Just-In-Time Learning Series:

AN INTRODUCTION TO MECHANICAL VENTILATION MANAGEMENT

Region 8 MOUNTAIN PLAINS Regional Disaster Health Response System

Anna Neumeier, MD

Anna Neumeier is an Assistant Professor of Pulmonary and Critical Care Medicine at CU Anschutz School of Medicine and the Associate Medical Director of the MICU at Denver Health.

Invasive Ventilation

The delivery of positive pressure into the lungs via an endotracheal tube or tracheostomy tube.

Indications for Invasive Mechanical Ventilation

Airway: Impending airway compromise
Breathing: Rapidly increasing O2 needs or worsening CO2
Circulation: Severe shock and acidosis
Disability: Inability to protect airway, prevent secondary brain injury
Everything else: need to perform an emergent/urgent procedure

Clinical judgement is crucial in recognizing a patients condition as not quickly reversible, and performing intubation early.

Non-Invasive Ventilation is beneficial in patients who have quickly reversible conditions (likely to resolve in 24-48hrs). Methods of non-invasive ventilation include CPAP or BIPAP.

EXTUBATION CRITERIA

- Underlying process has improved
- Patient is requiring minimal ventilator support (typically 40% FiO2, 5cmH2O of PEEP)
- Mental status and strength recovered (patient coughs, gags, follows commands)
- Manageable secretions
- Patient completes a "spontaneous breathing trial"
  - PS 5/5 on 40% FiO2 for 30-120 min
  - RR/TV ("RSBI") <105

Ventilator Modes and Settings

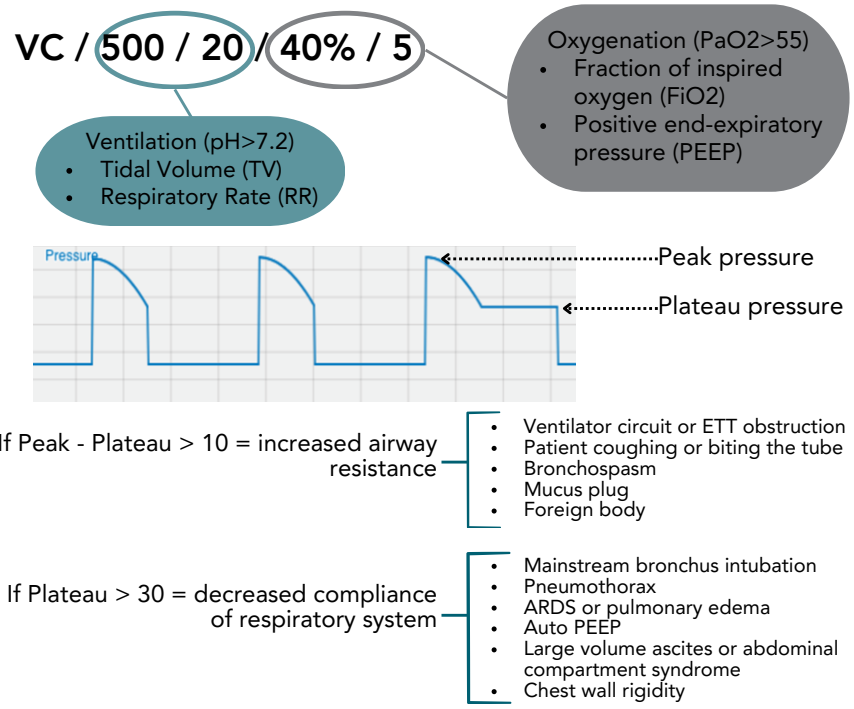
The selection of ventilator modes and settings is guided by therapeutic goals

MODES FALL IN TO 2 GENERAL CATEGORIES

	Volume Control *volume is set, pressure is variable*	**Pressure Control** *pressure is set, volume is variable*
what is set by the practitioner	respiratory rate, tidal volume, PEEP, FiO2	inspiratory pressure, inspiratory time, rise time, PEEP, FiO2
what is monitored by the practitioner	peak pressures, plateau pressures	tidal volume
Trigger what initiates the breath	time (respiratory rate)	time (respiratory rate)
Cycle what ends the breath	tidal volume	time at a designated pressure (inspiratory time)
Limit what stops a breath early	tidal volume	pressure

Goals of Mechanical Ventilation

Oxygenation	**Ventilation**	**Minimize Lung Injury**
FiO2 and PEEP to maintain PO2>55mmHg (around a saturation of 88% or greater)	pH>7.20 RR<30-35 (as low as possible)	TV<8-10 ml/kg PBW (target 6 ml/kg in ARDS) Plateau pressure <30 cmH2O



The associated training video to this document was published on 04/03/2024. The training can be viewed on Youtube at Mountain Plains RDHRS. The MPRDHRS JIT Learning Series is funded by Award Number 6 HITEP200043-01-03 from the Administration for Strategic Preparedness and Response (ASPR). This information is not meant to be a substitute for professional medical advice, diagnosis, or treatment.