



# Mechanical Ventilation

## COVID-19



### Considerations:

COVID-19 produces a very rapid and severe condition of acute respiratory distress syndrome (ARDS)



**ARDS** is an inflammatory condition of the lung that is characterized by **hypoxia**, **decreasing pulmonary compliance** (“stiff lungs”), and “ground glass” infiltrates on CXR or CT scan secondary to flooding of the lung alveoli.

Patients with ARDS are best treated by careful attending to low tidal volumes, low inspiratory pressure, high peep mechanical ventilation.

## MECHANICAL VENTILATION BASIC TERMINOLOGY

### Oxygenation Terms:

**FiO<sub>2</sub>** – Fraction of inspired oxygen (O<sub>2</sub> %)

**PEEP** – Positive End Expiratory Pressure-pressure held in lungs at the end of a breath

**I:E ratio** – Inspiratory to Expiratory ratio.  
Normal 1:2-1:3

**MAP** – Mean Airway pressure or pressure maintained throughout the respiratory cycle

**I-time** – Time spent in inspiration

### Ventilation Terms

**Respiratory rate (RR)** – how many breaths per minute

**Tidal Volume (TV)** – size of each breath (ml).  
Typical is 450-550 based on 6-8ml/kg IBW

**Minute Volume (MV)** – Amount of gas in/out of lungs over a minute

**Tidal Volume X RR** = Minute Volume (LPM)

**PIP – Peak Inspiratory Pressure** – pressure it requires to administer a tidal volume into the lungs

## ALARMS

- **First and foremost – Always treat the patient first and the ventilator second.**
- **If you cannot determine cause of an alarm within 20-30 seconds:**
  - Ensure patient is safe.
  - If inadequate ventilation (chest rise):
    - Place vent in standby, using a resuscitation bag with a filter between the bag and endotracheal tube, manually ventilate patient
    - Make sure resuscitation bag is connected to the flowmeter running at 15 LPM and oxygen is flowing
    - **Call for HELP - Respiratory/MD**



**See back for additional guidance**



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### WHEN IN DOUBT, BAG AND SHOUT

| ALARMS   | POSSIBLE CAUSES  | ACTION  |
|--|--|---|
| <b>High Pressure</b>                           | Coughing / fighting vent - Biting ETT / Kinked tube - Mucous plug - Decreasing lung compliance (in AC Vol.)              | Suction - Bite block / remove kink - Call RT to change settings - Sedate                              |
| <b>Low Pressure &amp; / or Vent Disconnect</b> | Vent disconnect - Hiccoughs, pt taking large fast breaths - Leak in circuit (cuff leak?)                                 | Find disconnection within 30 seconds - Call RT to fix or adjust setting - Sedate - RT add air to cuff |
| <b>High Vt &amp;/or High Minute Volume</b>     | Agitation, pain - Neuro breathing - Coughing, fighting vent - Decrease in lung compliance (in PCV) - Pt more awake/alert | Evaluate for extubation if awake, if agitated consider pain or sedate - Call RT/MD to assess/adjust   |
| <b>Low Vt &amp;/or Low Minute Volume</b>       | Secretions / mucous plug - Coughing - Decrease in lung compliance (in PCV) - Kink in circuit/ETT                         | Suction, Look/listen for disconnect or leak - Decrease sedation - Call RT to assess/adjust            |
| <b>High Rate</b>                               | Agitation - Pain - Neuro breathing - Coughing, fighting vent - Pt more awake/alert                                       | Consider pain meds - Call RT/MD to assess/adjust - Sedate   |
| <b>Low Rate &amp;/or Apnea</b>                 | Pt not as awake/alert - Sedation / pain meds given - Neuro breathing / hyperventilation then apnea - Neuro changes       | Call RT/MD to assess/adjust - Decrease sedation - Neuro exam  |

#### Settings needed for ordering Volume Control:

Mode-VC, Insp time, Tidal volume, Respiratory Rate, PEEP, FiO<sub>2</sub>

#### Settings needed for ordering Pressure Control:

Mode-PC, Insp Pressure (PIP), Insp time, Respiratory rate, PEEP, FiO<sub>2</sub>