

Paul Marik's COVID-19 Treatment Strategy

Folks:

I have updated our approach to COVID-19 based on the best (and most recent) available literature and the Shanghai Management Guideline for COVID.

We should not re-invent the wheel, but learn from others experience.

We need to think outside the box and use readily available and cheap drugs that could potentially act synergistically to impact this disease.

The impact on middle and low income countries will be enormous; these countries will not be able to afford expensive designer molecules.

Since we are all inhabitants of the same planet, we are in this together and we need to act decisively, and right now.

Mildly symptomatic patients (on floor):

- Vitamin C (500 BID/ TID) and Zn (220mg).
- Observe closely
- N/C 2L /min if required
- Avoid Nebulization and Respiratory treatments. Use MDI if required
- **NO Bagging**
- **NO NIV CPAP BiPAP or Hi-flow**
- T/f to ICU for increasing respiratory signs/symptoms

Chloroquine and hydroxychloroquine significantly decrease the duration of viral shedding. These agents (if available) could be used to mitigate/curtail the spread of this virus

Respiratory symptoms (SOB; hypoxia: admit to ICU)

1. Chloroquine 500mg PO BID or hydroxychloroquine 200mg TID for 10 days (if available).
2. Vitamin C 3g IV q 6 hourly until extubated and for at least 4 days up to 10 days.
3. Thiamine 200 q 12 (PO or IV)
4. Azithromycin 500mg day 1 then 250mg for 4 days
5. Melatonin 6mg at night
6. Broad spectrum antibiotics only if superadded bacterial pneumonia is suspected based on procalcitonin levels and resp. culture (no bronchoscopy)

Co-infection with other viruses is distinctly uncommon; superadded bacterial infection is uncommon on presentation (may develop with prolonged mechanical ventilation).

7. Fluid restrictive strategy; early norepinephrine for hypotension.
8. Tocilizumab (if available) may have a role in cytokine storm (see below)
9. Escalation of respiratory support (steps)
 - a. N/C 1-6 l/min
 - b. High Flow up to 30 L/min
 - c. **Intubation** ... By Expert intubator; Rapid sequence. No Bagging; PPE,
 - d. Volume protective ventilation following ARDSnet table
 - e. **APRV**
 - f. Prone positioning (plasma exchange should be considered before ECMO; see below)
 - g. ??? ECMO < 60yrs and no severe commodities/organ failure

It is not clear if the dose of Vitamin C should be reduced to 6 g/day in patients with cytokine storm and very high ferritin levels (? Prooxidant effect)

There is widespread concern that using HFNC could increase the risk of viral transmission. There is however there is no solid evidence to support this fear.

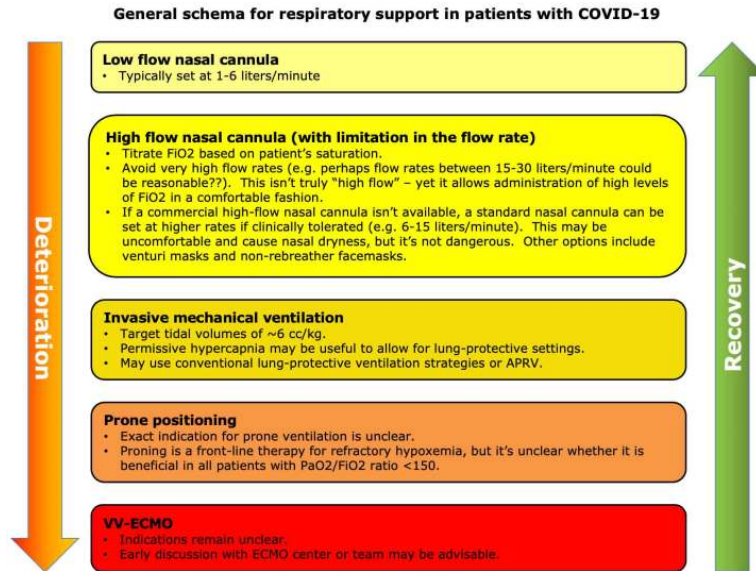
10. Consider plasma exchange for cytokine storm/HLH picture (see steroids below)

11. Steroids: This topic is controversial. However, the only study on steroids and COVID (from Wuhan) demonstrates a marked mortality reduction with methylprednisolone (60mg daily)

1. During the early viral replicative stage; probably best to avoid.
2. During the hyperimmune phase (day 6-8 onward).... Hydrocortisone 50 q 6 for 4 days may be given on a case by case basis.. based on features of ARDS and high CRP
3. Pts may evolve into an HLH/cytokine vortex phase, marked by increasing ferritin and worsening oxygenation. These patients may benefit from high dose methylprednisolone. (dose ?? 100 q 6))
4. It is not clear if the dose of Vitamin C should be reduced to 6 g/day in patients with very high ferritin levels (? Prooxidant effect)

12. Monitoring;

- Daily: PCT, CRP, BNP, Troponins, Ferritin, Neutrophil-Lymphocyte ratio, D-dimer.
- Seems like CRP and Ferritin are good biomarkers and tracks disease severity
- Il-6 at baseline and ? every 3-4 days
- No routine CT scans, follow CXR and chest ultrasound;
- Follow ECHO closely; Pts develop a severe cardiomyopathy.



The optimal strategy for respiratory support in COVID-19 remains unknown. The above strategy seems reasonable, adapted largely from experience with other types of viral pneumonia. Patients with more complex respiratory disease (e.g. COPD plus COVID-19) might benefit from BiPAP.

~The Internet Book of Critical Care, by @PalmCrit

Paul E. Marik MD, FCCP, FCCM |
Eastern Virginia Medical School |
Department of Internal Medicine |
Chief, Pulmonary and Critical Care Medicine |