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J.T., 74-year-old Hispanic male, came to the emergency department (ED) 7 days ago with complaints of shortness of breath. His wife stated that he has a history of hypertension, depression, and chronic obstructive pulmonary disease (COPD). The admission chest x ray revealed dense consolidation of the left lower lobe. An arterial blood gas (ABG) at that time showed pH 7.60, PaCO<sub>2</sub> 29, HCO<sub>3</sub> 32, and PaO<sub>2</sub> 75. He quickly deteriorated and required intubation. He has been in the intensive care unit for 3 days. JT has been married to his wife for 45 years and they live with a daughter and 2 grandchildren. JT and his wife speak English and Spanish. JT weighs 75kg

**Current Assessment and tests:**

BP 167/98, pulse 112, temp 102.3F, RR 144, O<sub>2</sub> sat 72%

Patient localizes to ETT and is intermittently opens eyes, making several attempts to pull ETT

Orally intubated with # 7.5 ETT, taped at 27 cm at teeth

Ventilator settings: Assist control (AC), Tidal volume (TV) 450, Rate 14, Fio<sub>2</sub> 60%, Peep 5 cm H<sub>2</sub>O

Breath sounds: decreased bases and bilateral crackles that do not clear after suctioning

Brown, yellow secretions returned with suctioning

Peripheral pulses weak with capillary refill greater than 4 seconds

2+ pitting edema in the bilateral lower extremities

ABG pH 7.31, PaCO<sub>2</sub> 58, HCO<sub>3</sub> 28, PaO<sub>2</sub> 54

Chest X-ray reveals diffuse white-out in middle and lower lobes; ETT present with tip above carina; left subclavian central venous catheter is located in the superior vena cava

1. Interpret JT's latest ABG's
  - Respiratory Acidosis Partially Compensated, Severe Hypoxemia
2. Describe each of JT's ventilator settings and the rationale for the selection of each
  - Assist Control – full support mode
  - VT – based on weight
  - Rate – is the number of breaths in a minute
  - Fio<sub>2</sub> – 60% of the air being given to the patient is oxygen
  - Peep – pressure left in the alveolar after exhalation
3. After JT's ABG results the provider increases the PEEP from 5 cmH<sub>2</sub>O to 8cm H<sub>2</sub>O. Why would this be necessary and what is the expected outcome with this action?
  - Improves oxygenation, reduces trauma on the alveoli, so the alveoli do not collapse
4. Based on the assessment data, what are the nursing priorities for JT?
  - Improving oxygenation by giving O<sub>2</sub>, ventilation, drug therapy, oral care

5. What measures should be part of JT's care to prevent complications?

- Purse lip breathing = increases SaO<sub>2</sub> by slowing respirations, allowing more time for expiration, and preventing small bronchioles from collapsing.
- Positioning - tripod
- Treat underlying problems before it becomes worse

6. What safety measures should you implement to protect JT while he is mechanically ventilated?

- BMV at the bedside
- Oxygen source
- Suction set up
- Extra Trach kit
- Obturator
- Make sure everything is working

7. List 3 potential complications with mechanical ventilation.

- Barotrauma occurs when increased airway pressure expands the lungs and ruptures the alveoli or emphysematous blebs.
- Pneumothorax can happen air escapes into the pleural space and becomes trapped, pleural pressure increases and the lung collapses.
- Ventilator assisted pneumonia is a high risk in mechanically ventilated patients due to poor nutritional intake, immobility, and ET tube bypassing normal upper airway defenses

8. List 3 benefits of using IV sedation and analgesic medications while JT is on mechanical ventilation.

- Relaxes patient - protection of tubes and lines
- Tolerate being on ventilation
- Decrease O<sub>2</sub> demands when they are restless

9. What would be signs JT is ready for weaning and possible extubation?

- Respiratory rate less than 25 breaths per minute
- Tidal volume greater than 5 mL/kg
- PaO<sub>2</sub>/FIO<sub>2</sub> greater than 200
- f/Vt less than 105, or less than 130 in elderly patients

10. An hour after extubation, JT shows signs that he is not tolerating being off of the ventilator. What would be some of these signs?

↑ or ↓ RR, ↑ HR, ↓ SaO<sub>2</sub> sustained <90%, Respiratory distress, LOC change, arrhythmias, agitation or anxiety, low tidal volumes