Student: Neringa Kairiene

Student number: 2435673

Module Code: BMHP5023

Title: Introduction to Physiology

Assignment title: Case Study Report: Asthma

Lecture: Robert Nartowski

Table of Content

Introduction.....3

Anatomy and Physiology.....4

Pathophysiology and Impact of Asthma.....4

Monitoring and data Use.....5

Evidence-Based Lifestyle Recommendations.....6

Conclusion.....8

Reference List.....9

Introduction

Asthma is a long-term respiratory condition that affects the airways and can make breathing difficult. The condition causes inflammation and narrowing of the airways, which can reduce airflow to the lungs. Common symptoms include wheezing, coughing, chest tightness and shortness of breath (NHS, 2021). In the UK asthma remains a significant public health concern , because it affects people of all ages. Although there is no cure for asthma, many people are able to control their symptoms through medication, regular monitoring and self-management (Asthma and Lung UK, 2023).

There are several factors that can increase the risk of developing asthma. These include a family history of asthma, childhood respiratory infections, air pollution, tobacco smoke and exposure to allergens such as dust mites, pollen and pet fur (WHO, 2023). Lifestyle factors can also have an impact. For example, smoking and vaping may irritate the airways and make symptoms worse. Understanding these risk factors can help individuals reduce exposure to triggers and manage their condition more effectively.

This report examines the physiology of asthma and its effects on the respiratory system. It describes the structure and function of the respiratory system and explains the processes involved in breathing and gas exchange. The report also discusses how airway inflammation can affect normal respiratory function. In addition, it explores the importance of peak flow monitoring and provides evidence-based recommendations to support effective asthma management.

Section1: Anatomy & Physiology

The respiratory system is in charge of eliminating carbon dioxide from the body and delivering oxygen. It is composed of many structures that cooperate to facilitate breathing. Air travels through the pharynx, larynx, and trachea after entering the body by the mouth or nose. After then, the trachea splits into two bronchi, which transport air to the lungs. The bronchi split into smaller tubes known as bronchioles inside the lungs. These result in alveoli, which are microscopic air sacs where gas exchange occurs (Tortora and Derrickson, 2023). The alveoli, which are encircled by tiny blood vessels known as capillaries, are where gas exchange occurs. Oxygen enters the alveoli during breathing and diffuses into the circulation. After then, the oxygen attaches itself to red blood cells and is carried throughout the body. Carbon dioxide enters the alveoli from the blood at the same moment. The body expels carbon dioxide as it exhales. Because it eliminates waste carbon dioxide and provides oxygen to the body's tissues, this procedure is crucial (Tortora and Derrickson, 2023).

Mechanical respiration is the process by which breathing takes place. The diaphragm contracts and descends during inhaling. The chest is raised simultaneously by the contraction of the intercostal muscles between the ribs. Air is drawn into the lungs as a result of the increased space inside the chest cavity. The diaphragm and intercostal muscles relax when you exhale. Air is forced out of the lungs as the chest cavity shrinks (Marieb and Hoehn, 2019).

Breathlessness is a possible symptom of asthma. Your airways narrow as a result of the tense muscles surrounding them. Breathing in oxygen and exhaling carbon dioxide becomes more challenging as a result. The airways also swell and produce a lot of mucus during an asthma attack. Chest tightness, coughing, and wheezing may result from this further reduction in airflow (NHS, 2021).

Section 2: Pathophysiology & Impact of Asthma

Asthma is a long-term inflammatory disease of the airways. Asthma sufferers' airways are more vulnerable to allergens, smoking, air pollution, and respiratory infections. The body's immune system reacts to these triggers by inflaming the airways. The inflammation causes the walls of the airways to swell and become more sensitive than usual (GINA, 2024).

5The muscles around the airways may constrict as inflammation progresses. We call this process bronchoconstriction. The airways may also produce too much mucus at the same

time. There is less room for ventilation when oedema, mucus production, and muscular stiffness are combined. Breathing becomes more difficult as a result, and symptoms such coughing, wheezing, chest tightness, and shortness of breath may manifest (NHS, 2021).

Normal respiratory function can be significantly impacted by airway inflammation. Less air may enter the alveoli, where gas exchange occurs, as the airways narrow. This could make physical exertion more challenging and lower the amount of oxygen entering the bloodstream. Some people may feel dyspnoea or fatigue more quickly when exercising. An asthma attack brought on by severe inflammation necessitates immediate medical attention.

One of the main things that can exacerbate asthma symptoms is smoking. Hazardous substances found in cigarette smoke irritate the lungs and cause inflammation. Additionally, smoking might lessen the effectiveness of asthma treatment, making it harder to manage symptoms. Long-term declines in lung function and frequent asthma flare-ups are more common in smokers (Asthma and Lung UK, 2023).

Among teenagers and young adults, vaping has grown in popularity. Vaping can still irritate the respiratory system even though it is frequently marketed as a safer option than smoking. Chemicals included in e-cigarette vapour may exacerbate asthma symptoms in certain people and cause airway inflammation. Because of this, medical specialists recommend that individuals with asthma refrain from smoking and vaping whenever feasible (WHO, 2024).

Asthma is frequently triggered by respiratory illnesses, including the common cold, influenza, and other viral infections. These illnesses can exacerbate asthma symptoms by increasing respiratory tract inflammation. People may have more coughing, wheezing, and dyspnoea during an infection. Regular asthma reviews and effective infection control strategies can significantly lower the likelihood of problems.

In general, respiratory infections, smoking, vaping, and inflammation can all impair lung function and make managing asthma more challenging. Improving asthma control and lowering the chance of recurrent exacerbations require an understanding of these factors (GINA, 2024).

Section 3: Monitoring & Data use

An essential component of managing asthma is keeping an eye on respiratory function. It aids both patients and medical professionals in understanding how well asthma is managed and spotting any changes in symptoms. Peak flow meters are among the most widely used

monitoring instruments in asthma treatment. The speed at which a person may exhale is measured by this apparatus. The peak expiratory flow (PEF) reading is the outcome (NHS, 2021).

Monitoring peak flow on a regular basis can help identify early indicators of deteriorating asthma. A decrease in peak flow measurements could be a sign of narrowing or inflammation of the airways. This may happen prior to the onset of serious symptoms. Early detection of these changes enables treatment to be examined and modified as needed. This could lessen the need for emergency medical care and potentially avoid asthma attacks (GINA, 2024).

People can see trends in their condition by tracking peak flow data over time. For instance, they might observe reduced readings following exposure to air pollution, allergens, respiratory illnesses, or cigarette smoke. Knowing these triggers might help people avoid situations that could exacerbate their symptoms and promote greater self-management.

Peak flow records can be used by medical practitioners in addition to drug reviews and symptom diaries. This data supports person-centred care and offers a more comprehensive understanding of asthma control. Precise monitoring can enhance patient-provider communication and help manage asthma more successfully (Asthma and Lung UK, 2023).

An essential component of treating asthma is keeping an eye on respiratory function. Frequent peak flow measurements assist people better manage their disease, enable early intervention, and offer important information regarding lung function.

Section 4: Evidence-Based lifestyle Recommendations

Stop smoking or vaping.

The best thing you can do for your lungs and general health if you smoke is to quit. You can find ways to make it easier with the assistance of your chemist and healthcare provider. Because they irritate and inflame the airways, smoking and vaping can exacerbate asthma. Increased mucus production and airway narrowing may result from this, making breathing more difficult. Smokers frequently have more asthma attacks and symptoms. E-cigarettes can still irritate the lungs and cause asthma symptoms, despite the fact that many young people believe vaping to be safer. Because of this, quitting smoking and vaping can help manage asthma and promote better respiratory health (NHS, 2024).

Additionally, studies reveal that quitting smoking can eventually improve lung and lessen asthma symptoms (CDC, 2024).

Keeping active.

Frequent exercise makes your muscles and lungs stronger and more effective. Maintaining an active lifestyle can improve your quality of life and lessen the symptoms of lung conditions.

People with asthma can better control their disease by being active. Frequent exercise strengthens the respiratory muscles and improves lung function. Additionally, it can enhance general fitness and wellness. Exercise may lessen asthma symptoms and enhance life quality. When their asthma is under control, the majority of patients may exercise safely (Asthma + Lung UK, 2024).

Eating well and staying a healthy weight

Maintaining a healthy diet can assist your immune system and muscles remain robust. Additionally, it can keep your lungs healthy by preventing chest infections.

Maintaining a healthy weight is also crucial. It can be more difficult for your lungs and respiratory system to function properly if you are overweight or underweight.

Additionally, asthma control can be enhanced by maintaining a healthy weight. Being overweight may put greater strain on the lungs and make breathing more challenging. Asthma symptoms can be lessened and respiratory health improved by eating a balanced diet and keeping a healthy weight (Asthma + Lung UK, 2024).

Avoiding pollution

Your lungs and airways are harmed by air pollution. It may irritate you and make breathing more difficult. Long-term exposure to air pollution raises the risk of lung diseases.

When at all feasible, people with asthma should strive to stay away from polluting environments. Asthma symptoms can be triggered by air pollution, which irritates the airways. Reducing asthma episodes and improving breathing can both be achieved by avoiding pollutants (NHS, 2024).

Air pollution can worsen asthma attack and its symptoms can be exacerbated by air pollution. Asthma control can be enhanced by avoiding polluted areas and adhering to an asthma management plan (WHO, 2024; NICE, 2024).

Conclusion

Asthma is a chronic respiratory disease that damages the airways and can make breathing challenging. Allergens, smoking, vaping, air pollution, and respiratory infections are common causes of the illness. It is crucial to comprehend how the respiratory system functions in order

to assist teenagers in realising the effects that asthma can have on their everyday lives and health.

Through gas exchange in the alveoli, the respiratory system is essential for delivering oxygen to the body and eliminating carbon dioxide. However, swelling and excessive mucus production can happen when asthma triggers cause the airways to become irritated, which reduces airflow and makes breathing more challenging. Symptoms including wheezing, coughing, and dyspnoea may result from this.

Monitoring respiratory function is an important part of asthma management. Recording peak flow readings can help identify changes in lung function and provide early warning signs of worsening symptoms. This allows individuals to seek appropriate treatment and reduce the risk of severe asthma attacks.

Asthma control is also greatly impacted by lifestyle decisions. Reducing airway irritation and inflammation can be achieved by abstaining from smoking, vaping, and air pollution. Respiratory health can be further supported by engaging in regular physical exercise, keeping a healthy weight, and avoiding respiratory infections. Attending routine asthma checkups and heeding doctor instructions can also enhance quality of life and symptom control.

All things considered, raising awareness of asthma and promoting healthy lifestyle choices can assist teenagers in better managing their illness, lowering the frequency of flare-ups, and enhancing their long-term respiratory health.

References:

Asthma and Lung UK (2023) *Asthma facts and statistics*. Available at: https://www.asthmaandlung.org.uk (Accessed: 9 June 2026).

Asthma and Lung UK (2024) *Exercise and asthma*. Available at: https://www.asthmaandlung.org.uk (Accessed: 9 June 2026).

Centers for Disease Control and Prevention (CDC) (2024) *Asthma and smoking*. Available at: https://www.cdc.gov/asthma (Accessed: 11 June 2026).

Global Initiative for Asthma (GINA) (2024) *Global Strategy for Asthma Management and Prevention*. Available at: https://ginasthma.org (Accessed: 9 June 2026).

Marieb, E.N. and Hoehn, K. (2019) *Human Anatomy and Physiology*. 11th edn. Harlow: Pearson.

National Health Service (NHS) (2021) *Asthma*. Available at: https://www.nhs.uk/conditions/asthma/ (Accessed: 9 June 2026).

National Institute for Health and Care Excellence (NICE) (2024) *Asthma: diagnosis, monitoring and chronic asthma management*. Available at: https://www.nice.org.uk/guidance/ng80 (Accessed: 11 June 2026).

Tortora, G.J. and Derrickson, B.H. (2023) *Principles of Anatomy and Physiology*. 16th edn. Hoboken, NJ: Pearson.

World Health Organization (WHO) (2023) *Asthma*. Available at: https://www.who.int/news-room/fact-sheets/detail/asthma (Accessed: 9 June 2026).

World Health Organization (WHO) (2024) *Air pollution and health*. Available at: https://www.who.int (Accessed: 11 June 2026).