



Tailor treatment to the patient with COPD

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Tailor treatment to the patient with COPD

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Step 1 – SABA	Short-acting bronchodilator (typically short-acting beta-agonist)	Commence initially
Step 2 – LABA/LAMA	Long-acting beta-agonist/ long-acting antimuscarinic	Commence for ongoing breathlessness and/or exacerbations at step 1
Step 2a – LABA/ICS	Long-acting beta-agonist/ inhaled corticosteroid	Commence instead of LABA/LAMA if features of steroid responsiveness or asthma*
Step 3 – LABA/LAMA/ICS	Long-acting beta-agonist/ long-acting antimuscarinic/inhaled corticosteroid	Commence for ongoing symptoms and/or exacerbations at step 2

*Features of steroid responsiveness or asthma are defined as: **A** any previous, secure diagnosis of asthma or atopy or **B** higher blood eosinophil count or **C** substantial variation in FEV₁ over time (at least 400 ml) or **D** substantial diurnal variation in peak expiratory flow (at least 20%)

FIGURE 1
Stepwise inhaler treatment for COPD⁴

How should diagnosis be confirmed?

What are the goals of treatment?

When should patients be referred?

THE CURRENT GLOBAL OBSTRUCTIVE LUNG DISEASE (GOLD) DEFINITION¹ DESCRIBES COPD AS

a common, preventable and treatable disease that is characterised by persistent respiratory symptoms and airflow limitation that is due to airway and/or alveolar abnormalities usually caused by significant exposure to noxious particles or gases and influenced by host factors including abnormal lung development. Significant comorbidities may have an impact on morbidity and mortality.

There is a clear emphasis on the presence of airflow obstruction, determined by spirometry, and exposure to noxious inhalants, typically tobacco smoke.

However, there is now a much clearer understanding about the development of airflow obstruction from recent studies in children and adolescents.² The core finding from this research is the presence of a group of adults with physiologically defined COPD, not because of an accelerated decline in

lung function from inhalants such as cigarette smoke, but because of early life events in utero and in childhood. This cohort already had impaired lung function (small lungs) as they entered adulthood. This has an important impact on diagnosis and interpretation of spirometry.

Spirometry is used to diagnose COPD in people with suggestive symptoms and risk factors. There is an evidence base spanning more than 20 years which shows the positive impact of spirometry on diagnosis, and the inaccuracy of diagnosis without it.³ NICE guidance emphasises the role of spirometry in the diagnosis of COPD,⁴ and also asthma.⁵

However, the recent national COPD audits found that 48% of people hospitalised with 'COPD' in England and Wales had no record of spirometry and 13% who had had spirometry performed previously did not have COPD.⁶

COPD is characterised by the presence of post-bronchodilator airflow obstruction though there is a lack of consensus about how to define airflow

obstruction. NICE recommends using the lower limit of normal, typically using Global Lung Initiative 2012⁷ reference values. In contrast, GOLD recommends using a fixed FEV₁/FVC ratio.

There are pros and cons to each approach. These are summarised in table 1, p14.

It is obviously beneficial to have local/regional agreement as to which method to use so there is geographical consistency.

What is crucial is that performance and interpretation of spirometry should be based on clinical suspicion of airway disease in a patient with suggestive symptoms and exposures, where a medical history has been taken and examination performed. Deviation from this well established practice is not infrequently the cause of diagnostic uncertainty.

Equally important is the need for spirometry to be performed only by individuals who are trained and in the UK that should be to standards set by the Association for Respiratory Technology & Physiology.

SYMPOSIUM RESPIRATORY MEDICINE

COPD

DIFFERENTIAL DIAGNOSES

Asthma is more challenging to diagnose and the core investigation is again spirometry, but with reversibility testing. Reversibility testing is not required to

diagnose COPD,⁴ but in light of the significant overlap in symptoms between COPD and asthma and the often uncertain pretest diagnosis, many practitioners perform spirometry and

reversibility as a first diagnostic test for all patients. There are pragmatic arguments to carrying out FeNO testing alongside spirometry as part of a 'one stop' system.

Table 2, below left, shows the differential diagnoses of COPD, key findings on clinical assessment and differences in diagnostics.

Table 1

Defining airflow obstruction: pros and cons of each method

Method	Pros	Cons
Lower limit of normal FEV ₁ /FVC exceeds lower limit of normal <i>Recommended by NICE⁴</i>	<ul style="list-style-type: none"> ● Use of Global Lung Initiative equations reflects individual predicted lung function 	<ul style="list-style-type: none"> ● More complex to interpret ● Based on values in the lowest 5% of the adult population
Fixed cut-off FEV ₁ /FVC is <0.7/<70% <i>Recommended by GOLD²</i>	<ul style="list-style-type: none"> ● Simple and easy for non-specialists to interpret ● Used for entry to clinical trials of COPD treatment 	<ul style="list-style-type: none"> ● Overdiagnoses COPD in elderly individuals ● Underdiagnoses COPD in younger individuals ● Ignores the change in lung physiology with ageing

TREATMENT

There are a wide variety of treatments used to treat COPD; some reduce symptoms, others reduce future risk and some reduce both. Treatment goals for patients with COPD are shown in table 3, below.

Targeting treatment to address outcomes that are most important to the individual is clearly important as is ongoing assessment of therapy and cessation where an intervention has provided no benefit. In particular, the benefit of certain treatments is less clear-cut in many people with COPD and when commencing these it is important to assess benefit and discontinue if this is not seen.

Current COPD treatments are summarised in table 4, p15. Inhaler therapy is based on NICE guidance⁴ and this is shown in figure 1, p13.

PULMONARY REHABILITATION

Pulmonary rehabilitation is a vital component of COPD care but is underutilised⁸; this area has been reviewed previously in detail in this publication.⁹

Delivery of pulmonary rehabilitation services has been impacted further by the COVID-19 pandemic with restriction of face to face training. However, it is highly cost effective and we know from the national pulmonary rehabilitation audit⁶ that when a pulmonary rehabilitation programme is completed

Table 2

Differential diagnosis of COPD

Condition	Clinical features	Diagnostics
COPD	<ul style="list-style-type: none"> ● Typically smoking > 10 pack-years ● Later age of onset ● Exertional breathlessness ● Cough with sputum ± wheeze 	<ul style="list-style-type: none"> ● Post-bronchodilator spirometry shows airflow obstruction
Asthma	<ul style="list-style-type: none"> ● Variable symptoms ● Younger age of onset ● Dry cough and wheeze ● Episodic breathlessness ● Nocturnal symptoms 	<ul style="list-style-type: none"> ● Spirometry may be normal or obstructive ● Peak flow variation ● Greater reversibility – 400 ml diagnostic if asthma suspected clinically
Bronchiectasis	<ul style="list-style-type: none"> ● Typically, frequent LRTIs with bacterial infection more common ● Large volumes of sputum ● Can have breathlessness and wheeze ● Can present with a dry cough 	<ul style="list-style-type: none"> ● Spirometry may be normal or abnormal ● Chest X-ray (CXR) typically normal but can show features of bronchiectasis ● CT scan shows bronchiectasis
Heart failure	<ul style="list-style-type: none"> ● Positional and exertional breathlessness ● Elevated jugular venous pressure and peripheral oedema ● Tachycardia, 3rd heart sound (gallop) and crackles 	<ul style="list-style-type: none"> ● NT pro-BNP raised ● ECG or CXR abnormal
Interstitial lung disease	<ul style="list-style-type: none"> ● Exertional breathlessness sometimes with oxygen desaturation ● Clubbing in some patients and fine bibasal crackles 	<ul style="list-style-type: none"> ● CXR then CT showing alveolitis/fibrotic change ● Reduced lung volumes and lung diffusion
Lung cancer	<ul style="list-style-type: none"> ● Cough present in a majority ● Typically, history of smoking ● Haemoptysis in a minority ● Chest pain with pleural and soft tissue/bone involvement 	<ul style="list-style-type: none"> ● CXR and staging CT thorax ● Endobronchial ultrasound or percutaneous lung biopsy

Table 3

Treatment goals for COPD

Relieve and reduce symptoms

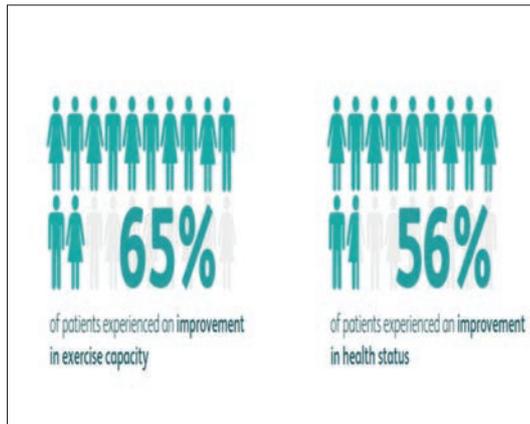
- Reduce breathlessness, cough and phlegm production and wheeze
- Reduce sleep disturbance
- Improve exercise limitation
- Improve health status

Reduce risk of future adverse events

- Prevent and treat acute exacerbations and hospitalisation
- Reduce disease progression
- Reduce mortality

FIGURE 2

Pulmonary rehabilitation outcomes in England, Scotland and Wales in the 2019 National Pulmonary Rehabilitation Audit.⁶ Improvement in exercise capacity was assessed by achieving the minimal clinically important distance (MCID) from the six-minute walking test or incremental shuttle test. Improvement in health status was assessed using the COPD Assessment Tool



the benefit is significant as shown in figure 2, left.

To address poor uptake and completion as well as deliver future pulmonary rehabilitation services a variety of methods of delivery will be needed; this has been described as a menu of options.¹⁰ These could include face to face training, remote monitored and web or app based programmes. Over the next few years, more evidence will emerge about the effectiveness of various delivery methods.

Pulmonary rehabilitation programmes must include exercise training, education and self-management. Pulmonary rehabilitation in the 28 days after hospitalisation reduces rehospitalisation and improves symptoms.¹¹

Table 4**Current COPD treatments**

Treatment	Potential benefit
Smoking cessation	● Slows disease progression and lowers mortality
Vaccinations	● Influenza – reduces exacerbations and mortality ● Pneumococcal – reduces exacerbations
Bronchodilators (LABA and LAMA)	● Improve lung function, reduce breathlessness, improve health status, reduce exacerbations
Inhaled corticosteroids	● Reduce exacerbations ● Improve lung function and breathlessness in patients with exacerbations
PDE4 inhibitors	● Roflumilast improves lung function and reduces exacerbations in those with chronic bronchitis and severe to very severe COPD who have frequent exacerbations
Low-dose oral corticosteroids	● No evidence of benefit but can be considered on a case by case basis (see table 5, p16)
Low-dose macrolides	● Reduce exacerbation rate in non-smokers
Mucolytics/antioxidants	● Reduce exacerbations in certain populations
Leukotriene receptor antagonists	● No evidence of benefit in COPD
Pulmonary rehabilitation	● Improves breathlessness, exercise capacity, health status, reduces exacerbation rate
Long-term oxygen therapy	● Reduces mortality in patients with chronic hypoxaemia
Long-term non-invasive ventilation	● Reduces mortality and hospitalisation in selected patients who have a history of acute respiratory failure and significant chronic hypercapnia
Lung volume reduction procedures	● Improve lung function, breathlessness and exercise capacity in certain carefully selected patients with advanced emphysema

REFERRAL

The vast majority of COPD care is not delivered in hospital but in the community. However, there are situations where referral for specialist advice is warranted, and this advice is increasingly provided as part of integrated community respiratory services. NICE recommends referral for specialist advice in the situations shown in table 5, p16.⁴

FOLLOW-UP

Regular follow-up is important and, in the UK, this is typically performed at least annually for those recorded as having COPD listed on a primary care COPD register. The review provides the opportunity to assess symptoms, exacerbations and comorbidities. The MRC dyspnoea score is useful to assess breathlessness and the CAT (COPD Assessment Tool) score to assess health status. Frequency of acute exacerbations should be noted on the primary care record and reviewed. Oxygen saturations, assessed at a time of clinical stability, should be measured to assess the need for oxygen.

Review of smoking status and vaccination history allows these areas to be targeted. Inhaler technique should be checked and choice of inhaler should be reviewed annually which necessitates face to face rather than remote review. The latter is challenging in light of COVID-19 but vital to the patient.

Metered-dose inhalers are the source of a major part of the NHS carbon footprint whereas dry powder inhalers do not have the same impact. A British Thoracic Society statement addresses this area.¹² However, the most important recommendation is that patients need to be prescribed an inhaler that they can and will use. >>

key points

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COPD is characterised by persistent respiratory symptoms and airflow limitation that is due to airway and/or alveolar abnormalities usually caused by significant exposure to noxious particles or gases and influenced by host factors including abnormal lung development. Recent research has identified a group of adults with physiologically defined COPD, because of early life events in utero and in childhood. These individuals already had impaired lung function (small lungs) as they entered adulthood. This has an important impact on diagnosis and interpretation of spirometry.

Performance and interpretation of spirometry should be based on clinical suspicion of airway disease in a patient with suggestive symptoms and exposures, where a medical history has been taken and examination performed. COPD is characterised by post-bronchodilator airflow obstruction though there is a lack of consensus about how to define airflow obstruction. NICE recommends using the lower limit of normal, typically using Global Lung Initiative 2012 reference values. In contrast, GOLD recommends using a fixed FEV₁/FVC ratio.

Reversibility testing is not required to diagnose COPD, but in light of the significant overlap in symptoms between COPD and asthma and the often uncertain pretest diagnosis, many practitioners perform spirometry and reversibility as a first diagnostic test for all patients.

Targeting treatment to address outcomes that are most important to the individual is important as is ongoing assessment of therapy and cessation where an intervention has provided no benefit. Pulmonary rehabilitation is a vital component of COPD care but is underutilised.

Indications for referral include: diagnostic uncertainty; suspected severe COPD; a rapid decline in FEV₁; a need for oxygen therapy assessment; onset of symptoms under 40; onset of cor pulmonale, assessment for long-term nebuliser therapy; dysfunctional breathing and symptoms disproportionate to lung function deficit.

Regular follow-up is crucial and provides the opportunity to assess symptoms, exacerbations and comorbidities. The MRC dyspnoea score is useful to assess breathlessness and the COPD Assessment Tool score to assess health status. Frequency of acute exacerbations should be noted and oxygen saturations measured to assess the need for oxygen. Review of smoking status and vaccination history allows these areas to be targeted. Inhaler technique should be checked and choice of inhaler should be assessed annually which necessitates face to face rather than remote review. Patients need to be prescribed an inhaler that they can and will use.

Annual spirometry is recommended as part of NICE⁴ and GOLD² guidance but this has been challenging due to the impact of the pandemic on respiratory diagnostic services; both the large backlog of tests accumulated when spirometry was not deliverable and the reduced capacity associated with testing restrictions.

Pragmatically, some spirometry

services have opted to prioritise diagnostic tests ahead of routine follow-up tests in the short to medium term.

Greater integration, less duplication and better information sharing are all high on the agenda and can deliver significant benefit for people with COPD and their carers.

Competing interests: None

Table 5

Referral of COPD patients for specialist advice, adapted from NICE NG115⁴

Reason for referral	Purpose
There is diagnostic uncertainty	● Confirm diagnosis and optimise therapy
Suspected severe COPD	● Confirm diagnosis and optimise therapy
The patient requests a second opinion	● Confirm diagnosis and optimise therapy
Onset of cor pulmonale	● Confirm diagnosis and optimise therapy
Assessment for oxygen therapy	● Optimise therapy and measure blood gases
Assessment for long-term nebuliser therapy	● Optimise therapy and exclude inappropriate prescriptions
Assessment for oral corticosteroid therapy	● Justify need for continued treatment or supervise withdrawal
Bullous lung disease	● Identify candidates for lung volume reduction procedures
A rapid decline in FEV ₁	● Encourage early intervention
Assessment for a lung volume reduction procedure	● Identify candidates for surgical or bronchoscopic lung volume reduction
Assessment for lung transplantation	● Identify candidates for surgery
Dysfunctional breathing	● Confirm diagnosis, optimise pharmacotherapy and access other therapists
Onset of symptoms under 40 years or a family history of alpha-1 antitrypsin deficiency	● Identify alpha-1 antitrypsin deficiency, consider therapy and screen family
Symptoms disproportionate to lung function deficit	● Look for other explanations including cardiac impairment, pulmonary hypertension, depression and hyperventilation
Frequent infections	● Exclude bronchiectasis
Haemoptysis	● Exclude carcinoma of the bronchus

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Useful information

For healthcare professionals

British Thoracic Society

Professional guidelines, position statements and respiratory education www.brit-thoracic.org.uk

For patients

British Lung Foundation

Information leaflets and advice about self-help groups www.blf.org.uk

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