

Prone Positioning for Acute Respiratory Distress Syndrome (ARDS)

Prone positioning is a technique used to help patients with acute respiratory distress syndrome breathe better.

Widespread inflammation in the lungs may result in a life-threatening condition called **acute respiratory distress syndrome (ARDS)**. Severe infections such as coronavirus disease 2019 (COVID-19) and influenza can cause ARDS. Breathing can be difficult for patients with ARDS.

Hospitalized patients typically lie on their backs, a position known as **supine**. In **prone positioning**, patients lie on their abdomen in a monitored setting. Prone positioning is generally used for patients who require a ventilator (breathing machine).

Prone positioning may be beneficial for several reasons: (1) In the supine position, the lungs are compressed by the heart and abdominal organs. Gas exchange, the process of trading carbon dioxide for oxygen, is reduced in areas of collapsed lung, resulting in low oxygen levels. In the prone position, lung compression is less, improving lung function. (2) The body has mechanisms to adjust blood flow to different portions of the lung. In ARDS, an imbalance between blood and air flow develops, leading to poor gas exchange. Prone positioning redistributes blood and air flow more evenly, reducing this imbalance and improving gas exchange. (3) With improved lung function in the prone position, less support from the ventilator is needed to achieve adequate oxygen levels. This may reduce risk of ventilator-induced lung injury, which occurs from overinflation and excess stretching of certain portions of the lung. (4) Prone positioning may improve heart function in some patients. In the prone position, blood return to the chambers on the right side of the heart increases and constriction of the blood vessels of the lung decreases. This may help the heart pump better, resulting in improved oxygen delivery to the body. (5) Because the mouth and nose are facing down in the prone position, secretions produced by the disease process in the lung may drain better.

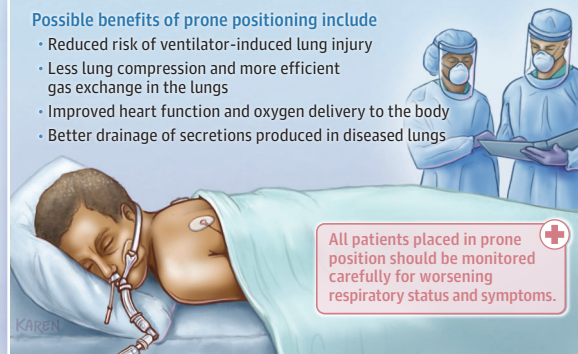
Placement of Patients in the Prone Position

Movement of patients to a prone position involves risk of serious complications such as a dislodged breathing tube or very low blood pressure. A team of trained clinicians, including respiratory therapists, nurses, and a physician, are necessary to safely reposition a patient. Most hospitals maintain patients in a prone position for at least 12 hours per day, though practices vary. Proning sessions continue until there is a sustained improvement in oxygen levels, or if proning does not improve oxygen levels.

Prone positioning is the technique of placing patients with breathing difficulties on their stomach to help them breathe better. Prone positioning is generally reserved for sedated patients who require a breathing machine, known as a ventilator, but it may be beneficial for awake patients with COVID-19.

Possible benefits of prone positioning include

- Reduced risk of ventilator-induced lung injury
- Less lung compression and more efficient gas exchange in the lungs
- Improved heart function and oxygen delivery to the body
- Better drainage of secretions produced in diseased lungs



While prone positioning is generally limited to patients on a ventilator, voluntary, awake proning is being studied in patients with COVID-19. These patients require monitoring for worsening respiratory status.

Challenges of Prone Positioning for ARDS

Prone positioning is considered on an individual basis. Although it is beneficial in some settings, not all patients improve and some may worsen. With changes in position, medical devices, breathing tubes, and drains may dislodge (unintentionally fall out). If a breathing tube becomes dislodged, replacement in the prone position is difficult. Performing procedures or cardiopulmonary resuscitation (CPR) is also challenging in the prone position and may require immediate repositioning. Also, with prone positioning, pressure is placed on the shoulders, chest, knee, and face, predisposing these areas to pressure ulcers. This may also result in nerve injury.

FOR MORE INFORMATION

- ✚ A JAMA Patient Page on *acute respiratory distress syndrome* was published in the February 20, 2018, issue of *JAMA*.

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