Surviving Sepsis Campaign Guidelines on COVID-19 (Published March 20, 2020)
Summary for EM Cases
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Summary of 54 statements on: 1) Infection control, 2) Lab diagnosis and specimens, 3) hemodynamic support, 4) ventilatory support, 5) COVID-19 therapy

- 4 best practice statements
- 9 strong recommendations
- 35 weak recommendations
- 6 no recommendations

Full summary can be found: https://www.esicm.org/ssc-covid19-guidelines/

Infection Control	**Strength**
1. For **aerosol-generating procedures**, suggest using fitted respirator masks (N95) and perform in a negative pressure room, when not available, a portable HEPA filter should be used	Best practice statement
2. Suggest using surgical/medical masks for non-ventilated patients and **non-aerosol-generating** procedures in addition to other protective equipment (i.e., gloves, gown and eye protection) - The use of medical masks as opposed to N95 did not increase laboratory confirmed respiratory infection - Should preserve limited N95 supplies for aerosol-generating procedures	Weak
3. Endotracheal intubation should be performed by the most experienced provider to minimize the number of attempts and risk of transmission. Suggest using video-laryngoscopy vs. direct laryngoscopy	Best practice statement; Weak
Diagnostic testing for intubated ICU patients suspected of COVID-19	
4. Suggest obtaining lower respiratory tract samples (endotracheal aspirates rather than BAL samples) given lower risk of aerosolization - A single negative swab from the upper airway does not rule out SARS CoV2 infection - A positive test from another respiratory virus does not rule out COVID-19 infection	Weak
Supportive Care (indirect evidence from critically ill/ARDS patients) ***Hemodynamic Support***	
5. In patients with COVID-19 and shock, suggest using dynamic parameters of skin temperature, cap refill, +/- serum lactate to assess fluid responsiveness	Weak
6. In acute resuscitation of COVID-19 patients with shock, suggest using a conservative over a liberal fluid strategy, use buffered (balanced) crystalloid solutions vs. 0.9% saline	Weak

Vasoactive agents

7. In patients with COVID-19 and shock, suggest using norepinephrine as the first-line agent, when not available, use either vasopressin or epinephrine, over other vasoactive agents, titrating to MAP of 60-65 mmHg. — Weak
   - In those with cardiac dysfunction and persistent hypoperfusion despite fluid and norepinephrine, add dobutamine over increasing norepinephrine. In those with refractory shock, use low dose corticosteroids (hydrocortisone 200mg/day)

Ventilatory Support

8. Suggest starting supplemental O2 if SPO_2 < 90% and avoid titration above 96%. Reasonable target is 92% to 96% — Strong
   - Liberal O_2 strategy is associated with increased mortality

9. Suggest using HFNC for patients failing low-flow nasal cannula — Weak
   - HFNC reduces intubation compared to conventional oxygen with no impact on risk of death or ICU stay
   - Intubation is a high-risk procedure, with increased transmission to HCW during SARS
   - In SARS, HCW exposed to HFNC were not at increased risk of developing disease
   - HFNC presented similar contamination risk as conventional O_2 in studies evaluating environmental bacterial contamination
   - Existing recommendations against the use of HFNC are lacking supporting evidence

10. In those with acute hypoxemic respiratory failure, suggest using HFNC over NIPPV — Weak
    - Evidence for decreased risk of intubation with HFNC vs. NIPPV, and NIPPV may carry greater risk of nosocomial infection of HCW
    - If HFNC not available, or other etiologies (CHF, COPD), consider NIPPV with close monitoring
    - In MERS, NIPPV was associated with a high failure rate (92.4%), with failure rates of 10% to 70% during H1N1 and SARS

Invasive Mechanical Ventilation

11. In mechanically ventilated patients with **COVID-19 and ARDS**, suggest using: Strong
    - low tidal volumes (Vt 4-8mL/kg of predicted body weight) Strong
    - target plateau pressures < 30 cm H_2O Weak
    - higher PEEP strategy Weak
    - conservative fluid strategy Weak
    - prone ventilation for 12-16 hrs Weak
    - recruitment maneuvers Strong
    - recommend against the routine use of inhaled nitric oxide

In those with moderate to severe ARDS, suggest using:
- as needed, intermittent boluses of neuromuscular blocking agent, and infusion for up to 48 hrs only if ongoing need for deep sedation, prone ventilation or high plateau pressures Weak Weak
- trial of inhaled pulmonary vasodilator

12. In mechanically ventilated patients with COVID-19 and refractory to above management, suggest using VV ECMO if available or referral to an ECMO center Weak

COVID-19 Therapy

13. Reserve the use of systemic corticosteroids in the sicker population of mechanically ventilated patients with COVID-19 **and ARDS** only Weak

14. Suggest using empiric antimicrobial/antibacterial agents in those mechanically ventilated with COVID-19 and respiratory failure to cover for potential bacterial co-infections. Providers should assess daily for de-escalation of therapy Weak

15. Suggest using acetaminophen for temperature control for those who develop fever Weak

16. Suggest against the routine use of: Weak
    - IVIG
    - Convalescent plasma
    - Lopinavir/ritonavir

    Insufficient evidence to issue a recommendation on the use of:
    - Other antiviral agents
    - Recombinant interferon therapy
    - Chloroquine or hydroxychloroquine (Gautret et al. study of 36 patients on hydroxychloroquine and azithromycin was published after release of guidelines) https://www.mediterranee-infection.com/wp-content/uploads/2020/03/Hydroxychloroquine_final_DOI_IJAA.pdf

- tocilizumab

Figure 1. Summary of recommendations on HFNC and NIPPV in patients with COVID-19

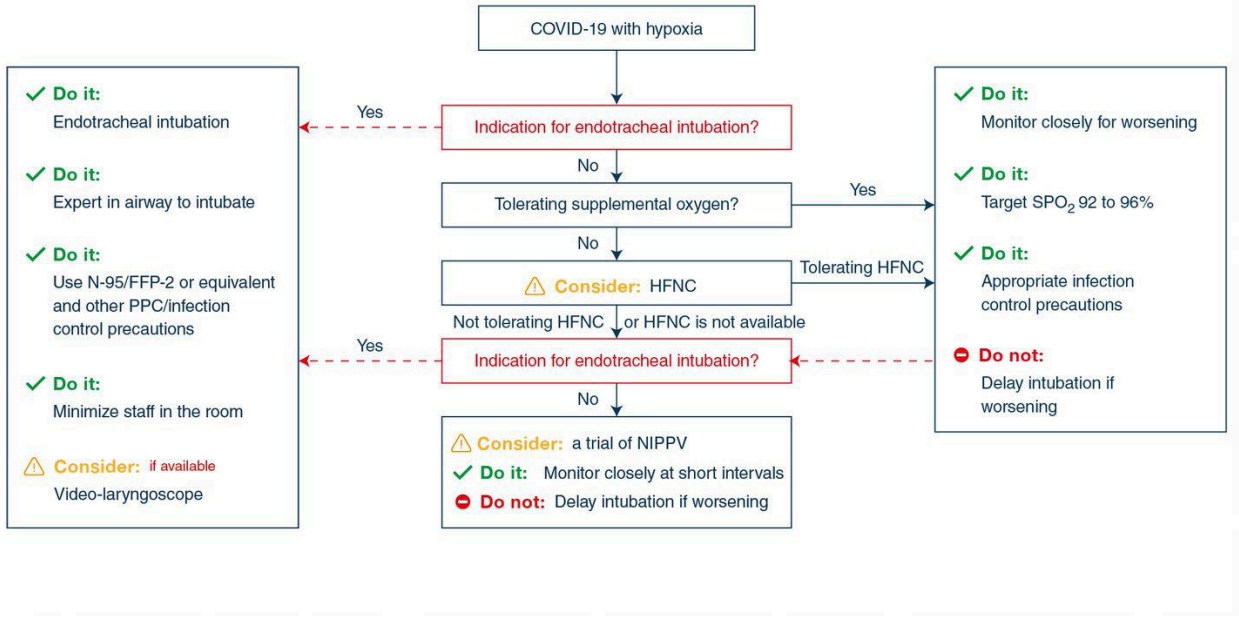
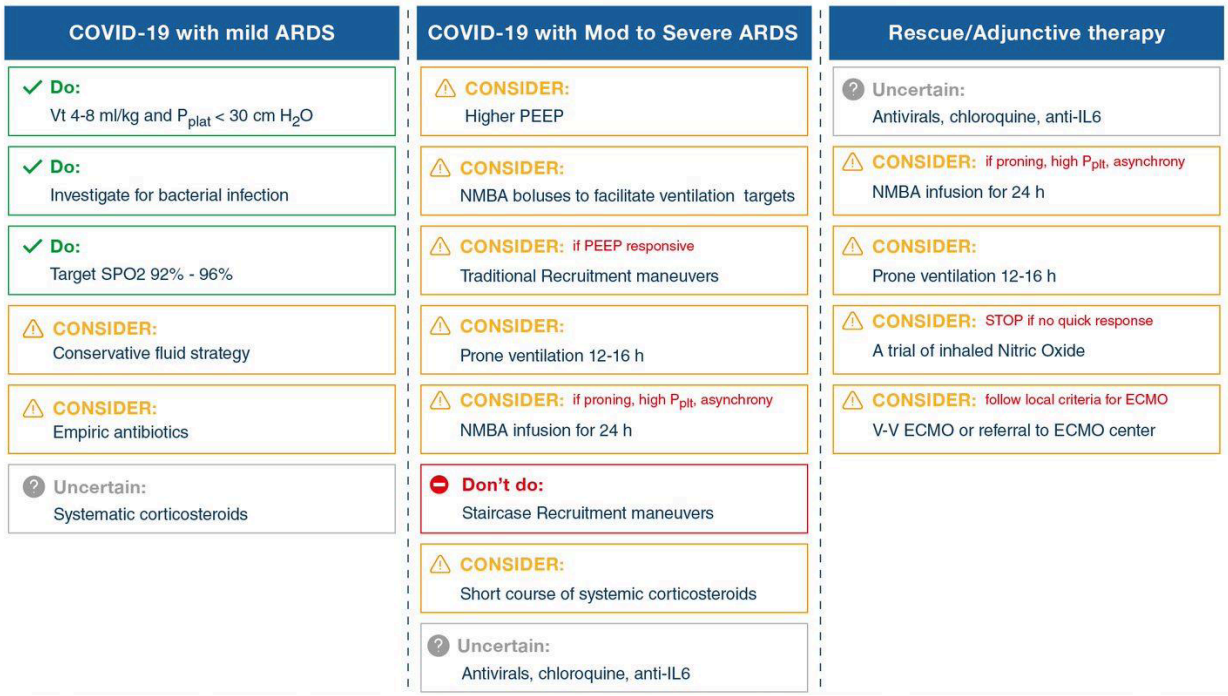


Figure 2. Summary of recommendations on hemodynamic and pharmacologic therapy in patients with COVID-19


COVID-19 with mild ARDS
Do:
Vt 4-8 ml/kg and P_{plat} < 30 cm H_2O
Do:
Investigate for bacterial infection
Do:
Target SPO2 92% - 96%
CONSIDER:
Conservative fluid strategy
CONSIDER:
Empiric antibiotics
Uncertain:
Systematic corticosteroids
COVID-19 with Mod to Severe ARDS
CONSIDER:
Higher PEEP
CONSIDER:
NMBA boluses to facilitate ventilation targets
CONSIDER: if PEEP responsive
Traditional Recruitment maneuvers
CONSIDER:
Prone ventilation 12-16 h
CONSIDER: if proning, high P_{plt}, asynchrony
NMBA infusion for 24 h
Don't do:
Staircase Recruitment maneuvers
CONSIDER:
Short course of systemic corticosteroids
Uncertain:
Antivirals, chloroquine, anti-IL6
Rescue/Adjunctive therapy
Uncertain:
Antivirals, chloroquine, anti-IL6
CONSIDER: if proning, high P_{plt}, asynchrony
NMBA infusion for 24 h
CONSIDER:
Prone ventilation 12-16 h
CONSIDER: STOP if no quick response
A trial of inhaled Nitric Oxide
CONSIDER: follow local criteria for ECMO
V-V ECMO or referral to ECMO center