3. Strategies for Caring for the COVID Positive Patient

Pathophysiology of COVID-19

- COVID-19 is classified as an infectious inflammatory disease
- Officially designated a pandemic by the World Health Organization on March 11, 2020
- In a severe case, an acute respiratory distress syndrome (ARDS) clinical picture evolves
    - ARDS is an acute inflammatory lung injury due to activation of circulating neutrophils that migrate to the lungs and release the content of their cytoplasmic granules.
    - This is called the respiratory burst and is designed to kill microorganisms, but unfortunately, also damages the capillary walls in the lungs, leading to protein-rich exudate, erythrocytes, and platelets. This inflammatory exudate leads to fibrin accumulation, which causes structural remodeling and pulmonary fibrosis
- Patients with severe cases can also go into septic shock due to the "cytokine storm"
    - Massive inflammation and systemic vasodilation can be caused by cytokines that are released with a large and severe viral load
        - Cytokines are a broad and loose category of small proteins that are important in cell signaling
    - Sepsis is considered a 3-pronged cascade that occurs in response to severe infection:
        - Inflammation
        - Suppression of the immune system
        - Activation of the coagulation cascade

Characteristics of COVID-19 Patients

- Based upon available information to date, those at high-risk for severe illness from COVID-19 include:
    - People who live in a nursing home or long-term care facility
    - Other high-risk conditions could include:
        - People with chronic lung disease or moderate to severe asthma
        - People who have serious heart conditions
        - People who are immunocompromised including cancer treatment
        - People of any age with severe obesity (body mass index [BMI] >40) or certain underlying medical conditions, particularly if not well controlled, such as those with diabetes, renal failure, or liver disease might also be at risk
    - People who are pregnant should be monitored since they are known to be at risk with severe viral illness, however, to date data on COVID-19 has not shown increased risk
- Imaging
    - Bilateral ground-glass or patchy opacity (89.6%) was the most common sign of radiological finding
- Lab findings
    - Lymphopenia (75.4%) and eosinopenia (52.9%) were observed in most patients.

- Blood eosinophil counts correlate positively with lymphocyte counts in severe ($r = .486$, $P < .001$) and non-severe ($r = .469$, $P < .001$) patients after hospital admission.
- Significantly higher levels of D-dimer, C-reactive protein, and procalcitonin were associated with severe patients compared to non-severe patients (all $P < .001$).

COVID-19: General Treatment and Nursing Considerations

- **Infection Prevention**
  - Prevent spread with isolation & strong infection prevention protocols
    - Standard precautions and transmission-based precautions (contact, droplet, airborne, plus eye protection)
    - Clean environment frequently
  - If patient is too sick to remain home, can be admitted on medical/surgical unit or to critical care unit (ICU), depending on manifestations

- **Treatment – Supportive Therapy**, similar to (or consistent with) in-hospital influenza management
  - Rest
  - High-flow O2 via nasal cannula
    - Nasal Cannula to Mechanical Ventilation with proning and/or extracorporeal membrane oxygenation (ECMO) as needed
  - Anticoagulation therapy
  - Vital signs monitoring
  - Nutrition support
  - Conservative fluid and electrolyte balance management
  - Lab monitoring to evaluate organ function
  - Chest imaging: Xray or computerized tomography (CT) scan
  - Extracorporeal Membrane Oxygenation (ECMO) for refractory hypoxemia
  - End-organ supportive therapies (e.g., dialysis for Acute Kidney Injury etc.)

- **Medications**
  - FDA approved Remdesivir (antiviral) for Covid-19 adult pts requiring hospitalization
    - Shortens LOS by approx. 4 days
    - WHO does not recommend the therapy (Nov 2020)
  - Regeneron Cocktail (casirivimab & imdevimab): FDA approved monoclonal therapy in Fall 2020 to treat mild to moderate Covid-19 in adults who are not hospitalized
  - Bamlanivimab: FDA issued an EUA for this monoclonal antibody therapy to treat mild to moderate Covid-19 in adults and children; ameliorates some symptoms and reduces the risk of hospitalization
  - Glucorticoids have a mortality benefit and a reduction in use of mechanical ventilation in adult critically ill patients
  - Symptomatic treatment of fever (e.g., acetaminophen)

- **Conservation Bronchodilator Therapy Strategies**
    - To deliver bronchodilator therapy to either persons under investigation (PUI) or confirmed COVID-19 patients, inhalers are preferred over nebulizers in order to limit the risk of viral exposure to other patients or staff due to aerosolization. There is currently a nationwide shortage of albuterol and ipratropium.
        - Patients with documented reactive airways disease who are COVID-19 positive or PUI may receive albuterol metered dose inhalers (MDIs).
            - Patients ruled out for COVID-19 should be switched to nebulized albuterol once the MDI canister is depleted.
            - Mechanically ventilated patients on continuous nebulized epoprostenol may receive albuterol MDIs.
            - Dose for patients on mechanical ventilation: 4 Puffs every 1-6 hours
        - All other patients should receive nebulized albuterol.

- **Manage and prevent complications**
    - While the CDC estimates that <1% of those infected will die in the US, approximately 88% of those hospitalized with Covid-19 go on to become "Covid long haulers" reporting at least one symptom 60 days after onset
        - Dysautonomia: miscommunication between the ANS & the rest of the body, involving heartrate, breathing, sleep, and digestion issues
        - Excessive fatigue
        - Numbness in extremities
        - Memory issues, foggy cognition, and psychosis
        - Chronic loss of sense of taste and smell
        - Anxiety & depression
    - Antibiotics for secondary infection
    - Recognize septic shock early; fluids and vasopressors for shock
    - Gastrointestinal (GI)/venous thromboembolism (VTE) prophylaxis
    - Prevention of pressure injury, falls, catheter associated urinary tract infection (CAUTI), central line-associated bloodstream infection (CLABSI), ventilator associated pneumonia (VAP), etc.

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