Mechanical Ventilation Study Sheet

Modes of Ventilation
The mode refers to the way the patient receives breaths from the ventilator. Two common types are volume-cycled and pressure-cycled. When selecting a mode, consider which mode will provide for adequate gas exchange while synchronizing with the pt’s own respiratory efforts, while also decreasing the potential for barotrauma (Black, pg 1641-1642).

Pressure-cycled ventilation:
• pressure is pre-selected
• delivers a volume of gas using positive pressure until the pressure level has been reached
• disadvantage: volume delivered may not be sufficient depending on lung compliance and integrity of the ventilatory circuit (kinked tubing would be a problem)

Volume-cycled ventilation
• delivers a preset tidal volume regardless of how much pressure is required
• TV is preselected based on pt weight
• pressure limit can be set to prevent dangerously high pressures

Continuous Mandatory Ventilation (CMV) (also known as assist control or “A/C”)
• delivers a preset volume of gas each time the pt initiates a breath
• if pt fails to initiate within a specified time period, the vent delivers a breath

Synchronous Intermittent Mandatory Ventilation (SIMV)
• delivers the preset volume or pressure breath for ONLY those breaths that are ventilator initiated
• this mode is often used for weaning

Triggering Mechanisms
Triggering mechanisms can be based on time, negative pressure, flow or volume
• Time-triggered inhalation is used to manage pts who cannot breathe on their own. Vent triggers a breath after a preset time, serving as a back-up in case pt’s breath falls below a preset value.
• Negative pressure inhalation is triggered by the initial negative pressure that begins inspiration. The pt initiates a breath and the vent is triggered to produce inhalation.
• Flow-triggered inhalation occurs when the pt CAN initiate a breath. The vent completes the breath by sensing the flow of air into the chest. This works well in combination with PEEP.
• Volume-triggered occurs when the vent completes the breath to maximize volumes.

Ventilator Settings
• Rate
  • the number of breaths the vent delivers per minute
  • typical setting is 6-20 breaths/min
• Tidal Volume (Vt)
  • volume of gas delivered to pt with each breath
  • 10-12 mL/kg or 6-8 mL/kg in acute lung injury
• FiO2
  • may be set between 21% and 100%.
  • adjusted to maintain PaO2 > 60 mmHg or SpO2 > 90%
• PEEP (positive end expiratory pressure)
• used to apply positive pressure that keeps alveoli open and reduce shunting
• goal is that the FiO2 be reduced to the lowest possible level to maintain gas exchange
• increased pressure increase FRC and enhances oxygenation as a result of greater surface area
• in normal conditions, 10 cm H20 is needed to keep alveoli open
• high tidal volumes and continuous cyclic expansion/collapse of alveoli deplete surfactant and create the need for higher PEEP
• positive pressures of 10-25 cm H20 are typical in adults (another source said 3-5?)

• Pressure Support (PS)
  • Positive pressure used to augment inspiratory efforts (reduces WOB)
  • 5-10 cm H20