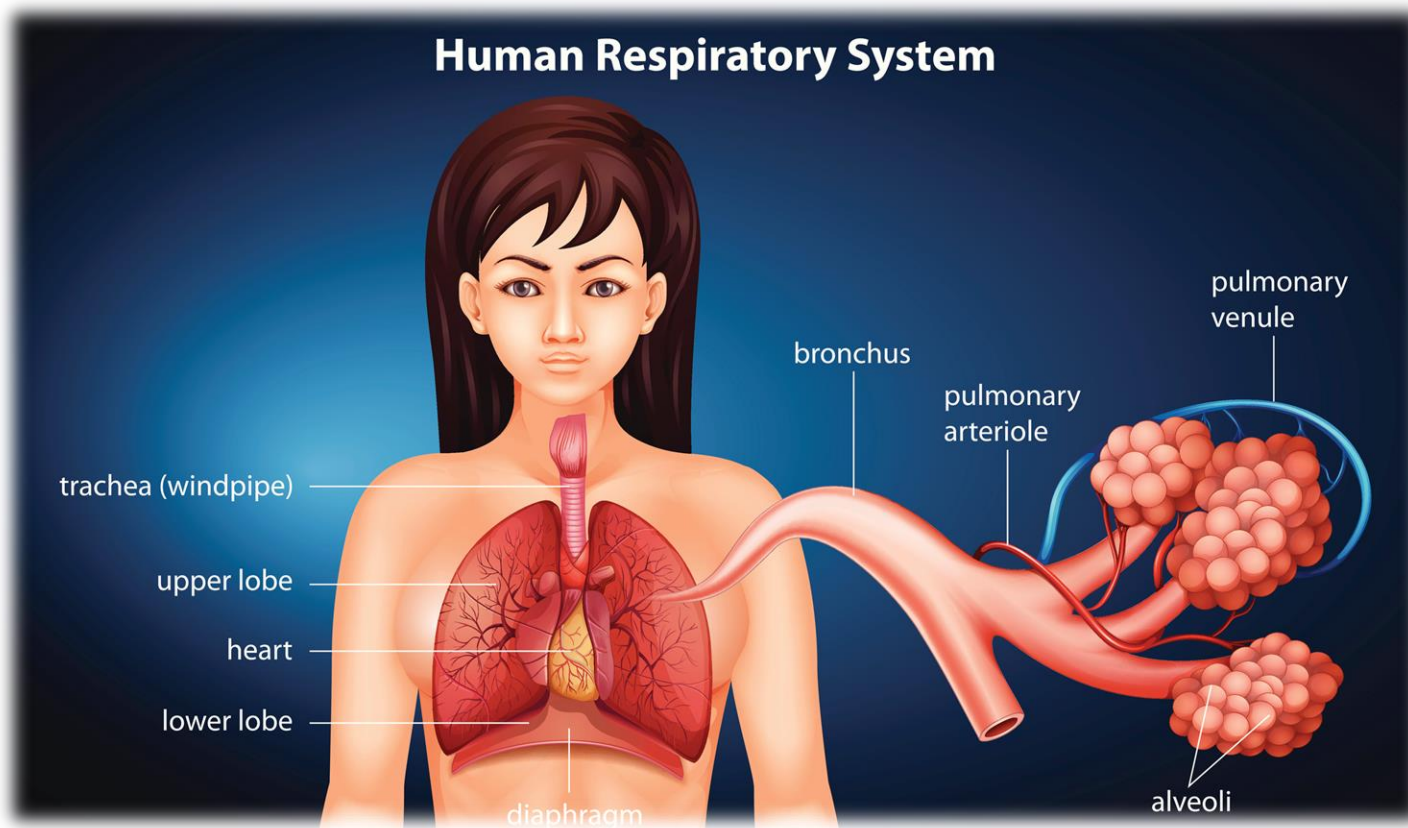


# Benefits of Prone Positioning for ARDS!

## Respiratory System

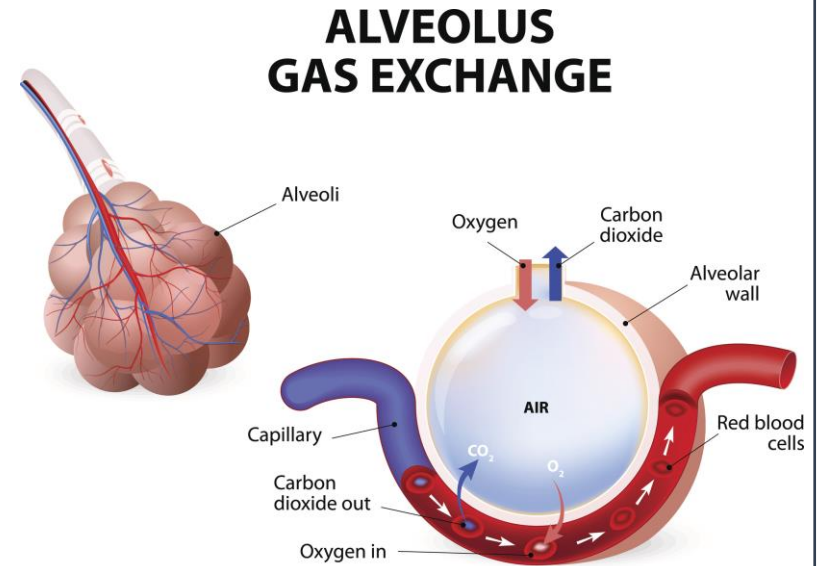




# Respiratory Failure

Respiratory failure is a serious condition that makes it difficult to breathe on your own. Respiratory failure develops when the lungs can't get enough oxygen into the blood.

We breathe oxygen from the air into our lungs, and we breathe out carbon dioxide, which is a waste gas made in the body's cells. Breathing is essential to life itself. Oxygen must pass from our lungs into our blood for our tissues and organs to work properly. Buildup of carbon dioxide can damage tissues and organs and prevent or slow oxygen delivery to the body.

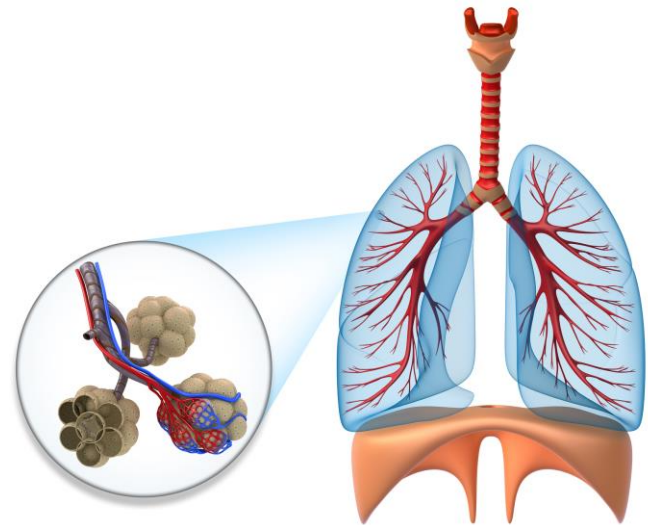




# Respiratory Failure

Acute respiratory failure happens quickly and without much warning. It is often caused by a disease or injury that affects your breathing, such as stroke, sepsis, pneumonia, trauma, COVID-19, and the flu, among others. Respiratory failure can also develop slowly. When it does, it is called chronic respiratory failure. Symptoms include shortness of breath or feeling like you can't get enough air, extreme tiredness, an inability to exercise as you did before, and sleepiness.

Acute respiratory distress syndrome (ARDS) is a serious lung condition that causes low blood oxygen. People who develop ARDS are usually ill due to another disease or a major injury.



# Acute Respiratory Distress Syndrome

In ARDS, fluid builds up inside the tiny air sacs of the lungs, and surfactant breaks down. Surfactant is a foamy substance made by your body that keeps your lungs fully expanded so you can breathe. The fluid buildup and lack of surfactant that happen because of ARDS prevent the lungs from properly filling with air and moving enough oxygen into the bloodstream and throughout the body. The lung tissue may scar and become stiff.

ARDS may develop over a few days, or it can get worse very quickly. The first symptom of ARDS is usually shortness of breath. Other symptoms of ARDS are low blood oxygen, rapid breathing, and clicking, bubbling, or rattling sounds in the lungs when breathing.





# Prone Positioning

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

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.





# Prone Positioning

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.

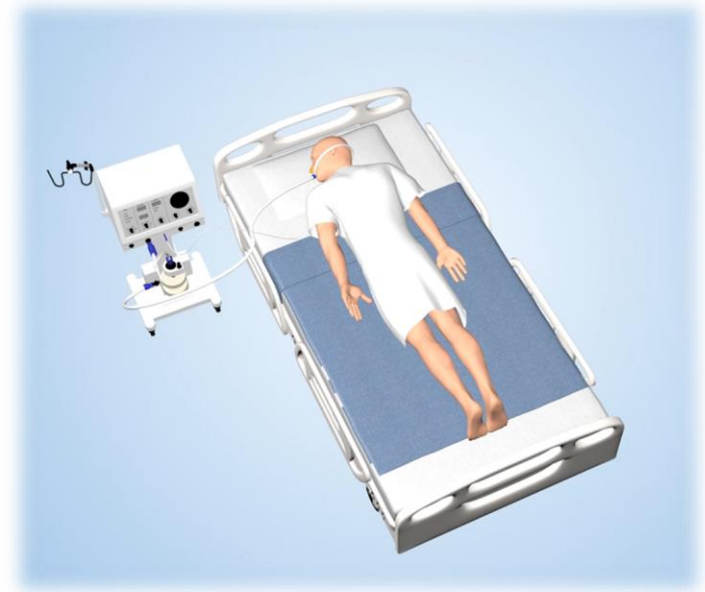
4) Prone positioning may improve heart function in some patients. In the prone position, blood return to the chambers on the right side of the heart increases and constriction of the blood vessels of the lung decreases. This may help the heart pump better, resulting in improved oxygen delivery to the body.





# Prone Positioning

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 in 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.

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

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.

