



Student name: Luize Kludzina

Student ID:2422963

Module name: Introduction to Physiology

Module code: BMHP5023

Lecturer name: Shaila Hussain

Assessment: Case Study report - Asthma

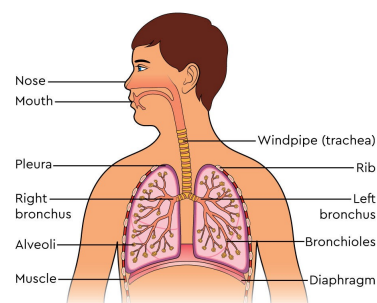
1. Introduction

Many children and adults worldwide are suffering with asthma, a chronic inflammatory disease which affects airways. It is caused by inflammation of the small tubes, which carry air in and out of the lungs (*Nidirect, 2017*). According to the National Health Service (NHS), the symptoms of asthma include, coughing, wheezing, shortness of breath and tight chest. It is a serious airway health condition, which can significantly impact quality of life, and in serious cases it can lead to death.(*NHS*). Asthma affects individuals within all socioeconomic backgrounds, however, according to the article and research written by *Simoneau and Gaffin (2023)*, it may be more prevalent within the lower socioeconomic backgrounds, largely due to be more exposed to the allergens, such as dust mites, second hand chemicals, smoke and other pollutants, which are the triggers for an asthma attacks.

This report will examine the structure of the of the respiratory system, as well explaining the process of breathing, the gaseous exchange within the lungs, how does the inflammation leads to swelling of the airways, exploring ways of monitoring the respiratory system, and lastly, helping the patients manage their own condition ,and what are the lifestyle recommendations or changes, which could prevent the asthma attack.

2. Structure of the respiratory system

The respiratory system is made up of a series of airways that link the external environment to the lungs, allowing gas exchange with the blood. Air enters through the nose and mouth, where it is warmed and humidified before passing into the lungs. Between the mouth and lungs, there is a system where, the humidified air gets delivered. It goes down the larynx which is situated between the throat and trachea, it prevents getting food getting down the lungs. Trachea (Windpipe) is an approximately 12cm long tube , which carries the air into the bronchi. The function of the bronchi is to carry air into the lungs, the air upon entering bronchi, air gets delivered to lungs. The lungs are the main organs of the respiratory system and are located in the chest cavity, where they are protected by the ribcage. They are divided into lobes, with the right lung consisting of three lobes and the left lung consisting of two. The left lung is smaller to accommodate space for the heart, while the right lung is slightly larger. The lungs sit above the diaphragm, a dome-shaped muscle that plays an important role in breathing. Each lung is covered by a double-layered membrane known as the pleura, which reduces friction and allows the lungs to expand smoothly during breathing (*Liv Hospital, 2026*). Inside the lungs, the bronchi divide into smaller airways known as



bronchioles (Harwood-Pearce, Connor and Morgan, 2006, pp.111–116).

Within the lungs, the bronchioles continue to branch out and eventually end in microscopic air sacs called alveoli.

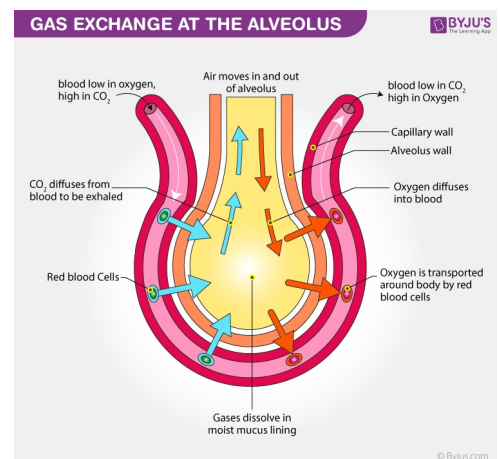
Each lung approximately has 300 million alveoli. Alveoli are responsible for the exchange of oxygen and carbon dioxide, the process is as well known as gaseous exchange. (Venetia Harwood-Pearce, Connor and Morgan(2006, pp.111–116).

Mechanical respiration, also known as ventilation, is the process of breathing in and breathing out. During inhalation, (breathing in) the diaphragm contracts, the intercostal muscles lift the ribcage, increasing the volume of the chest, allowing the air enter the lungs. During breathing out, (exhalation), the diaphragm relaxes and, return to it is shape, the muscles contract, ribs are forced downwards and inwards. That action squeezes the air out of the lungs.

3. Gas exchange in lungs

The gaseous exchange is a process when the oxygen moves from the lungs, into the bloodstream. While the carbon dioxide is moved from the blood back into the lungs. It all happens in alveoli. Every alveolus are covered with a network of capillaries, which allow the easy exchange of gasses. The walls between alveoli and capillaries are very thin, allowing the oxygen and carbon dioxide to move between them by diffusion. Oxygen enters the body and attaches to the red blood cells, which carries further more to the heart and around the body. At the same time, the carbon dioxide moves into the alveoli and is removed from the body when the person breathes out. This process is very crucial, since the body needs oxygen to survive and remove carbon dioxide as a waste gas. (Medline Plus, 2022).

Normal breathing occurs when the oxygen level concentration is high and the carbon dioxide is low in the alveoli, so the gaseous exchange can occur effectively. However, in individuals with asthma, airway narrowing restricts airflow, making it difficult to take in oxygen and remove carbon dioxide, which can lead to air trapping in the lungs. (Venetia Harwood-Pearce, Connor and Morgan, 2006, pp.111–116)



4. Recording and tracking respiratory functions

Managing and tracking respiratory function are essential for maintaining respiratory health. They help individuals manage asthma symptoms effectively and can be life-saving. People who regularly monitor their symptoms tend to have fewer hospital admissions, reduced emergency visits, and less time off work. This contributes to an overall improvement in quality of life (*Gibson, 2000*). Furthermore, tracking respiratory function is not limited to individuals already diagnosed with asthma, it also plays an important role in the early detection and accurate diagnosis of asthma. (*NHS,2017*). One method of monitoring asthma is the peak flow test. This involves blowing into a handheld device with a mouthpiece that measures how quickly air can be blown from the lungs, indicating how well the airways are functioning. Peak flow tests can be carried out in hospitals, general practice (GP) settings, or at home. When monitoring at home, individuals are often required to record their readings using a peak flow diary and assessment chart, which can later be reviewed by a doctor or nurse. Low peak flow scores may indicate narrowed airways and breathing difficulties, prompting further investigation or adjustments to treatment. It is also important to recognise that peak flow values vary between individuals, depending on factors such as age, sex, height, and even the time of day (*NHS,2017*). Another method of monitoring respiratory function is the use of a pulse oximeter. This is a small, non-invasive device placed on a finger or earlobe to measure oxygen saturation levels and pulse rate. Although it is not typically used to diagnose asthma, a pulse oximeter provides important information about how well oxygen is being delivered throughout the body. It can help identify breathing difficulties, assess how effectively the lungs are functioning, and determine whether additional support, such as oxygen therapy or ventilation, may be required. It may also be used to monitor conditions such as sleep apnoea, where breathing temporarily stops during sleep. However, oximeter can be used just as a routine wellness check how well lungs are performing. (*John Hopkins Medicine, 2024*). As well with the peak flow test, the self assessment diary can be used alongside, which can be reviewed by the nurses or the doctor and guide through the treatment, improving their lung overall health.

5. Recommendations

Effective asthma management requires careful consideration of environmental factors in both indoor and outdoor settings. The National Health Service, along with other public health organisations, recommends strategies such as engaging in regular physical activity and avoiding smoking in both indoors and outdoors. It is as well important in reducing allergens

which could possibly trigger the asthma attack, such as, strong smells, (perfume, cleaning chemicals), dust, pollen, and as well as animal hair. Moreover, going outside in the cold weather can trigger an episode.

Furthermore, it is also recommended to engage in regular physical activity, provided it does not trigger an asthma attack. Suitable forms of exercise include swimming, walking, and cycling, as they can improve overall lung function and physical health. It is also important to highlight the role of breathing exercises, which can help to improve breathing control and reduce symptoms over time.

However, it is crucial that all physical activity is carried out safely and in a controlled manner to avoid triggering an asthma episode. Several precautions should be followed, including always carrying a reliever inhaler, performing a proper warm-up and cool-down, and increasing intensity gradually rather than suddenly. Breathing through the nose can also help regulate airflow, and exercising in indoor or controlled environments may reduce exposure to triggers such as pollen or cold air.

In addition, it is important to recognise when to stop exercising. Symptoms such as wheezing, shortness of breath, or a feeling of tightness in the chest may indicate the onset of an asthma attack, the activity should be stopped immediately, if these occur. (*Evergreen Life*, 2025)

In addition, it is recommended to use the appropriate type of inhaler and inhaled treatment. Although these treatments do not cure asthma, they play a key role in managing and relieving symptoms, as well as improving overall quality of life. There are several types of medically approved inhalers, which are prescribed depending on the severity of symptoms and the type of asthma (*Usmani*, 2019).

One of the most commonly prescribed short-relief inhalers is Ventolin, which provides quick relief by opening the airways during an asthma attack and typically works for up to four hours. In contrast, long-acting beta agonists are used as maintenance treatments, as they help to keep the airways open for 12 or more hours and are not intended for immediate relief.

It is also important to use inhaled steroids alongside inhalers, as they help to reduce inflammation in the airways and prevent asthma symptoms from occurring. These treatments are often used regularly as part of long-term asthma control. (*Asthma + Lung UK* (2021)

If inhalers alone are not effective, additional treatment options such as oral medications may be prescribed. For example, oral tablets such as Montelukast may be used, particularly in cases where asthma is mild or triggered by allergies. This medication works by reducing

inflammation and preventing airway narrowing. However, it is not typically used on its own and is most effective when combined with inhaler treatment (*NHS*).

Overall, it is crucial to consult a doctor at a GP practice before starting or adjusting any treatment, and self-medication should always be avoided to ensure safe and effective asthma management.

Furthermore, short-acting relief medications may be used for quick symptom control, alongside allergy medications where asthma is triggered or worsened by allergens.

Overall, it is important to develop an individualised management plan tailored together with the general practitioner to the patient's specific needs and their type of asthma. (*Mayo Clinic, 2025*)

6. Conclusion

In conclusion, asthma is a chronic respiratory illness, which affects normal functioning of the respiratory system and requires ongoing management. This report explored the structure of the respiratory system, the process of breathing and gaseous exchange. It also explored the importance of monitoring respiratory functions and applying preventative strategies. Effective asthma control, includes, peak flow meter, oximeter, alongside with proper medication, such as steroids, inhalers and oral tablets. It is also pointed out appropriate lifestyle choices and environmental choices, which are essential in preventing asthma attacks and improving quality of life. Overall, with the correct choices and management, individuals with asthma can successfully control their symptoms and maintain as healthy and active lifestyle.

References

Asthma + Lung UK (2021). *Preventer inhalers* | *Asthma + Lung UK*. [online] [www.asthmaandlung.org.uk](https://www.asthmaandlung.org.uk/symptoms-tests-treatments/treatments/preventer-inhalers). Available at: <https://www.asthmaandlung.org.uk/symptoms-tests-treatments/treatments/preventer-inhalers> (accessed: 6.04.2026)

Asthma and Lung UK (2021). *Long-acting bronchodilator inhalers (LABA inhalers)* | *Asthma + Lung UK*. [online] [www.asthmaandlung.org.uk](https://www.asthmaandlung.org.uk/symptoms-tests-treatments/treatments/long-acting-reliever). Available at: <https://www.asthmaandlung.org.uk/symptoms-tests-treatments/treatments/long-acting-reliever> (accessed: 06.04.2026)

BYJU'S (2024). *Explore How Gas Exchange In The Lungs Takes Place In Vivid Detail*. [online] BYJUS. Available at: <https://byjus.com/biology/exchange-regulation-of-gases/> (accessed: 06.04.2026)

Evergreen Life. (2025). *Best exercises for asthma & COPD - Evergreen Life*. [online] Available at: <https://www.evergreen-life.co.uk/health-wellbeing-library/exercise-asthma-copd/> (accessed: 06.04.2026.)

Gibson, P.G. (2000). Monitoring the patient with asthma: An evidence-based approach. *Journal of Allergy and Clinical Immunology*, 106(1), pp.17–26. doi:<https://doi.org/10.1067/mai.2000.108307> (accessed: 06.04.2026)

Goldin, J., Hashmi, M.F. and Cataletto, M.E. (2024). *Asthma*. [online] PubMed. Available at: <https://www.ncbi.nlm.nih.gov/books/NBK430901/> (accessed:06.04.2026)

Inhalers for asthma and COPD-ensure your patient has the right device delivering the right drug at the right dose Device Drug Adult dose Doses Licensed <18yrs? Cost per inhaler Notes SABA. (n.d.). Available at: <https://nhssomerset.nhs.uk/wp-content/uploads/sites/2/Revised-inhaler-guide-v14.pdf> (accessed:06.04.2026.)

John Hopkins Medicine (2024). *Pulse Oximetry*. [online] Johns Hopkins Medicine Health Library. Available at: <https://www.hopkinsmedicine.org/health/treatment-tests-and-therapies/pulse-oximetry> (accessed: 03.04.2026)

Kudo, M., Ishigatsubo, Y. and Aoki, I. (2013). Pathology of asthma. *Frontiers in Microbiology*, [online] 4(263). doi:<https://doi.org/10.3389/fmicb.2013.00263> (accessed: 02.04.2026)

Liv Hospital. (2026). *Which Lung Is Bigger: Understanding Human Lung Anatomy*. [online] Available at: <https://int.livhospital.com/which-lung-is-bigger-understanding-human-lung-anatomy/> (accessed: 01.04.2026)

Lumen Learning (2019). *The Lungs | Anatomy and Physiology II*. [online] Lumenlearning.com. Available at: <https://courses.lumenlearning.com/suny-ap2/chapter/the-lungs/> (accessed: 04.04.2026)

Macmillan Cancer Support (2021). The Lungs. [online] www.macmillan.org.uk. Available at: <https://www.macmillan.org.uk/cancer-information-and-support/lung-cancer/the-lungs> (accessed: 06.04.2026.)

Medline Plus (2022). *Gas exchange - health video: MedlinePlus medical encyclopedia*. [online] Medlineplus.gov. Available at: <https://medlineplus.gov/ency/anatomyvideos/000059.htm> (accessed: 05.04.2026)

NHS (2021). *Asthma*. [online] NHS. Available at: <https://www.nhs.uk/conditions/asthma/> (05.04. 2026)

NHS website (2017). *Peak flow test*. [online] nhs.uk. Available at: <https://www.nhs.uk/tests-and-treatments/peak-flow-test/> (accessed: 06.04.2026)

Nidirect (2017). *Asthma | nidirect*. [online] www.nidirect.gov.uk. Available at: <https://www.nidirect.gov.uk/conditions/asthma> (accessed: 06.04.2026)

Simoneau, T. and Gaffin, J.M. (2023). Socioeconomic determinants of asthma health. *Current Opinion in Pediatrics*, 35(3), pp.337–343. doi:<https://doi.org/10.1097/mop.0000000000001235> (accessed: 06.04.2026)

Usmani, O.S. (2019). Choosing the right inhaler for your asthma or COPD patient. *Therapeutics and Clinical Risk Management*, [online] 15, pp.461–472. doi:<https://doi.org/10.2147/tcrm.s160365> (accessed: 06.04.2026.)

Venetia Harwood-Pearce, Connor, J. and Morgan, K. (2006). *Anatomy and physiology for therapists*. Heinemann Educational Publishe, pp.111–116. The respiratory system.