Task 1

Chronic Obstructive Pulmonary Disease (COPD) occurs when there is a persistent limitation of airflow caused due to a chronic inflammatory condition in the airways of the lungs in response to gases and noxious particles. A COPD exacerbation occurs when there is a sudden change in the patient's respiration as compared to baseline and requires a change of medications (Vestbo et al., 2013).

Exacerbations of COPD usually occur in response to either viral or bacterial respiratory infections, or exposure to environmental pollutants. The pathophysiology of COPD exacerbations is characterised by pulmonary embolism and deep venous thrombosis, and sometimes, systemic inflammation. There is often an increase in the levels of interleukin-6, D-dimer, von Willebrand's factor, and prothrombin fragment as they are significant markers of inflammation. During a COPD exacerbation, the body is in a prothrombotic and proinflammatory state, along with demonstrating clotting activation and endothelial damage (Qureshi et al., 2014).

The pathophysiologic changes in the lungs may sometimes be severe, causing the patient to require hospitalization and mechanical ventilation. Some of the characteristic changes include an increase in airways resistance, worsening airway inflammation, increased respiratory loads, and weakness in the inspiratory muscles. The use of accessory muscles for breathing is maximal and thoracoabdominal dysynchrony is seen. Fatigue of respiratory muscles leads to a decrease in the muscle force, and an exacerbation may quickly proceed to an acute respiratory failure. Other characteristic features of a COPD exacerbation are hypoxaemia, acidaemia, and carbon dioxide retention (Pavord et al., 2016).

One of the most common risk factors for acute exacerbation of COPD is respiratory infections by viruses or bacteria such as *Streptococcus pneumoniae*, *Haemophilus influenzae*, and *Moraxella catarrhalis*. The next most important risk factor for COPD exacerbation is smoking which negatively affects lung function and puts the individual at a higher risk for exacerbation of symptoms. Exposure to environmental pollutants is also a risk factor and the most dangerous pollutants are sulphur dioxide, ozone, carbon monoxide, and particulate matter. Apart from these, a history of prior exacerbations and seasonal variations also contribute to the risk of an acute COPD exacerbation in the patient. Other co-morbid conditions such as asthma, cardiovascular disease, bronchiectasis, gastroesophageal reflux disease, mental disorders, pulmonary embolism, diabetes, obstructive sleep apnea syndrome, skeletal muscle weakness, and chronic kidney disease all increase the likelihood of a COPD exacerbation. Finally, the patient's age and BMI also contribute to the risk of exacerbation of COPD symptoms in the patient (Hogea et al., 2020).

Considering the patient's past medical history, she is a heavy smoker, obese, and has diabetes, and hypertension, all of which are significant risk factors for COPD exacerbation. Out of these, smoking and obesity are modifiable through lifestyle changes, which can reduce the risk of future COPD exacerbations in the patient.

Task 2

Nursing Care Plan: Mrs. Amity Purple

Nursing problem: Acute Pain			
Related to: COPD exacerbation, dyspnea, hyperinflation, airway inflammation			
Goal of care	**Nursing interventions**	**Rationale**	**Evaluation**
To manage acute pain with the use of analgesics, so that the pain has a minimal effect on the patient's quality of life	Administration of an appropriate dosage of analgesics until required	Pain is reported in COPD exacerbations in up to 70% of the patients and it may affect the physical as well as mental quality of life. Therefore, its early management is essential for good prognosis of the condition (Maignan et al., 2019).	Use of a pain scale to assess the pain in the patient at regular intervals of time
Nursing problem: Risk of impaired gas exchange (Hypoxia)			
Related to: Shortness of breath in COPD exacerbation, inability to take in enough air in the lungs, reduced oxygen reaching the cells and tissues of the body			
Goal of care	**Nursing interventions**	**Rationale**	**Evaluation**
To administer supplemental oxygen to prevent the adverse effects of prolonged	Administration of oxygen therapy at moderate concentrations with continual monitoring of oxygen saturation level in the patient	A COPD exacerbation results in progressive airflow limitation, thereby lowering the amount of oxygen that reaches the cells of the body. This can cause a disruption in gas	The oxygen saturation level should increase from 89% to at least 95% and the respiratory rate should decrease from 26 to 20 or below.

hypoxia in the body; to raise the oxygen saturation level of the patient from 89% to at least 95% and reduce her respiratory rate to below 20		exchange resulting in hypoxemia. Therefore, it is important to reverse this state immediately (Kent et al., 2011).	
Nursing problem: Anxiety			
Related to: Fear of the progress of symptoms and possibility of impending death during a COPD exacerbation episode			
Goal of care	**Nursing interventions**	**Rationale**	**Evaluation**
To relieve symptoms of anxiety, panic, hopelessness, confusion, and fear in patients	Providing comfort and reassurance to the patient Motivating and encouraging the patient for a better prognosis Considering cognitive behavioural approaches if the anxiety worsens	Anxiety is reported in around 62% of patients experiencing an exacerbation, and this can worsen the prognosis of the symptoms. Also, anxiety is considered an important risk factor for requiring hospitalization for COPD exacerbation. Therefore, it needs to receive prompt attention through effective strategies (Halpin et al., 2015).	Visible improvement in symptoms of panic and anxiety in the patient; the patient appears calm, relaxed, and comfortable; does not appear confused or afraid

Task 3

Discharge Planning Item 1

One of the most important ways to prevent the progression and exacerbation of COPD is through smoking cessation. Reducing smoking has been linked with reduction in the risk of developing pulmonary conditions, reduction in the rate of requiring hospitalization due to an acute exacerbation, and a decline in the forced expiratory volume (Yoo, 2015). Statistically, around 20% of all smokers develop COPD, which also makes them susceptible to lung cancer, COPD exacerbation, and cardiovascular diseases. Studies have shown that even in the absence of pharmacological treatment, smoking cessation alone can halt the decline of lung function, thereby improving the prognosis of lung diseases (Warnier et al., 2013). Mrs. Amity Purple is a heavy smoker, stating that she smokes 20 cigarettes in a day. This is the most important reason for a decline in her pulmonary function, and reducing and eventually eliminating smoking will help her avoid respiratory problems in the future.

In order to encourage the patient to cease her smoking habit, an active educational and awareness program needs to be delivered with a specific focus on how it can help alleviate her COPD symptoms, and enable her to lead a longer and healthier life. Based on her situation, providing the financial aspect of saving costs in the hospital as well as on long-term medications can prove a positive motivating factor. According to the results of one study, informing the patient about her lung age based on her spirometry results will also help in motivating her to quit smoking (Yoo, 2015).

Discharge Planning Item 2

Another proven method to prevent the chances of a COPD exacerbation in the future is the regular use of long-acting bronchodilators. These medications have been shown to reduce the rate of a COPD exacerbation by up to 20% (Wedzicha et al., 2012). This is because bronchodilators help in reducing dynamic hyperinflation which can result in breathlessness in patients with severe COPD. Some examples of bronchodilators are tiotropium once a day and salmeterol twice a day; tiotropium has been shown to be a better preventer of COPD exacerbations as compared to salmeterol (Vogelmeier et al., 2011). A better strategy for the prevention of COPD exacerbations and improvement of lung function has been shown to be the combination of 2 long-acting bronchodilators. However, the exact patient profile that can benefit from this type of treatment has not been identified yet. When prescribing long-

acting bronchodilators, it is important to note that they may not have an effect on the frequency of exacerbations; however, they work by reducing breathlessness and increasing the threshold at which a patient might require emergency care services (Vestbo and Lange, 2015).

In addition to smoking cessation, the patient needs to be educated on the need for bronchodilators in her case, and its usefulness in preventing future exacerbations of her COPD. Her education should include the risk of progression of her COPD potentially leading to lung cancer and even death. Her physician needs to be consulted for including a suitable long-acting bronchodilator in her prescription considering risk factors and contraindications.

Task 4

Salbutamol

Salbutamol is a short-acting beta agonist and is considered to be the primary therapy for acute COPD exacerbations, exercise-induced asthma, and intermittent asthma. It works by relaxing the smooth muscles of the airway, increasing airflow in the lungs, and providing quick relief of acute symptoms. It is usually inhaled, which allows it to selectively activate beta-2 receptors present on bronchial smooth muscle cells so that effective bronchodilation may be achieved (Ullmann et al., 2015).

The patient has been prescribed this medication for management of her COPD symptoms such as cough, wheezes, tightness in the chest, and shortness of breath. She has been advised to take this medication as needed especially when she senses a severity in her symptoms. One problem with this medication can be its overuse or misuse, which if done regularly may cause a downregulation of beta receptors. Also, if the patient uses this medication too frequently, then it is indicative of poor control of her COPD symptoms and changes in her pharmacological management regimen must be considered. Therefore, the patient needs to be educated on its benefits and potential disadvantages before prescribing it for management of her COPD.

Amoxycillin

Amoxycillin belongs to the family of Penicillins, and is a beta-lactam antibiotic. It is an anti-bacterial medication used against a wide range of both Gram positive and Gram negative bacteria. It acts as a bactericide by inhibiting the biosynthesis of mucopeptide in the bacterial cell walls (Kaur et al., 2011). Amoxycillin, among other antibiotics, is widely prescribed for COPD patients to prevent acute bacterial respiratory infections that could

lead to an exacerbation of COPD symptoms. In COPD patients who acquire a respiratory bacterial infection, the bacteria can move to the lower airways and lead to acute inflammation, thereby resulting in an exacerbation of COPD. If the patient is already on an anti-bacterial medication, the drug combined with the patient's immunity can fight the infection eliminating a potential exacerbation and subsequent hospitalization (Brusse-Keizer et al., 2015).

The patient has been prescribed amoxycillin as a preventive measure for COPD exacerbation by preventing bacterial infections of the respiratory tract. This is intended to eliminate one of the major causes of COPD exacerbations thereby reducing the chances of such an episode and hospitalization in the future. However, it should be kept in mind that amoxycillin is a potential candidate for antibiotic resistance in patients and regular testing needs to be undertaken in the patient for testing the sensitivity of this medication against common respiratory bacterial pathogens. Also, it should be confirmed with the patient that she has not previously experienced an allergic or anaphylactic reaction to the beta-lactam group of antibiotics before prescribing this medication (Shenoy et al., 2019).

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