**Initial Management of Acute Respiratory Failure**

 An inability to effectively ventilate or provide sufficient O2 to blood and vital organs and/or effectively remove CO2 from the body.

**Manifestation:**

* Dyspnea/increased work of breathing. But can be blunted due to hypercarbia or hypoxemia.
* Nasal flaring
* Tripoding, accessory muscle use (neck, chest, intercostal etc)
* Also can include cough, sputum production and chest pain.
* Cyanosis, apnea

**ARF Etiology**

* CNS *(drugs, metabolic encephalopathy, CNS infections, increased ICP, OSA, Central alveolar hypoventilation)*
* spinal cord *(trauma, transverse myelitis)*
* neuromuscular system *(polio, tetanus, M.S., M.Gravis, Guillain-Barre, critical care or steroid myopathy)*
* chest wall *(Kyphoscoliosis, obesity)*
* upper airways *(obstruction from tissue enlargement, infection, mass; vocal cord paralysis, tracheomalacia)*
* lower airways *(bronchospasm, CHF, infection)*
* lung parenchyma *(infection, interstitial lung disease)*
* trauma (*pneumothorax)*
* pulmonary embolus
* cardiovascular system

**Types**

1. ***Hypoxemic***  - PO2 < 50 mmHg on room air. Common with V/Q mismatch where disorders interfere with the lung's ability to oxygenate blood as it flows through the pulmonary vasculature e.g., acute pulmonary edema or acute lung injury.
2. ***Hypercapnic/Ventilatory*** - PCO2 acutely > 50 mmHg. Common in increased work of breathing in obstructive or decreased respiratory system compliance, e.g. as seen in decreased respiratory muscle power due to neuromuscular disease, or with central respiratory failure and decreased respiratory drive.
3. ***Peri-operative*** - may be related to sedative use, difficulty extubating post surgery.
4. ***Shock***- secondary to cardiovascular instability.

**Clinical Evaluation**

* Airway, Breathing, Circulation

Thus the first step to managing the patient is to make an assessment

1. **Vitals:**
* The most important one is the oxygen saturation, it will gauge the relative stability of the patient. However, note that certain conditions may not exhibit a true picture of SPO2, e.g, smoke inhalation or with poor perfusion.
* Respiration rate: a gauge as to how hard the person is working and can be a monitor of response to therapy. However, the clinician will need to take into account other factors that might influence the RR, including, medications (e.g sedatives), hypoxemia/hypercarbia (decrease ventilator drive), mental state (e.g anxiety).
1. **General appearance:**
* Use of accessory muscles or retractions (sternal, intercostal etc)
* Ability (or not) to speak complete sentences
* Inability to phonate or stridor (severe upper airway compromise)
* Diaphoresis
1. **Mental status:**

Diminished alertness, confusion, hallucinations often indicates severe respiratory failure and may herald impending respiratory distress.

1. **Directed exam:**
* Presence, or not, of wheezing > indicating obstruction
* Unilateral breath sounds > PTX, mucous plugging, tumor or FB
* Chest wall/neck “crunching” > SbQ emphysema
1. **ABGs:** will assist in determining the underlying cause of the respiratory dysfunction.
* Hypoxemia > usually a result of v/q mismatch, right to left intrapulmonary or cardiac shunt or alveolar hypoventilation
* Hypercapnia > buildup of PaCO2, inversely related to alveolar ventilation
* Acid-base disturbances
1. **EKG**
2. **CXR:**
* May reveal cause of respiratory distress > PNA, PTX, mucous plugging, foreign body.
1. **CT:**
* May diagnose what was not otherwise diagnosed by CXR.
1. **Labs:**
* Chemistry, hematology, d-dimer, BNP, troponin

**Initial Management**

Ensure airway patency. Then,

1. **Supplemental Oxygen**
* low flow O2 for lower O2 needs that do not require increased FIO2(nasal cannula, or simple face masks), or high flow O2 for increased O2 needs with high (up to 100% FIO2 needs) (venturi mask, HFNC, face tents, tracheostomy collars).
1. **NIPPV (CPAP/BiPAP)**
* the patient needs to be alert enough to clear secretions,
* Shown to be helpful in preventing intubation in acute hypercapneic respiratory failure in COPD, cardiogenic pulmonary edema and hypoxic respiratory failure in immunocompromised patient.
1. **Endotracheal Intubation/Mechanical ventilation**
* Warranted (1)for upper airway patency (airflow integrity), (2)protection from aspiration, or (3) for significant compromise to oxygenation/ventilation
1. **Tracheostomy**
* Required in those that will need mechanical ventilation for more than 2 weeks.

**Medications:**

* Steroids / bronchodilators
* Diuretics
* Nitrites
* Narcan
* Antibiotics

Ensure adequate circulation, IVF PRN. After initial stabilization, look for underlying cause if still unknown.

Source: Chest Medicine, Mcgill University