

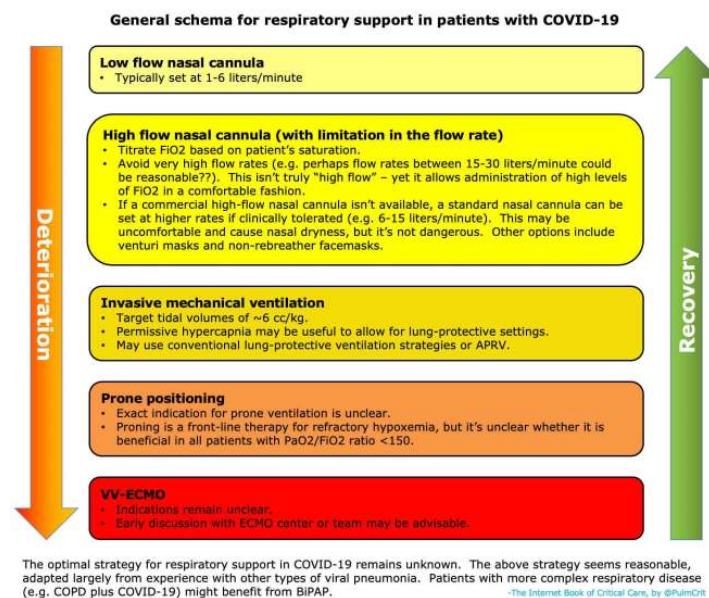
## Harbor-UCLA COVID-19 Airway Management Recommendations

- **Key Points:**

- Aerosol generating procedures, such as non-invasive ventilation (NIV), High-flow nasal Cannula (HFNC), bag-mask ventilation (BMV), nebulizers, and intubation are all particularly high-risk procedures
- Airway devices providing 6L/min or more of oxygen are considered high flow and their use should be discouraged if an airborne infection isolation room is unavailable
- Double gloving, as a standard practice might provide extra protection and minimize spreading via fomite contamination to surrounding equipment after intubation
- Early intubation should be considered in a patient with deteriorating respiratory condition
- Have a backup airway plan ready to go prior to intubation

- **Non-Invasive Oxygenation/Ventilation:**

- Supplemental oxygen can be provided with **nasal prongs** but a surgical mask should be worn over the patients face and prongs to reduce droplet spread
- **HFNC** can theoretically increase the risk of viral spread through aerosol generation. However this plus a surgical mask would be preferred over CPAP/BiPAP if needed.
- In general, **CPAP/BiPAP** should be avoided. Theoretically, could use if an appropriate viral exhalation filter is available and in the appropriate airborne isolation room.



- **Nebulization:**

- Should be avoided
- Bronchodilators should be administered using metered-dose inhalers (MDIs)
- Mild to Moderate Asthma/COPD: MDI with spacer
- Severe Asthma/COPD: 0.1 – 0.3mg Epi and consider early intubation

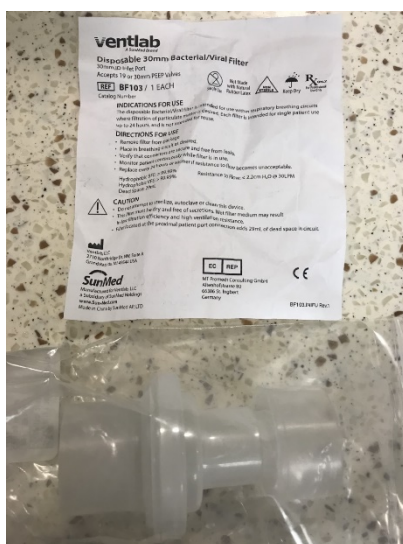
- **Intubation:**
  - **High-Risk Patient + High-Risk Procedure = Higher Level of Precautions**
    - Ideally, want to be in an airborne isolation room with appropriate airborne/droplet PPE plus respirator (PAPR / CAPR). N95 with eye protection (face shield or goggles) is also acceptable.
  - Most skilled person at intubation should perform the procedure to minimize attempts.
    - Similarly, avoid the # of individuals that are in the room during the procedure.
  - **Pre-oxygenation:**
    - Optimize preoxygenation with non-aerosol generating means: bed up head elevated, airway maneuvers (i.e. jaw thrust), use of positive end expiratory pressure valves, and airway adjuncts.
    - **BVM** prior to intubation can generate aerosols and generally should not be used. Again, theoretically could use a viral exhalation filter between the resuscitation bag and mask.
      - If BVM is required, use gentle ventilation via a supraglottic airway (SGA) instead of BMV. No robust evidence is available to show that SGA are less aerosol-generating than BMV. The devices are easy to place and spare man/woman power and thus reduces staff exposure.
  - **RSI** is the treatment of choice for intubation and all patients should get this, as inadequate sedation and paralysis can produce coughing during laryngoscopy which can also generate aerosols.
  - **Video laryngoscopy (VL)** is recommended over direct laryngoscopy with a **display separate from the blade** to avoid placing the face of the intubator close to the patient.
    - **VL equipment should be cleaned properly post-intubation**

#### COVID-19 Intubation

- **Personal protective equipment (PPE)**
  - ☐ Standard PPE
    - ☐ N95 or PAPR.
    - ☐ Face shield +/- goggles.
    - ☐ Gloves, gown.
  - ☐ Consider also (depending on availability):
    - ☐ Hood to cover neck (if unavailable, disposable cap to cover hair).
    - ☐ Two pairs of gloves, under-layer ideally long-cuffed surgical gloves.
    - ☐ Bunny suit for complete body coverage.
- **Medications & pre-planned ETT depth**
  - ☐ High dose paralytic (e.g. Rocuronium at least 1.2 mg/kg).
  - ☐ Calculate optimal ETT depth (using MDCalc).
- **Stuff**
  - ☐ Video laryngoscope & blade.
  - ☐ BVM with PEEP valve & viral filter.
  - ☐ Additional viral filter on exhalation port of ventilator.
- **Procedure**
  - ☐ Most experienced staff, limit people in room.
  - ☐ Pre-oxygenation: Options may include:
    - ☐ BIPAP with a two-tube system & viral filter.
    - ☐ BVM with viral filter, PEEP valve, and nasal cannula.
  - ☐ During apnea:
    - ☐ If using BIPAP: Continue with backup rate.
    - ☐ If using BVM: Hold mask (with PEEP valve) on patient's mouth to prevent decruitment (but don't actively bag the patient).
  - ☐ Inflate ETT cuff prior to ventilation.
  - ☐ Secure ETT at pre-calculated depth.
- **Post-procedure**
  - ☐ Meticulous removal of PPE (use ethanol hand wash *before and after* removal of PPE).

- **Viral Filters:**

- For BiPAP, use the ISO-Gard HEPA light (left)
- For BVM / ventilations, use Ventlab (right)



- **Mechanical Ventilations:**

- COVID doesn't appear to cause substantially reduced lung compliance, which is generally a hallmark finding of ARDS.
  - The predominant problem might be one or more of the following:
    - Atelectasis (alveolar collapse)
    - Drowning of the alveoli by fluid
- Tidal volumes should be targeted to a lung-protective range (6 cc/kg ideal body weight).
- Lower peep with early proning is recommended. If difficulty oxygenation in ED, high PEEPs should be utilized with ARDSnet protocol (see table below).
- Consider consulting pulmonary / CCM to discuss airway pressure release ventilation (APRV) if difficulty oxygenating.

**High & Low PEEP tables from ARDSnet**

FiO2	Low PEEP	High PEEP
0.3	5	5-14
0.4	5-8	14-16
0.5	8-10	16-20
0.6	10	20
0.7	10-14	20
0.8	14	20-22
0.9	14-18	22
1.0	18-24	22-24

PEEP tables don't need to be followed precisely, but can be useful as a general guide. The WHO recommends using a high-PEEP strategy, which seems consistent with available experience thus far with COVID-19. If high PEEPs are used, make sure to keep tidal volumes low to prevent excessively high plateau pressures. APRV is an alternative strategy which would likewise provide high mean airway pressures.

- **References / Resources:**

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