**Emphysema**

**Introduction**

Emphysema is a chronic lung condition that is part of a group called the chronic obstructive pulmonary disease (COPD). Emphysema is a progressive disease that damages the air sacs (alveoli) in the lungs resulting in decreased function and efficiency of the respiratory system. The damage to the lungs is commonly caused by exposure to irritants in the air such as cigarette smoke, air pollution, dust, and chemicals. The damage is irreversible and cannot be cured. However, there are treatments that can help manage the symptoms of emphysema **(MacGill, 2020).**

**Causes**

Common cases of emphysema have typically been caused by exposure to air irritants and chemicals such as:

**Smoking:** Primary cause of emphysema and is responsible for most of the cases. Smoking causes airways to narrow leading to inflammation resulting in damage to lung tissue over time. Dangerous chemicals contained in cigarette smoke such as arsenic, lead, and formaldehyde also increases the impact of damage to the lungs **(Mannino, 2015).** Tobacco smoking is responsible for over 70% of COPD cases worldwide and it is estimated that more than 480,000 deaths occur annually.

**Air pollution:** Prolonged exposure to air pollution and irritants such as dust, fumes, and chemicals can contribute to emphysema damaging the lung tissue by thinning airways and destroying the alveoli in the lungs **(*Long-Term Air Pollution Exposure and Emphysema*, 2019).**

**Symptoms**

**Shortness of breath:** One of the common symptoms and first to arise, shortness of breath usually begins slowly and can be noticed earlier during physical activities. Gradually, patients can even be short of breath while at rest when the symptoms worsen. Emphysema causes the inner walls of the alveoli to weaken and may rupture over time creating larger air spaces in the lungs. This reduces the surface area of the lungs making breathing difficult and patients experience shortness of breath **(*Emphysema - Symptoms and Causes*, 2017).**

**Chronic Coughs:** Especially if the cause of emphysema is smoking, chronic coughing produces large amount of mucus and can become persistent. When the chemicals from smoking products are inhaled, the airways can become inflamed leading to the increase of mucus production. Persistent coughs may occur as a natural reflex to get rid of the irritants and mucus in the airways **(https://www.facebook.com/verywell, 2022).**

**Blue lips and nails:** In more severe cases, emphysema can cause colour changes in lips and nails turning them blue/purple. This symptom is more known as cyanosis and indicates that patients don’t have enough oxygen in their blood. When the alveoli are damaged, gas exchange within the lungs is less efficient reducing the amount of oxygen reaching the bloodstream. As a result, the skin may appear blue or grey around the lips or nails **(Parul Pahal & Goyal, 2022)**

**Treatments**

As part of the chronic obstructive pulmonary disease (COPD), Emphysema is a progressive disease that cannot be stopped and cured once diagnosed. There are however a number of treatments and procedures that can slow down the progression of the disease and help relieve symptoms.

**Bronchodilators:** A drug causing the bronchi in the lungs to widen. Doctors would often prescribe this medicine to their patients in the form of puffers or inhalators for easy inhalation into the airways. Bronchodilators help relax muscles in the lungs and widen the airways to help with easier intake of oxygen into the lungs thus making patients breathe easier **(*Bronchodilators*, 2020).** When patients have a hard time breathing or is experiencing chest tightness, inhalators or puffers containing bronchodilators can be inhaled into the lungs for the airways to widen allowing for easier breathing.

**Oxygen Therapy:** Oxygen therapy is a common treatment for severely affected patients suffering from emphysema and have low levels of oxygen in their blood. The treatment works by administering oxygen through a mask or tubes that enter the nose. In severe cases, patients might need the mask or tubes all the time while some may only use it in certain time. Oxygen therapy increases the concentration of oxygen inhaled into a person’s lungs and allows the damaged alveoli to draw more oxygen for the body reducing tissue injury **(*Emphysema Treatment Options*, 2021).**

**Surgery or Lung Transplant:**

As a last resort or serious cases, surgery and lung transplant may come into to play. The lung volume reduction surgery is a treatment option in which parts of damaged lung tissues are removed to allow remaining tissues to function better. This allows the lungs to function more efficiently, and people would have less shortness of breath and an improved breathing ability **(*Lung Volume Reduction Surgery*, 2020).**

Another treatment option like lung transplant involves replacing a failing or seriously damaged lung with a healthy lung from a donor. Lung transplant can significantly improve a patient’s health and their quality of life. However, people who receive organ transplants would have to take medication for the rest of their lives as their body rejects the newly replaced organ **(*Lung Transplant*, 2023).**

**Prevention**

The prevention of developing symptoms for emphysema can be contributed to several environmental and behavioral factors. As most cases of emphysema is mostly influenced by smoking, quitting smoking is a significant step people can make to reduce their chances of developing emphysema. Lifestyle changes to people who already have emphysema can be things like quitting smoking, avoiding second-hand smoke and places where there might be a lot of harmful irritants and chemicals in the air. Work-related exposure to fumes, dust, and chemicals can also put people in risk of developing emphysema. Wearing protective gear or masks can protect the airways from attracting fumes and chemicals into the lungs **(*Emphysema*, 2021).**

**Tuberculosis**

**Introduction**

Tuberculosis (or TB) is an infectious disease caused by a bacterium called Mycobacterium Tuberculosis. The disease normally affects the lungs but can also spread to other organs and tissues in the body such as the brain, spine, and kidney. Tuberculosis is spread through the air when an ill-person that’s already infected sneezes, coughs, or spit and that bacteria is inhaled by another person. Not everyone infected with Tuberculosis becomes sick which is why there are two conditions related to TB. Latent TB infection and TB disease with TB disease being the deadliest **(*Fact Sheets*, 2023).**

**Causes**

Tuberculosis is caused by the bacterium called Mycobacterium Tuberculosis. The spread of the disease is commonly through the air when an already infected person with TB coughs, sneezes, or spits. When that bacterium is inhaled by another person, they are in risk of getting Tuberculosis. Once the bacteria are inside the body, they can grow and multiply leading to damage and inflammation to the body’s organs and tissues. Tuberculosis is not as contagious to catching the cold or flu as there needs to be a long time spent between the infected person and a healthy individual. However, if a person is infected with TB but do not have any symptoms, they cannot spread their TB to others (Latent TB). But it can still develop into a more active TB in the future. **(NHS Choices, 2023).**

**Symptoms**

While the Tuberculosis condition of latent tb infection have no symptoms as the body’s immune system can fight back against the growth, TB disease infection can harm an individual and give off symptoms. If someone is infected with Tuberculosis and have symptoms, they have what’s referred to as active TB. Some common examples of TB disease Infection include:

* Bad cough lasting 3 weeks or longer
* Pain in the chest
* Coughing up blood
* Weakness or fatigue
* Weight Loss
* No appetite
* Fever

However, if the Tuberculosis has spread to other parts of the body including the spine, brain, or kidney, other symptoms can arise such as:

* Swollen glands
* Body aches and pains
* Swollen joint or ankles
* Constipation
* Feeling confused
* Stiff neck
* Tummy or pelvic pain
* Rash found on the legs, face, or other parts of the body

When Tuberculosis spreads to the brain, more serious symptoms arise and it could be signs of meningitis. These symptoms include:

* Stiff neck
* Severe Headache
* Experiencing seizures or fits
* Change in behaviour such as sudden confusion
* Weakness or loss of movement in parts of the body

**(NHS Choices, 2023)**

**Treatments**

To fight off against the growth of Tuberculosis, treatment options generally come in forms of taking antibiotics. The most used antibiotics include isoniazid, rifampin, pyrazinamide, and ethambutol along with many others. These antibiotics are used in combination against Tuberculosis by attacking the bacteria that caused Tuberculosis. For example, pyrazinamide disrupts the bacterial membrane and lowers the pH level inside the bacterial cell. This makes it difficult for the bacteria to continue to thrive and survive inside the body. Ethambutol inhibits the synthesis of the bacterial cell wall preventing the bacteria from growing and dividing. These drugs in combination are effective at treating Tuberculosis although the effects can vary depending on the severity of the disease and its period of time in the body **(*Ethambutol: Uses, Interactions, Mechanism of Action | DrugBank Online*, 2020) (https://www.facebook.com/Drugscom, 2023).**

**Prevention**

As Tuberculosis is mainly spread through droplets in airborne particles, it can help to practice good hygiene like covering the mouth and nose when coughing or sneezing and to wear a mask when in close contact with other people who might be sick. There is also a vaccine option called the Bacillus Calmette-Guerin (BCG) vaccine. It is mostly used for infants and children in lower classed countries where risks of developing Tuberculosis are more common. The vaccine is not 100% in preventing Tuberculosis but can reduce the chances of developing severe forms of TB such as meningitis. Taking prescribed antibiotics when having Tuberculosis can also prevent the bacteria inside from growing and spreading out to other parts of the body **(*Prevention - TB Alert*, 2014).**

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