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

NICE guideline

Second draft for consultation, October 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 (COPD)

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 FEV₁ (FEV₁ less than 80% predicted) and a reduced FEV₁/FVC ratio (less than 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.

There is no single diagnostic test for COPD. Making a diagnosis relies on clinical judgement based on a combination of history, physical examination and confirmation of the presence of airflow obstruction using spirometry.
Key messages

The following recommendations have been identified as priorities for implementation.

1. Diagnose 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 must be competent in the interpretation of the results.

2. Stop smoking

Encouraging patients with COPD to stop smoking is one of the most important components of their management. All COPD patients still smoking, regardless of age should be encouraged to stop, and offered help to do so, at every opportunity.

3. Effective 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 less than or equal to 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.

4. Pulmonary rehabilitation for all who need it

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.
5. Use non-invasive ventilation

Non-invasive ventilation (NIV) is the treatment of choice for persistent hypercapnic respiratory failure during exacerbations after optimal medical therapy. It should be delivered by staff 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. Manage exacerbations

The frequency of exacerbations should be reduced by appropriate use of inhaled corticosteroids and bronchodilators, and vaccinations. The impact of exacerbations should be minimised by:

- giving self-management advice on responding promptly to the symptoms of an exacerbation
- starting appropriate treatment with oral steroids and or antibiotics
- use of non-invasive ventilation when indicated
- use of hospital-at-home or assisted-discharge schemes.

7. Multidisciplinary working

COPD care should be delivered by a multidisciplinary team which should be able to deliver all aspects of the guideline.
The following guidance is evidence based. The grading scheme used for the recommendations (A, B, C, D, DS or 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 factors: [D]

- weight loss
- effort intolerance
- waking at night
- ankle swelling
- fatigue
- occupational hazards
- chest pain
- haemoptysis.

N.B. These last two symptoms are uncommon in COPD but raise the possibility of an alternative diagnosis.
1.1.1.3 One of the primary symptoms of COPD is breathlessness. The MRC dyspnoea scale should 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 and be competent in the interpretation of spirometry. [D]

1.1.2.3 Spirometry can be performed by any healthcare worker who has undergone appropriate training and who keeps their skills up to date. [D]

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1.1.2.4 Spirometry services should be supported by quality control and audit processes. [D]

1.1.2.5 It is recommended that ERS 1993 reference values are used but it is recognised that these values may lead to under-diagnosis in the elderly and are not applicable in Black and Asian populations. [D]

1.1.3 Further investigations

1.1.3.1 At the time of their initial diagnostic evaluation in addition to spirometry all patients should have: [D]

- a chest radiograph to exclude other pathologies
- 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 below. [D]
### Additional investigations

<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>
</tbody>
</table>
| CT Thorax                         | To investigate symptoms that seem disproportionate to the spirometric impairment.  
                                          | To investigate abnormalities seen on a chest radiograph.             |
|                                   | To assess suitability for surgery.                                   |
| ECG                               | To assess cardiac status if features of cor pulmonale.              |
| Echocardiogram                    | To assess cardiac status if features of cor pulmonale.              |
| Pulse Oximetry                    | To assess need for oxygen therapy.                                  |
|                                   | If cyanosis, or cor pulmonale present, or if FEV₁ < 50% predicted. |
| Sputum culture                    | To identify organisms if sputum is persistently present and purulent.|

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 discuss the clinical management of this condition. [D]

1.1.4 Reversibility testing

1.1.4.1 In most patients routine spirometric reversibility testing is not necessary as a part of the diagnostic process or to plan initial therapy with bronchodilators or corticosteroids. It may be unhelpful or misleading because: [D]
• repeated FEV$_1$ measurements can show small spontaneous fluctuations
• the results of a reversibility test performed on different occasions can be inconsistent and not reproducible
• over-reliance on a single reversibility test may be misleading unless the change in FEV$_1$ is greater than 400 ml
• 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 are frequently distinguishable on the basis of history (and examination) in untreated patients presenting for the first time. These factors should be used to differentiate COPD from asthma whenever possible. [D]

**Clinical features differentiating COPD and asthma**

<table>
<thead>
<tr>
<th></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>

1.1.4.3 Longitudinal observation of patients (whether using spirometry, peak flow or symptoms) should also be used to help differentiate asthma. Over-reliance on a single reversibility test may be misleading unless the change in FEV$_1$ is greater than 400 ml. [D]
1.1.4.4 To help resolve cases where diagnostic doubt remains, or both COPD and asthma are present, the following findings should be 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 (greater than 400 ml) response to bronchodilators.
- A large (greater than 400 ml) response to 30 mg oral prednisolone daily for 2 weeks.
- Serial peak flow measurements showing significant diurnal or day-to-day variability.

1.1.4.5 Remaining diagnostic uncertainty may be resolved by referral for more detailed investigations, including imaging and measurement of TLCO. [D]

1.1.4.6 If patients report a dramatic improvement in symptoms in response to inhaled therapy the diagnosis of COPD should be reconsidered. [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
- 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 severity of airflow obstruction according to FEV₁ as a percentage of the predicted value

<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 who are over 35, current or ex-smokers and have a chronic cough. Up to 27% of such patients have COPD². [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 limitation³. [B]

1.1.7 Follow up of patients with COPD

1.1.7.1 Follow up of patients with COPD 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 (both absolute and percent predicted)
- recording changes in BMI
- offering smoking cessation advice
- documenting the effects of each drug treatment as it is tried


• assessing adequacy of symptom control
• recording the opportunistic measurement of spirometric parameters (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
• calculating BMI
• assessing the need for referral to specialist and therapy services.

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 and anxiety
• the patient’s nutritional state
• the need for social services and occupational therapy input
• the need for assessment for long-term oxygen therapy.

1.1.7.5 Patients with severe disease requiring interventions such as long-term non-invasive ventilation should be reviewed regularly by specialists. [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]

Reasons for referral include

<table>
<thead>
<tr>
<th>Reason</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<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>
<tr>
<td>Assessment for oral corticosteroids therapy</td>
<td>Justify need for long term treatment or to supervise withdrawal</td>
</tr>
<tr>
<td>Bullous lung disease</td>
<td>Identify candidates for surgery</td>
</tr>
<tr>
<td>A rapid decline in FEV₁</td>
<td>Encourage early intervention</td>
</tr>
<tr>
<td>Assessment for pulmonary rehabilitation</td>
<td>Identify candidates for pulmonary rehabilitation</td>
</tr>
<tr>
<td>Assessment for lung volume reduction surgery</td>
<td>Identify candidates for surgery</td>
</tr>
<tr>
<td>Assessment for lung transplantation</td>
<td>Identify candidates for surgery</td>
</tr>
<tr>
<td>Dysfunctional breathing</td>
<td>Confirm diagnosis, optimise pharmacotherapy and access other therapists</td>
</tr>
<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>
<tr>
<td>Haemoptysis</td>
<td>Exclude carcinoma of the bronchus</td>
</tr>
</tbody>
</table>
1.1.8.2 Referral for specialist advice should be considered when [D]

- there is diagnostic uncertainty
- the patient requests a second opinion
- an expert assessment of the patients management is required
- the patient requires therapies that cannot be provided by the referring clinician
- the patient is thought to be a candidate for surgical treatment

1.1.8.3 Patients who are referred 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 smoking quit rates for people with COPD. [B]

1.2.1.4 If a person with COPD is unsuccessful in an attempt to quit smoking, the person’s readiness to quit should be reassessed at 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 quitting⁴. [D]

1.2.2 Inhaled bronchodilator therapy

1.2.2.1 Short acting bronchodilators should be the initial empirical treatment drugs for the relief of breathlessness and exercise limitation. [B]

1.2.2.2 The effectiveness of bronchodilator therapy should not be assessed by lung function alone but should include a variety of other measures such as improvement in symptoms, ADL, 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 Long acting bronchodilators should be used in patients who remain symptomatic despite treatment with short acting bronchodilators or who have two or more exacerbations per year, 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 in that individual, side effects, patient preference and cost effectiveness. [D]

1.2.3 Theophylline and other methylxanthines

1.2.3.1 Theophylline should only be used after a trial of short-acting bronchodilators and long-acting bronchodilators, or in patients who are unable to use inhaled therapy, as there is a need to monitor plasma levels and interactions. [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, ADL, 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

None of the inhaled corticosteroids currently available are licensed for use in the treatment of COPD. Recommendations include usage outside licensed indications and prescribers should be aware where the responsibility for such prescribing lies.

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 FEV$_1$ less than or equal to 50% predicted who are having two or more exacerbations requiring treatment with antibiotics or oral corticosteroids in a 12 month period. (N.B. 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, and patients informed 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. Patients over the age of 65 should be started on prophylactic treatment without the need for monitoring. [D]

**Combination therapy**

1.2.4.7 Combining therapies from different drug classes (examples as 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.

1.2.4.8 The clinical effectiveness of combined treatments can be assessed by improvements in symptoms, ADL, exercise capacity and lung function. [D]

**1.2.5 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 that those with significant cognitive impairment (as a guideline, those with a Hodkinson Abbreviated Mental Test Score of 4 or less)
are unable to use any form of inhaler device.\textsuperscript{5,6} 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.

1.2.5.1 In most cases broncodilator therapy is best administered using a hand-held inhaler device (including a spacer device if appropriate). \[D\]

1.2.5.2 If the patient is unable to use a particular device satisfactorily, it is not suitable for them and an alternative should be found. \[D\]

1.2.5.3 Inhalers should be prescribed only after patients have received training in the use of the device and have demonstrated satisfactory technique. \[D\]

1.2.5.4 The patient should have his or her ability to use an inhaler device regularly assessed by a competent healthcare professional and, if necessary, he or she should be re-taught the correct technique. \[D\]

1.2.5.5 To ensure optimum efficacy for the patient with COPD, the dose of medication should be titrated according to individual clinical response. \[D\]

**Spacers**

1.2.5.6 The spacer should be compatible with the pMDI being used. \[D\]

1.2.5.7 It is recommended that spacers are used in the following way.

- Administered by repeated single actuations of the metered dose inhaler into the spacer, each followed by inhalation.
- There is minimal delay between pMDI actuation and inhalation.
- Tidal breathing is as effective as single breaths. \[D\]


1.2.5.8 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 air dry. The mouthpiece should be wiped clean of detergent before use. [D]

Nebulisers

1.2.5.9 Patients with distressing or disabling breathlessness despite maximal therapy should be considered for nebuliser therapy. [D]

1.2.5.10 Nebulised therapy should not continue to be prescribed without assessing and confirming that 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.

1.2.5.11 Nebulised therapy should not be prescribed without an assessment of patient’s and/or carer’s ability to use it. [D]

1.2.5.12 A nebuliser system, which is known to be efficient, should be used (once available, Comite European de Normalisation [CEN] data should be used to assess efficiency). [D]

1.2.5.13 Patients should be allowed to choose whether they prefer a facemask or a mouthpiece to administer their nebulised beta$_2$ agonists, unless their therapy specifically requires a mouthpiece (for example anticholinergic drugs). [D]

1.2.5.14 If nebuliser therapy is prescribed, the patient should have access to a nebuliser service providing equipment, servicing, advice and support for patients who require long-term nebuliser therapy. [D]
1.2.6 Oxygen

Long term oxygen therapy (LTOT)

1.2.6.1 LTOT is indicated in patients with COPD who have a PaO₂ less than 7.3 kPa when stable or a PaO₂ greater than 7.3 and less than 8 kPa when stable and one of: secondary polycythaemia, nocturnal hypoxaemia (SaO₂ less than 90% for more than 30% of time), peripheral oedema or pulmonary hypertension. [A]

1.2.6.2 To get the benefits of LTOT patients should breathe supplemental oxygen for at least 15 hours per day. Greater benefits are seen in patients receiving oxygen 20 hours per day. [A]

1.2.6.3 The need for oxygen therapy should be assessed in: [D]

- all patients with a severe airflow obstruction (FEV₁ less than 30% predicted)
- considered in patients with moderate airflow obstruction (FEV₁ 30–50% predicted)
- patients with cyanosis
- patients with polycythaemia
- patients with peripheral oedema
- patients with a raised jugular venous pressure
- patients with oxygen saturations less than or equal to 92% breathing air.

1.2.6.4 To ensure all patients eligible for long-term oxygen therapy (LTOT) are identified pulse oximetry should be available in all healthcare settings. [D]

1.2.6.5 The assessment of patients for LTOT should comprise the measurement of arterial blood gasses 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
whose COPD is stable. Patients requiring LTOT should be regularly assessed by practitioners familiar with LTOT. [D]

1.2.6.6 Oxygen concentrators should be used to provide the fixed supply at home for long-term oxygen therapy. [D]

**Ambulatory oxygen therapy**

1.2.6.7 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]

1.2.6.8 Patients receiving LTOT should be reviewed at least once per year and this review should include pulse oximetry. [D]

1.2.6.9 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 the motivation to use oxygen. [D]

1.2.6.10 Ambulatory oxygen therapy is not usually recommended in COPD if PaO2 greater than 7.3 kPa and there is no exercise desaturation. [D]

1.2.6.11 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 SaO2 above 90%. [D]

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

1.2.6.13 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>Usage</th>
<th>Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>For a duration of use of less than 90 minutes</td>
<td>Small cylinder</td>
</tr>
<tr>
<td>For a duration of use less than 4 hours but more than 90 min</td>
<td>Small cylinder with oxygen conserving device</td>
</tr>
<tr>
<td>For duration of use more than 4 hours</td>
<td>Liquid oxygen</td>
</tr>
<tr>
<td>For flow rates greater than 2 l/min and duration of use more than 30 min</td>
<td>Liquid oxygen</td>
</tr>
</tbody>
</table>

Short burst oxygen therapy

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

1.2.6.15 Short burst oxygen therapy should only continue to be prescribed if an improvement in breathlessness following therapy has been documented. [D]

1.2.6.16 When indicated, short burst oxygen should be provided from cylinders. [D]

1.2.7 Non-invasive ventilation (NIV)

1.2.7.1 Adequately treated 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 long term oxygen therapy should be referred to a specialist centre for consideration of long term non-invasive ventilation. [D]
1.2.8 Management of pulmonary hypertension and cor pulmonale

Diagnosis of pulmonary hypertension and cor pulmonale

In the context of this guideline, the term ‘cor pulmonale’ has been adopted 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 secondary to lung disease and those in whom the primary pathology is retention of salt and water, leading to the development of peripheral oedema.

1.2.8.1 A diagnosis of cor pulmonale should be considered if patients have:

- peripheral oedema
- a raised venous pressure
- a systolic parasternal heave
- a loud pulmonary second heart sound.

1.2.8.2 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

1.2.8.3 Patients presenting with cor pulmonale should be assessed for the need for long-term oxygen therapy. [A]

1.2.8.4 Oedema associated with cor pulmonale can usually be controlled symptomatically with diuretic therapy. [D]

1.2.8.5 The following are not recommended for the treatment of cor pulmonale: [C]

- angiotensin converting enzyme inhibitors
- calcium channel blockers
- alpha-blockers
- digoxin (except if there is atrial fibrillation).
1.2.9 Pulmonary rehabilitation

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

1.2.9.1 Pulmonary rehabilitation should be made available to all appropriate patients with COPD. [A]

1.2.9.2 Pulmonary rehabilitation should be offered to all patients who consider themselves functionally disabled by COPD (usually MRC grade 3 and above). Pulmonary rehabilitation is not suitable for patients who are unable to walk, have unstable angina or who have had a recent myocardial infarction. [D]

1.2.9.3 To be effective and improve concordance, pulmonary rehabilitation programmes should be accessible in terms of: [D]

- access
- location
- availability.

1.2.9.4 Pulmonary rehabilitation programmes should include multi-component, multidisciplinary interventions, which are tailored to the individual patient’s needs. The rehabilitation process incorporates a programme of physical training, disease education, nutritional, psychological and behavioural intervention. [A]

1.2.9.5 Patients should be made aware of the benefits of pulmonary rehabilitation and the commitment required to gain these. [D]
1.2.10 Vaccination and anti-viral therapy

National policy for 2002/2003 is that influenza immunisation should be offered to all patients with chronic obstructive pulmonary disease.7

Pneumococcal vaccine is recommended for all those aged two years or older with chronic respiratory disease.8

1.2.10.1 Pneumococcal vaccination and an annual influenza vaccination should be offered to all patients with COPD as recommended by the Chief Medical Officer. [C]

1.2.10.2 NICE Technology Appraisal Guidance No. 589 makes the following recommendations: [NICE]

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.

1.2.11 Lung surgery

1.2.11.1 Patients who are breathless with a single large bulla occupying more than one third of a hemithorax who have an FEV1 less

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7 Department of Health (2002) Letter from the Chief Medical Officer, the Chief Nursing Officer and the Chief Pharmaceutical Officer. Update on Immunisation issues. London: Department of Health
than 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]

1.2.11.2 Patients who remain breathless despite maximal medical therapy
(including rehabilitation), should be referred for consideration of
lung volume reduction surgery when all of the following criteria are
met: [A]

- FEV1 more than 20% predicted
- PaCO2 less than 7.3 kPa
- upper lobe predominant emphysema
- TlCO more than 20% predicted.

1.2.11.3 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.

1.2.12 Alpha-1 antitrypsin replacement therapy

1.2.12.1 There is currently insufficient evidence to recommend alpha-1
antitrypsin replacement therapy in the management of patients with
alpha-1 antitrypsin deficiency. [D]

See also recommendation in diagnostic section about referral to
specialist centres.
1.2.13  **Mucolytic therapy**

1.2.13.1 Mucolytic therapy should be considered in patients with a chronic cough productive of sputum. [B]

1.2.13.2 Mucolytic therapy should be continued if there is symptomatic improvement (for example reduction in frequency of cough and sputum production). [D]

1.2.14  **Anti-oxidant therapy**

1.2.14.1 Treatment with alpha-tocopherol and beta-carotene supplements, alone or in combination, is not recommended. [A]

1.2.15  **Anti-tussive therapy**

1.2.15.1 Antitussive therapy should not be used in the management of stable COPD. [D]

1.2.16  **Prophylactic antibiotic therapy**

1.2.16.1 There is insufficient evidence to recommend prophylactic antibiotic therapy in the management of stable COPD. [D]

1.2.17  **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, such as physiotherapy.

1.2.17.1 Patients with COPD should have access to the wide range of skills available from a multidisciplinary team. [D]

1.2.17.2 The multidisciplinary team should fulfil 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.
• Advising patients on exercise
• Education of patients and other health professionals.

Respiratory nurse specialists

1.2.17.3 It is recommended that respiratory nurse specialists form part of the multidisciplinary COPD team. [D]

Physiotherapy

1.2.17.4 If patients have excessive sputum, they should be taught:

• the use of PEP masks [B]
• active cycle of breathing technique. [D]

Identifying and managing anxiety and depression

1.2.17.5 Healthcare professionals should be alert to the presence of depression in patients with COPD. The presence of anxiety and depression should be considered in patients: [D]

• who are hypoxic (SaO2 less than 92%)
• who have severe dyspnoea
• who have been seen at or admitted to a hospital.
1.2.17.6 The presence of anxiety and depression in patients with COPD can be identified using validated assessment tools (see Appendix xx [to be completed] for further details). [D]

1.2.17.7 Patients found to be depressed or anxious should be treated with conventional pharmacotherapy. Future reference may be made to the NICE guideline on the management of depression in primary and secondary care, due for publication in May 2004. (See NICE website for details – www.nice.org.uk). [A]

1.2.17.8 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

1.2.17.9 BMI should be calculated in patients with COPD (See Section 1.1.3). [D]

- The normal range for BMI is 20 to 25.¹⁰
- If the BMI is abnormal (high or low), or changing over time, the patient should be referred for dietetic advice.
- 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.

Future reference may be made to the *Nutritional Supplements: feeding methods including enteral and parenteral feeding* guideline, due for publication in December 2005. (See NICE website for details – www.nice.org.uk).

Palliative care

1.2.17.10 Opiates can be used for the palliation of breathlessness in patients with end stage COPD unresponsive to other medical therapy. [D]

1.2.17.11 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]

1.2.17.12 Patients with end stage COPD and their family and carers 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**

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

1.2.17.14 Patients need for occupational therapy should be assessed using validated tools (See Appendix xx [to be completed] for further details). [D]

**Social services**

1.2.17.15 Patients disabled by COPD should be considered for referral for assessment by a social services department. [D]

**Advice on travel**

1.2.17.16 All patients on LTOT planning air travel should be assessed in line with the BTS recommendations. [D]

1.2.17.17 All patients with an FEV\textsubscript{1} less than 50% predicted who are planning air travel should be assessed in line with the BTS recommendations. [D]

1.2.17.18 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

1.2.17.19 Scuba diving is not recommended for patients with COPD. [D]

Education

1.2.17.20 Education should be tailored to individual patient’s needs. [D]

1.2.17.21 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]

1.2.17.22 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. [D]

- Suggested topics for inclusion are listed in Appendix C of the full guideline (see Section 5).
- The packages should take account of the different needs of patients at different stages of their disease.

1.2.17.23 Patients with moderate and severe COPD should be made aware of the technique of NIV and its benefits and limitations explained (see Section 1.3.7). [D]

Self management

1.2.17.24 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.

The appropriateness of the use of these tablets must be monitored.
1.2.17.25 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]

1.2.17.26 Patients given self-management plans should be advised to contact a healthcare professional if they do not improve. [D]

1.2.18 Fitness for general surgery

1.2.18.1 The ultimate clinical decision about whether or not to proceed with surgery should rest with a consultant anaesthetist and consultant surgeon taking account of the presence of comorbidities, the functional status of the patient and the necessity of the surgery. [D]

1.2.18.2 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]

1.2.18.3 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

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 following factors 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>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>

*Also available at hospital*

<table>
<thead>
<tr>
<th>Changes on the chest radiograph</th>
<th>No</th>
<th>Present</th>
</tr>
</thead>
<tbody>
<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.

Primary care

1.3.3.1 In patients with an exacerbation 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.

Patients referred to hospital

1.3.3.2 In all patients with an exacerbation 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 patients with exacerbations of COPD who would otherwise require hospitalisation. [A]
1.3.4.2 The multi-professional team required to operate these schemes should include allied health professionals with experience in managing patients with COPD, and may include nurses, physiotherapists, occupational therapists and generic health workers. [D]

1.3.4.3 There are currently insufficient data to make firm recommendations about which patients with an exacerbation 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 In COPD patients experiencing an exacerbation hospital at home and early discharge schemes should 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. [A]

1.3.4.6 Patient’s preferences regarding the service should 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 always 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 Prednisolone 30 mg orally should be prescribed for 7 to 14 days. [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 Patients with 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 Initial empirical treatment should be an aminopenicillin, a macrolide, or a tetracycline. When initiating empiric antibiotic treatment the prescriber should always be aware of any guidance issued by their local microbiologists. [D]

1.3.5.18 In situations when sputum has been sent for culture, the appropriateness of antibiotic treatment should be checked against laboratory culture and sensitivities when they become available. [D]
Theophylline and other methylxanthines

1.3.5.19 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]

1.3.5.20 Care should be taken when using intravenous theophylline because of interactions with other drugs and potential toxicity if the patient has been on oral theophylline. [D]

1.3.5.21 Theophylline levels should be monitored within 24 hours of starting treatment and subsequently as frequently as indicated by the clinical circumstances. [D]

Respiratory stimulants

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

1.3.5.23 It is recommended that doxapram is reserved for settings where non-invasive ventilation is either unavailable or considered inappropriate. [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 and they should be trained in their use. Clinicians should be aware that pulse oximetry gives no information about the PCO₂ or pH. [D]

1.3.6.2 In patients with an exacerbation of COPD, in the absence of facilities to measure arterial blood gasses, 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 greater than 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: [D]

- 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/min) and titrated upwards if saturation falls below 90% and downwards if the patient becomes drowsy or if the saturation exceeds 93–94%.

- 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.

1.3.6.6 Once facilities to measure arterial blood gases are available, they should be measured and the inspired oxygen concentration noted in all patients with an exacerbation of COPD. [D]

1.3.6.7 Arterial blood gas measurements should be repeated regularly, according to the response to treatment. [D]

1.3.6.8 The aim of supplemental oxygen therapy in exacerbations of COPD is to maintain adequate levels of oxygenation (SaO₂ greater than 90%), without precipitating respiratory acidosis or worsening hypercapnia. Patients with pH less than 7.35 should be considered for ventilatory support. [D]

1.3.7 Non-invasive ventilation (NIV) and COPD exacerbations

1.3.7.1 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 who have been trained in its application, who are experienced in 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 exacerbations of COPD should receive treatment on intensive care units, including invasive ventilation when this is thought to be necessary. [C]

1.3.8.2 During exacerbations of COPD neither age nor FEV₁ should be used in isolation to assess suitability for intubation and ventilation. [D]

1.3.8.3 During exacerbations of COPD, functional status, BMI, requirement for oxygen when stable, comorbidities 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 invasive ventilation. [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 FEV₁ 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 be given appropriate information to enable them to fully understand the correct use of medications, including oxygen, 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 period of consultation; it is available from www.nice.org.uk/article.asp?a=32649

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 practice for the management of COPD against this guideline as they develop 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. It is in the interests of patients that the implementation timeline is as rapid as possible.
Relevant local clinical guidelines, care pathways 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).

- **Pharmacological management**
  
  There is a need for long-term studies on the absolute and comparative efficacy of:
  - Long-acting bronchodilators
  - theophylline
  - mucolytics (including the development of outcome measures)
  - combination therapies
  - ambulatory oxygen
  - alpha-1 antitrypsin replacement therapy.

- **Adjunctive therapies**
  
  There is a need for further studies on the efficacy of:
  - nebulised therapy
  - non-invasive ventilation
  - oxygen delivery systems
  - physiotherapy
- pulmonary rehabilitation (in particular its efficacy compared with pharmacological therapies and its efficacy in patients with mild and severe COPD).

- Patient-focused strategies
  
  There is a need for further studies on:
  
  - the content and efficacy of educational packages for patients with COPD
  
  - the content and efficacy of self management strategies for exacerbations.

5 Full guideline

The National Institute for Clinical Excellence commissioned the development of this guidance 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


NICE is in the process of developing the following guidance.

- Nutritional supplements: feeding methods including enteral and parenteral feeding. Clinical guideline. (Publication expected December 2005.)

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). Each recommendation has been allocated a grading that directly reflects the hierarchy of evidence upon which it is based. Please note that the hierarchy of evidence and the recommendation gradings relate to the robustness of the literature not to clinical importance.

The gradings are as follows:
<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>Ila</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></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></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>
</tbody>
</table>

Appendix B: The Guideline Development Group

**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***
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
Consenus 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)
Radiologist, King’s College Hospital

Dr Gillian Hawksworth
Community Pharmacist

Dr Mary Hickson
Senior Research Dietician, Hammersmith Hospitals NHS Trust

Professor Walter W Holland
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
DRAFT FOR SECOND CONSULTATION

Professor Paul Little
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

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.

Dr Bernard Higgins (Chair)
Consultant Chest Physician, Freeman Hospital, Newcastle upon Tyne

Dr Robert Higgins
Consultant in Renal and General Medicine, University Hospitals Coventry and Warwickshire

Dr Marcia Kelson
Director, Patient Involvement Unit for NICE, College of Health, London

Dr Peter Rutherford
Senior Lecturer in Nephrology, Medical Director, University College of Wales College of Medicine

Dame Helena Shovelton
Chief Executive, British Lung Foundation

Fiona Wise
Acting Director of Modernisation, Bedfordshire and Hertfordshire Strategic Health Authority

Dr John Young
Medical Director, Merck Sharp and Dohme
Appendix D: Technical detail on the criteria for audit

[Suggested headings below; see notes on writing the NICE guideline]

Possible objectives for an audit

People that could be included in an audit and time period for selection

Measures that could be used as a basis for an audit
### Key recommendation

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 must be competent in the interpretation of the results.

#### Criterion

1. **Diagnose 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

#### Exception

Inability to perform spirometry, for example because of facial paralysis

Encouraging patients with COPD to stop smoking is one of the most important components of their management. All COPD patients still smoking, regardless of age should be encouraged to stop, and offered help to do so, at every opportunity.

#### Criterion

2. **Stop smoking**
   - 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

#### Exception

---

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 FEV$_1$ ≤ 50%.

#### Criterion

3. **Effective inhaled therapy**
   - Appropriateness of inhaled steroid therapy

#### Exception

Patient choice
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.

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.

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

The frequency of exacerbations should be reduced by appropriate use of inhaled corticosteroids and bronchodilators, and vaccinations. The impact of exacerbations should be minimised by:

- giving self-management advice on responding promptly to the symptoms of an exacerbation
- starting appropriate treatment with oral steroids and or

<table>
<thead>
<tr>
<th>4. Pulmonary rehabilitation for all who need it</th>
<th>Percentage of patients with COPD who have undergone pulmonary rehabilitation</th>
<th>Patient choice</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. Use non-invasive ventilation</td>
<td>Percentage of patients presenting with acute hypercapnic respiratory failure who have received non-invasive ventilation</td>
<td>Patient choice</td>
</tr>
<tr>
<td>6. Manage exacerbations</td>
<td>Frequency and appropriateness of oral steroid and antibiotic therapy</td>
<td>Patient choice</td>
</tr>
</tbody>
</table>
antibiotics

- use of non-invasive ventilation when indicated
- use of hospital-at-home or assisted-discharge schemes

### Calculation of compliance

Compliance (%) with each measure described in the table above is calculated as follows.

\[
\text{Compliance (\%)} = \left( \frac{\text{Number of patients whose care is consistent with the criterion}}{\text{Number of patients to whom the measure applies}} \right) \times 100
\]

Clinicians should review the findings of measurement, identify whether practice can be improved, agree on a plan to achieve any desired improvement and repeat the measurement of actual practice to confirm that the desired improvement is being achieved.
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 below)

If diagnosis seems likely
Perform spirometry
Airflow obstruction is defined as
FEV₁/FVC < 0.7
and
FEV₁ < 80% predicted

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

Clinical features differentiating COPD & asthma

<table>
<thead>
<tr>
<th>Feature</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 &amp; 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
- Serial peak flow measurements showing significant diurnal or day to day variability
- A large (> 400 ml) response to 30mg prednisolone daily for 2 weeks

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

Reassess diagnosis in view of response to treatment

COPD

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.
Algorithm 2: Investigating COPD

**COPD**

**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
- fatigue

Consider further investigations

Assess and record the severity of airflow obstruction according to the reduction in FEV₁

<table>
<thead>
<tr>
<th>Severity of airflow obstruction</th>
<th>FEV₁ % 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>

**Investigation**

<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>TCO</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. If cyanosis or cor pulmonale present, or if FEV₁ &lt; 50% predicted.</td>
</tr>
<tr>
<td>Sputum culture</td>
<td>To identify organisms if sputum is persistently present and purulent.</td>
</tr>
</tbody>
</table>

**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 100m 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>
Algorithm 3: Managing stable COPD

Not all people with COPD have the same symptoms and not all follow a stepwise decline in function. This algorithm starts with an assessment of the clinical problems (inner ring)

- Once those that are relevant have been identified use whichever of the outer rings are appropriate to determine management.
- For all patients multidisciplinary care is important.
- For most patients breathlessness and exercise limitation is the predominant symptom. This should initially be managed using short acting bronchodilators (alone or in combination). If symptom control is not adequate long acting bronchodilators should be used.
- Pulmonary rehabilitation should be offered to all patients still breathless after optimal medical therapy.

N.B The size of the boxes is not indicative of relative importance [please note the typesetting will be discussed with a technical editor prior to publication]
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.

**Factors to consider when deciding where to manage patient**

<table>
<thead>
<tr>
<th>Factor</th>
<th>Favours treatment at home</th>
<th>Favours treatment 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</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>(particularly cardiac and insulin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>dependent diabetes)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SaO2 &lt; 90%</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</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>home services</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**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.

**Make diagnosis of an exacerbation**

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

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

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

**Prior to discharge**
- Establish on optimal therapy
- Arrange multidisciplinary assessment if necessary

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

**Assess need for non-invasive ventilation**

**Consider**
- respiratory stimulants if NIV not available

**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

**Assess need for intubation**

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