
Pathophysiology Of Asthma

Asthma is a spasmodic contraction of the smooth muscle in the walls of the smaller bronchi and bronchioles and an enduring condition, which causes occasional breathing difficulties of a person and one of the major reasons behind poor health among the children and the adults that affect their quality of life (Crowley, 2013). According to Foundation, (2018), 8 million people - over 12% of the population – have been diagnosed with asthma. This essay attempts to demonstrate the pathophysiology and key clinical presentations of asthma by considering the case study scenario of Carol, a 22 years old Caribbean lady, who was diagnosed with asthma when she was 5 years old is currently prescribed an inhaled corticosteroid (equivalent to 800mcgs beclomethasone daily). She is admitted into theatres for laparoscopic operation. Later, the essay would also focus on the role of the ODP in providing relevant care during post-operative to the patient considering the present HCPC practices and NICE guidelines.

In asthma, airflow restriction is recurrent due to multiple changes within the airway of the affected individuals. It is believed to be a disease of chronic inflammation of the bronchial surface, and it is this chronic inflammation that appears to play a major role in the activity of the airway. Recognised triggers include physical exertion, allergens, medication, occupational infection, emotions and stress. As mentioned in the case study, shortness of breath is one of the most common clinical manifestations of asthma. Narrowing down of airway or bronchoconstriction is a major physiological event in asthma that affects the subsequent airflow. Contraction of the bronchial smooth muscles occurs rapidly that further narrows down the airways while exposing to various stimuli that include irritants or allergens. Mast cells of the immune system, found in loose connective tissue, when triggered by a substance or mechanism releases vasoactive chemical mediators, including, histamine, bradykinin, leukotrienes, cytokines, and prostaglandins. These mediators contract the airway smooth muscle directly (NHLBI, 2007). Neutrophils, lymphocytes, and eosinophils infiltrate the cells of the bronchial lining through chemotactic chemical mediators released from mast cells. These target the respiratory system and cause bronchoconstriction, vascular congestion, vasodilation, increases in capillary permeability, mucosal oedema, impaired mucociliary action, and increased mucus production, which leads to an increase in airway resistance. Plugging of mucus can also occur in the smaller bronchioles. These changes are difficult to manage with usual treatments. Inflammation plays a crucial role in the pathophysiology of asthma. The inflammation of the airways involves the interaction of multiple cell types and mediators and subsequently, gives rise to the characteristics of asthma: airway restriction and bronchial inflammation cause repeated incidents of wheeze, cough and thereby, shortness of breath (Kudo, et al., 2013). Han, et al., (2018) harangued that the outline of inflammation does not depend upon the sternness, duration and persistence of the disease nonetheless, the response of structural cells and cellular profile are rather stable. Thus, shows the evident that activation of mast cells provisions secretions of bronchoconstriction mediators like prostaglandin D₂, cysteinyl-leukotrienes and histamine. Allergen activation takes place through high-affinity IgE receptors and sensitized mast cells are activated by the osmotic stimuli due to exercise-induced bronchospasm. Larsson, et al., (2011) stated that elevation in the number of mast cells is linked with airway hyper-responsiveness. In the presence of a smaller number of allergens, mast cells could release good number of cytokines in order to change the adjacent of the airways and increase inflammation. Cytokines modify and direct inflammatory responses in asthma and thereby,

determine its intensity. Helper T cell 2 (Th2) derived cytokines, especially the IL-5 is necessary for the survival and differentiation of the eosinophils, IL-4 and IL-3 are important for the cell differentiation and IgE formation respectively. Other major cytokines like the tumour necrosis factor- α and IL-1 β intensify the inflammatory response that prolong the survival of the eosinophil within the airways (Lumb, 2017). These pathophysiological factors produce the typical clinical presentation of asthma, including wheezing and respiratory distress which the author will now discuss the signs and symptoms of asthma in the following paragraph.

As mentioned earlier, this patient can suffer common symptoms include coughing, especially at night, wheezing, shortness of breath, and chest tightness, pain or pressure. Still, not everyone with asthma has the same symptoms in the same way. Symptoms are experienced when the airway tightens, inflame, or fill with mucus. Severe attacks are less common, but last longer and require medical help whereas, mild asthma attacks are generally more common. Recognising signs such as loss of breath, feeling tired, easily upset or moody, decrease or changes in lung function as measured on a peak flow meter can help avoid asthma attack on this patient. Treating Carol with medicines such as aspirin or other nonsteroidal anti-inflammatory drugs and nonselective beta-blockers might cause a trigger (NHLBI, 2014). This patient has a condition and has undergone surgery. Volatile and anaesthetic agents including drugs were administered, so managing asthma can be harder sometimes. Examples of conditions that can hinder the treatment and management includes a runny nose, sinus infection, reflux disease, psychological stress and sleep apnoea. Such conditions need treatment as part of an overall asthma care plan.

It is important to have asthma symptoms under control to decrease the risk of bad reactions because surgery can be very challenging for the human body. Pain is usually inevitable in asthmatic patients after surgery and may cause many days of grief. It is advisable to discontinue pain medication such as Ibuprofen as soon as possible after a procedure (Levy & G, 2001). This patient can get an asthma attack anytime since the whole process is nerve-racking, hence the need to monitor symptoms closely all the time. Under 2% of cases of bronchospasm occurs during general anaesthesia and most likely during induction. Asthma is not thought to increase the risk of post-operative pulmonary complications significantly. However, for some procedures poorly controlled asthma associated with significant coughing can lead to increased postoperative risks such as the increased risk of wound re-opening. Thorough evaluation before surgery is vital to perform a history, physical exam, and review recent medical use. If found that asthma is not optimally controlled it may require that any elective, non-emergent surgery be postponed. If still not sure a peak expiratory flow rate test is performed. 80% is predicted good, one-time peak flow test is not considered optimal. For higher-risk procedures of upper abdominal, thoracic or cardiac surgery, FEV1 (spirometry) is used for monitoring. An FEV1 of greater than 80% of predicted generally indicates good asthma control. Carol can opt-in for regional anaesthesia instead of general. The main benefit of regional is that it avoids the potential risk for airway complications when the airway is manipulated. Intensive treatment before surgery with a short dose of steroids and other treatment is prescribed for not optimally controlled asthma. In the event this patient is already on chronic oral steroids and having needed oral steroids in the last six months, IV steroids should be administered during procedure (Bass, 2015).

ODP play a crucial role in managing symptoms of this patient in order to alleviate the disease complication. Occurrence of depression with asthma in women like this patient is very common, and can influence behavioural factors, such as treatment compliance, self-assessment, and

management of environment triggers, that can collectively result in poor asthma management and control (Frieri, et al., 2015). To achieve that the ODP should understand the pathophysiology of the illness and have an insight of patients' developmental stage, age and other related factors that would help them to offer individualized care or patient-centred care. This requires tremendous social and psychological support and ODP play a crucial role in this regard by ensuring patients' privacy while providing healthcare and respect their ethnical identity (Health, 2017). A study by Lin, et al., (2016) showed that patients with asthma had higher risk of post-operative pneumonia, septicemia, and urinary tract infection when compared with non asthmatic patients. Post operative adverse events are significantly increased among surgical patients with asthma who have pre-operative emergency visits, hospitalisation, or ICU stay. Appropriate skilled personnel should be provided to ensure that the patient is suitably recovered and sufficiently stable to be safely cared for after discharge. The NCEOPD, (2011) report found that patients whose condition was deteriorating were not always identified and referred to a higher level of care. Carol is at risk of clinical deterioration, and it is vital that it is minimised through knowledge and understanding of the key areas of risks and local policies (NICE, 2012). The ODP can track and trigger early sign warnings by checking the patient's pulse and respiratory rate, systolic blood pressure, temperature, and level of consciousness. Additional monitoring may include pain assessment, capillary refill time, percentage of oxygen administered, oxygen saturation, central venous pressure, infusion rates, and hourly urine output. Because this patient has undergone surgery, observing signs of haemorrhage, shock, sepsis and the effects of analgesia and anaesthetic. It is therefore imperative to manage this patient's pain, to ensure that the patient has adequate analgesia but is alert enough to communicate and cooperate with clinical staff during their postoperative stay (Wilson, 2006). Recording of signs and assessments is vital inline with guidance for record keeping (NHS, 2017). In case this patient suffers an asthma attack, supplementary oxygen, repeated inhaled bronchodilator and systematic corticosteroids is the mainway of treatment during the acute attack. Further treatment requirements and hospital admission is determined by the response to treatment. Patient with features of potentially life threatening who are not responding to treatment, or those with features suggesting that they are imminent risk of death, should be admitted to ICU or HDU. Ward admission is recommended if this patient's repeated bronchodilator treatment does not increase the FEV1 to >50-60% predicted, or if clinical features of severe asthma persists. Hospitalization positively and negatively affect both the adult and family. Positive side of hospitalization is that it promotes patient care and make people understand why seeking medical advice is important. Alternatively, hospital admission could increase stress on individuals, inadequate support of which could affect the quality of life of the patient and their family members A doctor or ODP should remain with this patient after initial treatment has started, or until clear improvement is noted. When an improvement is achieved, the emphasis shifts to investigation of the causes and circumstances of the severe attack, and arrangements are made for management. Following discharge, longterm treatment, the institution of a self-management plan and appropriate follow-up arrangements are made (Hodder, et al., 2010).

It is crucial that doctors address the problems that may have led to an asthma attack before discharging the patient. This is because this patient is considered high risk patients who have poor self-management and often have inadequate medical follow-up in the community. Prescription of regular inhaler corticosteroids and that their inhaler technique is intact should be checked prior to discharge. Arrangements should be made for medical follow up both with the GP and with the respiratory specialist in the case of life-threatening asthma (WebMD, 2018).

Communication theory, theories of integrated care and cognitive theory are considered good for this patient. Persuasion-Communication Model is deemed good for this patient because it presents a stepwise model of persuasion: exposure to a message, attention to that message, comprehension of the arguments and conclusion, acceptance of the arguments, retention of the content and attitude change. Both the patient and the healthcare staff are important factors in the source of the message and the recipient. Communication is vital as mentioned in the theory because it allows the patient to have a voice regarding their treatment (Cummings, et al., 2017). Theories of integrated care stress the radical or gradual redesign of the steps in providing care. For this patient, it includes collaborations of care providers, allocating tasks differently, transferring information more effectively, scheduling appointments and contacts more efficiently, and using new types of health professionals. Cognitive theory helps the ODP and other medical personnel to make rational decision if in order to provide optimal care, professionals must consider and balance the advantages of different alternative behaviours of the patient. Such theories regard the provision of convincing information about risks and benefits and pros and cons as crucial to performance change. This shows that the patient could take their own life decisions and thereby, they need to be involved in their care plan (Grol, et al., 2007). This plan, however, can be deterred when the patient is stressed due to pain or the stress of depending on other people. This could be sometimes life-threatening as they are still recovering from the operation. A prominent example in this context would be pressure to smoke, alcohol consumption and substance misuse that affect the health of the adults to a greater extent. It is evident that adults who are affected by asthma at a rate of 30-35% are cigarette smokers worldwide (AAAAI, 2018). Hence, it could be mentioned that Carol should be educated by a care professional, who could teach her about how asthma is affecting her health and encourage her for smoking cessation.

Person-centred care is also important while caring for this patient. This is because it makes the patient feel free from threat, both physically and psychologically. This type of approach is effective as it includes partnership building among the care professionals. This can only be achieved when there is a deep understanding, genuine, and acceptance in the relationship. This technique relies only on the personal qualities of the ODP/patient to build a non-judgemental and empathetic relationship (BAPCA, 2018).

There is no known asthma diet, because there are no foods that has been identified for reduce of airway inflammation. However, a good diet is important part of overall asthma treatment plan. Obesity is associated with severe asthma, so a regular exercising regime and healthy diet is encouraged. The nutritionist could develop proper diet chart for the asthma affected patient that would boost their immunity power and save them from rapid weight loss by rejuvenating body cells (WebMD, 2018). While individuals are living with an enduring disease, it is the healthcare professionals' responsibility to teach them with coping mechanisms so that they have survive well for the rest of their lives without compromising the quality of their life.

In conclusion, it could be mentioned that Asthma is a chronic respiratory illness that affect the health and wellbeing of affected individuals, which currently has no cure. Research into this area is important. But likewise, it is important to try and see if there are ways to prevent children and adults getting asthma in the first place. The health care professionals should be supportive and help these patients to entree adequate care interrelated resources to meet their healthcare needs to a greater extent. The care professionals should provide culturally competent care and maintain equality in the healthcare system. The care professionals should make adult patients and their family members understand the importance of person-centred care that could help

them to maintain their health and wellbeing throughout their lives. As, a patient that has undergone surgery phase, they should be provided with additional guidance and care so that they are not feel deprived and wound infection, while affected with a long-term illness. With the help of Cognitive and communication theory, this essay has strikingly illustrated the relevant aspects of care for asthma. In the meantime, research needs to concentrate on controlling asthma attacks which still kills people on a daily basis.