Summary guideline

Chronic Obstructive Pulmonary Disease

Primary objectives for COPD guideline

1. Increase identification of undiagnosed COPD
2. Confirm diagnosis with spirometry (quality controlled)
3. Improve rates of smoking cessation
4. Optimise care with regular patient review, including medications and immunisations
5. Improve uptake of pulmonary rehabilitation and access to self management and exercise groups
6. Improve end of life care

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Aim of Guideline

This summary guideline, based on NICE 2010, aims to support improved identification and structured care for COPD patients. It includes the clinical information and data collection framework for QOF, and the Care Package in Tower Hamlets.

Key References

2. Global Initiative for Chronic Obstructive Lung Disease (GOLD) (Revised 2011) Global Strategy for the diagnosis, management, and prevention of COPD.
1. Prevalence and Natural History

Chronic obstructive pulmonary disease (COPD) is a progressive condition characterised by airflow obstruction that is not fully reversible. There are an estimated 3.2 million people with COPD in the UK but only 835,000 have a diagnosis – the British Lung Foundation (BLF) refers to the undiagnosed as “the missing millions”. COPD is the fifth leading cause of death in the UK. It is among the most costly inpatient conditions treated by the NHS, with direct health care costs estimated at £800 million.

COPD prevalence (age-adjusted to the European standard population) in east London, based on GP disease registers, is 1.5%. The estimated prevalence is over 3%. Among inner London boroughs Tower Hamlets has the highest rate of emergency admissions and readmissions for COPD.

**Screening vs. Case Finding**

Screening for COPD can be justified if the gain is a significant decrease in smoking rates – this is the only intervention that delays disease progression. Currently there is no good evidence to support the use of mass spirometry screening.

Opportunistic case finding involves targeted screening of symptomatic individuals at high risk of lung disease. No trials exist to demonstrate the impact of case finding on smoking quit rates. Despite this, NICE supports this approach as a relatively cost effective strategy.

Diagnosing spirometry for everyone in high risk groups may not be possible. An alternative is symptom questionnaires and/or hand held spirometry to exclude those with a low probability of COPD before referring to formal spirometry. Evidence to support this approach is emerging.

**Groups At Risk for COPD**

- **Smokers** (current, ex-smokers, smokers using crack cocaine)
- **Frequent chest infections** requiring antibiotics and/or inhaled medication
- **Occupational exposures** (inhaled dusts and gases, wood-burning fires)
- **Chronic Asthma**
- **Childhood - lung infections**, smoking and exposure to second-hand smoke
- **Perinatal factors** – maternal smoking, premature birth and low birth weight
- **Genetic predisposition** – consider alpha 1 antitrypsin deficiency (α1 AT) if early onset, minimal smoking history or positive family history, (prevalence of α1 AT deficiency is 1 in 5000 in UK)

**Calculating Smoking Pack Years**

Total Pack years = (No. of cigarettes a day x No. of years smoking) ÷ 20
2. Diagnosis of COPD

There is no single diagnostic test for COPD. Diagnosis relies on a combination of history, physical examination, and confirmation of the presence of airflow obstruction by spirometry (FEV1/FVC ratio of <0.7). In the early stages the FEV1 may remain >80%.

The normal age-related decline in FEV1/FVC ratio - defined as lower limit of normal (LLN)

Beware of over diagnosing COPD in older people without typical symptoms of COPD who have FEV1/FVC < 0.7, but are above the LLN criteria. Beware of under diagnosing COPD in younger people with symptoms of COPD who have FEV1/FVC ratio ≥ 0.7, but are below the LLN criteria.

2.1 Clinical features

There are 3 broad categories of COPD presentation in primary care:

1) Undiagnosed with symptoms - consider diagnosis if age >35 years, smoking history with exertional breathlessness, chronic cough, regular sputum production, frequent winter ‘bronchitis’, or wheeze.
2) Known COPD with gradual decline in condition – signs include hyperinflated chest, accessory muscle use, wheeze or quiet breath sounds, weight loss, features of cor pulmonale.
3) Acute exacerbation – acute worsening of symptoms (breathlessness, productive cough, change in sputum). Many patients are first diagnosed with COPD following a hospital admission.
Is it COPD or Asthma?
Symptom variability (diurnal or day-to-day) is the key feature that distinguishes asthma from COPD. Other features are shown below:

<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 35</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>
</tbody>
</table>

It is possible to have both diagnoses. For this group of patients:
- Longitudinal observation may be necessary to determine best treatment.
- Decide which condition predominates using:
  1) History, examination findings
  2) Spirometry with reversibility testing (>400ml response or 15% improvement with bronchodilators suggests asthma) and/or
  3) Serial PEF measurements, 20% or greater variability suggests asthma.
- If Asthma predominates, patients require annual review, as COPD may dominate the clinical presentation in future years.

COPD registers in east London show high rates of asthma co-morbidity. In south Asian groups 40% have a recorded diagnosis of asthma. This is reflected in high rates of inhaled steroids (27% of patients are on inhaled steroids, and 50% on Seretide)

Alternative diagnoses
Consider:
- Bronchiectasis - recurrent infections and excessive sputum
- Congestive cardiac failure - increasing SOBOE, swollen ankles
- Lung cancer - weight loss, haemoptysis
- Interstitial lung disease – e.g. fibrosing alveolitis, restrictive lung defect on spirometry
- Obesity – SOB and a restrictive lung defect on spirometry
- Thromboembolic disease

If emphysema is predominant there is a mismatch between mild spirometry findings and the severity of symptoms/signs (breathlessness, hyper expansion) and low gas transfer factor. Treatment includes early tiotropium. Bronchodilators and steroids are less helpful. Refer for specialist assessment if suspected.
2.2 Spirometry

Airflow obstruction is defined as a reduced post-bronchodilator FEV1/FVC ratio < 0.7.
NICE have modified their severity grading (based on FEV1) in line with other COPD guidance:

<table>
<thead>
<tr>
<th>Severity of airflow obstruction</th>
<th>NICE 2004</th>
<th>GOLD 2008</th>
<th>NICE 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-bronchodilator FEV1/FVC</td>
<td>FEV1 % predicted</td>
<td>Post-bronchodilator</td>
<td>Post-bronchodilator</td>
</tr>
<tr>
<td>&lt; 0.7</td>
<td>≥ 80%</td>
<td>Stage 1 – Mild*</td>
<td>Stage 1 – Mild*</td>
</tr>
<tr>
<td>&lt; 0.7</td>
<td>50-79%</td>
<td>Stage 2 - Moderate</td>
<td>Stage 2 - Moderate</td>
</tr>
<tr>
<td>&lt; 0.7</td>
<td>30-49%</td>
<td>Stage 3 - Severe</td>
<td>Stage 3 - Severe</td>
</tr>
<tr>
<td>&lt; 0.7</td>
<td>&lt; 30%</td>
<td>Stage 4 - Very severe**</td>
<td>Stage 4 - Very severe**</td>
</tr>
</tbody>
</table>

*Symptoms should be present to diagnose COPD in people with mild airflow obstruction
** Or FEV1 < 50% with respiratory failure

Primary care investigations
Essential:
CXR – to exclude other pathology
FBC - for anaemia or polycythaemia
BMI
Pulse oximetry - to assess need for oxygen assessment

Consider:
Sputum culture – to identify organisms if sputum is persistent and purulent
Serial home PEF – helps exclude asthma
Alpha 1 antitrypsin – if family history, early age of onset and minimal smoking history

Additional investigations
ECG+/- Echo – to assess for right heart failure if features of cor pulmonale.
CT thorax – if symptoms are disproportionate to spirometric impairment. (Volume CT if cancer suspected. High resolution CT if emphysema/bronchiectasis suspected)
Transfer factor for carbon monoxide (TLCO) – if symptoms are disproportionate to spirometric impairment and emphysema suspected.

2.3 Who to refer for specialist assessment at diagnosis

High priority:
- Presence of red flag symptoms (e.g. weight loss, haemoptysis)
- Assessment for oxygen therapy – oxygen saturation < 92% (when well), onset of cor pulmonale.
- Diagnostic uncertainty, e.g. frequent infections (bronchiectasis), or mismatch between symptoms and spirometry findings

Consider referral if:
- Rapid decline in FEV1.
- Very severe COPD, for advice on additional treatment options (e.g. use of maintenance oral steroids, nebulizer therapy or lung surgery)
- Onset of symptoms under age 40 or family history of alpha-1-anti-trypsin deficiency.
2.4 Assessing COPD severity

There is poor correlation between severity of airflow limitation (classified by FEV1) and the degree of symptoms and disability. Severity assessment should be reviewed annually, or every six months for the most severe, to monitor disease progression, determine prognosis and inform management.

Multidimensional severity assessment includes:

<table>
<thead>
<tr>
<th>FEV1 % Predicted</th>
<th>MRC dyspnoea scale</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 Not troubled by breathlessness except on strenuous exercise.</td>
</tr>
<tr>
<td>Pulse oximetry</td>
<td>2 Short of breath when hurrying on the flat, or walking up a slight hill.</td>
</tr>
<tr>
<td></td>
<td>3 Walks slower than peers on level ground, or stops for breath when walking at own pace.</td>
</tr>
<tr>
<td>BMI</td>
<td>4 Stops for breath after walking about 100m on level ground.</td>
</tr>
<tr>
<td></td>
<td>5 Too breathless to leave house, or breathless when dressing or undressing.</td>
</tr>
</tbody>
</table>

Exacerbation frequency and severity
Frequent exacerbations ≥ 3 a year

<table>
<thead>
<tr>
<th>Mild exacerbations</th>
<th>Severe exacerbations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Managed at home.</td>
<td>Require hospital admission</td>
</tr>
<tr>
<td>Often self managed.</td>
<td>May have respiratory failure.</td>
</tr>
</tbody>
</table>

Comorbidities

<table>
<thead>
<tr>
<th>Anxiety and/or depression</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social and carer needs assessment</td>
</tr>
</tbody>
</table>

Health status – quick questionnaires to help quantify the impact of COPD on health status.

CAT (COPD Assessment test) – 8 questions
www.catestonline.org

CCQ (Clinical COPD Questionnaire) – 10 questions
www.ccq.nl

Prognosis - there are a number of multi-component indices to predict mortality and outcomes.

| BODE index (airflow obstruction, exercise capacity, dyspnoea, BMI) |
| DOSE score (airflow obstruction, dyspnoea, exacerbation frequency, smoking status) |
| ADO index (age, dyspnoea and airflow obstruction) |
| PARR 2 Score (identifies risk of admission) |
Systemic Manifestations and Comorbidities of COPD

COPD is not confined to the lung. The disease process triggers inflammation in other systems (e.g. skeletal muscle, haemopoiesis, CVS).

It is important to assess and manage these comorbidities when reviewing a patient with COPD:

3. Management of stable COPD

Principles of management

1. Prevent disease progression and improve survival - smoking cessation, LTOT.
2. Reduce rate of exacerbations and potential admissions – pulmonary rehabilitation, appropriate inhaled therapies (check technique) and use of spacer devices, immunisations
3. Encourage self-management – breathing techniques, action plans and rescue medication, diet and exercise
4. Assess and treat co-morbidities – depression, anxiety, CVD, osteoporosis, cor pulmonale
5. Identify social needs and assess carers – involve social services, voluntary and community groups

Effective chronic disease management requires equal attention to care organisation and clinical delivery. The requirements include:

- IT systems (such as EMIS Web) to support a ‘dashboard’ of clinical indicators. Practices can assess progress towards targets.
- Structured recall for systematic review, using chronic disease templates to prompt clinical care.
- Care planning, with written self management plans, to engage patients and their carers.

Clinical indicators include:
- Increase in COPD prevalence
- No. referred for pulmonary rehabilitation
- No. of housebound patients reviewed
- COPD and still smoking

- Diagnostic and review spirometry
- COPD reviews (include housebound patients)
- Immunisations, self management plans, rescue medication

- Regular updates on key performance indicators
- Searches to identify possible new COPD patients
- MDTs to support GP management

- Access to pulmonary rehabilitation
- Self management groups
- Community respiratory teams, MDTs,
### Clinical Review

<table>
<thead>
<tr>
<th>Frequency (include housebound)</th>
<th>Mild/Moderate/Severe – annual</th>
<th>Very Severe – six months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurements</td>
<td>Post BD spirometry, BMI, MRC dyspnoea scale, pulse oximetry</td>
<td>Smoking status and desire to quit</td>
</tr>
<tr>
<td>Clinical Assessment</td>
<td>Medication review, inhaler/spacer technique, use of nebuliser, Oxygen requirements, LTOT or NIV</td>
<td>Immunisations</td>
</tr>
<tr>
<td></td>
<td>Consider osteoporosis risk, BMI, co-morbidities</td>
<td>Self-management plan and rescue pack</td>
</tr>
<tr>
<td></td>
<td>Referral to specialist, therapy and/or social services</td>
<td>Need for pulmonary rehabilitation, or exercise referral</td>
</tr>
<tr>
<td></td>
<td>Screen for anxiety/depression</td>
<td>Carers’ assessment</td>
</tr>
<tr>
<td></td>
<td>Patients on LTOT/NIV need annual review by specialist respiratory team</td>
<td></td>
</tr>
</tbody>
</table>

Template guide available from CEG
http://www.icms.qmul.ac.uk/chs/ceg/datacollectiontemplates/index.html

### Smoking cessation, the most important intervention for COPD

A cheap intervention with a relatively low success rate can make a difference if applied throughout the disease course.

<table>
<thead>
<tr>
<th></th>
<th>1 year abstinence %</th>
<th>QALY £</th>
</tr>
</thead>
<tbody>
<tr>
<td>Usual care</td>
<td>1.4</td>
<td></td>
</tr>
<tr>
<td>Minimal counseling</td>
<td>2.6</td>
<td>14,735</td>
</tr>
<tr>
<td>Intensive counseling</td>
<td>6</td>
<td>7,149</td>
</tr>
<tr>
<td>Intensive counseling + pharmacotherapy</td>
<td>12.3</td>
<td>2,092</td>
</tr>
</tbody>
</table>

### Evidence and benefits of primary care interventions for COPD

**COPD ‘Value’ Pyramid – London Respiratory Team**

The quality-adjusted life year (QALY) is a measure of disease burden. Cost effectiveness is expressed as ‘£ per QALY’. Used to assess value for money of medical interventions.
PRACTICAL TIP - How to manage a falling BMI
Before referring to a dietician (suggested by NICE for patients with BMI < 20) consider:

- Smaller more frequent high protein meals – meat, chicken, fish, eggs, cheese, milk, pulses
- High energy snacks between meals - cakes, cereal bars, nuts, yogurts
- Food fortification - add milk powder to full cream milk; add butter/margarine/ghee/cream/cheese to foods
- Full fat or fortified milk drinks

3.1 Pulmonary rehabilitation

A multidisciplinary programme including exercise (strength and endurance), education and psycho-social support. Based in community settings over a 6-8 week period, it can be delivered at home for housebound patients and those with the most severe disease.

Evidence of benefit includes:

- Improved health related quality of life.
- Improved exercise capacity.
- Reduction in breathlessness.
- Reduction in number of exacerbations.
- Reduction in number of readmissions.
- Reduction in anxiety and depression.

Who to refer
Any patient who has a stable cardiac status and;
Is symptomatic (usually MRC ≥ 3)
Had a recent hospital admission for an acute exacerbation

Attendance at pulmonary rehabilitation is a cost-effective alternative to stepping up to triple therapy

Breathe Easy Groups
Network of support groups run by the British Lung Foundation.
Breathe Easy is suitable for anyone with/affected by a respiratory condition and run monthly support meetings/outings/social events.
Patients who complete pulmonary rehabilitation often value the on-going support of these groups.

Convincing patients of the benefits of PR
Despite evidence of benefit, it is difficult to convince patients to attend pulmonary rehabilitation.
Selling points include:-

- Helps you to breathe better, feel good and do more.
- Improves ability to manage everyday activities: gardening, walking to shops, swimming, which may have ceased due to breathlessness.
- COPD education with specialists on diet, psychological well-being, medication and self management.
- Meet others with similar problems
3.2 Pharmacological therapies - Inhaled therapy (based on NICE guidelines 2010 and NHS Evidence NICE update 2012)

COPD algorithm for use of inhaled therapies

with first line recommendations

<table>
<thead>
<tr>
<th>Breathlessness and exercise limitation</th>
<th>SABA or SAMA as required*</th>
</tr>
</thead>
<tbody>
<tr>
<td>FEV1 ≥ 50%</td>
<td></td>
</tr>
<tr>
<td>LABA TWICE DAILY: Salmeterol 25mg/2 puff (pMDI) 2 puffs or Formoterol 12mcg/dose DPI 1 puff</td>
<td></td>
</tr>
<tr>
<td>ONCE DAILY: Indacaterol 150mcg-300mcg 1 puff</td>
<td></td>
</tr>
<tr>
<td>FEV1 &lt; 50%</td>
<td></td>
</tr>
<tr>
<td>LABA</td>
<td></td>
</tr>
<tr>
<td>LABA DISCONTINUE SAMA Tiotropium hand inhaler 18mcg/dose 1 dose OD</td>
<td></td>
</tr>
<tr>
<td>---- OR ----</td>
<td></td>
</tr>
<tr>
<td>LABA</td>
<td></td>
</tr>
<tr>
<td>Indacaterol 150mcg-300mcg 1 puff OD</td>
<td></td>
</tr>
<tr>
<td>LAMA</td>
<td></td>
</tr>
<tr>
<td>LAMA + LABA/ICS</td>
<td></td>
</tr>
<tr>
<td>Sermite 500/50 Accuhaler 1 dose BD or Symbicort 400/12 DPI 1 dose BD</td>
<td></td>
</tr>
<tr>
<td>Consider LABA + LAMA if ICS declined or not tolerated</td>
<td></td>
</tr>
</tbody>
</table>

Key changes in 2010 NICE guidelines for inhaled therapies:

Use of LABA/ICS

- Early addition to short-acting bronchodilator when FEV1 < 50%
- Instead of LABA if still symptomatic when FEV ≥ 50%
- In addition to LAMA if still symptomatic irrespective of FEV1

Use of LAMA

- Addition to LABA if still symptomatic and ICS is declined/intolerant when FEV ≥ 50%
- Addition to LABA + ICS irrespective of FEV1 if symptomatic breathlessness

Tips for cost effective prescribing:

Choose Sermite 500/50 Accuhaler where clinically possible instead of Sermite 250 Ebohaler
Consider Indacaterol (once-daily LABA) as an alternative to Tiotropium or Salmeterol/Formoterol.
(NHS Evidence update 2012)

Who needs a nebuliser long term?

Consider for those on maximal inhaled therapy with ongoing breathlessness who respond well to nebulisers, in primary or secondary care, outside of an exacerbation.
PRACTICAL TIP - Using inhaled corticosteroids
- Inform about adverse effects such as non-fatal pneumonia and oral thrush, (see BNF).
- Current evidence does not demonstrate adverse effects on bone density.
- Encourage use of spacer – reduces oral thrush
- Consider a steroid card if on high dose (symbicort 200/6 or seretide 250 BD, or higher)
- Withdraw inhaled ICS if FEV1 >50% and no symptomatic benefit. Current evidence suggests that withdrawal is safe and will not lead to a significant increase in exacerbations.

Oral Treatments not recommended by NICE
Anti-oxidants
Cough mixtures
Prophylactic antibiotics (unless initiated by a chest physician)

Beta blockers
Traditionally withheld in COPD patients with significant airways reversibility due to concerns about causing bronchoconstriction. Observational studies indicate cardio-selective beta blockers are safe to use in patients with COPD. They do not trigger bronchospasm and do not block the response to beta-agonists. Hence beta blockers can safely be used as treatment for CVS co-morbidity, and such use may reduce hospitalisation and mortality.

3.3 Pharmacological therapies - Oral therapy

Theophylline
- Consider when still breathless on maximal inhaled treatment.
- Start aminophylline SR 225mg BD (brand prescribing needed).
- Monitor levels (aim 10-20) only if poor clinical response at 1-2 weeks.
- Toxicity is rare at these doses.
- Possible side effects – nausea, vomiting, palpitations.

Mucolytic therapy
- No evidence that mucolytics reduce exacerbations in stable COPD.
- Consider using carbocisteine (Mucodyne) or mecysteine (Visclair) for distressing viscid sputum for a 4-week trial. Only continue if positive response.

Oral corticosteroids
- Use for exacerbations (30mg prednisolone for 7-14 days). No need to tail off dose unless the course is longer than 2 weeks.
- Used for maintenance therapy in very severe cases with recurrent exacerbations (discuss with respiratory consultant).

When to consider osteoporosis prophylaxis in COPD patients
- High dose steroid combination inhaler – no evidence
- Steroids in exacerbations - consider DEXA in those with > 3 courses/year of oral prednisolone.
- Those on long-term oral corticosteroids (e.g. longer than three months), should be on bone protection treatment. (Calcium and vitamin D with a bisphosphonate)
3.4 Oxygen

Assessment for oxygen therapy
Oxygen requirement should be assessed using pulse oximetry in all patients at their annual COPD review. Further triggers for assessment might include:

- Cor pulmonale – raised JVP, peripheral oedema, ascites, enlarged liver
- Suspicion of nocturnal hypoxia (e.g. RHF signs with normal daytime SaO2, obesity, obstructive sleep apnoea)

If SaO2 is persistently ≤ 92% breathing air when stable (i.e. not in an exacerbation), refer for specialist assessment and blood gases to determine whether suitable for long term oxygen therapy.

Types of Oxygen therapy

Controlled Oxygen Therapy (for acute hypoxia)
During an exacerbation, COPD patients may develop acute hypoxia requiring oxygen. Because of the risk of developing hypercapnic respiratory failure always:

- Use 0.5 to 2L/min via nasal cannulae or 24% to 28% masks using venturi valves
- Aim to keep oxygen saturations between 88 - 92% (do regular blood gases in hospital)

Fitness to fly
Refer for specialist assessment if SaO2 <95% on air, and advise to defer flight booking until the assessment is done. This is particularly important for long haul flights. A hypoxic challenge test will provide advice on whether flying is safe, and whether continuous supplementary oxygen is required.

Pulse oximetry
The pulse oximeter measures the oxygen-saturated percentage of haemoglobin (%SaO2). This reflects the partial pressure of oxygen in the arterial system:

- SaO2 > 95%, PaO2 is likely to be 10-14 kPa, (normal range)
- SaO2 < 92% corresponds to PaO2 < 8kPa

Cautions
Below SaO2 90%, small differences in haemoglobin saturation reflect large changes in PaO2.

Pulse oximetry may be inaccurate in anaemic patients.

Requirements for accurate pulse oximetry
1. Nails free of varnish/dirt.
2. Warm digits – low perfusion may result in no reading.
Dangers of giving too much Oxygen in COPD

Key abnormalities in COPD are hypoventilation (due to obstructed airways and hyper-expanded lungs) and reduced gas exchange (due to destruction of alveoli and vasoconstriction). This leads to hypoxia and hypercapnia (type 2 respiratory failure). Normally this stimulates the brain to increase ventilation, but in COPD, ventilation is restricted, the brain adapts by tolerating higher levels of CO₂ and switches its stimulus for ventilation to the hypoxic drive.

High-flow oxygen removes the stimulus for ventilation, and causes respiratory depression. Therefore it is important to only partially correct hypoxia in COPD, and maintain the hypoxic drive of ventilation.

Oxygen alert card

Can be obtained from the BTS website. Should be given to all those at risk of type 2 respiratory failure.

Benefits of long term oxygen (LTOT)

Improved survival and quality of life
Improved exercise tolerance
Less polycythaemia
Slows progression of pulmonary hypertension and right heart failure
Improvement in neuro-psychological health, fatigue, cognition and sleep

Long term oxygen therapy (LTOT)

LTOT is indicated in confirmed chronic hypoxaemia.
- PaO₂ at or below 7.3 kPa with or without hypercapnia
- PaO₂ between 7.3 kPa and 8 kPa if there is secondary polycythaemia, nocturnal hypoxaemia, peripheral oedema or pulmonary hypertension confirmed by echocardiogram.

Use for at least 15 hours a day using an oxygen concentrator (1-4 l/min) and nasal prongs. Include night time use as arterial hypoxemia worsens during sleep.

Long term and ambulatory oxygen should only be prescribed by the specialist respiratory consultant team.

After starting LTOT patients require a domiciliary review by the respiratory team within 4 weeks. Annual review by a respiratory specialist (with blood gases), and an annual oxygen use review in the community is best practice.
Ambulatory oxygen therapy (AO)
Provided for periods of exercise for people:
- On LTOT who are active outside the home
- Non-LTOT with exercise desaturation
Portable systems with conserving devices or liquid oxygen are available.

Short burst oxygen therapy (SBOT)
There is no evidence to support SBOT to relieve periods of breathlessness.
SBOT is used in palliative care to help relieve breathlessness at the end of life if hypoxic.

3.5 Non-invasive ventilation (NIV)
NIV or BiPAP (Bi-level positive airway pressure) is ventilation support using a mask or similar device. The aim is to improve survival by the correction of acidosis during respiratory failure in COPD.

When is it used?
During acute hospital admission for episodes of respiratory failure
Long term, mainly at night, if:-
- Significant symptomatic hypercapnia on LTOT and maximal medical therapy.
- Frequent exacerbations, admissions and/or ITU stays.
- Two or more exacerbations requiring NIV in hospital.
- For palliation of breathlessness.

3.6 Management of cor pulmonale
Oxygen: Assess need for LTOT.
Medication: Manage oedema symptomatically with diuretics e.g. loop diuretics (frusemide, bumetanide, metolazone) monitor renal function.
No evidence for use of ACE inhibitors, calcium antagonists, alpha-blockers or digoxin
Dietary: Low salt diet.
Fluid restriction to 1.5L/day.

3.7 Lung surgery
Consider in selected younger patients, with FEV1 <20% or a rapidly declining FEV1. Three surgical procedures have gained prominence in the management of end-stage COPD: bullectomy, lung volume reduction surgery, and lung transplantation. Symptomatic and functional improvements can occur in carefully selected individuals.

CPAP (Continuous positive airway pressure) machines are simpler devices which deliver a continuous pressure to the upper airway during sleep to overcome obstructions and apnoeas in Obstructive Sleep Apnoea (OSA). Some larger patients with COPD have an overlap with OSA and may use CPAP machines.
4. Management of exacerbations

An exacerbation is defined as a sustained worsening of the patient’s condition, beyond normal day-to-day variation, that is acute in onset and necessitates a change in regular medication. Common symptoms include worsening breathlessness, productive cough, and change in the amount, viscosity and colour of sputum. Each exacerbation, even if mild, is associated with impaired health status and decline in lung function. Management of exacerbations includes:-

i) Self-management advice and rescue packs

   Early medication use results in a shorter time to recovery.

   Encourage patients to have ‘Rescue’ medication at home (one week antibiotic and 7-14 days prednisolone 30mg/daily), and to start early in exacerbations.

   Encourage contact with the practice at the start of a rescue pack to:-

   - Assess exacerbation severity
   - Supply new rescue medication
   - Review care plan

Which antibiotic?

<table>
<thead>
<tr>
<th>1st line: amoxicillin</th>
<th>2nd line: co-amoxiclav</th>
<th>3rd line: quinolones</th>
</tr>
</thead>
<tbody>
<tr>
<td>If penicillin allergic: clarithromycin/ doxycycline</td>
<td>If penicillin allergic: quinolones</td>
<td></td>
</tr>
</tbody>
</table>

When flu is circulating, consider oseltamivir within 48 hours of onset of symptoms, and use clarithromycin for secondary infection, as staphlococcal infection is a risk.

ii) Assess need for hospitalisation: Factors influencing the place of management.

<table>
<thead>
<tr>
<th>Factor</th>
<th>Treat at home</th>
<th>Treat in hospital</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breathlessness</td>
<td>Mild</td>
<td>Severe</td>
</tr>
<tr>
<td>General condition</td>
<td>Good</td>
<td>Poor/deteriorating/bed-bound</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>Acute confusion</td>
<td>No</td>
<td>Yes</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>Rapid rate of onset</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Significant co-morbidity (particularly cardiac disease and/or Type 1 diabetes)</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>SaO2 &lt; 90%</td>
<td>No</td>
<td>Yes*</td>
</tr>
</tbody>
</table>

*no absolute exclusion if baseline SaO2 known to be < 90% when well
If transfer to hospital is needed and SaO2 < 90% give controlled oxygen therapy (see oxygen section) to prevent CO2 retention.
When managing the patient at home, the GP should re-assess regularly until stable. Community respiratory teams, district nurses and community matrons may provide additional support, depending on local arrangements.

Admission Avoidance (by specialist community teams) and Hospital at Home/Early/Supported discharge schemes.

Provide treatment and support for selected patients with exacerbations of COPD at home. Outcomes include: reducing the risk of adverse events, rehabilitating patients in their home environment, supporting self-management and reducing dependency on the acute sector. At present there is little evidence that these teams reduce overall hospital use, or that they are cost efficient. However, they are popular and improve the quality of patient care.

iii) Review following acute exacerbations

Full recovery from an acute exacerbation of COPD takes at least six weeks. Following hospital discharge patients need early review to include:

a) Optimal medical therapy and medicine use review.

b) Self management, including early referral to pulmonary rehabilitation and smoking cessation.

c) Replace rescue pack.

5. Palliative care

5.1 Disease trajectory

The uncertain disease progression in COPD makes decisions about inclusion on the palliative care register difficult. Triggers might include:

1. “Would I be surprised if my patient were to die in the next 6-12 months?”

2. When a patient chooses comfort care only, not ‘curative’ treatment.

3. Clinical indicators of a poor outcome include:

   - More than 3 hospital admissions in last 12 months, previous ITU or NIV.

   - Severe disease, on LTOT, MRC score 4 or 5, dependence in most ADLs

   - Rapid decline in condition and functional ability

   - Co-morbidity (especially cor pulmonale)

   - Low BMI (especially low muscle mass)

Conversations about Advance Care Planning

Identifying patients’ views on CPR, mechanical ventilation and other treatment, along with their preferred place of death may emerge during visits by trusted practitioners. This may extend to a formal advance care plan.
Palliative care services at St Josephs Hospice

Operate in close collaboration with primary and secondary care

Use referral form for St Josephs Hospice to access services

- Community assessment and advice on symptom management
  - Includes access to breathlessness clinic and complementary therapies
- Admission to St Josephs Hospice
  - Symptom/exacerbation management, respite and/or terminal care.
- Day hospice
- Advice and help with advance care planning

5.2 Symptomatic control of breathlessness and cough in advanced COPD

Refractory breathlessness has a wide-ranging impact on patients with terminal COPD. Assessment requires attention to functional, psychological and spiritual domains, as well as support to carers.

Non pharmacological

- Where hypoxia is absent, evidence suggests that an open window, or fan provides subjective relief.
- Use of breathing techniques such as positioning (e.g. sitting in chair with upper body leaning forward), pursed lip breathing
- Hospice admission for symptom control, physiotherapy, NIV and psycho-social support.

Pharmacological

- Lorazepam at a starting dose of 0.5 – 1mg od.
- Consult the palliative care team for advice on the use of opioids for managing breathlessness in the absence of co-morbid conditions causing pain.

6. Patient information

www.patient.co.uk
www.lunguk.org/supporting-you/breathe-easy

7. Practitioner resources

PCRS website – good for specialist respiratory care information and self management plans.
http://www.pcrs-uk.org/

NHS choices pulmonary rehabilitation video http://www.nhs.uk/Video/Pages/Pulmonaryrehabilitation.aspx
8. Appendix

8.1. Spirometry interpretation

- Do not use spirometry alone to diagnose COPD or other respiratory conditions. Consider alternatives in older people without typical symptoms of COPD and a FEV1/FVC ratio < 0.7, and younger people with symptoms of COPD and FEV1/FVC ratio ≥ 0.7.
- Severity of objective airflow obstruction does not correlate well with symptoms.
- Always check the FVC % predicted to pick up:
  - Restrictive pattern – FVC < 80% predicted and FEV1/FVC ratio normal.
  - Mixed pattern - FVC < 80% and FEV1/FVC ratio < 0.7

If FEV1/FVC ratio returns to normal following treatment, re-consider the diagnosis.
Defer spirometry until 6 weeks after an exacerbation to allow full recovery.
8.2 Quality Spirometry

High quality spirometry in primary care requires training, support and regular review from local community respiratory teams or other organisations with relevant expertise.

1. Machines should meet ECCS/ERS (European Community for Coal and Steel/European Respiratory Society) standards
2. Machine and syringe should be verified/calibrated according to manufacturers’ instructions
3. Reference values (height, age, gender and race) are documented
4. The FVC blows are reproducible; e.g. at least 2 blows within 150mls or 5% variability
5. Flow/volume and time/volume graphs are visible
   a. Flow/volume: no coughs or early stops
   b. Time/volume: the curve plateaus for at least 1 second

Doing Post bronchodilator spirometry
Use 400mcg salbutamol via spacer or 2.5mg salbutamol by nebuliser
Perform spirometry after 20 minutes

Doing and interpreting reversibility testing
Measure FEV1 pre and post bronchodilation
An increase in FEV1 that is either greater than 400 ml or 15% above the pre-bronchodilator value – this is significantly greater than the natural variability of the FEV1

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