

# Strategies to support the COVID-19 response in LMICs

## A virtual seminar series

### Resource Page

## Management of Critically Ill COVID-19 Patients in Low Resource Settings

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### Summary/Key Points:

#### Severity

- COVID-19 severe cases can be complicated by arterial hypoxemia, Acute Respiratory Distress Syndrome (ARDS), sepsis/septic shock, and multiorgan failure
- Risk factors for disease severity include cardiovascular disease, respiratory disease, hypertension, diabetes, and cancer
- In-hospital markers include older age, co-morbid disease, higher SOFA scores, D-dimer >1µg/L, people with HIV

#### Initial Management

|  |  |
|--|--|
| <b>Mild:</b> Symptomatic; self-quarantine; return precautions  | <b>Moderate:</b> Symptomatic support; self-quarantine; empiric antibiotics if pneumonia; if bronchodilator use MDI; no systemic steroids; return precautions   |
| <b>Severe:</b> Admit; Use supplemental O <sub>2</sub> to achieve SpO <sub>2</sub> >92% ( <u>Nasal cannula</u> : 24-40% oxygen, O <sub>2</sub> dose 1-5L/min; <u>Simple face mask</u> : 40-60% oxygen, O <sub>2</sub> dose 6-10L/min; <u>Non-rebreather face mask</u> : 60-90% oxygen, O <sub>2</sub> dose 10-15L/min; <u>High-flow nasal cannula</u> : 30-100% oxygen; 30-60 L/min); transfer to higher level of care when O <sub>2</sub> requirements are ≥ 6 L/min | <b>Critical:</b> Intubate (done by most senior physician), RSI, NRB for pre-oxygenation, no bagging; mechanical ventilation; ECG/labs; co-infections; anticoagulation; IVF resuscitation (2-4 L, be cautious of fluid overload) and vasopressors if shock persists after IVFs; ventilator triage |

- Death most often results from complications from multi-organ failure; low incidence seen of sudden cardiac death/myocarditis at day 10-14 of critical illness

### Hypoxemia Considerations

- “Silent Hypoxemia” presents without dyspnea (more common in elderly patients)
- WHO recommends SpO<sub>2</sub> > 94% for COVID-19 patients
- Experience now suggests delaying intubation as much as possible without compromising patient safety (opposed to initial thought of early intubation)
  - Pragmatic approach to keep SpO<sub>2</sub> > 88-92% with non-invasive oxygen delivery system while watching the work of breathing and clinical status → has led to lower intubations
- Pre-intubation oxygenation strategies: nasal cannula or simple/non-rebreather masks (1-15 L/min), high flow nasal cannula (30-60 L/min), awake non-ventilated proning, non-invasive ventilation with continuous positive airway pressure or bilevel ventilation (caution: high risk of aerosolization of virus, may be possible in negative-pressure rooms).

## **Intubation & Mechanical Ventilation**

### Intubation

- Performed by trained and experienced provider using airborne precautions
  - Use of PAPR and N95 (preferred) including gown and double gloves or appropriate PPE (according to institutional guidelines) prior to intubation
  - Pre-oxygenate with 100% FiO<sub>2</sub> for 5 minutes via face mask with reservoir bag, bag-valve mask, HFNC
  - After an airway assessment identifies no signs of difficult intubation, a rapid sequence intubation is appropriate
  - Use fiberoptic or video assisted intubation to maximize distance between patient and provider

### Ventilation

- Keep tidal volumes and airway pressures as low as possible to avoid lung injury
- Avoid spontaneous modes of ventilation as they may lead to tidal volumes >8 mL/kg of predicted body weight (PBW) and cause injury
- Titrate tidal volumes and FiO<sub>2</sub>/PEEP according to ARDS Network Protocol ([http://www.ardsnet.org/files/ventilator\\_protocol\\_2008-07.pdf](http://www.ardsnet.org/files/ventilator_protocol_2008-07.pdf))
- Use volume assist/control mode to dial a specific tidal volume and monitor airway pressures
- Start at 8 mL/kg PBW and aim for V<sub>T</sub>s 4-6 mL/kg PBW
- Keep airway pressures low by lowering V<sub>T</sub> (aim for plateau pressures < 30 cm H<sub>2</sub>O)
- Consider neuromuscular blockers early if dysynchrony
- Recommend using the lower PEEP/higher FiO<sub>2</sub> table to encourage protocolized care (shown below)

### Lower PEEP/higher FiO<sub>2</sub>

|                  |     |     |     |     |     |     |     |     |
|------------------|-----|-----|-----|-----|-----|-----|-----|-----|
| FiO <sub>2</sub> | 0.3 | 0.4 | 0.4 | 0.5 | 0.5 | 0.6 | 0.7 | 0.7 |
| PEEP             | 5   | 5   | 8   | 8   | 10  | 10  | 10  | 12  |

|                  |     |     |     |     |     |       |
|------------------|-----|-----|-----|-----|-----|-------|
| FiO <sub>2</sub> | 0.7 | 0.8 | 0.9 | 0.9 | 0.9 | 1.0   |
| PEEP             | 14  | 14  | 14  | 16  | 18  | 18-24 |

- Keep arterial PaO<sub>2</sub>s between 55-80 mmHg
- Prone positioning for any intubated patient with an FiO<sub>2</sub> ≥ 0.6 and PEEP ≥ 10 cm H<sub>2</sub>O.
- Stick to a consistent protocol for management of intubated COVID-19 patients in which you limit volume and pressure used with the ventilator to ensure the best outcomes
- Be patient! COVID-19 patients have had prolonged courses on mechanical ventilation
- Do daily spontaneous breathing trials and extubate at the earliest possible time

### Other Considerations

- Imaging cannot make a diagnosis but can show extent of disease and assist in developing A differential diagnosis

### Surviving Sepsis Campaign:

- For the acute resuscitation of adults with COVID-19 and shock:
  - *Recommend* using crystalloids over colloids and *suggest* using buffered/ balanced crystalloids over unbalanced crystalloids
- For adults with COVID-19 and shock:
  - Use norepinephrine as the first-line vasoactive agent; if unavailable use epinephrine
  - *Recommend against* using dopamine if norepinephrine is available
  - *Suggest* adding vasopressin as a second-line agent if target mean arterial pressure (MAP) cannot be achieved by norepinephrine/epinephrine alone
  - *Suggest titrating* vasoactive agents to target mean arterial pressures of 60-65 mmHg

### Therapeutics

- Not many treatment options -mostly supportive care to prevent secondary infections and complications
- Advise against using investigational drugs until rigorous randomized controlled trials demonstrate a clear benefit