Chronic obstructive pulmonary disease: Management of adults with chronic obstructive pulmonary disease in primary and secondary care

NICE guideline

First draft for consultation, September 2003

If you wish to comment on the recommendations please make your comments on the full version of the draft guideline.
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Working definition of chronic obstructive pulmonary disease

Chronic obstructive pulmonary disease (COPD) is difficult to define and many different definitions have been published and used in practice. The following definition is used in this guideline:

Chronic obstructive pulmonary disease (COPD) is characterised by airflow obstruction. The airflow obstruction is usually progressive, not fully reversible and does not change markedly over several months. The disease is predominantly caused by smoking.

- Airflow obstruction is defined as a reduced FEV$_1$ (FEV$_1$ < 80% predicted) and a reduced FEV$_1$/FVC ratio (< 0.7).
- The airflow obstruction is due to a combination of airway and parenchymal damage.
- The damage is the result of chronic inflammation that differs from that seen in asthma and which is usually the result of tobacco smoke.
- Significant airflow obstruction may be present before the individual is aware of it.
- COPD produces symptoms, disability and impaired quality of life, which may respond to pharmacological and other therapies which have limited or no impact on the airflow obstruction.
- COPD is now the preferred term for patients with airflow obstruction who were previously diagnosed as having chronic bronchitis or emphysema.
- Other factors, particularly occupational exposures, may also contribute to the development of COPD.
Key recommendations

The following recommendations have been identified as priorities for implementation.

1. Diagnosing COPD

A diagnosis of COPD should be considered in patients over the age of 35 who have a risk factor (generally smoking) and who present with exertional breathlessness, chronic cough, regular sputum production, frequent winter ‘bronchitis’ or wheeze. The presence of airflow obstruction should be confirmed by performing spirometry. All health professionals managing patients with COPD should have access to spirometry and they should be competent in the interpretation of the results. Routine spirometric reversibility testing is not recommended as a part of the diagnostic process or to plan initial therapy: COPD and asthma can usually be differentiated on clinical grounds.

2. Smoking cessation

Encouraging patients with COPD to stop smoking is one of the most important components of their management. In order to facilitate this:

- An up to date smoking history should be documented for everyone with COPD.
- All COPD patients still smoking, regardless of age should be encouraged to stop, and offered help to do so, at every opportunity.
- Unless contraindicated, pharmacotherapy combined with an appropriate support programme should be used to optimise quit rates for people with COPD.

3. Inhaled therapy

Long acting inhaled bronchodilators should be used to control symptoms and improve exercise capacity in patients who continue to experience problems despite the use of short-acting drugs. Inhaled corticosteroids should be added to long-acting bronchodilators in patients with an FEV₁ ≤ 50% predicted who
have had two or more exacerbations requiring treatment with antibiotics or oral corticosteroids in a 12-month period in order to decrease exacerbation frequency.

- The choice of bronchodilators should be determined with reference to: efficacy in an individual following a trial, side effects and patient preference.
- The clinical effectiveness of long-acting bronchodilators can be assessed by improvements in symptoms, daily activities, exercise capacity and lung function.

4. Pulmonary rehabilitation

- Pulmonary rehabilitation should be made available to all appropriate patients with COPD.
- Pulmonary rehabilitation should be offered to all patients who consider themselves functionally disabled by COPD.
- Pulmonary rehabilitation programmes must meet clinical needs in terms of access, location and availability.
- Pulmonary rehabilitation programmes should include multicomponent, multidisciplinary interventions, which are tailored to individual patients needs.

5. Non-invasive ventilation

Non-invasive ventilation (NIV) is the treatment of choice for persistent hypercapnic respiratory failure during exacerbations after optimal medical therapy.

- NIV should be delivered by members of the multidisciplinary team (including as a minimum medical staff, respiratory nurses and physiotherapists). The staff should be trained in its application, experienced in its use and aware of its limitations.
- When patients are started on NIV there should be a clear management plan in the event of deterioration and ceilings of therapy agreed.
6. Reducing the impact of exacerbations
Efforts should be made to reduce the impact of exacerbations by:

- appropriate use of inhaled corticosteroids
- giving self-management advice on responding promptly to the symptoms of an exacerbation
- starting oral corticosteroid therapy
- starting antibiotic therapy if there is a history of purulent sputum
- appropriate use of non-invasive ventilation
- use of hospital-at-home or assisted-discharge schemes
- vaccination.

7. Multi-disciplinary working
Patients with COPD should have access to members of a multi-disciplinary team, which should be responsible for ensuring that all aspects of the guideline are implemented and in particular fulfil the following functions.

- Assessing patients.
- Managing patients.
- Advising patients on self management strategies.
- Identifying and monitoring patients at high risk of exacerbations and undertaking activities which aim to avoid emergency admissions.
- Education of patients and other health professionals.
The following guidance is evidence based. The grading scheme used for the recommendations (A, B, C, D, DS and NICE) is described in Appendix A; a summary of the evidence on which the guidance is based is provided in the full guideline (see Section 5).

1 Guidance

1.1 Diagnosing COPD

The diagnosis of COPD depends upon thinking of it as a cause of breathlessness or cough. The diagnosis is suspected on the basis of symptoms and signs and confirmed by spirometry.

1.1.1 Symptoms

1.1.1.1 A diagnosis of COPD should be considered in patients over the age of 35 who have a risk factor (generally smoking) and who present with one or more of the following symptoms: (D)

- exertional breathlessness
- chronic cough
- regular sputum production
- frequent winter ‘bronchitis’
- wheeze.

1.1.1.2 Patients in whom a diagnosis of COPD is considered should also be asked about the presence of the following symptoms: (D)

- weight loss
- effort intolerance
- haemoptysis
- waking at night
- ankle swelling
- chest pain
- fatigue.
1.1.1.3 One of the primary symptoms of COPD is breathlessness. The MRC dyspnoea scale\textsuperscript{1,2} can be used to grade the breathlessness according to the level of exertion required to elicit it. (D)

**MRC dyspnoea scale**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Degree of breathlessness related to activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Not troubled by breathlessness except on strenuous exercise</td>
</tr>
<tr>
<td>2</td>
<td>Short of breath when hurrying or walking up a slight hill</td>
</tr>
<tr>
<td>3</td>
<td>Walks slower than contemporaries on the level because of breathlessness, or has to stop for breath when walking at own pace</td>
</tr>
<tr>
<td>4</td>
<td>Stops for breath after walking about 100 m or after a few minutes on the level</td>
</tr>
<tr>
<td>5</td>
<td>Too breathless to leave the house, or breathless when dressing or undressing</td>
</tr>
</tbody>
</table>

1.1.2 Spirometry

1.1.2.1 Spirometry should be performed: (D)
- at the time of diagnosis
- opportunistically, not more often than once per year
- to reconsider the diagnosis if patients show an exceptionally good response to treatment.

1.1.2.2 All health professionals managing patients with COPD should have access to spirometry. (D)

1.1.2.3 Spirometry can be performed by any health professional who has undergone appropriate training and who keeps their skills up to date. (D)

1.1.2.4 Spirometry can be reliably performed in both primary and secondary care settings. (D)

1.1.2.5 Health professionals managing patients with stable COPD should be competent in the interpretation of spirometry. (D)


1.1.2.6 Spirometry services should be supported by quality control and audit processes. (D)

1.1.2.7 It is recommended that European Community for Steel and Coal (ECCS)\(^3\) reference values are used but it is recognised that these values may lead to under-diagnosis in the elderly and are not applicable in non-Caucasians. (D)

1.1.3 Further investigations

1.1.3.1 At the time of their initial diagnostic evaluation all patients should have: (D)
- a chest radiograph to exclude other pathologies
- an assessment of their breathlessness using the MRC dyspnoea scale
- a full blood count
- body mass index calculated.

1.1.3.2 The following additional investigations should be performed to aid management in the circumstance described in the table below. (D)

Investigations to aid management

<table>
<thead>
<tr>
<th>Investigation</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serial peak flow measurements</td>
<td>To exclude asthma if diagnostic doubt remains.</td>
</tr>
<tr>
<td>Alpha-1 antitrypsin</td>
<td>If early onset, minimal smoking history, or family history.</td>
</tr>
<tr>
<td>TLCO</td>
<td>To investigate symptoms that seem disproportionate to the spirometric impairment.</td>
</tr>
<tr>
<td>CT thorax</td>
<td>To investigate symptoms that seem disproportionate to the spirometric impairment. To investigate abnormalities seen on a chest radiograph. To assess suitability for surgery.</td>
</tr>
<tr>
<td>ECG</td>
<td>To assess cardiac status if features of cor pulmonale.</td>
</tr>
<tr>
<td>Echocardiogram</td>
<td>To assess cardiac status if features of cor pulmonale.</td>
</tr>
<tr>
<td>Pulse oximetry</td>
<td>To assess need for oxygen therapy.</td>
</tr>
</tbody>
</table>

1.1.3.3 Patients identified as having alpha-1 antitrypsin deficiency should be offered the opportunity to be referred to a specialist centre to allow discussion of the clinical management of this condition. (D)

1.1.4 Reversibility testing

1.1.4.1 Routine spirometric reversibility testing is not recommended as a part of the diagnostic process or to plan initial therapy using spirometric measurements with bronchodilators or corticosteroids because: (D)

- repeated FEV₁ measurements can show small spontaneous fluctuations
- responses to interventions can be inconsistent and not reproducible
- the definition of the magnitude of a significant change is purely arbitrary
- response to long-term therapy is not predicted by acute reversibility testing.

1.1.4.2 COPD and asthma can usually be differentiated on clinical grounds. It is recommended that this approach is used whenever possible. (D)

1.1.4.3 To help resolve cases where diagnostic doubt remains, or both COPD or asthma are present, it is recommended that the following findings are used to help identify asthma. (D)

- Clinically significant COPD is unlikely if the FEV₁ and FEV₁/FVC ratio return to normal with drug therapy.
- A large (> 400ml) response to bronchodilators.
• A large (> 400ml) response to 30 mg oral prednisolone daily for 2 weeks.
• Serial peak flow measurements showing significant diurnal or day-to-day variability.

1.1.4.4 Remaining diagnostic uncertainty may be resolved by referral for more detailed investigations, including imaging, measurement of TLCO, and measurement of airway hyperreactivity. (D)

1.1.5 Assessment of severity

1.1.5.1 Mild airflow obstruction can be associated with significant disability in patients with COPD. A true assessment of severity should include assessment of the degree of airflow obstruction and disability, the frequency of exacerbations and the following known prognostic factors: (D)

- FEV₁ (post bronchodilator; rate of change)
- TLCO
- breathlessness (MRC scale)
- health status
- exercise capacity
- BMI
- PaO₂
- cor pulmonale.

1.1.5.2 The severity of airflow obstruction should be assessed according to the reduction in FEV₁ as shown in the table below. (D)

### Assessment of obstruction

<table>
<thead>
<tr>
<th>Severity</th>
<th>FEV₁</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild airflow obstruction</td>
<td>50-80% predicted</td>
</tr>
<tr>
<td>Moderate airflow obstruction</td>
<td>30-50% predicted</td>
</tr>
<tr>
<td>Severe airflow obstruction</td>
<td>&lt;30% predicted</td>
</tr>
</tbody>
</table>
1.1.6 Identification of early disease

1.1.6.1 Spirometry should be performed in patients attending in primary care who are over 35, current or ex-smokers, and have a chronic cough. Up to 27% of such patients have COPD. (B)

1.1.6.2 Spirometry should be considered in patients attending in primary care with chronic bronchitis. A significant proportion of these will go on to develop airflow limitation. (B)

1.1.7 Follow-up of patients with COPD

1.1.7.1 Follow up of patients with COPD in primary care should include:

(D)

- highlighting the diagnosis of COPD in the case record and recording this using Read Codes on a computer database
- recording the values of spirometric tests performed at diagnosis
- supervision of smoking cessation
- documenting the effects of each drug treatment as it is tried
- assessing adequacy of symptom control
- recording changes in spirometric parameters measured opportunistically at intervals (A loss of 500 ml over 5 years will select out those patients with rapidly progressing disease who may need specialist referral and investigation.)
- regular reassessment of inhaler technique
- assessing the need for referral (to secondary care or other professionals such as physiotherapists or occupational therapists).

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1.1.7.2 Patients with mild or moderate COPD should be reviewed at least once per year, or more frequently if indicated. (D)

1.1.7.3 For most patients with stable severe disease, regular hospital review is not necessary, but there should be locally agreed mechanisms to allow rapid access to hospital assessment when necessary. (D)

1.1.7.4 When patients with severe COPD are reviewed in primary care, specific attention should be paid to: (D)
   - the adequacy of symptom control
   - the medication that they are receiving
   - the presence of depression
   - the patient’s nutritional state
   - the need for social services and occupational therapy input
   - the need for long-term oxygen therapy.

1.1.7.5 Patients with severe disease requiring specialist interventions such as non-invasive ventilation should be reviewed regularly by specialists at a hospital (D)

1.1.8 Referral for specialist advice

1.1.8.1 It is recommended that referrals are made when clinically indicated. Referral may be appropriate at all stages of the disease and not solely in the most severely disabled patients. Reasons for referral include those given in the table below. (D)

Some suggested referral criteria

<table>
<thead>
<tr>
<th>Reason</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Therapeutic advice:</strong></td>
<td></td>
</tr>
<tr>
<td>Suspected severe COPD</td>
<td>Confirm diagnosis and optimise therapy</td>
</tr>
<tr>
<td>Onset of cor pulmonale</td>
<td>Confirm diagnosis and optimise therapy</td>
</tr>
<tr>
<td>Assessment for O₂ therapy</td>
<td>Optimise therapy and measure blood gases</td>
</tr>
<tr>
<td>Assessment for long-term nebuliser therapy</td>
<td>Optimise therapy and exclude inappropriate prescriptions</td>
</tr>
</tbody>
</table>
Assessment for oral corticosteroid therapy

Bullous lung disease

A rapid decline in FEV₁

Assessment for pulmonary rehabilitation

Assessment for lung volume reduction surgery

Assessment for lung transplantation

Dysfunctional breathing

Justify need for long-term treatment or supervise withdrawal

Identify candidates for surgery

Encourage early intervention

Identify candidates for pulmonary rehabilitation

Identify candidates for surgery

Identify candidates for surgery

Confirm diagnosis, optimise pharmacotherapy and access other therapists

### Diagnostic advice

<table>
<thead>
<tr>
<th>Condition</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aged under 40 years or a family history of α₁-antitrypsin deficiency</td>
<td>Identify α₁-antitrypsin deficiency, consider therapy and screen family</td>
</tr>
<tr>
<td>Uncertain diagnosis</td>
<td>Make a diagnosis</td>
</tr>
<tr>
<td>Symptoms disproportionate to lung function deficit</td>
<td>Look for other explanations</td>
</tr>
<tr>
<td>Frequent infections</td>
<td>Exclude bronchiectasis</td>
</tr>
</tbody>
</table>

1.1.8.2 Referral should be considered if there is diagnostic uncertainty or if the patient requests a second opinion. (D)

1.1.8.3 Referral should be considered if the patient is thought to require an expert assessment of their management or if they require therapies that cannot be provided by the referring clinician. (D)

1.1.8.4 Referral should be considered if the patient is thought to be a candidate for surgical treatment. (D)

1.1.8.5 Referrals do not always have to be seen by a respiratory physician. In some cases they may be seen by members of the COPD team who have appropriate training and expertise. (D)
1.2 Managing stable COPD

1.2.1 Smoking cessation

1.2.1.1 An up-to-date smoking history should be documented for everyone with COPD. (D)

1.2.1.2 All COPD patients still smoking, regardless of age, should be encouraged to stop, and offered help to do so, at every opportunity. (C)

1.2.1.3 Unless contraindicated, pharmacotherapy combined with an appropriate support programme should be used to optimise quit rates for people with COPD. (B)

1.2.1.4 If a person with COPD is unsuccessful in an attempt to quit smoking, further quit attempts should not normally be encouraged for at least 6 months to allow the smoker to regain adequate motivation. However, if external factors interfere with an individual’s initial attempt to stop smoking, it may be reasonable to try again sooner, and previous quit attempts are a positive predictor of eventual successful quitting. (D)

1.2.2 Inhaled bronchodilator therapy

1.2.2.1 Short-acting bronchodilators should be the first-line drugs for the relief of breathlessness and exercise limitation. (B)

1.2.2.2 The effectiveness of this treatment should not be assessed by lung function alone but should include a variety of other measures such as improvement in symptoms, activities of daily living, exercise capacity, and rapidity of symptom relief. (D)

1.2.2.3 Patients who remain symptomatic should have their inhaled treatment intensified to include long-acting bronchodilators or combined therapy with a short-acting beta agonist and a short-acting anticholinergic. (A)
1.2.2.4 It is recommended that a long-acting bronchodilator is used in patients who remain symptomatic despite treatment with short-acting bronchodilators, because these drugs appear to have additional benefits over combinations of short-acting drugs. (B)

1.2.2.5 The choice of drug(s) should be determined with reference to efficacy in an individual following a trial, side effects, patient preference and cost effectiveness. (D)

1.2.3 Theophylline and other methylxanthines

1.2.3.1 Because of the need to monitor plasma levels, and the potential for interactions, it is recommended that theophylline is only used after a trial of short-acting bronchodilators and long-acting bronchodilators, or in patients who are unable to use inhaled therapy. (D)

1.2.3.2 Particular caution needs to be taken with the use of theophylline in elderly patients because of differences in pharmacokinetics, the increased likelihood of co-morbidities and the use of other medications. (D)

1.2.3.3 The effectiveness of the treatment with theophylline should be assessed by improvements in symptoms, activities of daily living, exercise capacity and lung function. (D)

1.2.3.4 The dose of theophylline prescribed should be reduced at the time of an exacerbation if macrolide or fluroquinolone antibiotics (or other drugs known to interact) are prescribed. (D)

1.2.4 Corticosteroids

Inhaled corticosteroids

1.2.4.1 Oral corticosteroid reversibility tests do not predict response to inhaled corticosteroid therapy and should not be used to identify which patients should be prescribed inhaled corticosteroids. (A)
1.2.4.2 Inhaled corticosteroids should be prescribed for patients with an $\text{FEV}_1 \leq 50\%$ predicted who are having two or more exacerbations requiring treatment with antibiotics or oral corticosteroids in a 12-month period. (Note that the aim of treatment is to reduce exacerbation rates and slow the decline in health status, and not to improve lung function per se.) (B)

1.2.4.3 Clinicians should be aware of the potential risk of developing osteoporosis and other side effects in patients treated with high-dose inhaled corticosteroids (especially in the presence of other risk factors). (D)

**Oral corticosteroids**

1.2.4.4 Maintenance use of oral corticosteroid therapy in COPD is not recommended. Some patients with advanced COPD may require maintenance oral corticosteroids when these cannot be withdrawn following an exacerbation. (D)

1.2.4.5 The dose of oral corticosteroids should be kept as low as possible. (D)

1.2.4.6 Any patient treated with long-term oral corticosteroid therapy should be monitored for the development of osteoporosis and given appropriate prophylaxis. (D)

1.2.4.7 Combination therapy

1.2.4.8 Combining therapies from different drug classes (such as those listed below) is recommended to increase clinical benefit. (A)

- beta-agonist and anticholinergic
- beta-agonist and theophylline
- anticholinergic and theophylline
- beta agonist and inhaled corticosteroid.
1.2.4.9 The clinical effectiveness of combined treatments can be assessed by improvements in symptoms, activities of daily living, exercise capacity and lung function. (D)

**Delivery systems used to treat patients with stable COPD**

Contrary to popular belief, the vast majority of elderly patients are able to acquire and maintain adequate inhaler technique given adequate instruction. The exception to this is in the very demented. In most patients, however, a pragmatic approach guided by individual patient assessment is needed in choosing a device, and regular reassessment and reinstruction is essential.

1.2.4.10 Most indications for bronchodilator therapy are best managed by the use of a hand-held inhaler device (including a spacer device if appropriate). (D)

1.2.4.11 Inhalers should be prescribed only after patients have received training in the use of the device and have demonstrated satisfactory technique. (D)

1.2.4.12 If the patient is unable to use a particular device satisfactorily it is not suitable for them and an alternative should be tried. (D)

1.2.4.13 The patient should have their ability to use an inhaler device regularly assessed by a competent health care professional and, if necessary, they should be re-taught the correct technique. (D)

1.2.4.14 The delivery of drug varies from individual to individual, whatever the device, and so the dose of medication needs to be titrated against clinical response to ensure optimum efficiency for that patient. (D)

**Recommendations about spacers**

1.2.4.15 The spacer should be compatible with the patient administered metered dose inhaler (pMDI) being used. (D)

1.2.4.16 It is recommended that spacers are used in the following way. (D)
• Administered by repeated single actuations of the metered
dose inhaler into the spacer, each followed by inhalation.
• Minimal delay between pMDI actuation and inhalation.
• Tidal breathing is as effective as single breaths.

1.2.4.17 Spacers should be cleaned no more than monthly as more
frequent cleaning affects their performance (due to build up of static). They should be cleaned with washing-up liquid and
allowed to dry in air. The mouthpiece should be wiped clean of
detergent before use. (D)

Recommendations about nebulisers

1.2.4.18 Patients with distressing or disabling breathlessness despite
maximal therapy should be considered for a trial of nebuliser
therapy. (D)

1.2.4.19 Nebulised therapy should not be prescribed without assessing
and confirming one or more of the following occurs: (D)
• a reduction in symptoms
• an increase in the ability to undertake activities of daily living
• an increase in exercise capacity
• an improvement in lung function.

1.2.4.20 Nebulised therapy should not be prescribed without an
assessment of patient’s and/or carer’s ability to use it. (D)

1.2.4.21 A nebuliser system, which is known to be efficient should be used
(once available, CEN data should be used to assess efficiency)
(D)

1.2.4.22 Patients should be allowed to choose whether they prefer a
facemask or a mouthpiece to administer their nebulised treatment,
unless their therapy specifically requires a mouthpiece (for
example, anticholinergic drugs). (D)
1.2.4.23 If nebuliser therapy is prescribed, the patient should have access to an appropriately run nebuliser service providing equipment, servicing, advice and support for patients who require long-term nebuliser therapy. (D)

1.2.5 Oxygen

Long term oxygen therapy (LTOT)

1.2.5.1 LTOT is indicated in patients with COPD who have a PaO$_2$ < 7.3 kPa when stable or a PaO$_2$ > 7.3 and < 8 kPa when stable and one of: secondary polycythaemia, nocturnal hypoxaemia (SaO$_2$ < 90% for > 30% of time), peripheral oedema, or pulmonary hypertension. (A)

1.2.5.2 To get the benefits of LTOT patients must breathe supplemental oxygen for at least 15 hours per day. Greater benefits are seen in patients receiving oxygen 20 hours per day. (A)

1.2.5.3 The need for oxygen therapy should be assessed in all patients with a severe airflow obstruction (FEV$_1$ < 30% predicted) and considered in patients with moderate airflow obstruction (FEV$_1$ 30–50% predicted). (D)

1.2.5.4 The need for oxygen therapy should be assessed in patients with cyanosis, polycythaemia, peripheral oedema, a raised jugular venous pressure, or oxygen saturations < 92% when breathing air. (D)

1.2.5.5 To ensure all patients eligible for LTOT are identified it is recommended that pulse oximetry is available to primary care. (D)

1.2.5.6 The assessment of patients for LTOT should comprise the measurement of arterial blood gases on two occasions not less than 3 weeks apart in patients who have a confident diagnosis of COPD, who are receiving optimum medical management, and who are stable. (D)
1.2.5.7 Oxygen concentrators should be used to provide the fixed supply at home for LTOT. (D)

**Ambulatory oxygen therapy**

1.2.5.8 People who are already on LTOT who wish to continue with oxygen therapy outside the home, and who are prepared to use it, should have ambulatory oxygen prescribed. (D)

1.2.5.9 Ambulatory oxygen therapy should be considered in patients who have exercise desaturation, are shown to have an improvement in exercise capacity and/or dyspnoea with oxygen, and have the motivation to use oxygen. (D)

1.2.5.10 Ambulatory oxygen therapy is not usually recommended in COPD if \( \text{PaO}_2 > > 7.3 \text{ kPa} \) and there is no exercise desaturation. (D)

1.2.5.11 Ambulatory oxygen therapy should only be prescribed after an appropriate assessment has been performed by the hospital specialist. The purpose of the assessment is to assess the extent of desaturation, and the improvement in exercise capacity with supplemental oxygen, and the oxygen flow rate required to correct desaturation, aiming to keep the \( \text{SaO}_2 \) above 90%. (D)

1.2.5.12 Small light-weight cylinders, oxygen conserving devices and portable liquid oxygen systems should be available for the treatment of patients with COPD. (D)

1.2.5.13 A choice about the nature of equipment prescribed should take account of the hours of ambulatory oxygen use required by the patient and the oxygen flow rate required. (D)

**Appropriate equipment**

<table>
<thead>
<tr>
<th>Duration of use</th>
<th>Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Time Range</td>
<td>Oxygen Source</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>----------------------------------------------------</td>
</tr>
<tr>
<td>Less than 90 minutes</td>
<td>Small cylinder</td>
</tr>
<tr>
<td>90 minutes to 4 hours</td>
<td>Small cylinder with oxygen conserving device</td>
</tr>
<tr>
<td>More than 4 hours</td>
<td>Liquid oxygen</td>
</tr>
<tr>
<td>More than 30 minutes, with</td>
<td>Liquid oxygen</td>
</tr>
<tr>
<td>flow rates greater than 2 litres/minute</td>
<td></td>
</tr>
</tbody>
</table>

**Short burst oxygen therapy**

1.2.5.14 Short burst oxygen therapy should only be considered for episodes of severe breathlessness not relieved by other treatments in patients with COPD. (C)

1.2.5.15 Short burst oxygen therapy should only continue to be prescribed if an improvement in breathlessness has been documented. (D)

1.2.5.16 When indicated, short burst oxygen should be provided from cylinders. (D)

**1.2.6 Non-invasive ventilation (NIV)**

1.2.6.1 Patients with chronic hypercapnic respiratory failure who have required assisted ventilation (whether invasive or non-invasive) during an exacerbation or who are hypercapnic or acidotic on LTOT should be referred to a specialist centre for consideration of long term NIV. (D)

**1.2.7 Management of pulmonary hypertension and cor pulmonale**

**Diagnosis of pulmonary hypertension and cor pulmonale**

In the context of this guideline, the term ‘cor pulmonale’ is used to define a clinical condition that is identified and managed on the basis of clinical features. This clinical syndrome of cor pulmonale includes patients who have right heart failure and those in whom the primary pathology is retention of salt and water, leading to the development of peripheral oedema.
1.2.7.1 A diagnosis of cor pulmonale should be considered if patients have: (D)
- peripheral oedema
- a raised venous pressure
- a systolic parasternal heave
- a loud pulmonary second heart sound.

1.2.7.2 It is recommended that the diagnosis of cor pulmonale is made clinically and that this process should involve excluding other causes of peripheral oedema. (D)

Treatment of cor pulmonale

1.2.7.3 Patients presenting with cor pulmonale must be assessed for the need for long-term oxygen therapy. (A)

1.2.7.4 Oedema associated with cor pulmonale can usually be controlled symptomatically with diuretic therapy. (D)

1.2.7.5 The following are not recommended for cor pulmonale (C):
- angiotensin converting enzyme inhibitors
- calcium channel blockers
- alpha-blockers
- digoxin (except if there is atrial fibrillation).

1.2.8 Recommendations on pulmonary rehabilitation

Pulmonary rehabilitation is a multidisciplinary programme of care for patients with chronic respiratory impairment that is individually tailored and designed to optimise physical and social performance and autonomy.

1.2.8.1 In view of the magnitude of benefits of pulmonary rehabilitation, it should be made available to all appropriate patients with COPD managed in primary care and secondary care settings. (A)

1.2.8.2 Pulmonary rehabilitation should be offered to all patients who consider themselves functionally disabled by COPD. (D)
1.2.8.3 To be effective and improve compliance, pulmonary rehabilitation programmes must be accessible in terms of (D):
- Access
- Location
- Availability

1.2.8.4 Pulmonary rehabilitation programmes should include multicomponent, multidisciplinary interventions that are tailored to individual patient’s needs. (A)

1.2.8.5 Patients should be made aware of the benefits of pulmonary rehabilitation and the commitment required to gain these. (D)

1.2.9 Vaccination and anti-viral therapy

1.2.9.1 Pneumococcal vaccination and annual influenza vaccination should be offered to all patients with COPD, as recommended by the Chief Medical Officer (D).

1.2.9.2 NICE Technology Appraisal Guidance No. 58 \(^7\) makes the following recommendations.
- Within licensed indications, zanamivir and oseltamivir are recommended for the treatment of at-risk adults who present with influenza like illness (ILI) and who can start therapy within 48 hours of the onset of symptoms.

**Zanamivir**
- Zanamivir should be used with caution in people with COPD because of risk of bronchospasm.
- If people with COPD are prescribed zanamivir they should be made aware of the risks and have a fast-acting bronchodilator available.

1.2.10 **Lung surgery**

1.2.10.1 Patients who are breathless, with a single large bulla occupying more than one third of a hemithorax, who have an FEV₁ < 50% predicted, evidence of progressive restriction of normal lung tissue, a reasonably preserved TLCO and a normal PaCO₂ should be referred for consideration of bullectomy. (C)

1.2.10.2 Patients who remain breathless despite maximal medical therapy (including rehabilitation), who meet all of the following criteria: (A)

- FEV₁ >20% predicted,
- PaCO₂ < 7.3 kPa,
- upper lobe predominant emphysema
- TLCO > 20% predicted

should be referred for consideration of lung volume reduction surgery.

1.2.10.3 Patients who remain breathless despite maximal medical therapy should be referred for consideration of lung transplantation, bearing in mind co-morbidities and local surgical protocols. Considerations include: (C)

- age
- FEV₁
- PaCO₂
- homogeneously distributed emphysema on CT scan
- elevated pulmonary artery pressures with progressive deterioration.

1.2.11 **Alpha-1 antitrypsin replacement therapy**

1.2.11.1 There is currently insufficient evidence to recommend alpha-1 antitrypsin replacement therapy in the management of patients with alpha-1 antitrypsin deficiency. (D)
1.2.12  Mucolytic therapy

1.2.12.1 A trial of mucolytic therapy should be considered in patients with a chronic cough productive of sputum. (B)

1.2.12.2 Mucolytic therapy should be continued if there is symptomatic improvement (such as reduction in frequency of cough and sputum production). (D)

1.2.13  Anti-oxidant therapy

1.2.13.1 Treatment with alpha-tocopherol and beta-carotene supplements, alone or in combination, is not recommended. (A)

1.2.14  Anti-tussive therapy

1.2.14.1 Antitussive therapy should not be used in the management of stable COPD. (D)

1.2.15  Prophylactic antibiotic therapy

1.2.15.1 There is insufficient evidence to recommend prophylactic antibiotic therapy in the management of stable COPD. (D)

1.2.16  Multidisciplinary management

Multidisciplinary working is breaking down historic demarcation of roles and many of the activities can be undertaken by individuals from different professional backgrounds. Some of these activities may be undertaken in the clinic or in the practice as part of routine care by the practitioner seeing the patient, but in certain circumstances it may be necessary for the patient to be referred to a specialist department, for example physiotherapy.

1.2.16.1 Patients with COPD should have access to the wide range of skills available from a multidisciplinary team. (D)

1.2.16.2 The multidisciplinary team should fulfill the following functions. (D)
• Assessing patients (including performing spirometry, assessing the need for oxygen, the need for aids for daily living and the appropriateness of delivery systems for inhaled therapy).
• Managing patients (including non-invasive ventilation, pulmonary rehabilitation, hospital at home/early discharge schemes, providing palliative care, identifying and managing anxiety and depression, advising patients on relaxation techniques, dietary issues, exercise, social security benefits and travel).
• Advising patients on self-management strategies.
• Identifying and monitoring patients at high risk of exacerbations and undertaking activities which aim to avoid emergency admissions.
• Education of patients and other health professionals.

Respiratory nurse specialists

1.2.16.3 It is recommended that respiratory nurse specialists form part of the multidisciplinary COPD team. (D)

Physiotherapy

1.2.16.4 If patients have excessive sputum, they should be taught: (D)
• the use of PEP masks (B)
• active cycle of breathing technique.

Identifying and managing anxiety and depression

1.2.16.5 Healthcare professionals in primary care should be alert to the presence of depression in patients with COPD. (D)

1.2.16.6 The presence of anxiety and depression should be considered in patients: (D)
• who are hypoxic (SaO₂ < 92%)
• who have severe dyspnoea
• who have been seen at or admitted to a hospital.

1.2.16.7 The presence of anxiety and depression in patients with COPD can be identified using validated assessment tools (see Appendix in full guideline; to be completed] for further details). (D)

1.2.16.8 Patients found to be depressed or anxious should be treated with conventional pharmacotherapy. (A)

1.2.16.9 For antidepressant treatment to be successful, it needs to be supplemented by spending time with the patient explaining why depression requires treatment alongside physical disorder. (C)

Nutritional factors

1.2.16.10 Body mass index (BMI) should be calculated in patients with COPD. (D):

1.2.16.11 If the BMI is abnormal (high or low), or changing over time, the patient should be referred for dietetic advice.

1.2.16.12 If the BMI is low patients should also be given nutritional supplements to increase their total calorific intake and patients should be encouraged to take exercise to augment the effects of nutritional supplementation.

Palliative care

1.2.16.13 Opiates can be used for the palliation of breathlessness in patients with end-stage COPD unresponsive to other medical therapy. (D)

1.2.16.14 Benzodiazepines, tricyclic antidepressants, major tranquillisers and oxygen should also be used when appropriate for breathlessness in patients with end-stage COPD unresponsive to other medical therapy. (D)
1.2.16.15 Patients with end-stage COPD should have access to the full range of services offered by multidisciplinary palliative care teams, including admission to hospices. The organisation of these services lies outside the remit of these guidelines. (D)

**Occupational therapy**

1.2.16.16 Patients should be regularly asked about their ability to undertake activities of daily living and how breathless they become when doing these. (D)

1.2.16.17 Patients’ need for occupational therapy should be assessed using validated tools (see Appendix in full guideline (to be completed) for further details). (D)

**Social services**

1.2.16.18 Patients disabled by COPD should be considered for referral for assessment by a social services department. (D)

**Advice on travel**

1.2.16.19 All patients on LTOT planning air travel should be assessed in line with the BTS recommendations. (D)

1.2.16.20 All patients with an FEV₁ < 50% predicted who are planning air travel should be assessed in line with the BTS recommendations. (D)

1.2.16.21 All patients known to have bullous disease should be warned that they are at a theoretically increased risk of developing a pneumothorax during air travel. (D)

**Scuba diving**

1.2.16.22 Scuba diving is not recommended for patients with COPD. (D)

**Education**

1.2.16.23 Education should be tailored to individual patient’s needs. (D)
1.2.16.24 There are significant differences in the response of patients with COPD and asthma to education programmes. Programmes designed for asthma should not be used in COPD. (A)

1.2.16.25 Specific educational packages should be developed for patients with COPD. (D).

Suggested topics for inclusion are listed in Appendix F.

The packages should take account of the different needs of patients at different stages of their disease.

1.2.16.26 Patients with moderate and severe COPD should be made aware of the technique of NIV, and its benefits and limitations explained (D).

Self management

1.2.16.27 Patients at risk of having an exacerbation of COPD should be given self-management advice that encourages them to respond promptly to the symptoms of an exacerbation by: (A)

- starting oral corticosteroid therapy if their increased breathlessness interferes with activities of daily living (unless contraindicated)
- starting antibiotic therapy if their sputum is purulent
- adjusting their bronchodilator therapy to control their symptoms.

1.2.16.28 Patients at risk of having an exacerbation of COPD should be given a course of antibiotic and corticosteroid tablets to keep at home for use as part of a self-management strategy. (D)

1.2.16.29 Patients given self-management plans should be advised to contact a healthcare professional if they do not improve. (D)
1.2.17 **Fitness for surgery**

1.2.17.1 The ultimate decision about whether or not to proceed with surgery should rest with a consultant anaesthetist and consultant surgeon, taking account of the presence of co-morbidities, the functional status of the patient, and the necessity of the surgery. (D)

1.2.17.2 It is recommended that lung function should not be the only criterion used to assess patients with COPD prior to surgery. Composite assessment tools such as the ASA scoring system are the best predictors of risk. (D)

1.2.17.3 If time permits, the medical management of the patient should be optimised prior to surgery and this might include undertaking a course of pulmonary rehabilitation. (D)

1.3 **Management of exacerbations of COPD**

1.3.1 **Definition of an exacerbation**

The definition of an exacerbation used in this document is as follows.

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. Commonly reported symptoms are worsening breathlessness, cough, increased sputum production and change in sputum colour. The change in these symptoms often necessitates a change in medication.

1.3.2 **Assessment of need for hospital treatment**

Most patients with an exacerbation of COPD can be managed at home but a few need hospital treatment. This may be because of the severity of the exacerbation, the need for therapies that are not available to that patient at home (such as oxygen or nebulised bronchodilators), or the need for specialist interventions such as non-invasive ventilation.
1.3.2.1 The factors in the table below should be used to assess the need to treat patients in hospital. (D)

**Deciding where to treat the patient**

<table>
<thead>
<tr>
<th>Factor</th>
<th>Treat at home</th>
<th>Treat in hospital</th>
</tr>
</thead>
<tbody>
<tr>
<td>Able to cope at home</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Breathlessness</td>
<td>Mild</td>
<td>Severe</td>
</tr>
<tr>
<td>General condition</td>
<td>Good</td>
<td>Poor – deteriorating</td>
</tr>
<tr>
<td>Level of activity</td>
<td>Good</td>
<td>Poor/confined to bed</td>
</tr>
<tr>
<td>Cyanosis</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Worsening peripheral oedema</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Level of consciousness</td>
<td>Normal</td>
<td>Impaired</td>
</tr>
<tr>
<td>Already receiving LTOT</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>SaO₂ &lt; 90%</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Social circumstances</td>
<td>Good</td>
<td>Living alone/not coping</td>
</tr>
<tr>
<td>Acute confusion</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Rapid rate of onset</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Significant comorbidity (particularly cardiac and insulin dependent diabetes)</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Also available at hospital</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Changes on the chest radiograph</td>
<td>No</td>
<td>Present</td>
</tr>
<tr>
<td>Arterial pH level</td>
<td>≥ 7.35</td>
<td>&lt; 7.35</td>
</tr>
<tr>
<td>Arterial PaO₂</td>
<td>≥ 7 kPa</td>
<td>&lt; 7 kPa</td>
</tr>
<tr>
<td>Local availability of hospital-at-home services</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

1.3.3 Investigation of an exacerbation

The diagnosis of an exacerbation is a clinical diagnosis and is not dependent upon the results of investigations; however, in certain situations investigations may assist in ensuring appropriate treatment is given. Different investigation strategies are required for patients managed in hospital (who will tend to have more severe exacerbations) and those managed in the community.
Recommendations for primary care

1.3.3.1 Patients managed in primary care. (D)

- Sending sputum samples for culture is not recommended in routine practice.
- In patients with clinical features of a severe exacerbation, pulse oximetry is of value.

Recommendations for patients referred to hospital

1.3.3.2 In all patients referred to hospital: (D)

- a chest radiograph should be obtained
- arterial blood gas tensions should be measured and the inspired oxygen concentration must be recorded
- an ECG should be recorded (to exclude co-morbidities)
- a full blood count should be performed and urea and electrolyte concentrations should be measured
- a theophylline level should be measured in patients on theophylline therapy prior to admission
- if it is purulent, sputum should be sent for microscopy and culture.

1.3.4 Hospital-at-home and assisted-discharge schemes

1.3.4.1 Hospital-at-home and assisted-discharge schemes can be used to manage exacerbations of COPD that would otherwise require hospitalisation. (A)

1.3.4.2 The multiprofessional team required to operate these schemes should include allied health professionals with experience in managing patients with COPD, and may include nurses, physiotherapists and generic health workers. (D)

1.3.4.3 There are currently insufficient data to make firm recommendations about which patients are most suitable for hospital at home or early discharge. Patient selection should
depend on the resources available and absence of factors associated with a worse prognosis, such as acidosis. (D)

1.3.4.4 Hospital-at-home and early-discharge schemes can be used to provide effective intermediate care as recommended in the National Service Framework (NSF) for Older People: Standard Three: Intermediate care. (D)

1.3.4.5 Where there is a need to reduce hospital bed occupancy, hospital-at-home and assisted-discharge schemes can be recommended, but it is acknowledged that it might not be cheaper for the NHS because these patients would need to use resources from primary care. (A)

1.3.4.6 Patients’ preferences regarding the service must be considered. (D)

1.3.5 Pharmacological management

Increased breathlessness is a common feature of an exacerbation of COPD. This is usually managed by taking increased doses of short-acting bronchodilators and these drugs may be given using different delivery systems.

Delivery systems for inhaled therapy during exacerbations

1.3.5.1 Both nebulisers and hand-held inhalers can be used to administer inhaled therapy during exacerbations of COPD. (A)

1.3.5.2 The choice of delivery system should reflect the dose of drug required, the ability of the patient to use the device and the resources available to supervise the administration of the therapy. (D)

1.3.5.3 Patients should be changed to hand-held inhalers as soon as their condition has stabilised because this may permit earlier discharge from hospital. (D)
1.3.5.4 If patients are hypercapnic or acidotic the nebuliser should be driven by compressed air, not oxygen (to avoid worsening hypercapnia) and, if required, oxygen therapy administered simultaneously by nasal cannulae. (D)

1.3.5.5 When prescribing nebulised therapy, its driving gas should be specified in the prescription. (D)

**Systemic corticosteroids**

1.3.5.6 In the absence of significant contraindications oral corticosteroids should be used, in conjunction with other therapies, in all patients admitted to hospital with an exacerbation of COPD. (A)

1.3.5.7 In the absence of significant contraindications oral corticosteroids should be considered in patients managed in the community who have an exacerbation with a significant increase in breathlessness which interferes with daily activities. (B)

1.3.5.8 Patients requiring corticosteroid therapy should be encouraged to present early to get maximum benefits. (D)

1.3.5.9 In the light of the gap in the evidence-base and the diversity in clinical practice, it is recommended that 30 mg prednisolone orally for 7 to 14 days is prescribed. (D)

1.3.5.10 It is recommended that individual courses of corticosteroid treatment should not be prescribed for more than 14 days as there is no advantage in prolonged therapy. (A)

1.3.5.11 Osteoporosis prophylaxis should be considered in patients requiring frequent courses of oral corticosteroids. (D)

1.3.5.12 Patients should be made aware of the optimum duration of treatment and the adverse effects of prolonged therapy. (D)
1.3.5.13 Patients, particularly those discharged from hospital, should be given clear instructions about why, when, and how to stop their corticosteroid treatment. (D)

**Antibiotics**

There has been controversy about whether antibiotics have a benefit in exacerbations and more specifically about whether their use should be restricted to patients with purulent sputum.

1.3.5.14 Antibiotics should be used to treat exacerbations of COPD associated with a history of purulent sputum. (A)

1.3.5.15 Antibiotics are more likely to be helpful in patients with more severe underlying disease. (A)

1.3.5.16 Exacerbations without purulent sputum do not need antibiotic therapy unless there is consolidation on a chest radiograph or clinical signs of pneumonia. (B)

1.3.5.17 First line treatment should be amoxicillin or equivalent, erythromycin or equivalent, or tetracycline or equivalent. (D)

**Theophylline and other methylxanthines**

1.3.5.18 Intravenous theophylline should only be used as an adjunct to the management of exacerbations of COPD if there is an inadequate response to nebulised bronchodilators. (D)

1.3.5.19 Care must be taken when using intravenous theophylline because of interactions with other drugs and potential toxicity if the patient has been on oral theophylline. (D)

1.3.5.20 Theophylline levels should be monitored within 24 hours of starting treatment, and subsequently as frequently as indicated by the clinical circumstances. (D)
Respiratory stimulants

1.3.5.21 It is recommended that doxapram is reserved for settings where non-invasive ventilation is either unavailable or considered inappropriate. (D)

1.3.5.22 There is insufficient evidence to recommend a change from current clinical practice of using doxapram to treat respiratory failure during exacerbations of COPD. (D)

1.3.6 Oxygen therapy during exacerbations of COPD

1.3.6.1 Pulse oximeters should be available to all healthcare professionals managing patients with exacerbations of COPD. (D)

1.3.6.2 In patients with an exacerbation of COPD, in the absence of facilities to measure arterial blood gases, the oxygen saturation should be measured. (D)

1.3.6.3 In patients with an exacerbation of COPD, oxygen should be given to keep the SaO₂ > 90%. (C)

1.3.6.4 In the interim period whilst the recommendation on the availability of oximeters is implemented, if the oxygen saturations are not known, oxygen should be given to all patients with an exacerbation of COPD who are breathless. (D)

1.3.6.5 During the transfer to hospital, it is not desirable to exceed an oxygen saturation of 93%. In these cases, oxygen therapy should be commenced at approximately 40% (4–6 litres/minute for most brands of MC mask) and titrated upwards if saturation falls below 90% and downwards if the patient becomes drowsy or if the saturation exceeds 93–94%. (D)

1.3.6.6 Patients with known type II respiratory failure need special care, especially if they require a prolonged rural ambulance journey or if
they are given oxygen at home for a prolonged period prior to the arrival of the ambulance. (D)

1.3.6.7 All paramedic ambulances should carry pulse oximeters and all paramedical staff should be trained in their use in COPD. (D)

1.3.6.8 Once facilities to measure arterial blood gases are available they must be measured and the inspired blood gases concentration noted in all patients with an exacerbation of COPD. (D)

1.3.6.9 Arterial blood gas measurements should be repeated regularly, according to the response to treatment. (D)

1.3.6.10 The aim of supplemental oxygen therapy in exacerbations of COPD is to maintain adequate levels of oxygenation ($\text{SaO}_2 > 90\%$), without precipitating respiratory acidosis or worsening hypercapnia. Patients with pH $<7.35$ should be considered for ventilatory support. (D)

1.3.7 NIV and COPD exacerbations

1.3.7.1 In view of the clinical and cost effectiveness of NIV, it is recommended that NIV is the treatment of choice for persistent hypercapnic respiratory failure during exacerbations after optimal medical therapy. (A)

1.3.7.2 It is recommended that NIV should be delivered in a dedicated setting with staff (including medical staff, respiratory nurses and physiotherapists) who have been trained in its application, who are experienced its use, and who are aware of its limitations. (D)

1.3.7.3 When patients are started on NIV there should be a clear management plan in the event of deterioration, and ceilings of therapy agreed. (D)
1.3.8 Invasive ventilation and ITU care

1.3.8.1 Patients with COPD should receive treatment on intensive care units, including invasive ventilation when this is thought to be necessary. (C)

1.3.8.2 Neither age nor FEV\textsubscript{1} should be used in isolation to assess suitability for intubation and ventilation. (D)

1.3.8.3 Functional status, BMI, requirement for oxygen when stable, co-morbidities and previous ITU admissions should be considered when assessing suitability for intubation and ventilation. (D)

1.3.8.4 NIV may be useful in patients who are slow to wean from IPPV. (A)

1.3.9 Respiratory physiotherapy and exacerbations

1.3.9.1 Physiotherapy using PEP may be helpful in assisting clearance of sputum in selected patients with exacerbations of COPD. (B)

1.3.9.2 Physiotherapists should be part of the multidisciplinary assessment of overall functional status of the patient prior to discharge. (D)

1.3.10 Monitoring recovery from an exacerbation

1.3.10.1 Patients’ recovery should be monitored by regular clinical assessment of their symptoms and observation of their functional capacity. (D)

1.3.10.2 Pulse oximetry should be used to monitor the recovery of patients with non-hypercapnic, non-acidotic respiratory failure. (D)

1.3.10.3 Intermittent arterial blood gas measurements should be used to monitor the recovery of patients with respiratory failure who are hypercapnic or acidotic, until they are stable. (D)
1.3.10.4 Daily monitoring of PEF or FEV$_1$ is of limited value in monitoring recovery from an exacerbation because the magnitude of changes is small compared to the variability of the measurement. (D)

1.3.11 Discharge planning

1.3.11.1 Spirometry should be measured in all patients prior to discharge. (D)

1.3.11.2 Patients should be re-established on their optimal maintenance bronchodilator therapy prior to discharge. (D)

1.3.11.3 Patients who have had an episode of respiratory failure should have satisfactory oximetry or arterial blood gas results prior to discharge. (D)

1.3.11.4 All aspects of the routine care that patients receive (including appropriateness and risk of side effects) should be assessed prior to discharge. (D)

1.3.11.5 Patients (or home caregivers) should fully understand the correct use of medications prior to discharge. (D)

1.3.11.6 Follow-up and home care arrangements should be completed (such as visiting nurse, oxygen delivery, meal provisions) prior to discharge. (D)

1.3.11.7 Patient, family, and physician should be confident that the patient can manage successfully prior to discharge. When there is remaining doubt, a formal activities of daily living assessment may be helpful. (D)

2 Notes on the scope of the guidance

All NICE guidelines are developed in accordance with a scope document that defines what the guideline will and will not cover. The scope of this guideline was established at the start of the development of this guideline, following a
The guideline offers best practice advice on the care of adults who have a clinical working diagnosis of COPD including chronic bronchitis, emphysema, and chronic airflow limitation/obstruction. The guideline is relevant to primary and secondary healthcare professionals who have direct contact with and make decisions concerning the care of patients with COPD.

The guideline covers diagnostic criteria and identification of early disease. The guideline also makes recommendations on the management of stable patients, exacerbations and preventing progression of the disease.

The guideline does not cover the management of people with asthma, bronchopulmonary dysplasia and bronchiectasis, nor does it cover children.

3 Implementation in the NHS

3.1 In general

Local health communities should review their existing service provision for the management of COPD against this guideline as they begin their Local Delivery Plans. The review should consider the resources required to implement the recommendations set out in Section 1, the people and processes involved, and the timeline over which full implementation is envisaged. Clearly, it is in the interests of people with COPD, their carers and healthcare professionals that the implementation timeline is as rapid as possible.

Relevant local clinical guidelines and protocols should be reviewed in the light of this guidance and revised accordingly.

This guideline should be used in conjunction with the NICE technology appraisals listed in Section 6.
3.2 Audit

Suggested audit criteria are listed in Appendix D. These can be used as the basis for local clinical audit, at the discretion of those in practice.

4 Research recommendations

The following research recommendations have been identified for this NICE guideline, not as the most important research recommendations, but as those that are most representative of the full range of recommendations. The Guideline Development Group’s full set of research recommendations is detailed in the full guideline produced by the National Collaborating Centre for Chronic Conditions (see Section 5).

[A list of up to five research recommendations will be added for the second consultation.]

5 Full guideline

The National Institute for Clinical Excellence commissioned the development of this guideline from the National Collaborating Centre for Chronic Conditions. The Centre established a Guideline Development Group, which reviewed the evidence and developed the recommendations. The full guideline, Chronic obstructive pulmonary disease: management of adults with chronic obstructive pulmonary disease in primary and secondary care, is published by the National Collaborating Centre for Chronic Conditions; it is available on its website (URL to be added), the NICE website (www.nice.org.uk) and on the website of the National Electronic Library for Health (www.nelh.nhs.uk). [Note: these details will apply to the published full guideline.]

The members of the Guideline Development Group are listed in Appendix B. Information about the independent Guideline Review Panel is given in Appendix C.

The booklet The Guideline Development Process – Information for the Public and the NHS has more information about the Institute’s guideline development
process. It is available from the Institute’s website and copies can also be ordered by telephoning 0870 1555 455 (quote reference N0038).

6 Related NICE guidance


7 Review date

The process of reviewing the evidence is expected to begin 4 years after the date of issue of this guideline. Reviewing may begin earlier than 4 years if significant evidence that affects the guideline recommendations is identified sooner. The updated guideline will be available within 2 years of the start of the review process.

A version of this guideline for patients with COPD their carers and the public is available from the NICE website (www.nice.org.uk) or from the NHS response line (0870 1555 455: quote reference number N0xxx for an English version and N0XXX for an English and Welsh version)

[Note these details apply at publication. A draft of the public version will be available for the second consultation]
Appendix A: Grading scheme

The grading scheme and hierarchy of evidence used in this guideline (see Table) is adapted from Eccles and Mason (2001).

<table>
<thead>
<tr>
<th>Hierarchy of evidence</th>
<th>Grading of recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ia</td>
<td>A</td>
</tr>
<tr>
<td>Evidence from systematic reviews or meta analysis of randomised controlled trials</td>
<td>Based on hierarchy I evidence</td>
</tr>
<tr>
<td>Ib</td>
<td>B</td>
</tr>
<tr>
<td>Evidence from at least one randomised controlled trial</td>
<td>Based on hierarchy II evidence or extrapolated from hierarchy I evidence</td>
</tr>
<tr>
<td>IIa</td>
<td>C</td>
</tr>
<tr>
<td>Evidence from at least one controlled study without randomisation</td>
<td>Based on hierarchy III evidence or extrapolated from hierarchy I or II evidence</td>
</tr>
<tr>
<td>IIb</td>
<td>D</td>
</tr>
<tr>
<td>Evidence from at least one other type of quasi experimental study</td>
<td>Directly based on hierarchy IV evidence or extrapolated from hierarchy I, II or III evidence</td>
</tr>
<tr>
<td>III</td>
<td></td>
</tr>
<tr>
<td>Evidence from non experimental descriptive studies, such as comparative studies, correlation studies and case control studies</td>
<td>Evidence from diagnostic studies</td>
</tr>
<tr>
<td>IV</td>
<td></td>
</tr>
<tr>
<td>Evidence from expert committee reports or opinions and/or clinical experience of respected authorities</td>
<td>Evidence from diagnostic studies</td>
</tr>
<tr>
<td>DS</td>
<td></td>
</tr>
<tr>
<td>Evidence from diagnostic studies</td>
<td>Evidence from diagnostic studies</td>
</tr>
<tr>
<td>NICE</td>
<td></td>
</tr>
<tr>
<td>Evidence from NICE guidelines or Health Technology Appraisal programme</td>
<td>Evidence from NICE guidelines or Health Technology Appraisal programme</td>
</tr>
<tr>
<td>HE</td>
<td></td>
</tr>
<tr>
<td>Health economic evidence statement</td>
<td></td>
</tr>
</tbody>
</table>


*Health Technology Assessment* 5: 16
Appendix B: The Guideline Development Group

Dr David Halpin
Clinical Advisor and Lead
Consultant Physician and Senior Lecturer in Respiratory Medicine, Royal Devon & Exeter Hospital

Ms Jill Parnham
Senior Health Service Research Fellow in Guideline Development and Project Manager, National Collaborating Centre for Chronic Conditions (NCC-CC)

Ms Karen Reid
Information Scientist, NCC-CC

Ms Katherine Stevens
Health Economist; Research Associate in Health Economics, School of Health and Related Research, The University of Sheffield

Dr David Bellamy*
General Practitioner, Bournemouth

Ms Julie Booker* (attended one meeting)
Respiratory Nurse Specialist, Rotherham General Hospital

Dr Martin Connolly
Consultant Physician/Geriatrics, University of Manchester

Professor Peter Calverley (seconded from CRG to GDG for three meetings)
Professor of Respiratory Medicine, University of Liverpool and Aintree Hospital NHS Trust

Dr Rachel Garrod*
Senior Lecturer, Kingston University

Mr Ashley Green* (deputy for Esther Threlfall)
Breathe Easy Assistant Manager, British Lung Foundation
Ms Gwen Haylett*
nominated by the British Lung Foundation, Breathe Easy Patient Representative

Dr Michael M.L. Morgan (seconded from CRG to GDG for one meeting)
Consultant Physician, University Hospitals of Leicester NHS Trust

Dr Michael Rudolf*
Consultant Physician, Ealing Hospital NHS Trust

Ms Esther Threlfall*
UK Breathe Easy Manager, British Lung Foundation

Ms Jane Scullion* (attended two meetings) (deputy for Julie Booker),
Respiratory Consultant Nurse, University Hospital of Leicester

Ms Teresa Smith (attended five meetings) (deputy for Julie Booker),
Senior Respiratory Nurse/Chest Clinic Manager, Heatherwood and Wexhampark NHS Trust

Ms Elaine Stevenson (attended one meeting) (deputy for Julie Booker),
Clinical Practitioner Respiratory Care, Southern Derbyshire Acute Hospitals Trust

Professor Jadwiga Wedzicha*
Professor of Respiratory Medicine, St Bartholomew's and Royal London School of Medicine

*Denotes member of GDG and CRG

**Consensus reference group (CRG)**

To support the development of this guideline, a Consensus Reference Group (CRG) was formed. This group used formal consensus techniques in its consideration of clinically important areas where there was insufficient evidence or disagreement over the interpretation of the evidence.
Professor Duncan Geddes (Chair)
Professor of Respiratory Medicine, Royal Brompton Hospital NHS Trust

Ms Alison Bent (attended one meeting as deputy for Mary Hickson),
Dietitian, Hammersmith Hospitals NHS Trust

Professor Peter Calverley
Professor of Respiratory Medicine, University of Liverpool and Aintree Hospital NHS Trust

Dr Stephen Connellan
Consultant Physician, The Royal Wolverhampton Hospitals NHS Trust

Dr Sujal Desai (attended one meeting) nominated
Radiologist, King’s College Hospital

Dr Gillian Hawksworth
Community Pharmacist,

Dr Mary Hickson
Senior Research Dietician, Hammersmith Hospitals NHS Trust

Professor Walter W Holland, nominated
Emeritus Professor of Public Health Medicine, Visiting Professor, London School of Economics

Dr Bill Homes (attended one meeting)
Group Medical Director, Nestor Healthcare Group Plc

Professor Paul Little, nominated
Professor of Primary Care Research, University of Southampton

Dr Michael ML Morgan
Consultant Physician, University Hospitals of Leicester NHS Trust

Ms Louise Sewell
Pulmonary Research Specialist Therapist, The Glenfield Hospital, Leicester
DRAFT FOR FIRST CONSULTATION

Dr Mangalam Sridhar
Consultant Physician, Hammersmith Hospitals NHS Trust

Dr Mike Thomas (attended one meeting as deputy for David Bellamy)
General Practitioner, Minchinhampton, Gloucestershire

Ms Patrician Turner-Lawlor (attended one meeting as deputy for Louise Sewell)
Senior Research Occupational Therapist, Cardiff and Vale NHS Trust
Appendix C: The Guideline Review Panel

The Guideline Review Panel is an independent panel that oversees the development of the guideline and takes responsibility for monitoring its quality. The Panel includes experts on guideline methodology, health professionals and people with experience of the issues affecting patients and carers. The members of the Guideline Review Panel were as follows.

[NICE to add]
Appendix D: Technical detail on the criteria for audit
<table>
<thead>
<tr>
<th>Criterion</th>
<th>Exception</th>
<th>Definition of terms</th>
</tr>
</thead>
</table>
| 1. Diagnosing COPD  
   a) percentage of smokers over the age of 35 consulting with a chronic cough and/or breathlessness who have had spirometry performed  
   b) percentage of patients with a diagnosis of COPD who have had spirometry performed  
   c) percentage of patients being assessed for the first time who have spirometry performed before being given a diagnosis of COPD | Inability to perform spirometry, for example because of facial paralysis | [Insert definitions] |
| 2. Smoking cessation  
   a) percentage of people over the age of 15 whose GP records contain an entry about their smoking status that is not more than 2 years old  
   b) percentage of patients with COPD who are current smokers recorded in the general practice records as having been offered smoking cessation advice and or therapy | | [Insert definitions] |
| 3. Inhaled therapy  
   a) percentage of people with COPD who have been tried on a long-acting bronchodilator  
   b) percentage of people with an FEV₁ less than 50% who have had two or more exacerbations in the past year offered treatment with an inhaled steroid (either alone or in combination with a long acting bronchodilator) | Patient choice | [Insert definitions] |
| 4. Pulmonary rehabilitation  
   a) The presence of a contract between the PCT and a specialist respiratory service for the provision of pulmonary rehabilitation programmes or the presence of a funded service within the PCT to provide multidisciplinary pulmonary rehabilitation | Patient choice | [Insert definitions] |
### 5. Non-invasive ventilation

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>a)</strong> The presence of a funded service within secondary care to provide non-invasive ventilation for people presenting with an exacerbation of COPD and respiratory failure.</td>
<td>Patient choice</td>
</tr>
<tr>
<td><strong>b)</strong> Percentage of patients presenting with an exacerbation of COPD who have received non-invasive ventilation.</td>
<td>[Insert definitions]</td>
</tr>
</tbody>
</table>

### 6. Reduce the impact of exacerbations

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>a)</strong> Percentage of patients given self-management advice on responding promptly to an exacerbation.</td>
<td>Patient choice</td>
</tr>
<tr>
<td><strong>b)</strong> Percentage of patients with exacerbations treated with oral corticosteroids.</td>
<td>[Insert definitions]</td>
</tr>
<tr>
<td><strong>c)</strong> Percentage of patients with exacerbations treated with antibiotics.</td>
<td>[Insert definitions]</td>
</tr>
</tbody>
</table>

### 7. Multidisciplinary management

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>a)</strong> All patients with COPD receive a copy of the public version of this guideline.</td>
<td>Patient choice</td>
</tr>
<tr>
<td><strong>b)</strong> Percentage of patients in a patient survey who have been seen by members of a multi-disciplinary team.</td>
<td>[Insert definitions]</td>
</tr>
</tbody>
</table>
Appendix E: The algorithms

Algorithm 1: Making a diagnosis of COPD

**THINK of a diagnosis of COPD**
- in patients over 35
- who are smokers or ex-smokers
- with symptoms
  - exertional breathlessness
  - chronic cough
  - regular sputum production
  - frequent winter ‘bronchitis’
  - wheeze
- and no clinical features of asthma (see Algorithm 2)

If diagnosis seems likely

**Perform spirometry**

A diagnosis of airflow obstruction can be made if $\text{FEV}_1/\text{FVC} < 0.7$ and $\text{FEV}_1 < 80\%$ predicted

Make diagnosis of COPD if:
- Presence of symptoms with appropriate pattern
- History of smoking (or other risk factor)
- Airflow obstruction on spirometry

Having made a diagnosis of COPD

- Arrange a chest radiograph
- Assess breathlessness using the MRC dyspnoea scale
- Check a full blood count
- Calculate body mass index

Ask about the presence of:
- Weight loss
- Effort intolerance
- Haemoptysis
- Waking at night
- Ankle swelling
- Chest pain

Assess and record the severity of airflow obstruction according to the reduction in $\text{FEV}_1$:

<table>
<thead>
<tr>
<th>Severity of airflow obstruction</th>
<th>$\text{FEV}_1$ % predicted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>50–80</td>
</tr>
<tr>
<td>Moderate</td>
<td>30–50</td>
</tr>
<tr>
<td>Severe</td>
<td>&lt; 30</td>
</tr>
</tbody>
</table>

Consider further investigations (see Section 1.1.3)

Definition of chronic obstructive pulmonary disease (COPD)

COPD is characterised by airflow obstruction. The airflow obstruction is usually progressive, not fully reversible and does not change markedly over several months. The disease is predominantly caused by smoking.

Airflow obstruction is defined as a reduced $\text{FEV}_1$ ($\text{FEV}_1 < 80\%$ predicted) and a reduced $\text{FEV}_1/\text{FVC}$ ratio ($< 0.7$).
Algorithm 2: Differentiating COPD from asthma

Asthma and COPD can usually be differentiated on clinical grounds.

Spirometric reversibility testing is not usually necessary as a part of the diagnostic process or to plan initial therapy.

<table>
<thead>
<tr>
<th>Clinical features differentiating COPD &amp; asthma</th>
<th>COPD</th>
<th>Asthma</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoker or ex-smoker</td>
<td>Nearly all</td>
<td>Possibly</td>
</tr>
<tr>
<td>Symptoms under age 45</td>
<td>Rare</td>
<td>Often</td>
</tr>
<tr>
<td>Chronic productive cough</td>
<td>Common</td>
<td>Uncommon</td>
</tr>
<tr>
<td>Breathlessness</td>
<td>Persistent and progressive</td>
<td>Variable</td>
</tr>
<tr>
<td>Night time waking with breathlessness and or wheeze</td>
<td>Uncommon</td>
<td>Common</td>
</tr>
<tr>
<td>Significant diurnal or day to day variability of symptoms</td>
<td>Uncommon</td>
<td>Common</td>
</tr>
</tbody>
</table>

If diagnostic uncertainty remains consider the following pointers:

Clinically significant COPD is unlikely if the FEV₁ and FEV₁/FVC ratio return to normal with drug therapy.

If diagnostic doubt remains, or both asthma and COPD are present the following findings may help identify asthma:
- A large (> 400 ml) response to bronchodilators
- A large (> 400 ml) response to 30 mg prednisolone daily for 2 weeks
- Serial peak flow measurements showing significant diurnal or day to day variability

Remaining diagnostic uncertainty may be resolved by referral for more detailing investigations.

Definition of chronic obstructive pulmonary disease (COPD)
COPD is characterised by airflow obstruction. The airflow obstruction is usually progressive, not fully reversible and does not change markedly over several months. The disease is predominantly caused by smoking.

Airflow obstruction is defined as a reduced FEV₁ (FEV₁ < 80% predicted) and a reduced FEV₁/FVC ratio (< 0.7).
Algorithm 3: Managing Stable COPD

Long acting bronchodilators

Smoking cessation advice and pharmacotherapy

Inhaled corticosteroid
(N.B. these will generally be prescribed in patients already on long-acting bronchodilators)

Patient with COPD

Dietetic Advice

Oxygen Therapy

LTOT Ambulatory Short Burst

NIV

Theophylline

Pulmonary Rehabilitation

Surgery
**Algorithm 4: Managing exacerbations of COPD**

**Definition of an Exacerbation**
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. Commonly reported symptoms are worsening breathlessness, increased sputum production and change in sputum colour and cough. The change in these symptoms often necessitates a change in medication.

**Make diagnosis of an exacerbation**
Exacerbations of COPD can be associated with increased:
- dyspnoea
- sputum purulence
- sputum volume
- cough.

Also:
Upper airway symptoms (e.g. colds and sore throats), increased wheeze, chest tightness, reduced exercise tolerance, fluid retention, increased fatigue, acute confusion

**Decide where to manage patient**

<table>
<thead>
<tr>
<th>Factor</th>
<th>Treat at home</th>
<th>Treat in Hospital</th>
</tr>
</thead>
<tbody>
<tr>
<td>Able to cope at home</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Breathlessness</td>
<td>Mild</td>
<td>Severe</td>
</tr>
<tr>
<td>General condition</td>
<td>Good</td>
<td>Poor - deteriorating</td>
</tr>
<tr>
<td>Level of activity</td>
<td>Good</td>
<td>Poor/confined to bed</td>
</tr>
<tr>
<td>Cyanosis</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Worsening peripheral oedema</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Level of consciousness</td>
<td>Normal</td>
<td>Impaired</td>
</tr>
<tr>
<td>Already receiving LTOT</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Social circumstances</td>
<td>Good</td>
<td>Living alone/not coping</td>
</tr>
<tr>
<td>Acute confusion</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Rapid rate of onset</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Significant comorbidity (particularly cardiac and insulin dependent diabetes)</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Treat with:**
- Increase frequency of bronchodilators (consider need for nebulised therapy)
- Give oral antibiotics if history of purulent sputum
- Give 30mg prednisolone orally for 7 to 14 days to all patients with a significant increase in breathlessness and all patients admitted to hospital, unless contraindicated

**In patients admitted to hospital**

**Arrange Investigations**
- Obtain a chest radiograph
- Measure ABGs
- Obtain an ECG
- Measure FBC and U&Es
- Check Theophylline levels if on it
- Send sputum for culture if purulent

**Consider adding intravenous theophylline if poor response to inhaled bronchodilators**

**Controlled oxygen therapy should be given to keep the SaO₂ > 90%.
- Patients with pH < 7.35 should be considered for ventilatory support.**

**Consider adding hospital at home or assisted discharge scheme**

**Assess need for non-invasive ventilation**

**Consider respiratory stimulants if NIV not available**

**Assess need for intubation**

**Before discharge**
- Establish on optimal therapy
- Arrange multidisciplinary assessment if necessary
Appendix F Education package

Specific educational packages should be developed for patients with COPD. The packages should take account of the different needs of patients at different stages of their disease. Suggested topics for inclusion are:

- disease education (anatomy, physiology, pathology and pharmacology, including oxygen therapy and vaccination)
- dyspnoea/symptom management, including chest clearance techniques
- smoking cessation
- energy conservation/pacing
- nutritional advice
- managing travel
- benefits system and disabled parking badges
- advance directives (living wills)
- making a change plan
- anxiety management
- goal setting and rewards
- relaxation
- identifying and changing beliefs about exercise and health-related behaviours
- loving relationships/sexuality
- exacerbation management (including when to seek help, self-management and decision making, coping with setbacks and relapses)
- home care support
- managing surgery (non thoracic)
- the benefits of physical exercise
- support groups.