

Script for COVID training

1. Greetings everybody. We are in the midst of a COVID 19 pandemic which is testing the tenacity of all healthcare systems. Fortunately the disease is mild in majority of children. In the next 20 minute or so, I will be taking you through some of the key aspects of managing the few unfortunate sick kids who may require PICU care.

2. This talk will cover :
 - How to triage and classify severity
 - What are the indications of PICU admission
 - What are the indications and options for non-invasive respiratory support
 - Steps in RSI
 - Mechanical ventilation and points to remember.
 - Supportive care and repurposed treatments

3. At triage first Classify children into SARI or non - SARI
SARI defined as
 - Any child with tachypnoea *and / or* retractions / nasal flaring with SPO₂, <94% in room air
 - These children need to be admitted, tested for SAR CO₂V₂
 - Start on oxygen therapy, empirical antibiotics and oseltamivir
 - Decided on ward / ICU care based on response or progression

4. The severity in COVID 19 is categorised into
 - Mild
 - Moderate: clinical / radio features of LRI
 - Severe: refusal to feed, , dyspnea, or hypoxemia requiring o₂,
 - Critical: ARDS, shock, MODS

Of these the severe and critical require PICU care and fall within purview of this talk.

5. The baseline investigations read it out: is as for any other sick child where all baseline organ function parameters are recorded. Important among these are the inflammatory markers (CRP, PCT, ferritin) and coagulation profile
6. CXR should be done in all children who need PICU. Although CXR findings in children are not described in details, findings in adults include consolidation and ground glass opacities, involving peripheral, LZ mostly bilateral. This is what is shown in the representative x rays
7. CT Scan is recommended only if it will change the clinical management
3 different phases of COVID progression as shown
 - a. Early
 - b. Progressive
 - c. Developed
8. In the blood investigations, The extent of leukopenia and lymphopenia are less reported in children as compared to adults.
RFT, LFT, ABGS should be monitored like for any sick child.
PCT is more often found to be elevated than CRP in children.
9. Once laboratory investigations are available, the high risk cases are those who are clinically symptomatic with leukopenia, lymphopenia, high CRP, PCT and abnormal chest X-ray.
 - Which children will you shift to PICU? Children who fail to improve with supplemental O2 and Have associated shock, encephalopathy and AKI are candidates for PICU care
10. Ideally all these kids must be managed in a negative pressure isolation with HEPA filter.
In absence of these, the best alternative would be to have a room / area, preferably in the higher floors of the building with exhaust fans. this is another alternative for creating a negative pressure room

The rooms should be well equipped for managing critically ill children.

All personnel should be in full PPE.

11. The non invasive respiratory support needs to be escalated in a stepwise fashion based on clinical status

A. Start Supplemental O₂ with low flow device like nasal prongs / face mask.

Avoid nebulisation if possible as it generates aerosols.

B. For those who fail to respond to low flow O₂, start high flow humidified O₂ through nasal cannula especially if FiO₂ required is >40%.

A hood may be used over HHFNC to prevent aerosol dissemination.

C. Children who fail to respond need escalation to Non-invasive ventilation.

Adequate interface seal is indicated for mild ARDs when P/F ratios between 200-300).

Indigenous bubble CPAP can be used if ventilator NIV is unavailable.

D. Remember aerosol precaution is very important during HHFNC & NIV

Monitor respiratory status in the form of RR WOB, P/F & SF ratio continuously

E. Children in whom FiO₂ requirement >60% with worsening distress and PCO₂ need intubation.

12. RSI

Intubation is an AGP and hence all precautions need to be taken.

The extra preparations include:

A plastic hood / box OR a plastic sheet as shown in the figure (plastic sheet been used while doing Bag and mask)

HME filter / Viral filter if available.

Bains (Flow inflating bag) is better than simple Ambu Bag.

Ideally, video assisted laryngoscopy and intubation are better, if available.

13. Intubation must always be done PPE donned with all precautions.

The most experienced person of the team should do the intubation.

The steps are as for any other RSI except that we use NRM and mask filter bag assembly for pre-oxygenation.

14. There are important set of precautions needed during MV

- Attachment of anti viral filter between ET and ventilator tubing.as shown in the figure
- Use of cuffed ETT to prevent leak
- Disconnection must be avoided
- Hand bagging must be avoided
- A closed inline suction is preferred.

15. The ventilator strategies for COVID-19 follow the same principle as for any other ARDs management.

Low TV ventilation

Adequate Sedo-analgesia

Strict fluid titration

Prevent asynchrony

Steroids need a special mention: Dexamethasone recommended @ 0.15 mg/kg OD; Max 6mg/day for 6 days.

16. All multi-organ support is similar to any other critical illness.

Myocarditis seen in COVID-19 can be a part of the MIS-C which has overlapping features with TSS & KD.

17. Supportive care – similar as for any other case.

18. Repurposed therapy:

A. In the early phase of illness, antivirals can be tried before 4 days. Among the antivirals, Remdesivir has shown positive results with 31% faster recovery and mortality reduction in adults. Trial in children is ongoing.

- B. Anti-inflammatory agents are normally indicated between day 4-7, in children who show clinical (worsening MODS) and lab evidence (\uparrow inf markers) of cytokine storm. Steroids & IL-6 inhibitor Tocilizomab may be considered.
- C. Convalescent plasma again the trails have not shown conclusive benefits; if planned should be given early
- D. IVIG is indicated in MIS-C
- E. LMWH is indicated on Day 4-7 in moderate to severe illness in children with no contraindication to use of heparin. LMWH at prophylactic doses 0.5 mg/kg 12 hourly SC if D-Dimer > 2500 or > 1500 and rising.

19. MIS-C is being increasingly described in children, post SARS Cov2 infection. Postulated due to an abnormal immune response to the virus. Mimics TSS and KD shock syndrome. Affected children are negative for RT PCR, but have a positive serology.

20. This table shows the WHO case definition of MIS-C. fever > 3 days, age 0-19 years, multisystem involvement, elevated inflammatory markers ,recent or current sars cov 2 infection

21. Putting it all together.

Categorise severity

Get Baseline investigations

Monitoring for progression

Treatment

22. Category A. we will not discuss in this talk

23. Category B

Stable SARI

Not require ventilation

OR

Worsening at 48 hours.

These children need investigations.

CXR, hemogram, CRP / PCT

D – Dimer / INR / Ferritin

Consider Azithromycin and oseltamivir

May consider Remdesivir (Dose 3.5mg/kg loading dose over 4 hrs on day 1, then 1.7mg/kg day 2-day 5)

24. Severe (Category C)

Unstable SARI

Requiring CPAP, HFNC or high O2 flow.

The monitoring and investigations will be same as above and more depending on clinical need.

Treatment: Apart from IV Antibiotics, these children need to be started on Dexamethasone as described earlier for 6 days.

LMWH at prophylactic doses 0.5 mg/kg 12 hourly SC if D-Dimer > 2500 or > 1500 and rising.

COVID specific therapy will be Remdesivir and Convalescent plasma.

25. Category D (Critical).

ARDS with two or more organ dysfunction.

In these children apart from treatment initiated in Category C, if features of cytokine storm (high IL-6, rising ferritin or progressive cytopenias) are there, then consider Tocilizumab. (Dose 4- 8 mg/Kg as 1 hour single infusion)

26. Category E (MIS-C).

IVIg is indicated 2 g/kg over 12-24 hours.

Aspirin may be considered for children with KD like features.

Conclude: COVID 19 is less severe in children. In the absence of specific targeted evidenced based therapy the emphasis is on good supportive care in a PICU setting following all precautions as described