

# ACUTE RESPIRATORY DISTRESS SYNDROME (ARDS)

*(Last updated 07/23/2019; Reviewed by: Chun Wan, MD)*

**PRESENTING COMPLAINTS:** Respiratory distress, tachypnea, oxygen-starved (can't be relieved by routine oxygenation)

## FINDINGS

- **A** Check Airway
- **B** RR ↑, respiratory distress
- **C** BP ↓ / N, HR ↑ / ↓ / N, arrhythmias
- **D** Variable altered (V, P, U, D)\*
- **E** Cyanosis
- **L<sub>PC</sub>** ABG, WBC, Hb, lactate
- **U<sub>PC</sub>** Lung (bilateral B lines, irregular pleural segment thickening, heart (RV enlargement if prolonged hypoxemia)

\***V** (verbal), **P** (pain), **U** (unconsciousness), **D** (delirious)

**U<sub>PC</sub>** (point of care ultrasound) **L<sub>PC</sub>** (point of care labs)

## HISTORY

- **Signs & Symptoms**
  - New or worsening **dyspnea** signs within one week of a known predisposing conditions
  - **Hypoxemia**
  - Clinical evidence of non-cardiogenic **pulmonary edema**
- **Predisposing conditions**
  - Sepsis, shock, aspiration or near drowning, pneumonia, pancreatitis, any transfusion of a blood product, stem cell transplantation
  - Mechanical ventilation
    - Also if only for a short period, e.g. during general anesthesia for surgery, or ventilation in the ICU before this admission
  - Severe trauma: includes chest trauma, but also head trauma, long bone fractures
- **Other history**
  - Pneumonia, aspiration, toxic inhalation, severe systemic infection, trauma, surgery of high risk, pancreatitis

## DIFFERENTIAL DIAGNOSIS

- Severe pneumonia, cardiac insufficiency, cardiogenic pulmonary edema, pulmonary embolism, fluid overload
- ARDS mimickers: Acute exacerbation of chronic interstitial lung disease, Idiopathic acute eosinophilic pneumonia, Cryptogenic organizing pneumonia, Diffuse alveolar hemorrhage

## OTHER INVESTIGATIONS

- **Labs:** ABG
- **ABG:**  $\text{PaO}_2/\text{FiO}_2 < 300$  mm Hg at PEEP on CPAP  $\geq 5$  cm H<sub>2</sub>O; Note: hypoxemia at no PEEP still could mean that a patient has ARDS
- **Pulse oximetry:**  $\text{SpO}_2/\text{FiO}_2 < 315$  at PEEP on CPAP  $\geq 5$  cm H<sub>2</sub>O; Note: hypoxemia at no PEEP still could mean that a patient has ARDS
- Bronchoscopy/BAL +/- lung biopsy in unexplained causes, beware of risk of bronchoscopy from derecruitment precipitating hypoxemia
- **Lung ultrasound:** as mentioned above
- **Chest radiograph, or CT-scan:** new or worse **bilateral** alveolar and/or interstitial **infiltrates** on chest radiograph or CT-scan, Often heterogeneous (Consider uncontrolled source of infection and/or ischemia)

## THERAPEUTIC INTERVENTIONS

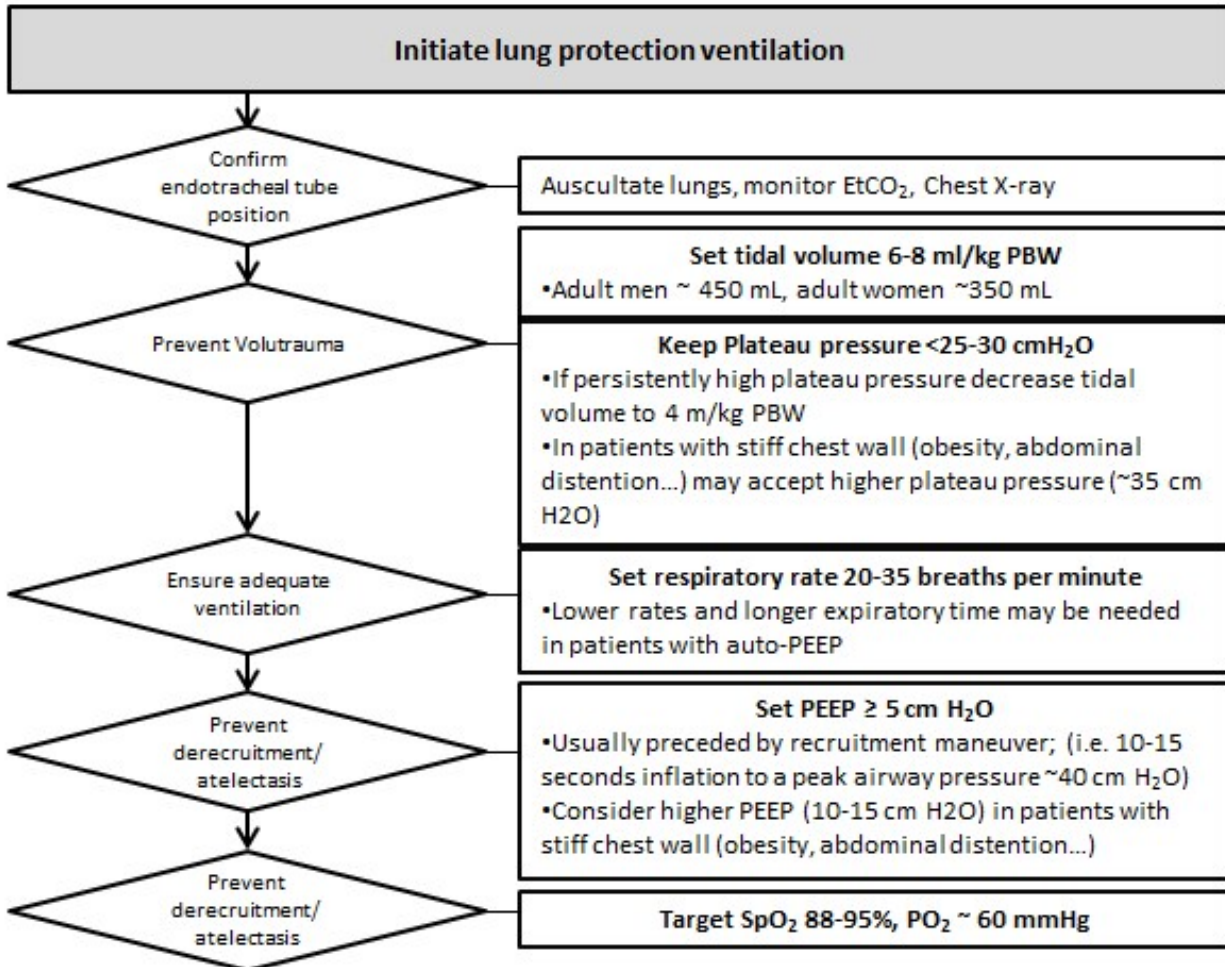
- **Mechanical Ventilation:** Consider trial of non-invasive mechanical ventilation; Invasive mechanical ventilation; Use Lung Protective Ventilation settings (**Low tidal volume:** ~4-8 mL/kg Predicted Body Weight, **Low plateau pressure:**  $\leq 30$  cm H<sub>2</sub>O, **Low driving pressure:** defined as the difference between plateau pressure and PEEP,  $\leq 12-15$  cm H<sub>2</sub>O)
  - Oxygen Goal:  $\text{SpO}_2$  88–92% with the lowest  $\text{FiO}_2$  and/or PEEP level
  - Consider neuromuscular blockade for ventilator asynchrony
- **Prevention of nosocomial pneumonia:** “Ventilator bundle”
  - Prompt evaluation and treatment if needed with timely broad antimicrobial therapy
- **Rescue therapies in cases of refractory hypoxemia:** Treat shock, prone position, ECMO; Recruitment maneuvers, followed by PEEP adjustments (Avoid prolonged,  $> 40$  seconds maneuvers)
- **Supportive care**
  - Adequate sedation: Using a protocol and sedation-scores, intermittent instead of continuous infusion of benzodiazepines, or propofol, analgo-sedation instead of hypno-sedation
  - Restrictive fluid management: Aim for even to negative fluid balance as soon as hemodynamically stable

- Corticosteroids for specific situations: Pneumocystis pneumonia, drug-induced (amiodarone), severe pneumonia (CRP > 150)
- Consider VV–ECMO (if available) for refractory hypoxemia and hypercapnia
- Consider VA–ECMO (if available) for refractory cardiopulmonary dysfunction

## **ONGOING TREATMENT**

- **Consider bronchoalveolar lavage:** Adapt antibiotics to culture results: de-escalation; To assist with differential diagnosis: diffuse alveolar hemorrhage and atypical infections (PJP, fungi)
- **Weaning from mechanical ventilation:** Daily awakening and breathing trials, consider tracheostomy when expected duration of ventilation will exceed 10 days
- **Prevent or treat complications related to critical illness:** Delirium, VAP, DVT and stress ulcer, PICS, PTSD, neuromuscular weakness; early physical therapy and psychological support
- **Family information**
  - Discuss prognosis, including expectations with regard to mortality, duration of stay in ICU, duration of ventilation, complications (like risk of cognitive impairment), muscle weakness

## ALGORITHM



## REFERENCES & ACKNOWLEDGMENTS

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