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# Mechanical Ventilation

## Indications for Mechanical Ventilation

- List the four broad reasons for initiating mechanical ventilation
- Identify the abnormalities in gas exchange that are potential indications for mechanical ventilation
- Provide specific examples of disorders that fall under the broad categories of indications for mechanical ventilation
- Describe the two major ways that ventilatory support can be provided

## Overview of NIPPV

- Recognize how noninvasive positive pressure ventilation (NIPPV) differs from invasive mechanical ventilation and from CPAP
- Identify the major clinical settings that are particularly amenable to use of NIPPV
- Identify the clinical settings where evidence is limited for use of NIPPV
- Recognize when NIPPV should be avoided

## Delivering NIPPV: Practical Aspects

- Describe the available patient interfaces for delivering NIPPV
- Discuss how different ventilator types can provide the positive pressure for NIPPV
- Understand the necessary ventilator settings (IPAP and EPAP) when delivering NIPPV
- Monitor the benefit and potential problems in a patient receiving NIPPV

## Mechanical Ventilation Modes

- List the major modes of mechanical ventilation
- Describe the difference between volume and pressure targets in delivering mechanical ventilation
- Describe how ventilation is supported with synchronized intermittent mandatory ventilation (SIMV)
- Identify the pros and cons of pressure support ventilation (PSV)
- List the independent (clinician-set) and dependent (patient-related) variables for each of the major modes of mechanical ventilation

## Volume Targets vs. Pressure Targets

- Describe the roles of elastance and resistance in the relationship between pressure and volume
- Identify important pressures from a ventilator's pressure tracings
- Know how to measure plateau pressure
- Interpret changes in peak and plateau pressures
- Recognize the benefits and drawbacks of volume-targeted vs. pressure-targeted ventilation

**Respiratory Mechanics in the Ventilated Patient**

- Understand the relationship between elastance and compliance
- Calculate compliance and resistance in the ventilated patient
- Correlate changes in peak and plateau pressures with changes in resistance and compliance
- Recognize clinical scenarios causing changes in resistance and compliance

**Intrinsic PEEP**

- Understand the relationships between alveolar and airway pressures during expiration
- Define intrinsic positive end expiratory pressure (iPEEP)
- Identify patient and ventilator factors contributing to iPEEP
- Understand how to detect iPEEP
- Recognize the adverse consequences of iPEEP
- Utilize strategies to minimize or eliminate iPEEP and its effects

**Sedation**

- Utilize non-pharmacologic measures to minimize distress in mechanically ventilated patients
- Utilize sedatives, anesthetics, analgesics, and anti-psychotics appropriately in ventilated patients
- Identify potential side effects and adverse consequences of the various pharmacologic agents used to reduce distress in mechanically ventilated patients

**Treatment of Refractory Hypoxemia**

- Define refractory hypoxemia
- Understand the roles and potential problems with sedation, paralysis, and prone positioning in patients with refractory hypoxemia
- Recognize potential strategies for treatment of refractory hypoxemia that have limited evidence for support
- Understand the meaning, potential complications, and utility of extracorporeal membrane oxygenation (ECMO)

**Liberation (Weaning)**

- Assess potential readiness for liberation from mechanical ventilation
- Utilize spontaneous breathing trials in preparation for extubation
- Calculate and understand the use of the rapid shallow breathing index (RSBI)