receive HFNO, although emerging data suggest that HFNO may be safe in patients with mild-moderate and non-worsening hypercapnia.
- Patients receiving HFNO should be in a monitored setting and cared for by experienced personnel capable of performing endotracheal intubation in case the patient acutely deteriorates or does not improve after a short trial (about 1 hour).

Dos of Respiratory hygiene
Do hand hygiene if coughed/sneezed on hand

- In situations where mechanical ventilation might not be available, bubble nasal CPAP may be used for newborns and children with severe hypoxemia, and may be a more readily available alternative in resource-limited settings

9. Management of septic shock

Recognize septic shock in children with any hypotension (systolic blood pressure [SBP]

< 5th centile or > 2 SD below normal for age) or two or more of the following:

- Altered mental state
- Bradycardia or tachycardia (HR < 90 bpm or > 160 bpm in infants and HR < 70 bpm or > 150 bpm in children)
- Prolonged capillary refill (>2 sec) or feeble pulses
- Tachypnea
- Mottled or cold skin or petechial or purpuric rash
- Increased lactate
- Oliguria
- Hyperthermia or hypothermia.

If lactate measurement is not feasible, use blood pressure (i.e. MAP) and clinical signs of perfusion to define shock.

- a) Standard care includes early recognition and the following treatment within 1 hour of recognition. Antimicrobial therapy, initiation of fluid bolus and vasopressors for hypotension. The use of central venous and arterial catheters should be based on resource availability and individual patient needs

Dos of Respiratory hygiene

**Turn head away from others when coughing/sneezing and
Maintain 1 meter (2 arm) distance**

- b) Resuscitation of children with septic shock includes, 10 -20 mL/kg crystalloid fluid as a bolus in the first 30 -60 minutes and reassess for signs of fluid after each bolus. Crystalloids include normal saline and Ringer's lactate.
- c) Determine need for additional fluid boluses (10-20 mL/kg in children) based on clinical response and improvement of perfusion targets.
- d) Perfusion targets include MAP (> 65 mmHg or age -appropriate targets in children), urine output (1mL/kg/hr in children), and improvement of skin mottling and extremity perfusion, capillary refill, heart rate, level of consciousness, and lactate.
- e) If there is no response to fluid loading or signs of volume overload appear (e.g. jugular venous distension, crackles on lung auscultation, pulmonary edema on imaging, or hepatomegaly), then reduce or discontinue fluid administration.
- f) This is particularly important in patients with hypoxemic respiratory failure. The next step is consideration of vasopressors
- g) Administer vasopressors if:
 - i. Signs of shock such as altered mental state, bradycardia or tachycardia (HR < 90 bpm or > 160 bpm in infants and H R < 70 bpm or > 150 bpm in children);
 - ii. prolonged capillary refill (>2 seconds) or feeble pulses;
 - iii. tachypnea;
 - iv. mottled or cool skin or petechial or purpuric rash;

What is Extended use of N95 Mask?

Refers to wearing the same N95 respirator for repeated close contact encounters with several patients, without removing the respirator between patient encounters; as long as they are functional well (up to 8hr)

- v. increased lactate;
 - vi. oliguria persists after two repeat boluses; or
 - vii. age-appropriate blood pressure targets are not achieved; or
 - viii. Signs of fluid overload are apparent.
- If central venous catheters are not available, vasopressors can be given through a peripheral IV, but use a large vein and closely monitor for signs of extravasation and local tissue necrosis.
 - If extravasation occurs, stop infusion.
 - Vasopressors can also be administered through intra-osseous needles.
 - If signs of poor perfusion and cardiac dysfunction persist despite achieving MAP target with fluids and vasopressors, consider an inotrope.
 - In children, epinephrine is considered first-line treatment, while norepinephrine can be added if shock persists despite optimal dose of epinephrine.
 - Children with Cytokine storm syndrome benefit from care by a multidisciplinary team of specialists, including those with expertise in intensive care, cardiology, rheumatology, immunology and infectious diseases
 - ***Prevention of complications;***
 - ✓ Implement the following interventions (Table 2) to prevent complications associated with critical illness. These interventions are generally limited to feasible recommendations based on high quality evidence.

Limited Reuse of N95 Mask

- ! Refers to the practice of using the same N95 respirator for multiple encounters with patients but removing it („doffin) after each encounter. exercise this option with great CAUTION

Table:2

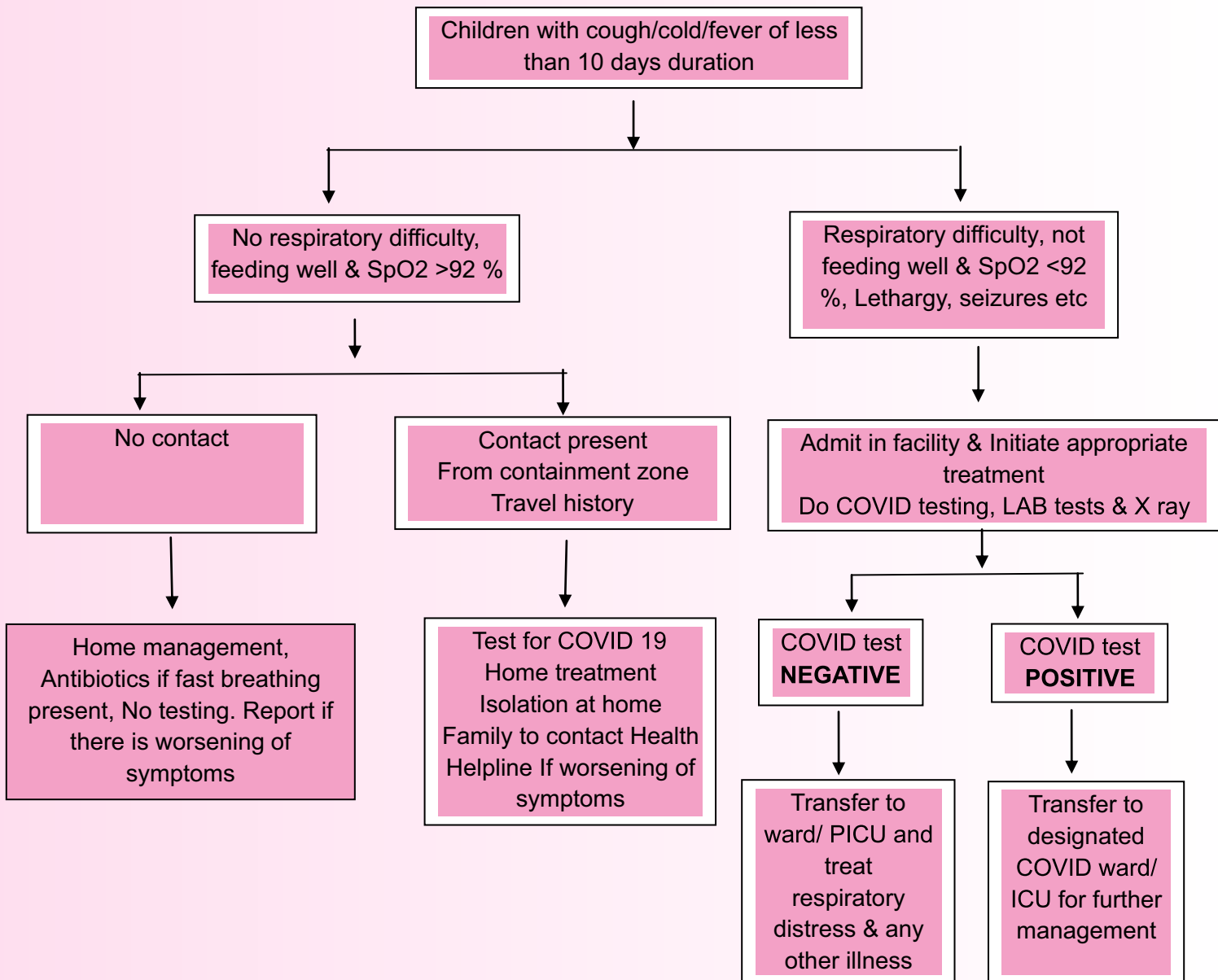
Anticipated outcome	Interventions
Reduce days of invasive mechanical ventilation	<ul style="list-style-type: none"> • Use weaning protocols that include daily assessment for readiness to breathe spontaneously • Minimize continuous or intermittent sedation, targeting specific titration endpoints (light sedation unless contraindicated) or with daily interruption of continuous sedative infusions
Reduce incidence of ventilator-associated pneumonia	<ul style="list-style-type: none"> • Oral intubation is preferable to nasal intubation in adolescents and adults • Keep patient in semi-recumbent position (head of bed elevation 30-45°) • Use a closed suctioning system; periodically drain and discard condensate in tubing • Use a new ventilator circuit or each. Change circuit if visibly soiled or damaged. • Change heat moisture exchanger when it malfunctions, when soiled, or every 5-7 days.
Reduce incidence of catheter-related bloodstream infection	<ul style="list-style-type: none"> • Use a check list for sterile insertion, adopt asepsis during daily addition of fluids and a daily reminder to remove catheter if no longer needed.
Reduce incidence of pressure ulcers	<ul style="list-style-type: none"> • Turn patient every 2 hours. Actively mobilize the patient early in the course of illness, when safe to do so.
Reduce gastrointestinal (GI) bleeding	<ul style="list-style-type: none"> • Administer histamine-2 receptor blockers or proton-pump inhibitors in patients with risk factors for GI bleeding. Risk factors for GI bleeding include mechanical ventilation for ≥ 48 hours, coagulopathy, liver disease, multiple co-morbidities, and higher organ failure score.

Do you Know?

PPE should be available where and when indicated

- according to risk
- in the correct size

Approach to a child with acute respiratory symptoms during COVID-19 pandemic

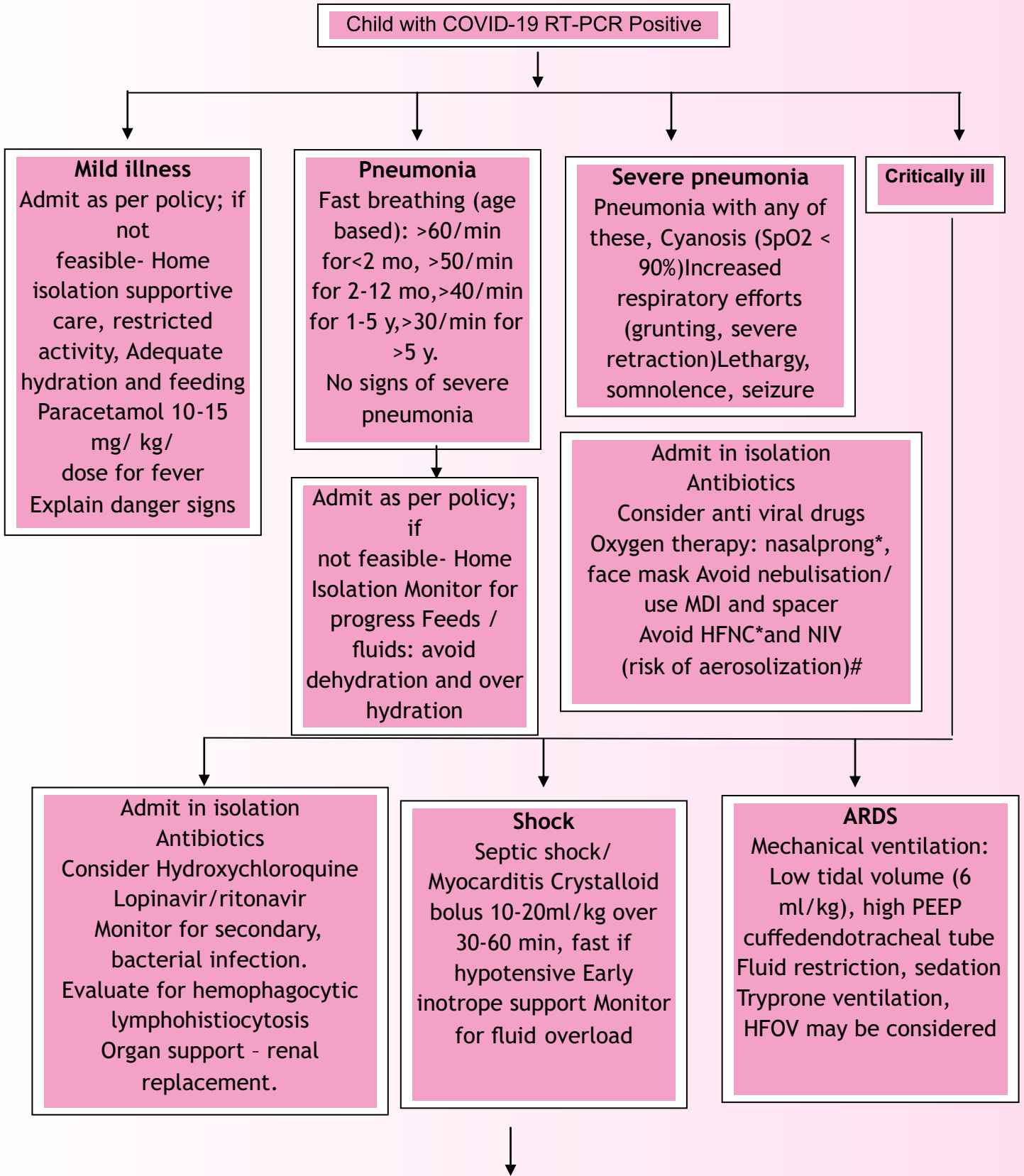


***Testing**
Respiratory sample: Nasopharyngeal and oropharyngeal swab together sent in viral transport medium, posterior-pharyngeal swab, endotracheal aspirate, or broncho-alveolar lavage.

Children can potentially catch corona virus from anyone infected with the virus, even if that person appears well. In particular children should be kept away from people with cough, fever or other viral symptoms such as a runny nose, vomiting or diarrhea. It is recommended that parents follow the advice of Government

Self-isolation, social-distancing and respiratory hygiene

Summary of management of children with COVID-19



***Use face mask over nasal prong and HFNC cannula.**

#Ensure appropriate PPE for aerosol transmission.

Evaluate all admitted children with CBC, LFT, RFT, Coagulogram, D -dimer, Fibrinogen, Chest X-ray, bloodculture.

Admit/ closely monitor children with co-morbidities:chronic lung disease, symptomaticdisease,chronic kidney disease.

10. COVID 19 & Hemoglobinopathies

- The SARS-CoV-2 infection presents particular challenges and dangers to patients with hemoglobin disorders.
- The virus affects primarily the respiratory system, from nasopharyngeal symptoms to full blown pneumonia.
- So far very little clinical experience of infected patients with hemoglobin disorders has been recorded across the world.
- However it is important that clinicians managing children with hemoglobin disorders be aware of the problems that they could face if the child is infected with COVID 19
- Haemoglobin disorders are generally not associated with respiratory conditions. However, complications involving the heart, lungs and the immune system, can be present in these patients and in a SARS -CoV-2 positive patient may trigger very serious complications.
- In addition, some of these patients might be splenectomised and sickle cell patients may be functionally asplenic.

How long can a person shed infection?

An infected person can shed the virus between 2 to 14 days. Even asymptomatic people (people who are infected, but don't show any symptoms) do infect others. Hence, a non-infectious person may get infected if he/she gets in close contact with the infected person during the viral shedding period.

Sickle cell disease:

- Compared to the general population, patients with SCD are particularly at risk for acute pulmonary complications, including viral infections.
- Evidence for this is available from the influenza pandemic in the past when children with SCD were hospitalized 56 times more frequently than normal children.
- The SARS-CoV-2 infection may trigger such a serious complication and require special alertness on behalf of physicians treating infected patients.
- In addition, any hypoxia, dehydration or acidosis due to respiratory infection may trigger a vaso-occlusive crisis (including acute chest syndrome).
- Some of the children may be on treatment with Hydroxyurea.
- Such history should be elicited and currently the child should be treated as one would treat the acute chest syndrome or vaso-occlusive crisis, along with the management of COVID presentation.

In a child who does not have any infection Hydroxyurea if being consumed should be continued.

Thalassemia:

- Thalassemia patients do not have the same risk of lung infections as patients with sickle cell disease but, older children may have underlying complications including heart disease, liver disease, diabetes and severe iron overload may also be particularly vulnerable to complications of the virus.

Myth Buster : Exposing yourself to the sun or to temperatures higher than 25°C degrees
DOES NOT prevent COVID-19

- One particular endocrine complication, often not recognized, is underactivity of the adrenal glands (adrenal hypofunction).
- In the presence of a serious infection, however, the ability to limit the effects of the infection may be compromised.

Dealing with a thalassemia patient infected by the virus should take this possibility into consideration and the possibility of low -dose glucocorticoid supplementation may be given.

Guidance on Blood transfusion:

1. At this time there is no evidence that the corona virus may be transmitted through donated blood.
2. One visible danger is the possibility of under -transfusion during the epidemic due to blood donor reluctance or even infection
3. It is important to emphasize the need to continue to get blood transfusions as otherwise the child may die of severe anemia with failure.
4. Children may not be able to reach the appropriate hospital due to the restrictions imposed by the lockdown
5. Encourage the relatives, friends to donate blood for the child

Guidelines for Blood collection from donors

- Continue to motivate the donors to donate blood.
- Ensure that safe blood donation environments are available for them.
- Give appointments through phone so that minimal time is spent by the donor in the hospital

Myth Buster : Being able to hold your breath for 10 seconds or more without coughing or feeling discomfort DOES NOT mean you are free from COVID-19 or any other lung disease.

- Use thermal scanner at the entry point and ask about the common symptoms of COVID19. If present refer them to the OPD for further screening.
- If no such symptoms or signs present then invite them to the bleeding chamber follow the below guidelines
- Social distancing with continuous wearing of facemask
- Sanitiser should be available at the entry point for the donors

Management of a child suspected of COVID 19 infection

- First, it is important to recognize clinical manifestations suggestive of rapidly progressive Acute Chest Syndrome - ACS, including multi-organ failure, hepatic dysfunction, thrombocytopenia and acute kidney injury.
- Healthcare professionals should differentiate between pneumonia or Acute Chest Syndrome -ACS and the more diffuse ground glass appearance that is commonly associated with SARS-CoV-2 infection.
- Pulmonary and cardiac specialists should be consulted in case of suspicion of pulmonary hypertension.
- It is also important to recognize the high risk of life-threatening sepsis among Sickle Cell Disease patients, whose functional hyposplenism renders them vulnerable to fulminant sepsis
- If a child with Thalassemia or SCD presents with symptoms of cough, fever, fatigue or other symptoms suggestive of an acute respiratory illness, test for COVID-19 along with other respiratory viral pathogens should be done

Myth Buster : Spraying alcohol or chlorine all over your body will not kill viruses that have already entered your body

- If suspicion for COVID-19 is high or test is positive, the treating physician should obtain a hematologist consult (directly if available in the premises or by online)
- A chest X ray for all sickle cell disease and thalassemia patients who have respiratory symptoms should be obtained.
- In addition, a chest X ray should be obtained for sickle cell disease patients who are admitted for a vaso-occlusive crisis.
- If COVID-19 is present or infiltrates present on Chest X-ray suggestive of ACS (Acute Chest Syndrome) in SCD, patients should be admitted to intensive care and managed.
- If severe COVID 19 is diagnosed stop Iron chelation till recovery

Management of Acute Chest Syndrome in Sickle Cell Disease Patients Infected with COVID-19

- a) Early exchange transfusion
- b) Broad spectrum antibiotics - include MRSA coverage, atypicals, pneumococcus
- c) May be some benefit of plasmapheresis
- d) Consideration of high dose steroids

Children with Splenectomy :

- Thalassemia patients, particularly of the older age groups may have been splenectomised and sickle cell patients have often a condition equivalent to splenectomy (functional hyposplenism or asplenia).

Myth Buster : Spraying alcohol or chlorine all over your body will not kill viruses that have already entered your body

- This renders all these patients vulnerable to bacterial infections and trigger serious and life threatening sepsis. If infected by the virus patients may also develop secondary bacterial infections.

Prevention of infection with COVID 19:

- General rules to apply to stop the spread of the virus include: (to be followed by the care givers of the child and also by the child)
- Washing hands often and properly (well and for over 20 seconds) - with soap and water, or use alcohol sanitizer if hand washing facilities are not available. This is particularly important after going out of the house for what so ever.
- Covering your cough or sneeze with a tissue, then throwing the tissue in a bin. (Catch it, Bin it, Kill it)
- Avoid going out unless essential

Face mask at all times

- Maintain at least 2 m of distance when talking to other people
- Avoid touching eyes, nose and mouth with hands that have not been washed or disinfected
- Disinfect all surfaces you touch or use including TV controls, mobiles, and telephones.

Guidelines for Hemophilia during COVID 19 Pandemic

- **For people with hemophilia (PWH) currently treated with standard or extended recombinant half-life FVIII or FIX concentrates, FEIBA or FVIIa,**
- No reason to change the recommended treatment regimen

Myth Buster : COVID-19 CANNOT be transmitted through mosquito bites.

- No reason to fear at this stage a shortage of treatment supplies, manufacturing issues or interruption in the supply chain
- Provide information on admission for Factor administration to the medical officer on duty and to the parents in case of bleeds

For PWH treated with plasma-derived FVIII/FIX

- Viral inactivation and elimination procedures employed are sufficient to destroy lipid-enveloped viruses like SARS-CoV-21
- Blood and plasma donation continue to be a safe process, and the need for plasma donations is as great as ever.
- The support of current and new donors remains critical to maintain an adequate supply of blood and plasma during the pandemic. **For PWH treated with other blood-derived products which are not virally inactivated (e.g., cryoprecipitate, platelets)**
- Treatment decisions should be based on clinical risk/benefit analysis balancing the safety of not treating a bleeding event and any residual risk of acquiring another infection.

Treatment for Children with cancer during COVID pandemic

- Majority of the children get the infection from parents.
- In children with cancer, strategies are aimed at reducing time spent in the hospital.
- Strategies adopted in the department include
 - Provide chemotherapeutic drugs during maintenance phase at home.

Myth Buster : COVID-19 CANNOT be transmitted through mosquito bites.

- If possible, give chemotherapeutic drugs in the hospital as day care procedure in the intense phase of therapy.
- Redistribute the children who require to be in the hospital to nearby homes.
- Prevent children from contracting infections by providing hygiene kit and counselling
- Provide children with nutritious food.

Drugs at the doorstep:

- With the help of CANKIDS (NGO) children on maintenance phase were line listed, their drug requirement calculated and the drug kit was handed over to NHM/RBSK state Nodal team.
- The RBSK team handed over the drugs and the hygiene kit to the children at their homes across the state.

Myth Buster : There is no evidence that eating garlic has protected people from COVID-19





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