

Fact sheet

Chronic obstructive pulmonary disease (COPD)

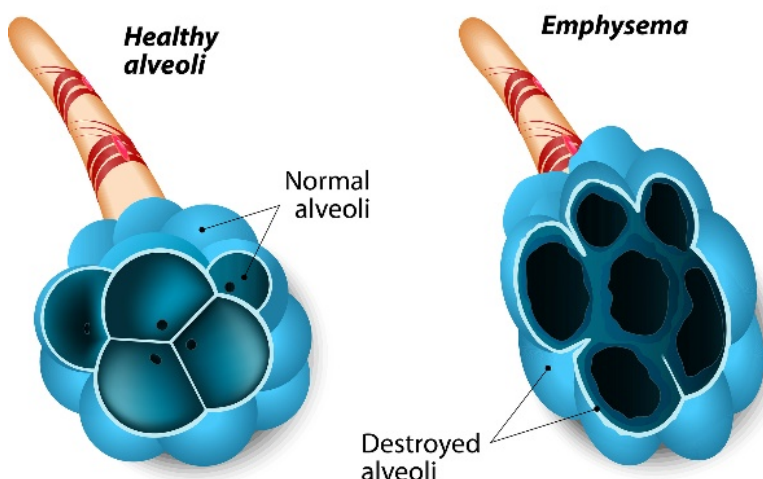
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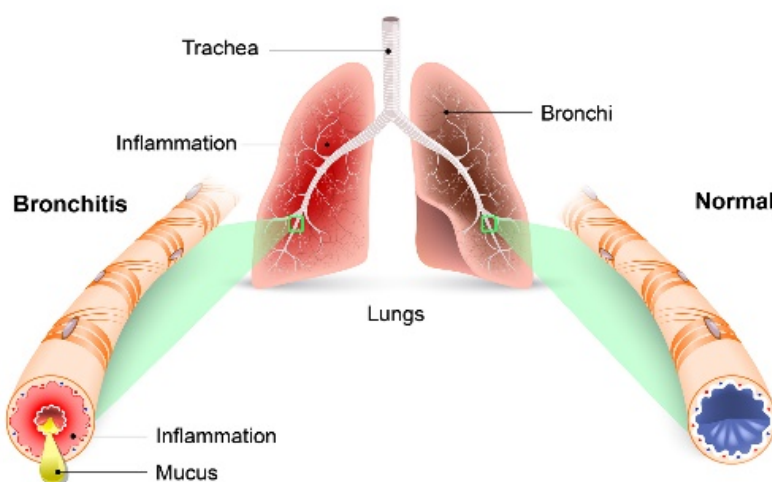
Definition

Chronic obstructive pulmonary disease (COPD) is a treatable, yet incurable, and largely preventable lung disease. It is characterised by obstructed respiratory airflow which is not fully reversible and is usually progressive. The airway obstruction is due to a combination of emphysema (damage to the alveoli) and chronic bronchitis (long-term inflammation of the airways).^{1, 2, 3}

EMPHYSEMA



BRONCHITIS



The National Institute for Health and Care Excellence (NICE) defines COPD in the following way:

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- 'Airflow obstruction is defined as a reduced FEV1/FVC ratio (where FEV1 is forced expired volume in 1 second and FVC is forced vital capacity), such that FEV1/FVC is less than 0.7.
- If FEV1 is greater than or equal to 80 percent predicted normal a diagnosis of COPD should only be made in the presence of respiratory symptoms, for example breathlessness or cough.'⁴

There may be occasions where COPD sufferers experience an acute exacerbation of COPD. This is defined by NICE as:

*'a sustained worsening of the patient's symptoms from their usual stable state which is beyond normal day-to-day variations, and is acute in onset.'*⁴

It is important to understand the differences between COPD and asthma. Access the *Pharmaceutical Journal* article, **Knowing the differences between COPD and asthma is vital to good practice**, which discusses this. The British Lung Foundation provide an easy to understand summary for patients.

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Prevalence and incidence

COPD is the second most prevalent lung disease in the UK after asthma and affects an estimated **two percent** of the population⁵ which equates to around **1.2 million people**. It is also estimated that there are an additional 2 million people with COPD who are undiagnosed.³

British Lung Foundation research suggests that the prevalence is growing, with the number of people living in the UK who have never been diagnosed with COPD rising from just fewer than 1 million in 2004; however, the numbers of new diagnoses per 100,000 people fell between 2004 and 2012, from 226 to 193.⁶

The prevalence of COPD increases with age and people are not usually diagnosed until they are 50 years of age or older³. It is more prevalent in men than women and men are more likely to die from it. Mortality rates are higher in Scotland and the North of England than the South, reflecting the fact that the prevalence and incidence is nearly twice as high in the most deprived 20 percent of the population compared to the least.⁵

For more general COPD statistics visit the **British Lung Foundation** website.

An inquiry into premature deaths of people with learning disabilities found that the most prevalent immediate cause of death in people with learning disabilities was respiratory disorders⁷. For more information, access **Confidential Inquiry into premature deaths of people with learning disabilities (CIPOLD)**.

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Signs and symptoms

The most common symptoms of COPD include cough, increased volume of sputum, persistent wheeze, frequent chest infections and increasing breathlessness.^{8,9}

At a more advanced stage symptoms include weight loss, tiredness, swollen ankles (peripheral oedema).

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Due to the progressive nature of COPD, these symptoms usually get worse over time and have an increasingly large impact on daily activities.

These symptoms usually develop gradually over time and significant airflow obstruction may be present before the person is aware of it.^{3,4}

During an acute exacerbation patients may report worsening breathlessness, cough, increased sputum production and change in sputum colour.⁴

For more information about how people experience COPD, watch:

British Lung Foundation - Living with COPD: Jim's story



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Causes/risk factors

Smoking

Tobacco smoke causes the chronic airway inflammation and alveolar damage described above and is the major risk factor for COPD. It is estimated to account for 90 percent of cases and seems to enhance the effects of other risk factors.^{3, 4}

Studies have also found a trend towards increased risk of COPD with passive smoking. Other types of smoking, such as pipe, cigar, water pipe, and marijuana increase the risk of COPD compared to non-smokers.

Occupational exposure

Exposure to dust, such as silica dust and grain and flour dust, chemicals, such as isocyanates, noxious gases, and particles has been linked to the development of COPD.³ It has been suggested that 20 percent of diagnosed cases of COPD can be attributed to occupational exposure, and in lifelong non-smokers this increases to 30 percent.^{2,3}

Other factors

There is some evidence to suggest air pollution can contribute to the development of COPD, although this is not conclusive.

There is also a potential genetic influence. Approximately one percent of those with COPD are deficient in alpha-1 antitrypsin which is a protease enzyme inhibitor that protects lung tissue. People who have alpha-1 antitrypsin deficiency usually develop COPD at a younger age, particularly if they are a smoker. There

seems to be a familial risk in smokers who have close relatives with severe COPD, meaning that there is likely to be a genetic influence in those who develop the disease.

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Pathophysiology (mechanism of disease)

If you would like information on the pathology, pathogenesis, and pathophysiology of COPD then access the following *British Medical Journal* practice article, **Pathology, pathogenesis, and pathophysiology**.

The following *Proceedings of the American Thoracic Society* article focuses specifically on the pathophysiology of exacerbations: **Pathophysiology of exacerbations of chronic obstructive pulmonary disease**.

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Prognosis and complications

Although the mortality rate for COPD is difficult to quantify as many people die with the disease, we do know that about five percent of all deaths in the UK are due to COPD; this equates to around 30,000 people per year.

The inpatient mortality rate for people who are admitted to hospital for an exacerbation of COPD is around 3 to 4 percent, or 11 to 24 percent for those requiring intensive care unit treatment.

Complications include reduced quality of life due to breathlessness, **depression and anxiety**, cor pulmonale (right **heart failure** secondary to lung disease), type 2 respiratory failure due to increased airway resistance, and lung **cancer**.³

The majority of COPD exacerbations are due to infection. If a chest infection or **pneumonia** is diagnosed, NICE recommends initial empirical treatment should be an aminopenicillin (eg, amoxicillin), a macrolide (eg, clarithromycin/erythromycin), or a tetracycline (eg, doxycycline).¹⁰

For more information about the management of exacerbations of COPD visit the following NICE pathway, **Managing exacerbations of COPD**.

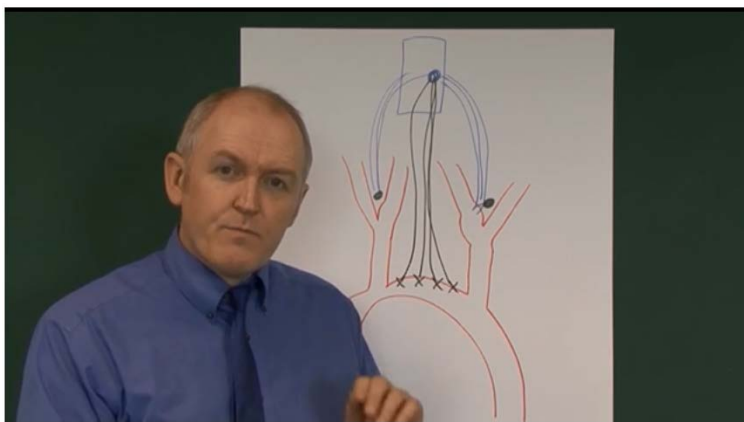
During an acute exacerbation, a serious complication that can arise is respiratory failure. Should you wish to learn more about respiratory failure in general, the following video offers an introduction to this, the differences between type 1 and 2 respiratory failure, and the associated arterial blood gas changes:

Respiratory Failure



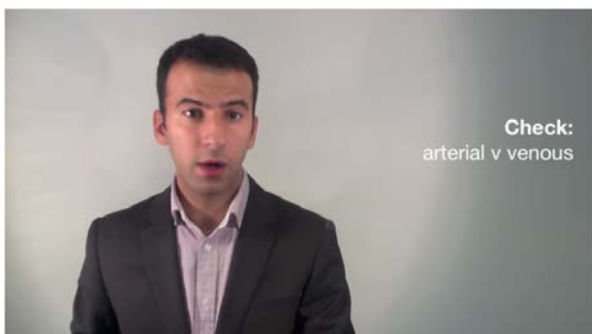
It is important to recognise that in patients with COPD, as mentioned in the above video, their respiratory drive is driven by oxygen levels. Watch the following video to learn more about this mechanism:

Hypoxia 22, Carbon dioxide retainers



For more information about interpretation of blood gases, watch the following video:

Arterial blood gas interpretation (in 3 easy steps)



Arterial blood gas interpretation (in 3 easy steps)

To learn more about how to manage respiratory failure in COPD, access the *International Journal of Chronic Obstruct Pulmonary Disease* article, **Treatment of respiratory failure in COPD**.

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Diagnosis/detection

There is no single diagnostic test for COPD.³ To learn more about the diagnosis and assessment of COPD, access the following NICE clinical knowledge summary (CKS), **Chronic obstructive pulmonary disease. Diagnosis**.

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Pharmacological treatment

Until recently, because the NICE guidance for the management of COPD was so out of date, the Global Initiative for Chronic Obstructive Lung Disease (GOLD) guidance was broadly adopted using the ABCD

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assessment tool. NICE updated their guidelines in December 2019, and so these have now been broadly adopted.

There is an easy to follow flowchart that NICE have produced, ***Chronic obstructive pulmonary disease in over 16s: non-pharmacological management and use of inhaled therapies.***

For a patient newly diagnosed with COPD (without asthma features, for instance steroid responsiveness, elevated eosinophil counts, previous diagnosis of asthma or atopy or variation in airflow), the first-line therapy is a long-acting beta-2 agonist and long-acting muscarinic antagonist (LABA/LAMA) combination. This differs from GOLD, as they suggest single bronchodilators until the severity of the COPD increases to include breathlessness and exacerbation frequency (GOLD group D).

Note that if a LAMA is introduced, a short-acting muscarinic antagonist (SAMA) should be discontinued, whereas a short-acting beta-2 agonist (SABA) may be continued with all other combinations of inhalers. In practice, LABA/LAMA combination inhalers are now commonly being offered as a first therapy to maximise the symptom control for those with COPD for as long as possible and reduce exacerbation rates from the outset. This is also a cost-effective option when considering the cost of a LAMA inhaler such as tiotropium and the cost of a LAMA/LABA combination inhaler which is often cheaper. This approach also reduces the switching of devices and inhalers whilst stepping up and, although at this point a review is required, there is likely to be less alteration of therapy at this review.

For patients with asthmatic features or evidence of steroid responsiveness, they should be offered an ICS/LABA combination inhaler.

Triple therapy (ICS/LABA/LAMA) should be considered for any patient that continues to experience day-to-day symptoms or if they have one severe (hospitalisation) or two moderate exacerbations in the space of twelve months. Before escalating to triple therapy, a clinical review should be conducted.

Determine if the non-pharmacological management has been optimised, eg, up to date with vaccinations and the patient has been offered smoking cessation support, where appropriate. Ensure that either acute, or day-to-day symptoms are not caused by another physical or mental health condition prior to escalation of therapy. Adherence and inhaler technique should also be checked.

For patients who continue to have symptoms on a day-to-day basis (as opposed to exacerbations), triple therapy should be trialled for three months, with a view to de-escalation to either LABA/LAMA or ICS/LABA if symptoms have not improved after this time.

Devices for each of these treatments vary and are operated in a variety of ways. Patient preference and ability to use each device should be considered paramount. Additional devices such as spacers may be useful and nebulisers may be initiated by specialists³. However, nebulisers should be discouraged as they limit people's activities, as well as introducing issues surrounding the logistics of maintaining nebuliser equipment. With the advent of the newer bronchodilators, there should be limited need for nebulisers to be recommended.

Other pharmacological treatment options for COPD include the following (although the evidence for these therapies is of variable quality):

- short-term antibiotics for acute exacerbations
- short-term oral corticosteroids (to reduce airway inflammation) for acute exacerbations

- theophylline to encourage bronchodilation to improve lung function, or to act as a steroid-sparing agent⁵ (although its use is not favoured due to the limited evidence of benefit and the toxicity risks)
- mucolytics to reduce the viscosity of the respiratory mucus and reduce exacerbation frequency
- anxiolytics and antidepressants for the management of depression and anxiety associated with COPD.³
- PDE4 inhibitors (roflumilast) may be considered in ex-smokers– for further information refer to the NICE guidance entitled Roflumilast for treating Chronic Obstructive Pulmonary Disease (2018).
- Long term prophylactic antibiotics such as azithromycin 250 mg three times a week is occasionally used in select patient groups – further information can be found in the NICE guideline (2019).

Long-term oral corticosteroids may be initiated by respiratory specialists although they are not usually recommended³. Long-term prophylactic macrolide use, eg, azithromycin, is occasionally used in select high-risk patients and studies have shown that this may reduce exacerbation rates¹¹. It should be noted that oral corticosteroids in COPD have been linked with increased risk of sepsis¹² and NICE lists long-term steroid use as a risk factor for the development of sepsis.¹³

A respiratory specialist would be able to assess the need for oxygen, and potentially long-term oxygen therapy (LTOT), which may also be prescribed.³ Note that it is recommended that oxygen should be regarded as a drug.¹⁴ For more information about LTOT, access the British Thoracic Society (BTS) guideline for home oxygen use in the *Thorax* article **BTS Guidelines for Home Oxygen Use in Adults**.

For further information about the recommended pharmacological therapies and appropriate monitoring, access the following guidance documents:

- GOLD's ***Pocket guide to COPD diagnosis, management, and prevention: A guide for healthcare professionals***.
- NICE CKS, ***Chronic obstructive pulmonary disease***.
- NICE guideline ***Chronic obstructive pulmonary disease in over 16s: diagnosis and management [NG115]***.

Vaccination against pneumococcal disease (causing pneumococcal pneumonia) and influenza is recommended for those with COPD^{15,16}. For more information on pneumococcal vaccinations, visit the NICE CKS ***Immunizations – pneumococcal*** and for more information on influenza vaccinations, visit the NICE CKS ***Immunizations - seasonal influenza***.

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Non-pharmacological treatment

Smoking cessation

In current smokers, smoking cessation is the most effective treatment for COPD.¹

Non-invasive ventilation

This is often only offered during acute type 2 respiratory failure, although on occasion, pressurised air administered by a mask or nasal cannula can help to support breathing, especially at night. This can help to improve oxygen saturations¹. More information can be found in the BTS guideline ***Non-invasive ventilation in acute respiratory failure***.

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Breathing control techniques

Techniques can be used to help reduce breathlessness. Information on these different techniques can be found on the British Lung Foundation's **Breathing control techniques** page. Kings College Hospital NHS Foundation Trust Breathlessness Support Service also offers patient advice:

www.kcl.ac.uk/cicelysaunders/research/symptom/breathlessness

Pulmonary rehabilitation

This is a specialised programme focusing on physical exercise training, education, dietary advice, and psychological and emotional support.²

Visit the following NHS Choices page on **Pulmonary rehabilitation** and watch the embedded video to learn more about pulmonary rehabilitation.

More information about pulmonary rehabilitation can be found on the British Lung Foundation's page **Pulmonary rehabilitation or PR**.

Lung surgery

Surgery would only usually be considered for a small number of people. Surgeries include bullectomy (removal of an air pocket), lung volume reduction surgery (removal of a damaged section of lung) and lung transplant.²

Multidisciplinary team support

Physiotherapy can be beneficial for a person with excessive sputum³. Referral to a dietetic service should be considered for those who have a body mass index (BMI) less than 20 kg/m² or more than 25 kg/m².³ Other services which should be considered include occupational therapy and psychosocial services.

Patient support

The British Lung Foundation has a page dedicated to supporting people with COPD, **COPD (chronic obstructive pulmonary disease)**.

NHS Choices also has a dedicated COPD page, **Chronic obstructive pulmonary disease (COPD)**.

To learn more about one project that supports COPD patients, visit the Eden Project **Healthy walking group** information page and watch the following video:

Healthy walking club at the Eden Project

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Further resources

NICE quality standard **Chronic obstructive pulmonary disease in adults (QS10)** covers the assessment, diagnosis and management of COPD.

Information on Asthma-COPD Overlap (ACOS) can be found in the following GOLD document, **Diagnosis of Diseases of Chronic Airflow Limitation: Asthma, COPD and Asthma- COPD Overlap Syndrome (ACOS)**.

If you would like to look at the evidence relating to the use of LABA/LAMA therapy compared to LABA/ICS therapy and the withdrawal of ICS, then access the following articles in *The New England Journal of Medicine*:

- **Indacaterol- glycopyrronium versus salmeterol-fluticasone for COPD.**
- **Withdrawal of inhaled glucocorticoids and exacerbations of COPD.**

If you would like to look at the evidence for the triple inhalers access the following:

- The Pharmaceutical Journal, **Role of dual and triple fixed-dose combination inhalers in the treatment of chronic obstructive pulmonary disease.**
- *The Lancet* article, **Extrafine inhaled triple therapy versus dual bronchodilator therapy in chronic obstructive pulmonary disease (TRIBUTE): a double-blind, parallel group, randomised controlled trial.**
- *The New England Journal of Medicine* article, **Once-daily single-inhaler triple versus dual therapy in patients with COPD.**

CPPE has the following resources to support your COPD learning:

COPD - Consulting with the avatar patient e-learning.

This programme has been developed in collaboration with Keele University and NHS Education for Scotland. Consulting with James, the interactive avatar patient gives you the opportunity to take your patient-centred consultation skills on a test drive in a safe environment and check your knowledge and shared decisions around medicines for COPD.

COPD and asthma medication reviews workshop.

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This study day supports you to conduct medication reviews with patients who have asthma and COPD, and take action to reduce disease burden, improve quality of life and reduce risk of hospital admission.

Inhaler technique for health professionals: getting it right e-learning.

In this e-learning programme we explore the reasons why we need to improve how we help patients with their inhaler devices. We look at how the devices work and why making simple changes when we are counselling patients could improve outcomes for both the patient and the health professional.

CPPE's **Smoking** gateway page is a collection of content relating to smoking cessation.

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External websites

CPPE is not responsible for the content of any non-CPPE websites mentioned on this page or for the accuracy of any information to be found there.

All web links were accessed on 16 January 2020.

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