Medications

1. Guaifenesin
-Class: Expectorants
-Asses: for the presence of cough
-This patient is taking this medication for symptomatic cough.

2. Ipratropium/albuterol
- Class: Anticholinergic-bronchodilator/Inhaled beta-2-agonist
- Asses: respiratory rate, heart rate, blood pressure, oxygen saturation, dyspnea, lung sounds
- This patient has been taking this medication for shortness of breath. Inhaled short-acting beta-agonists is the treatment for COPD exacerbations.

3. Formoterol
- Class: Long-acting beta-agonists (LABAs).
- Asses: respiratory rate, heart rate, dyspnea, lung sounds
- This patient is taking this medication for shortness of breath. To prevent and control COPD exacerbation.

4. Methylprednisolone
- Class: Glucocorticoid
- Asses: respiratory rate, oxygen saturation, dyspnea, lung sounds, WBC count, blood glucose
- This patient is taking this medication for shortness of breath. To decrease inflammation and bronchospasms associated with COPD.

5. Budesonide
- Class: Inhaled glucocorticoid
- Asses: respiratory rate, oxygen saturation, dyspnea, lung sounds, WBC count, blood glucose
- This patient is taking this medication for shortness of breath. To decrease inflammation and bronchospasms associated with COPD.

Lab Values/Diagnostics

Potassium (3.5-5.1) = 3.1 ↓
- Adrenergic agents such as epinephrine and albuterol can cause low serum potassium (Capriotti, 2020).
Chloride (98-107) = 96 ↓
- COPD patients are at risk for electrolyte imbalances due to inadequate oxygenation and perfusion (Capriotti, 2020).
Glucose (70-99) = 126 ↑
- Stress can cause a rise in blood glucose levels (Capriotti, 2020).
Eosinophil (0-6.3) = 8.5 ↑
- Increased eosinophil activity is contributed to the inflammatory process of COPD (Capriotti, 2020).
paO2 (40-50) = 67 ↑
- Hyperoxemia can be caused by oxygen therapy as PaO2 reflects both inspired air and the oxygen being continuously supplied (Rocker, 2017).
HCO3 (22-26) = 28.5 ↑
- The kidneys compensate for the imbalance of blood gases caused by chronic hypoxia by retaining bicarbonate (Capriotti, 2020).
D-dimer (0-250) - 273 ↑
- Increased D-dimer is an inflammatory marker for the progression of COPD (Zhang et al., 2016).
CXR: Heart size is appropriate. Lungs are clear. No pneumothorax/pleural effusion present
- CXR is indicated due to history of COPD and shortness of breath. COPD can cause cor pulmonale.
CT chest pulmonary angiogram: No evidence of pulmonary embolism/aortic dissection/aneurysm
- CTPA is indicated due to elevated D-dimer and SOB, findings consistent with possible PE. Used to rule out possible PE.

Demographic Data

Date of Admission: 10/24/21
Admission Diagnosis/Chief Complaint: COPD exacerbation
Age: 59 y/o
Gender: Female
Race/Ethnicity: White/Caucasian
Allergies: Simvastatin (muscle pain), Atorvastatin (muscle pain), Varenicline (nausea), Hydrocodone (unknown)
Code Status: Full code
Height in cm: 172.5 cm
Weight in kg: 78.100 kg
Psychosocial Developmental Stage: Generativity vs. Stagnation
Cognitive Developmental Stage: Formal operations
Braden Score: 20
Morse Fall Score: 45
Infection Control Precautions: Standard

Admission History

A 59 y/o female was presented to the ED on Sunday (10/24/21) complaining of shortness of breath associated with COPD exacerbation. The patient reported that shortness of breath started on Thursday and has progressively worsened. The patient reported tightening of the chest and air hunger accompanied by a cough and audible wheezing. The patient stated that they were compliant with their medications in COPD management; however, they found no relief as symptoms began worsening. The patient declared that they continue to smoke one pack per day and deny using oxygen at home. The patient was given DuoNeb for treatment at the ED. The patient reported that it had helped with their shortness of breath.

Medical History

Previous Medical History: HTN, CAD, COPD, GERD, hyperlipidemia, cervical atypia, chronic ischemic heart disease, fibromyalgia

Prior Hospitalizations: COPD exacerbation (8/26/21), low back pain (6/9/21)

Previous Surgical History:
Esophagogastroduodenoscopy biopsy (8/12/20), tubal ligation (unknown)

Social History: Denies alcohol use. Denies recreational drug use. Smoke cigarettes 1 pack per day since 16 y/o

Pathophysiology

Disease process:
COPD consists of chronic bronchitis, emphysema, and hyperreactive airways (Capriotti, 2020). Bronchitis is inflammation, edema, and mucus hypersecretion in the airway. Obstructing inspiratory airflow and limiting oxygenation (Capriotti, 2020). Emphysema is the overdistention of alveoli due to excess carbon dioxide leading to distended alveoli that cannot recoil (Capriotti, 2020). Chronic inflammation of the airways causes macrophage stimulation accompanied by accumulation of neutrophils, lymphocytes, and tumor necrosis factors, further damaging lung structures. Pathological changes are permanent remodeling of the pulmonary airways leading to thickening and narrowing of the lumen walls, excessive mucus, and alveolar distention leading to airflow limitation (Capriotti, 2020).
S/S of disease:
Symptoms of COPD are consistent with emphysema, bronchitis, and asthma (Capriotti, 2020). The most common symptoms are dyspnea, coughing, and wheezing. The patient was presenting these signs during admission and during the time of care. A productive cough, hypoxia, pursed-lip breathing may also be present. Symptoms of right-sided failure may develop, such as jugular venous distention, ascites, and edema may occur as hypoxia stimulates pulmonary hypertension (Capriotti, 2020). Manifestations of chronic hypoxia such as clubbing of the fingernail and a barrel-shaped chest may be present. The client did not appear to have a barrel-shaped chest; however, clubbing is present.
Method of Diagnosis:
A PFT is used to diagnose COPD. An FVC measures the total volume of air expelled out, and FEV1 measures the volume of air that expires during the first second of exhalation (Capriotti, 2020). An FEV1/FVC ratio less than 70% indicates COPD (Capriotti, 2020). A COPD assessment determines the patient's breathing ability and accompanying symptoms (Capriotti, 2020). A CBC, ABG, and blood chemistry panel are analyzed to detect any disturbances caused by airflow obstruction (Capriotti, 2020). Imaging studies such as a chest X-ray and an electrocardiogram can visualize any abnormalities of the lungs and heart caused by chronic hypoxia.
Treatment of disease:
Common pharmacological treatments for COPD are bronchodilations and long-acting anticholinergic agents (Capriotti, 2020). A short-acting bronchodilator is accepted, and a long-acting agent can be included (Capriotti, 2020). Bronchodilators stimulate smooth muscle relaxation, and anticholinergic agents work to decrease inflammation (Capriotti, 2020). The patient has prescriptions for both long-acting and short-acting bronchodilators, as well as anticholinergic agents. DuoNeb, a short-acting bronchodilator, was given to the patient for their acute bronchospasm. Non-pharmacological interventions include smoking cessation, pulmonary rehabilitation, pneumococcal, and influenza vaccination (Capriotti, 2020). The patient was encouraged to stop smoking; however, cessation did not occur, as they reported.

Active Orders

Respiratory protocol
- The patient is expected to be given inhaled short-acting beta-agonists as it is the primary treatment for acute exacerbations of COPD (Capriotti, 2020).
Continuous pulse oximetry
- The patient's chief complaint is shortness of breath due to COPD. Continuous pulse oximetry is appropriate to monitor adequate perfusion.
Cardiac monitoring
- The patient is in sinus tachycardia. Cardiac monitoring is indicated for abnormal sinus rhythms.
Ambulate as tolerated
- Frequent ambulation prevents atelectasis. Physical activity promotes pulmonary rehabilitation and encourages oxygenation and circulation.

Physical Exam/Assessment

General: Alert and responsive, A&O x4, no visible signs of distress, overall appearance was appropriate

Integument: Skin color is usual for ethnicity, supple, warm, elastic turgor, no rashes observed, no bruises observed, no wounds observed, clubbing of fingernail bilaterally, Braden score: 20

HEENT: Normocephalic, no deviation of trachea, no drainage, grey-pink tympanic membrane no drainage, symmetrical, pink conjunctiva, no septum deviation, polyps, turbinate, teeth intact, no visible dental caries

Cardiovascular: Normal S1/S2 heart sounds heard, no murmur or gallops heard, normal steady rate and rhythm, bilateral radial peripheral pulses 3+, bilateral capillary refill 3 sec

Respiratory: Respiration pattern is elevated, Anterior/posterior coarse crackles and expiratory wheeze breath sounds heard bilaterally throughout all lobes, equal lung aeration

Genitourinary: Regular diet, bowel sounds active in all 4 quadrants, last BM 10/24, no pain/masses detected upon palpation, no distention/incision/scars/drains/wounds observed, light-yellow clear urine, no pain with urination

Musculoskeletal: Nail bed pink, bilateral capillary refill 3 sec, warm skin, active range of motion, strength 4- active motion against some resistance (slight weakness), up ad lib with occasional assist,

Neurological: MAEW, PEARLA, equal strength, A&O x4, normal cognition, sensory perception appropriate, alert and responsive

Most recent VS (include date/time and highlight if abnormal): 10/25/21, 0800, BP: 131/67 mmHg, temp: 37.1 C, SaO2: 96%, RR: 22 bpm, HR: 112 bpm

Pain and pain scale used: 10/25/21, 0800, 4/10, numeric pain scale, slight throbbing headache

Nursing Diagnosis 1	Nursing Diagnosis 2	Nursing Diagnosis 3
Ineffective airway clearance related to bronchospasm as evidenced by shortness of breath and cough.	Impaired gas exchange related to abnormal breath sounds as evidenced by anterior/posterior coarse crackles and expiratory wheeze breath sounds heard bilaterally throughout all lobes.	Risk for infection related to stasis of mucus secretion as evidenced by cough and adventitious breath sounds.
Rationale The patient presented to the ED due to worsening shortness of breath accompanied by a cough. The patient was given a short-acting bronchodilator and reported enhancement in breathing.	**Rationale** Upon auscultation, adventitious breath sounds were heard throughout all lobes. Coarse crackles may indicate fluid in the lungs, and expiratory wheeze implies inflammation of the airways. Adventitious lung sounds suggest inadequate ventilation and perfusion.	**Rationale** The patient is at risk for infection as mucus begins to build up in the airways. The mucociliary escalator is impaired, causing stasis of mucus, which puts the patients at risk for illness due to the inability to remove microbes trapped in the secretions.
Interventions **Intervention 1:** Administer prescribed Guaifenesin, SABA, LABA, and corticosteroids as prescribed for symptomatic management of COPD. **Intervention 2:** Elevate the head of the bed to high fowlers position and promote turning, coughing, and deep breathing at least every hour.	**Interventions** **Intervention 1:** Implement continuous pulse oximetry. Initiate oxygen therapy if patient's saO2 falls below <92%. **Intervention 2:** Monitor patients for manifestations of hypoxia such as cyanosis, restlessness, and tachycardia Q4H.	**Interventions** **Intervention 1:** Monitor temperature closely Q4H and report any changes above 100F. **Intervention 2:** Increase fluid intake to thin and loosen mucus in the airways.
Evaluation of Interventions The patient's breathing pattern was recorded at 16 bpm. Appropriate depth was observed. Air hunger and chest tightness were not reported. Cough is diminished.	**Evaluation of Interventions** The patient's saO2 remained stable at 96%. The patient's nail bed/lips/earlobes were pink and usual for ethnicity. No signs of hypoxia were observed.	**Evaluation of Interventions** Temperatures were reported at 98.6F. Fever was not present during the time of care, indicating no signs of impending infection. The patient increased fluid intake to thin out and loosen mucus allowing them to expectorate secretions.

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