

Respiratory failure type 1, or hypoxemic respiratory failure, occurs when the lungs fail to adequately oxygenate the blood, leading to a significant decrease in the partial pressure of oxygen (PaO_2) while carbon dioxide (PaCO_2) levels remain normal or only slightly elevated. Additionally, shunting, where blood bypasses ventilated areas of the lungs (as seen in severe pneumonia or congenital heart defects), exacerbates oxygen deprivation. This type of respiratory failure is primarily characterized by a ventilation-perfusion (V/Q) mismatch, where areas of the lung either receive insufficient ventilation relative to blood flow or are poorly perfused despite adequate ventilation. Common causes of type 1 respiratory failure include conditions such as acute respiratory distress syndrome (ARDS), pneumonia, pulmonary embolism, and interstitial lung diseases. However, the failure to maintain adequate oxygen levels in the blood is the hallmark of type 1 respiratory failure, leading to tissue hypoxia and the potential for multiorgan dysfunction if untreated. In these conditions, inflammation, fluid accumulation, or structural damage to the alveoli disrupt the exchange of gases, leading to hypoxemia.