



## MECHANICAL VENTILATION

Principles of Management and Weaning

---

---

---

---

---

---

---

---

### Patient Settings

- |  |  |
|--|--|
| <input type="checkbox"/> Respiratory Rate  | <input type="checkbox"/> FIO2                              |
| <input type="checkbox"/> Vt (tidal volume) | <input type="checkbox"/> Flow/l time                       |
| <input type="checkbox"/> PEEP              | <input type="checkbox"/> Pressure Support/Pressure Control |

---

---

---

---

---

---

---

---

### Patient Measurements / Values

- Respiratory Rate
- Exhaled Tidal Volume
- Minute Volume
- Peak Pressure
- Mean Airway Pressure
- I:E Ratio

---

---

---

---

---

---

---

---

## Ventilator-Patient Synchrony

Vent-Patient synchrony is an upmost priority!

- I-Time / Inspiratory Flow Rate needs to meet the patient's inspiratory flow demand
- Avoid inverse I:E ratio unless using pressure ventilation
- COPD requires extra time for exhalation
- Ventilator trigger sensitivity should be set for minimal patient effort, without causing autcycle/breath stacking

---

---

---

---

---

---

---

---

## Modes of Ventilation

### AC (assist/control)

- RR
- VT
- PEEP
- FIO2
- I time

Patient will receive a minimal guaranteed rate and volume. Any spontaneous trigger results in delivery of set volume.

### SIMV (synchronized intermittent mandatory ventilation)

- RR
- VT
- PEEP
- FIO2
- I time
- Pressure Support

Patient will receive a minimal guaranteed rate and volume, but some spontaneous triggers will result in the pressure support breath, others will deliver the set volume.

---

---

---

---

---

---

---

---

## Modes of Ventilation

### Spontaneous (cpap/flowby/pressure support)

- Pressure Support
- PEEP
- FIO2

Patient sets own respiratory rate. Vt is based on set pressure support relative to patient's participation or disease process.

### Pressure Control

- Available in AC, SIMV, APRV, BiLevel
- Utilizes a set pressure instead of set volume
- Pressure is constant, volume is variable based on lung and chest wall compliance
- Useful in restrictive lung disease
- Lung protective strategy for ARDS
- Safe to use from neonate and older

---

---

---

---

---

---

---

---

Managing Oxygenation

PEEP

- Positive end expiratory pressure
- "backpressure" applied while patient exhales
- Keeps alveoli patent
- Anatomical peep is 3-6cmH2O (depending on text)
- 5 is a good place to start
- As a general practice, increase peep when FIO2 reaches 60
- Watch plateau pressure for over-distension

Managing CO2 (ventilation)

Minute Ventilation

- $RR \times VT = \text{Minute Ventilation}$
- Minute Volume and PACO2 are inversely proportional
- Increase minute ventilation to decrease CO2
- Decrease minute ventilation to increase CO2
- Permissive hypercapnia causes a rightward shift of the oxyhemoglobin dissociation curve, which allows for more oxygen available to tissue, due to a decreased affinity of hemoglobin for O2

---

---

---

---

---

---

---

---

---

---

How much to I adjust minute volume?

If no changes to v/q matching occur, this sets a good starting point for ventilation changes

Required Minute Volume =	known PaCO2 x known minute volume
	Desired PaCO2

---

---

---

---

---

---

---

---

---

---

Weaning from Mechanical Ventilation

Assess Readiness for Spontaneous Breathing Trial (SBT)

- Has condition been resolved?
- Hemodynamically stable?
- Stop paralytics
- Reduce / discontinue sedation
- Assess neuro status
- RSBV <100
- FIO2 <=50%
- PEEP <=5
- MV < 10 L/min

---

---

---

---

---

---

---

---

---

---

## Weaning from Mechanical Ventilation

### SBT

- Facility should have a weaning protocol
- Most widely accepted practice:
  - PS 5, PEEP 5
  - Check abgs in 30-60min
  - If patient is unable to maintain adequate minute ventilation on PS 5, increase PS to achieve a tidal volume close to previously set volume
  - Wean PS incrementally as patient tolerates, to a goal of 5

---

---

---

---

---

---

---

---

## When to extubate

- Is patient able to protect airway?
- Gag reflex intact?
- Can patient manage oral/pulmonary secretions?
- NIF > 20-30
- RSBI <100
- Oxygenation adequate?
- Is patient hemodynamically stable?
- Availability of a skilled intubator?

---

---

---

---

---

---

---

---



---

---

---

---

---

---

---

---

---

QUESTIONS?



---

---

---

---

---

---

---