

# **Management of COVID cases in Pediatrics**

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# INTRODUCTION

- WHO declared Covid – 19 caused by SARS CoV-2 as a public health emergency of international concern on 30th January 2020 and subsequently declared it to be a pandemic on 11th March 2020.
- Majority of children are asymptomatic or mildly symptomatic.
- A small proportion (<10%- 20%) of symptomatic children may need hospitalization and 1% to 3% of symptomatic children may have severe illness requiring intensive care admission.

# Learning Objectives

- Clinical features & assessment of severity
- Treatment according to severity: Mild, Moderate, Severe
- Covid in newborn

# Clinical Manifestation

- Majority -asymptomatic or mildly symptomatic.

## Common symptoms

- Fever
- Cough, breathlessness/ shortness of breath,
- Fatigue, myalgia
- Rhinorrhea, sore throat
- Loss of smell, loss of taste
- Diarrhea
- Few children may present with gastrointestinal symptoms and atypical symptoms also.

# Atypical manifestation of covid

## **Gastrointestinal symptoms** seen in

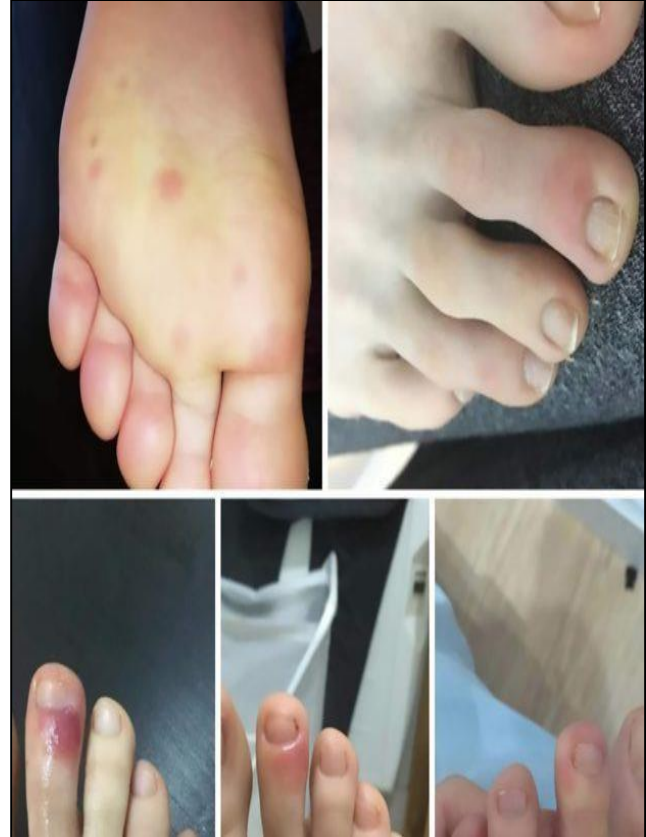
5-10%

- It may occur without respiratory symptoms in children
- Diarrhea, vomiting and abdominal pain are most common

## **Cutaneous manifestations** seen in

<3%

- It includes maculopapular, urticarial, and vesicular eruptions
- COVID toes: Reddish-purple nodules on distal digits



# Danger signs/ Red flag signs

- Fever > 100.4 F for more than 4 days
- Spo2 < 94%
- Respiratory rate
  - 0- 2 months : > 60/min
  - 2-12 months : > =50/min
  - 1-5 years : >= 40/min
  - > 5 years : >= 30/min
- Chest indrawing

- Skin rash
- Redness and swelling of lips, tongue, hands and feet
- Decrease oral intake
- Lethargy
- Decrease urine output
- Cold extremities

# Mild COVID

Sore throat, Rhinorrhoea, Cough, No fast breathing

## **Management:**

Home Isolation

Supportive care

Rest

Adequate hydration and feeding

Paracetamol 10-15 mg/kg/dose for fever

Report if worsening of danger signs

# MODERATE COVID

Fast breathing (age based):

≥60/min for <2months,

≥ 50/min for 2-12 months,

≥ 40/min for 1-5 years,

≥ 30/min for >5years.

And Oxygen saturation < 94% but  
above 90%

No signs of severe  
pneumonia/illness



## Management :

Admit

Investigations as per requirement

Supportive management

If SpO<sub>2</sub><94%, start oxygen.

Add steroids only if very rapid  
progression



# SEVERE COVID

- SpO2 level less than 90%
- Severe pneumonia,
  - pneumonia with cyanosis
  - Clinically present with grunting, severe retraction of chest, lethargy, somnolence, seizure
- Acute Respiratory Distress Syndrome
- Septic Shock
- Multi-organ dysfunction syndrome (MODS)

# ADMISSION CRITERIA OF PICU

- Hypoxemia (>6 lit/min) or respiratory distress or respiratory failure, requirement of intubation, new tracheostomy
- Shock, myocarditis, CCF, inotropes or vasopressor requirement
- GCS < or = 8, or Rapid fall in GCS >3, active seizure
- Child with co-morbidities and requires oxygen support
- Any major organ dysfunction or worsening organ dysfunction
- MIS-C with major organ dysfunction (cardiac, respiratory, renal, CNS, coagulopathy with active bleeding)

# MANAGEMENT OF SEVERE COVID

## Investigations

- Complete blood counts,
- liver function tests
- renal function tests,
- Chest X-ray
- Additional tests like inflammatory markers (CRP, Ferritin, D-Dimer, LDH, Procalcitonin)

# MANAGEMENT OF SEVERE COVID (Cont.)

## Treatment

- Empirical antibiotics
- Intravenous Fluids Therapy
- Corticosteroids
  - Dexamethasone 0.15 mg/kg per dose (max 6 mg) twice a day - preferred.
  - Equivalent dose of Methylprednisolone may be used for 5 to 14 days depending on continuous clinical assessment.
- O2 therapy
- Anti-viral agents: Remdesivir NOT RECOMMENDED as there is no clinical trial data in children. It's use to be restricted to severe cases presenting within 72 hours of onset of symptoms provided liver and kidney function parameters are normal
- No Role of Hydroxychloroquine, Favipiravir, Ivermectin, lopinavir/ritonavir, Umifenovir

# ARDS

## **Mild ARDS:**

HFNO/NIV trial

## **Severe ARDS:**

Mechanical ventilation: Low tidal volume (6ml/kg), high PEEP, cuffed endotracheal tube

Fluid restriction

Sedation

If poor response: may try prone ventilation, HFOV

# Shock

Septic shock/ Myocardial dysfunction

Crystalloid bolus 10-20 ml/kg over 30-60 min, fast if hypotensive; careful administration/ avoid if myocardial dysfunction suspected

Early inotrope support

Monitor for fluid overload

# **Multisystem Inflammatory Syndrome in Children (MIS-C)**

# Diagnostic Criteria for MIS-C

- Children and adolescents 0–19 years of age with fever  $\geq 3$  days

**AND** two of these:

- Rash or bilateral non-purulent conjunctivitis or muco-cutaneous inflammation signs (oral, hands or feet).
- Hypotension or shock.
- Features of myocardial dysfunction, pericarditis, valvulitis, or coronary abnormalities (including ECHO findings or elevated Troponin/NT-pro BNP),
- Evidence of coagulopathy (by PT, PTT, elevated d-Dimers).
- Acute gastrointestinal problems (diarrhoea, vomiting, or abdominal pain).

**AND**

- Elevated markers of inflammation such as ESR, C-reactive protein, or procalcitonin.

**AND**

- No other obvious microbial cause of inflammation, including bacterial sepsis, staphylococcal or streptococcal shock syndromes.

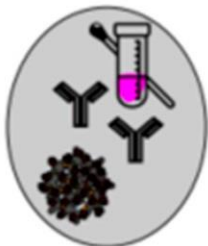
**AND**


- Evidence of COVID-19 (RT-PCR, antigen test or serology positive), or likely contact with patients with COVID-19.




**Multisystem  
Inflammatory  
Syndrome in  
Children (MIS-C)**


Lab evidence  
of current or  
past infection  
with  
SARS-CoV-2





 Fever,  
Myalgia


Conjunctivitis  
Rash, Lymphadenopathy,  
Stomatitis,  
Extremity swelling  
with erythema  
Skin peeling

 Headache  
Meningismus  
Lethargy


 High ESR, CRP, ferritin,  
LDH, IL-6, Fibrinogen,  
Procalcitonin, CPK,  
D-dimers etc.,

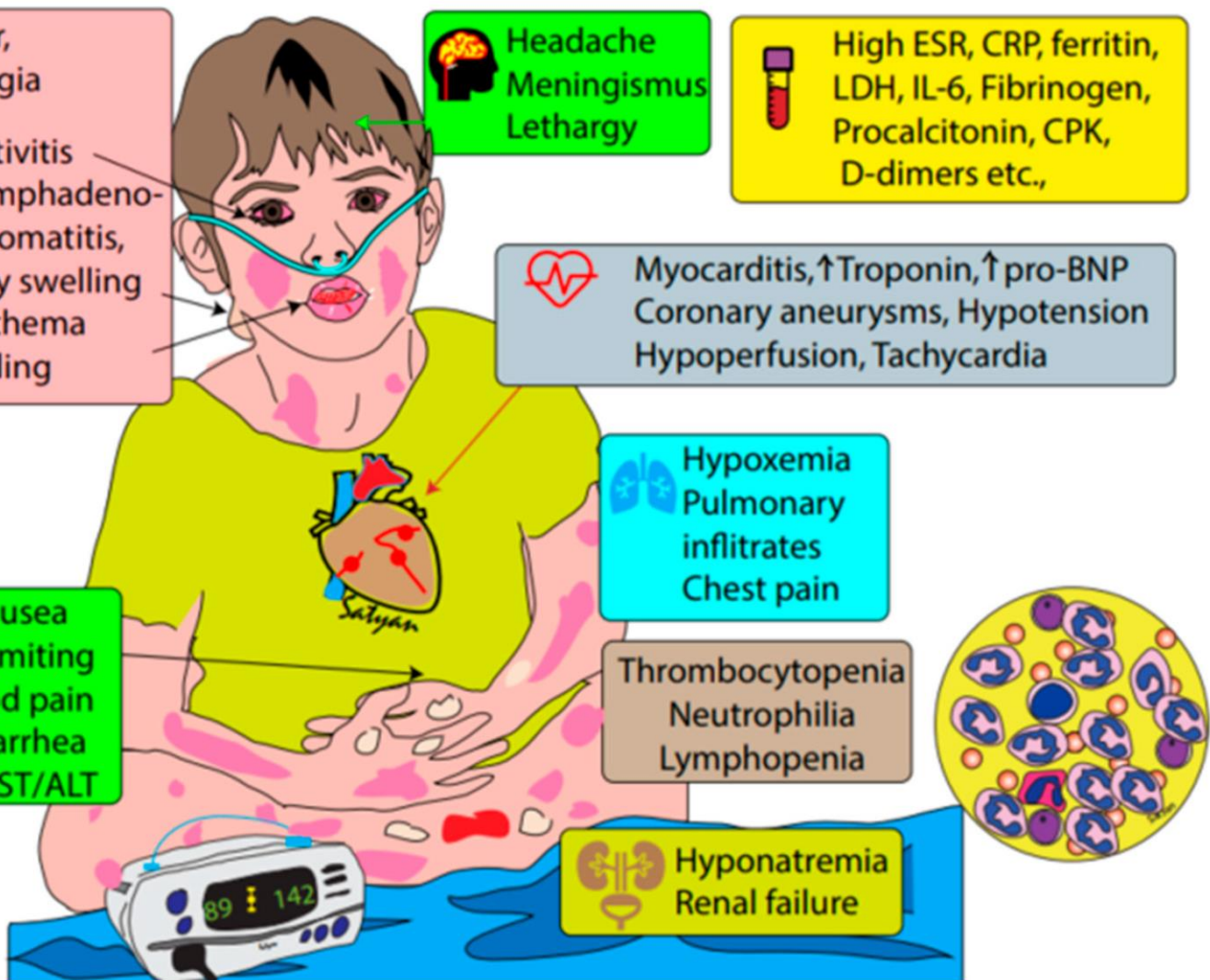
 Myocarditis,  $\uparrow$  Troponin,  $\uparrow$  pro-BNP  
Coronary aneurysms, Hypotension  
Hypoperfusion, Tachycardia

 Hypoxemia  
Pulmonary  
infiltrates  
Chest pain

 Nausea  
Vomiting  
Abd pain  
Diarrhea  
 $\uparrow$  AST/ALT

Thrombocytopenia  
Neutrophilia  
Lymphopenia

 Hyponatremia  
Renal failure



# When to administer steroids/ IVIg ?

Any of these present?

Cardiac dysfunction/shock, Coronary involvement, MODS, Life threatening conditions

## If yes then

Steroid (Methylprednisolone 1-2 mg/kg/d) +

IVIg (2 g/kg over 24-48 hr) +

Antimicrobials

If thrombocytosis or Coronary artery aneurysm

Tab Aspirin 3-5 mg/kg/day

Inj Enoxaparin SC 1 mg/kg/day twice daily

## If no then

Rule out tropical infections first

Steroid (Methylprednisolone 1-2 mg/kg/d): first line,

OR

IVIg (2 g/kg over 24 hr to 48 hrs): alternative/first line, as per availability/feasibility

# COVID in Newborn

## Case definition- Neonate

- **Suspected COVID-19 Neonate**

- Born to mother with a history of COVID19 infection between 14 days before and 28 days after delivery,

**OR**

- The newborn directly exposed to those infected with COVID-19(including members, caregivers, medical staff and visitors).

- **Confirmed COVID-19 Neonate : RT-PCR positive**

# Testing of Neonate

- Ideally as soon as possible but preferably within 24-48 hours of delivery.
- If the first report is negative then a repeat test needs to be done between 5-14 days.
- Nasopharyngeal and Oropharyngeal swabs need to be collected and if intubated, then tracheal secretions need to be collected for testing.

# Newborn - born to Covid Suspect/Positive mother

- **NRP** remains the same
- **Rooming in** baby with mother if both are medically stable
- Support direct **breast feeding** or expressed breast milk feeding
- Provide **KMC** with contact precaution
- Baby should not be handled by **multiple people**
- Correct masking and hand hygiene by mother and all family members.

# Clinical Presentations of Covid-19 in Neonates

- Early onset
- Late onset
- MIS – N/C extremely rare
  
- Second-wave V/s First-wave

-Absolute no. of neonates with Late onset disease has increased like in all other age groups

-Still majority of symptomatic have mild to moderate diseases and improves with oxygen with nasal prongs

# VACCINES IN CHILDREN- WAY FORWARD

- Trials are underway for vaccine efficacy and safety
- However fully vaccinated adults in the family and COVID appropriate behavior- indirect protection to children by immunizing all eligible adult members of family

# TAKE HOME MESSAGES

- Children can be managed at home if asymptomatic or mildly symptomatic
- Moderate and severe illness should be managed in inpatient facility
- Rational use of medication is required
- MIS-C is condition related to COVID 19 being seen in children
- Trials of vaccine in children is undergoing; guidance likely to be based on documentation of safety and efficacy