Week 3 Case Study Template

Chief Complaint

A.C., is a 61-year old male with complaints of shortness of breath.

History of Present Illness

A.C. was seen in the emergency room 1 week ago for an acute onset of mid-sternal chest pain. The event was preceded with complaints of fatigue and increasing dyspnea for 3 months, for which he did not seek care. He was evaluated by cardiology and underwent a successful and uneventful angioplasty prior to discharge. Despite the intervention, the shortness of breath has not improved. Since starting cardiac rehabilitation, he feels that his breathlessness is worse. The cardiologist has requested that you, his primary care provider, evaluate him for further work-up. Prior to today, his last visit with your practice was 3 years ago when he was seen for acute bronchitis and smoking cessation counseling.

Pathophysiology & Clinical Findings of the Disease

1. Are the spirometry results consistent with obstructive or restrictive pulmonary disease? What is the most likely pulmonary diagnosis for this patient?

   The spirometry results are consistent with obstructive pulmonary disease since the patients forced expiratory volume in 1 second (FEV1) is decreased as seen in obstructive pulmonary disease, the normal range is >80%. Also the patient's FEV1/FVC ratio is less than 70% at a pre-bronchodilator prediction of 69% and a post-bronchodilator prediction of 64%. The TLC is 125 and the qualifications for Obstructive pulmonary disease has a TLC range that is considered normal at >120% (Van Dijk, W., Tan, W., Li, P., Guo, B., Li, S., Benedetti, A., & Bourbeau, J., 2015). The most likely pulmonary diagnosis for this patient is chronic obstructive pulmonary disease.

2. Explain the pathophysiology associated with the chosen pulmonary disease.

   Individuals who are diagnosed with chronic obstructive pulmonary disease experience the symptom of shortness of breath because they have difficulty exhaling all the air from their lungs. This is caused by the airway narrowing inside of their lungs due to damage to their lungs, therefore exhaled air is more slowly expelled. After fully exhaling, the individual will still have an abnormally higher amount of air left lingering in their lungs (Asp, K. C., 2020). COPD is a mixture of small airway diseases like obstructive bronchiolitis and emphysema and may differ between patients depending on their history, risk factors and exposure to

pollutants. Chronic inflammation causes structural changes which narrow the airways causing limitation to airflow and mucociliary dysfunction (Global Initiative for Chronic Obstructive Lung Disease, 2018).

3. Identify at least three subjective findings from the case which support the chosen diagnosis.

   One subjective finding from the case which supports the diagnosis of COPD is that the patient has a 35 pack-year smoking history. The second subjective finding is that the patient complains of dyspnea with exertion. Lastly, the patient states he has a non-productive cough in the morning.

4. Identify at least three objective findings from the case which support the chosen diagnosis.

   One objective finding from the case which supports the diagnosis of COPD would be the assessment of + Bilaterally wheezes noted with forced exhalation along with a prolonged expiratory phase. The second objective finding would be the results of the chest x-ray showing the patients lungs appearing hyper-inflated bilaterally with a flattened diaphragm, consistent findings with COPD. Lastly, the third objective findings from the case which support the diagnosis would be the spirometry results which was thoroughly discussed in detail in question one regarding the patients values for FEV1, FEV1/FVC and TLC.

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Management of the Disease

**Utilize the required Clinical Practice Guideline (CPG) to support your treatment recommendations.*

1. Classify the patient's disease severity. Is this considered stable or unstable?

   According to the GOLD standard, Table 2.4 displays the classification of severity of airflow limitation. The patient's disease severity is considered "GOLD 2 – Moderate" since the patients predicted FEV1 is 64% pre-bronchodilator and 66% post-bronchodilator which is <80% and >50% (Global Initiative for Chronic Obstructive Lung Disease, 2018). Considering the patient's spirometry results, assessment and symptoms, the patient's condition is considered stable.

2. Identify two (2) *"Evidence A"* recommended medication classes for the treatment of this condition and provide an example (drug name) for each.

   The following medication classes are recommended for the treatment of stable COPD as mentioned on the Global Initiative for chronic Obstructive Lung Disease report 2018. Examples are included:

   a) Inhaled bronchodilators

      Short-acting beta-agonists (SABA): albuterol, levalbuterol

      Short-acting muscarinic antagonist (SAMA): ipratropium, tiotropium

   b) Inhaled Corticosteroids: budesonide, fluticasone propionate

3. Describe the mechanism of action for each of the medication classes identified above.

   Short-acting beta-agonists (SABAs) have the shortest half-life and are utilized for immediate symptomatic relief as opposed to long-acting beta-agonists (LABAs). The SABAs have the greatest effect on the smooth muscle of the airway, uterus,

intestine and systemic vasculature. The mechanism of action includes the activation of B adrenergic receptors which relax the smooth muscle in the lung and dilate the opening of the airways. There have also been claims that beta-2 agonists have anti-inflammatory effects in the smooth muscle by the lowering of intercellular adhesion molecules, reduction of granulocyte-macrophage colony-stimulating factors, mast cell stabilization and prevention of inflammatory pathways (Hsu, E., & Bajaj, T., 2020). Short-acting muscarinic antagonists (SAMAs) are considered anticholinergics which block the activity of the muscarinic cholinergic receptors which produces mydriasis and dilation of the bronchioles, increases heart rate, and prevents secretions. The muscarinic receptor is a protein that transmits signals through parts of the nervous system and the antagonists work against the transmission from occurring (Duke, J., 2021). Lastly, inhaled corticosteroids prevent airway inflammation due to the anti-inflammatory effects of corticosteroids. When the corticosteroids enter the body's cell cytoplasm it binds to the inactive glucocorticoid receptor complex and also binds to DNA and promotes the synthesis of anti-inflammatory process which prevents the synthesis of proinflammatory responses. Corticosteroids inhibits the number of T lymphocytes, eosinophils, mast cells and dendritic cells in airways (Global Initiative for Chronic Obstructive Lung Disease, 2018).

4. Identify two (2) "*Evidence A*" recommended <u>non-pharmacological treatment</u> options for this patient.

For "Evidence A" the first recommended non- pharmacological treatment option for a patient with stable COPD would be participation in pulmonary rehabilitation which would assist in improving dyspnea, health status and exercise tolerance in stable patients. The second recommended non-pharmacological treatment option for a patient with stable COPD would be considered, "Interventional therapy in stable COPD" which includes, lung volume reduction surgery which may improve survival in patients with severe emphysema with an upper-lobe emphysema and low post-rehabilitation exercise capacity (Global Initiative for Chronic Obstructive Lung Disease, 2018).

References

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