

Chronic obstructive pulmonary disease

Understanding NICE guidance –
information for people with chronic obstructive
pulmonary disease, their families and carers,
and the public

February 2004



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Chronic obstructive pulmonary disease:

Understanding NICE guidance – information for people with chronic obstructive pulmonary disease, their families and carers, and the public

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To order copies

Copies of this booklet can be ordered from the NHS Response Line; telephone 0870 1555 455 and quote reference number N0463. A version in English and Welsh is also available, reference number N0464. Mae fersiwn yn Gymraeg ac yn Saesneg ar gael hefyd, rhif cyfeirnod N0464. The NICE clinical guideline on which this information is based, *Chronic obstructive pulmonary disease: management of chronic obstructive pulmonary disease in adults in primary and secondary care*, is available from the NICE website (www.nice.org.uk/CG012NICEguideline). A quick reference guide for healthcare professionals is also available from the website (www.nice.org.uk/CG012NICEquickrefguide), and the NHS Response Line, reference number N0462).

National Institute for Clinical Excellence

MidCity Place
71 High Holborn
London WC1V 6NA

www.nice.org.uk

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About this information

This information describes the guidance that the National Institute for Clinical Excellence (called NICE for short) has issued to the NHS on the management of chronic obstructive pulmonary disease (which is usually shortened to COPD) in adults in the community and in hospitals. It is based on *Chronic obstructive pulmonary disease: management of chronic obstructive pulmonary disease in adults in primary and secondary care* (NICE Clinical Guideline no. 12), which is a clinical guideline produced by NICE for doctors, nurses and others working in the NHS in England and Wales. Although this information has been written chiefly for people with COPD, it may also be useful for family members, those who care for people with COPD and anyone interested in COPD or in healthcare in general.

Clinical guidelines

Clinical guidelines are recommendations for good practice. The recommendations in NICE guidelines are prepared by groups of health workers, lay representatives with experience or knowledge of the condition being discussed, and scientists. The groups look at the evidence available on the best way of treating or

managing a condition and make recommendations based on this evidence.

There is more about NICE and the way that the NICE guidelines are developed on the NICE website (www.nice.org.uk). You can download the booklet *The guideline development process – information for the public and the NHS* from the website, or you can order a copy by phoning the NHS Response Line on 0870 1555 455 (quote reference number N0038).

What the recommendations cover

NICE clinical guidelines can look at different areas of diagnosis, treatment, care, self-help or a combination of these. The areas that a guideline covers depend on the topic. They are laid out in a document called the scope at the start of guideline development.

The recommendations in the NICE guideline on COPD cover the full range of care that should be available from the NHS to adults with COPD. They include how the diagnosis should be made and the treatments that should be offered at different times.

The information that follows tells you about the NICE guideline on COPD. It doesn't attempt to explain COPD or the treatments in detail. NHS

Direct is a starting point to find out more and has some information on some of the medical conditions that may be involved, such as bronchitis. Phone NHS Direct on 0845 46 47 or visit the website at www.nhsdirect.nhs.uk.

If you have questions about the specific treatments and options covered, talk to your doctor or nurse (or another health professional, depending on what it is you want to know).

How guidelines are used in the NHS

In general, health workers in the NHS are expected to follow NICE's clinical guidelines. But there will be times when the recommendations won't be suitable for someone because of his or her specific medical condition, general health, wishes or a combination of these. If you think that the treatment or care you receive does not match the treatment or care described on the pages that follow, you should talk to your doctor, nurse or other health professional involved in your treatment.

If you want to read the other versions of this guideline

There are four versions of this guideline:

- this one
- the NICE guideline, *Chronic obstructive pulmonary disease: management of chronic obstructive pulmonary disease in adults in primary and secondary care*
- the quick reference guide, which is a summary of the main recommendations in the NICE guideline, for family doctors and their practice teams; NICE has sent copies of the quick reference guide to doctors and other healthcare professionals working in the NHS
- the full guideline, which contains all the details of the guideline recommendations, how they were developed and information about the evidence on which they were based.

All versions of the guideline are available from the NICE website (www.nice.org.uk). This version and the quick reference guide are also available from the NHS Response Line – phone 0870 1555 455 and give the reference number(s) of the booklets you want (N0463 for this version, N0464 for this version in English and Welsh, and N0462 for the quick reference guide).

Chronic obstructive pulmonary disease

Chronic obstructive pulmonary disease (which is shortened to COPD) is the name given to a condition where people cannot breathe in and out properly because of long-term damage to the lungs. In COPD, the airways have become blocked ('obstructed') to some extent, and the air sacs may have become damaged. (The airways are the passages through which the gases oxygen and carbon dioxide flow into and out of the body, and the air sacs are where oxygen passes from the air into the blood, and carbon dioxide passes out of the blood.) Causes of the blockage include an increased amount of mucus in the airways and narrowing of the passages as a result of the airway walls becoming thickened. Emphysema is the name for the damage to the lung tissue in COPD that affects the ability of the air sacs to transfer air into the body and that makes the airways floppy.

The changes usually start with inflammation in the airways, which is the body's response to a harmful substance (most often cigarette smoke) being breathed in over a period of time. If the inflammation lasts for a while, permanent changes start to take place.

Although treatments for COPD can help a person

to breathe more easily, they can't repair the damage.

Key messages for you and for health professionals

The guideline that NICE has issued to the NHS contains many specific recommendations about the sort of care a person with COPD should receive in the NHS and these are covered on the following pages. Some of the recommendations in the guideline are known as 'key priorities for implementation'. They are particularly important and should be put in place as a priority.

Key priorities

Diagnosing COPD

Your doctor should think about COPD as a possible diagnosis if you are over 35, are or have been a smoker and you tell him or her that you:

- find that you are short of breath after going upstairs, exercising or some other type of exertion, **or**

- have a cough that has lasted a long time, **or**
- often cough up phlegm ('sputum') from your lungs, **or**
- get a lot of chestiness or wheezing during cold weather.

Your doctor should test how well your lungs are working using a piece of equipment called a spirometer. All doctors, nurses and other health professionals who treat people with COPD should have a spirometer available for this or should have access to facilities where the test can be performed. If they are doing it themselves, they should have up-to-date training to do the test and should understand the results.

Stopping smoking

Giving up smoking is very important if you are a smoker with COPD. Your doctor or nurse should really encourage and help you to do this, no matter what your age or how long you've been smoking.

Different inhaler medicines

If you are short of breath on exertion, or limited in what you can do, you should be given a type of medicine called a bronchodilator in an inhaler (see page 24).

Broadly speaking, some bronchodilators have a short-lasting effect while others last for longer. They are sometimes called 'short-acting' and 'long-acting' bronchodilators. If you are still having problems with your breathing despite using a short-acting bronchodilator in an inhaler, you should be given a long-acting bronchodilator inhaler.

If your COPD is quite bad and there have been two or more times in a 12-month period when you've had to have antibiotics or steroids to help, you should also be given a steroid inhaler. (COPD that's 'quite bad' here means an FEV₁ of 50% predicted or lower, see page 15 for an explanation.)

Pulmonary rehabilitation if you need it

Pulmonary rehabilitation aims to help people with COPD (and those with other long-term breathing problems) to have as normal a life as possible. It involves a programme of exercise and discussions with health professionals and other patients to help you understand COPD and how to treat it.

If pulmonary rehabilitation would help you, you should be offered a programme that has been designed specifically for you.

Using non-invasive ventilation

Non-invasive ventilation (NIV for short) is a method of helping a person to breathe artificially when their breathing is worse during a bad attack (this is called an exacerbation, see below). The person wears a mask that covers the nose (or less commonly, a full face mask that covers the nose and mouth). This is connected to a small machine that pushes air through the mask and into the person's lungs. NIV should be used for people who, when their COPD is particularly bad, cannot get enough oxygen into their blood and have too much carbon dioxide in it despite having the right type of medicines. The medical term for what happens is hypercapnic ventilatory failure.

If you have NIV, the system should be set up and monitored by a team of health professionals who are trained and experienced in using it. There should be a clear plan about what to do if you get worse.

Managing exacerbations

During an exacerbation, your COPD gets worse over a few days. You should be offered vaccinations to stop you getting flu or another infection called pneumococcal infection as this

helps prevent exacerbations. If your COPD is quite bad and you are having two or more exacerbations per year, health professionals should also try to reduce the number of exacerbations you have by giving you a steroid inhaler and a long-acting bronchodilator. If you still get exacerbations, your doctor or nurse should help you make them less serious by:

- advising you about what to do at the first sign of an exacerbation
- advising you to start on steroid tablets and antibiotics as soon as you notice signs of an exacerbation
- using NIV if you need it
- using a hospital-at-home or assisted-discharge scheme when appropriate (see page 43 for an explanation).

Having access to a team of experts

Your care should be provided by a team of experts who may be responsible for different aspects of your care, and making sure you get the right treatment at the right time.

Diagnosing COPD

Your doctor should think about COPD as a possible diagnosis if you are over 35, are or have been a smoker and you:

- find that you are short of breath after going upstairs, exercising or some other type of exertion, **or**
- have a cough that has lasted a long time, **or**
- often cough up sputum (the medical word for phlegm) from your lungs, **or**
- get a lot of chestiness or wheezing during cold weather.

If COPD is a possibility, you should be asked if:

- you've lost weight recently
- you find it hard to put effort into any physical activity
- you've coughed up any blood
- you've been waking up at night
- you've been getting swollen ankles and/or chest pains
- you're feeling particularly tired
- you have worked with chemicals that could affect your breathing.

Your doctor should also ask you what makes you short of breath (breathless) and how your daily life is affected. He or she will use this information to give you a grade for your

breathlessness using a scale that goes from 1 to 5. Sometimes the symptoms of COPD and asthma are similar, but it is important to be sure which disease a person has because the treatments are not the same. Some of the questions and tests are to help your doctor decide if you have COPD or asthma (see page 18).

Spotting COPD early

In order to try to catch COPD early, doctors and nurses working in GP practices or community clinics should use a spirometer to check people who:

- are over 35, **and**
- are current or ex smokers, **and**
- have had a cough for a long time.

This type of check should also be considered for people who have long-term bronchitis (inflammation of the airways).

A spirometer is a piece of equipment used to measure how well the lungs are working.

Checking how well your lungs work

When trying to reach a diagnosis, your doctor should check how well your lungs are working using a piece of equipment called a spirometer.

All doctors, nurses and other health professionals who treat people with COPD should have the right equipment for this, or should have access to facilities where it can be performed. If they are doing the test themselves, they should have up-to-date training to do the test and should understand the results.

FEV₁ and FVC

A spirometer is used to take two important measurements, called FEV₁ and FVC.

FEV stands for 'forced expiratory volume'. The FEV₁ is the maximum amount of air that a person can force out of their lungs in a second. If a person has COPD, the FEV₁ is lower than would be predicted from their age, sex and other characteristics.

FVC is short for 'forced vital capacity'. This is the total amount of air that a person can force out of their lungs.

FEV₁ and FVC are important measurements for a person with COPD as they show how much their lungs have become affected. A person is said to have an obstructed airflow (as happens in COPD) if their FEV₁ is lower than 80% of what would be expected from their age, height and sex, and their FEV₁ divided by their FVC is below 0.7.

Other tests at diagnosis

Your doctor should arrange for you to have a chest X-ray to rule out any other causes of your symptoms. A blood test (called a 'full blood count') will show if your symptoms are due to anaemia. Your body mass index (BMI) should also be calculated (this shows your body weight in relation to your height).

Additional tests that may be needed

Other tests may be needed in certain circumstances, and these are described below. The results of these tests will help the doctor and you to plan your treatment.

More breathing tests if your doctor is still not sure whether it's asthma or COPD. You will be given a device called a peak flow meter, which measures how fast you can breathe out, and asked to take measurements at various times of the day for several days.

A blood test for alpha-1 antitrypsin if you're young to have the symptoms of COPD (under 40), you've never smoked or hardly smoked, or if other members of your family have been alpha-1 antitrypsin deficient. Alpha-1 antitrypsin is an enzyme that helps to protect the lungs against damage from things like cigarette smoke. If

you're found to have alpha-1 antitrypsin deficiency, you should be offered the chance to go to a centre that has staff who specialise in the care of people with the condition so you can talk about the care and support that are available.

A breathing test to measure your T_LCO (transfer factor for carbon monoxide), if your symptoms seem worse than they should be, given the results from your spirometer tests. Transfer factor for carbon monoxide is a way of assessing the lungs' ability to transfer oxygen to the blood stream.

A CT scan of your chest if your symptoms seem worse than they should be given your spirometry results, or if something has shown up on your chest X-ray or if you might need to have surgery because, for example, the treatments aren't working as well as expected. (CT stands for computed tomography, which is a way of viewing the body tissues.)

An ECG (heart trace), an echocardiogram (which uses ultrasound), or both, to check your heart for signs that it may have been affected by the COPD.

Pulse oximetry if your breathing is very poor or if there are signs that your heart has been affected. This is to see whether you need to have

some extra oxygen. A pulse oximeter senses how much oxygen there is in your blood.

A sputum test if you produce a lot of sputum that's green or brown, to check for signs of infection.

Distinguishing between COPD and asthma

Doctors can usually tell whether a person has COPD or asthma by asking questions and examining them. A person who is a smoker (or ex-smoker), over 35, has a persistent cough and often coughs up sputum, and has breathlessness that doesn't vary much from day to day probably has COPD. If the breathlessness is variable, or the person often wakes up at night feeling wheezy, he or she is more likely to have asthma than COPD.

Sometimes other tests may be needed (see page 16). If you have had some of these tests and your doctor is still not sure whether you have asthma, COPD or both, he or she may try a different test called a reversibility test. With reversibility testing, the doctor gives the patient a medicine to see whether it can improve the functioning of the lungs. The test may be tried with bronchodilator inhalers, steroid tablets or both.

If the condition gets a lot better and your breathing improves to near normal with treatment, it's more likely that asthma accounts for your symptoms.

Finding out how severely you are affected

If your FEV₁ is between 50 and 80% of that predicted, you are said to have mild airflow obstruction. If it's between 30 and 49% of that predicted, it's said to be moderate airflow obstruction. And if it's below 30% of that predicted, the airflow obstruction is severe.

But COPD causes different problems for different people, and some people with airflow obstruction that is considered to be mild can be severely disabled by their COPD. Your doctor should work out how bad your COPD is from the results of your tests, how much it affects your daily life, how often you get bad attacks and how healthy you are otherwise.

Once COPD has been diagnosed

Once you've been diagnosed as having COPD, your doctor or nurse should:

- highlight that you have COPD in your notes and include the results of your initial spirometer tests
- help you to try to stop smoking
- record the effects of any different medicines that you try for your COPD
- use a spirometer to check from time to time how well your lungs are working
- check from time to time that you're using your inhaler(s) properly
- keep a check on whether you need to see a specialist or other health professional for help and advice
- check if you need pulmonary rehabilitation
- record any changes in your weight.

People with mild or moderate COPD

If your COPD is mild or moderate, you should see someone for a check at least once a year.

People with severe COPD

If your COPD is severe but doesn't seem to be getting any worse, you probably don't need to have regular hospital checks. You should see your GP or nurse at least twice a year. He or she should check how well your medicines for COPD are working. Attention should also be paid to whether you are depressed or anxious, are eating properly, or need help from other quarters, such as social services or occupational

therapy, and whether you need long-term oxygen.

There should also be arrangements in place so you can get a hospital check quickly if you need one.

If you have severe COPD and you're having specialist treatments such as non-invasive ventilation (see page 36), you should have regular appointments with a specialist.

Seeing a specialist

Sometimes it's necessary for a person with COPD to see a specialist – it may be so that you can get the best type of treatment for your particular circumstances. Or it might be because your doctor is not completely sure about the diagnosis. You may also see a hospital specialist if you've asked for a second opinion about your diagnosis.

If you're given a hospital appointment, you may not always see a doctor who specialises in breathing problems. You may see another health professional such as a nurse or a physiotherapist who works with the doctor and who specialises in helping people with breathing difficulties.

Learning about COPD

Your healthcare team should teach you about your condition and how to help yourself. You will need different information at different times when you have COPD, and your healthcare team should take account of this.

If you have moderate or severe COPD, you should be told about non-invasive ventilation (see page 36) and its benefits and limits so that if this is ever needed in the future you will understand what is involved.

Managing the risk of a bad attack (an exacerbation)

One or more members of your healthcare team should offer you advice about what to do if you think you are starting an exacerbation (see page 42). This should include keeping the medicines you might need at home, and knowing who to contact if your symptoms do not improve quickly.

When your COPD is stable

Your COPD is said to be stable if your symptoms are more or less the same from day to day.

Stopping smoking

Giving up smoking is very important if you are a smoker with COPD, no matter how long you've been smoking. Your doctor or nurse should really encourage and help you to do this, whatever your age. He or she should ask you about how many cigarettes you smoke each day and write this in your notes.

If you are having trouble stopping, your doctor or nurse should discuss trying one of the 'stopping smoking' programmes that are now available (such as medicines or patches, with extra support to help you use them successfully), though there may be reasons why some options may not be suitable for you.

If you try to stop smoking but are unsuccessful, your doctor or nurse will not normally encourage you to have another go until you've waited for at least 6 months. This should give you time to rebuild your motivation to succeed. You may be encouraged to try again sooner if there are reasons why another attempt might be more successful.

Medicines

There are several different types of medicines that can help the symptoms of COPD. The decision about which medicines to use depends on how severe the COPD is, how it is affecting your everyday life, and the side effects of the medicines. Sometimes you may need to try several different medicines or combinations of medicines to find out what works best for you.

Bronchodilator inhalers

In COPD, the airways can become narrowed because the muscle layers around the passages tighten ('contract'). A type of medicine called a bronchodilator helps to reduce this narrowing effect by relaxing the muscle layers. Broadly speaking, some bronchodilators have a short-lasting effect while others last for longer. They are sometimes called 'short-acting' and 'long-acting' bronchodilators.

If the COPD is making you breathless and limiting what you do, you should be given a short-acting bronchodilator inhaler to use.

When your doctor or nurse comes to review how well this is working, he or she should look at:

- how you've been on the inhaler

- what you've been able to do since you've had an inhaler, compared with what you could do beforehand
- how quickly the inhaler eases your breathing
- your results in spirometer tests.

If you're still having problems, you should also be offered either a long-acting bronchodilator inhaler, or a combination of two different types of short-acting bronchodilators called beta-agonists and anticholinergic medicines. As with other aspects of your treatment, you should be involved in the decision about which option to try – this will include discussing with your doctor the effects of medicines you've tried so far, the possible side effects of different medicines and their costs.

Theophylline

Theophylline is a type of bronchodilator that is a tablet rather than being inhaled. You should be offered theophylline only after you've tried short-acting and long-acting bronchodilator inhalers. This is because if there's too much theophylline in a person's body, or the person is also taking certain other types of medicines, it can cause problems. You might also be tried on theophylline if you can't use inhalers. A person taking theophylline has to have regular blood tests.

If you try theophylline, your doctor or nurse should check:

- how you've been on theophylline
- what you've been able to do since you've had it compared with what you could do beforehand
- your results in spirometer tests.

Doctors should be particularly cautious when using theophylline in older people, because their bodies deal with medicines at slower rates and they are also more likely to be taking other medicines. If you're given antibiotics known as macrolides or fluoroquinolones, your theophylline dose should be reduced. This should also be done if your doctor gives you any other medicine that can cause problems if taken at the same time as theophylline.

Steroids

Steroid inhalers

If your COPD is quite bad and there have been two or more times in a 12-month period when you've had to have antibiotics or steroid tablets to help, you should also be offered a steroid inhaler. (COPD that's 'quite bad' here means an FEV₁ of 50% predicted or lower, see page 15 for an explanation.) COPD isn't one of the disorders that steroid inhalers are licensed for, but doctors

can prescribe them for COPD once they've discussed the possible benefits and side effects with you.

If you use a steroid inhaler a lot or if you are on a high dose, there's a risk of developing side effects such as osteoporosis (where the bones become weakened and break more easily). Your doctor should be aware of these risks, which are usually quite low, and should watch out for side effects. Your doctor should discuss the risks to help you decide about using the steroid inhaler.

Steroid tablets

In general, you shouldn't be kept on steroid tablets for long periods. But sometimes people who have severe COPD and are given the tablets to help during an exacerbation might need to stay on them.

If you are given steroid tablets, you should be on as low a dose as possible. There is a risk of side effects with long-term steroids. If you're on steroid tablets for a long period you should be monitored for signs of side effects, including osteoporosis, and given preventive treatment if you need it. People aged 65 and over who are taking steroid tablets for a long period should have treatment to prevent osteoporosis as a matter of course, unless there are reasons that they can't take it.

Medicines to help with sputum

If you cough up a lot of sputum from the lungs (this is called a productive cough), your doctor should think about trying what's known as a mucolytic medicine. If this is successful and lessens your coughing and the amount of sputum you're coughing up, you should stay on it.

If you produce an excessive amount of sputum, a physiotherapist should show you how to use a special mask and how to breathe to try to reduce the effect of the sputum.

Medicines and supplements that should not be used

Some medicines and supplements should **not** generally be used because either they have been shown not to work in people with stable COPD or there isn't enough research to justify their use.

These are:

- cough medicines (called anti-tussive medicines)
- antibiotics given to try to **prevent** infection (rather than to fight an infection that you already have)

- alpha-tocopherol and beta-carotene supplements (which are a type of antioxidant therapy)
- alpha-1 antitrypsin replacement treatment in people who are found to have alpha-1 antitrypsin deficiency.

Combining medicines

Certain combinations of medicines seem to be particularly helpful in COPD, when a single medicine isn't working well on its own. How well a combination works should be monitored in the same way as for single medicines. If your symptoms do not improve within 4 weeks of starting a combination of medicines, your doctor should advise you to stop taking it.

Inhalers and other devices

Inhalers

You should be prescribed an inhaler only after you've tried it and your doctor or nurse is sure that you can use it properly. If you can't get the hang of a certain type, you should be able to try another one. Most people can learn to use an inhaler unless they are seriously affected by a condition such as Alzheimer's disease.

From time to time, your doctor or nurse should check that you're still using your inhaler

correctly. If necessary, he or she should show you again the correct way to do it.

Your doctor might need to adjust the dose of your medicine to suit the way you use your inhaler.

Spacers

A spacer device attaches to an inhaler. With a spacer, the user doesn't have to co-ordinate puffing and inhaling. If you need a spacer, you should be given the right type of spacer for your inhaler.

When you're using your spacer, you should operate the inhaler once and then inhale. Repeat these steps as necessary. Spacers work just as well if you breathe in and out normally as if you take single breaths.

Clean your spacer using water and washing-up liquid and let it dry naturally. Don't do this more than once a month, though, and don't dry it with a towel or too much static will build up and it won't work as well as it should. Before you use it, wipe the mouthpiece.

Nebulisers

A nebuliser is a device that converts a liquid containing the medicine into an aerosol (or mist)

that can be breathed in. In this way, higher doses of medicines can be taken.

Your doctor should think about trying a nebuliser if you're using a hand-held inhaler but you're still affected by breathlessness. Before prescribing a nebuliser, your doctor should think about whether you would be able to use it, or if your carer could help you. You should usually be able to choose whether you want a nebuliser with a facemask or a mouthpiece (though it has to be a mouthpiece for some types of medicine). If a nebuliser is prescribed, you should have access to equipment, servicing, advice and support.

Your doctor should check to see whether the nebuliser therapy is helping your breathlessness, or increasing your ability to carry out daily activities or to exercise. If it isn't, he or she may talk to you about stopping it.

Oxygen

Your doctor should check whether you need to have extra oxygen if:

- you have severe airflow obstruction (see page 19), **or**
- there is an increase in the number of your red blood cells ('polycythaemia'), **or**

- there is swelling in your limbs, **or**
- your skin has a bluish tinge because of a shortage of oxygen, **or**
- there's a raised blood pressure in the jugular vein, **or**
- the amount of oxygen in your blood is low (described as being below 92% saturation).

If you have moderate airflow obstruction, your doctor should also think about whether you might need extra oxygen.

To see whether you need extra oxygen in addition to your other treatments for COPD, the amount of oxygen and carbon dioxide in your blood should be measured. This should be done on two occasions that are at least 3 weeks apart. If the results show that you're not able to breathe in enough oxygen normally (see box, page 33), you should be given extra oxygen.

If you need a fixed supply of oxygen at home to use for long periods, you should be given an oxygen concentrator. This is a machine that purifies oxygen from room air and provides a continuous supply. It plugs into the electricity supply, and takes oxygen into rooms that you use through tubing fixed around the skirting. If you smoke while using extra oxygen, you need to be aware that this could cause a fire or explosion.

To get the benefits of oxygen treatment, you should breathe it for at least 15 hours a day. Once you're having this long-term oxygen treatment, you should have regular assessments at least once a year by someone familiar with the treatment. The assessment should include pulse oximetry (see page 17).

When extra oxygen should be given

When deciding if a person needs extra oxygen, healthcare professionals take a measurement called the PaO₂. PaO₂ is a medical term meaning 'partial pressure of oxygen in arterial blood', and it gives an idea of how much oxygen is being transferred from the lungs to the blood.

A PaO₂ below 7.3 kPa means extra oxygen is needed to boost the amount the person can breathe in.

Extra oxygen is also needed for a person with a PaO₂ between 7.3 kPa and 8 kPa if he or she has an increase in the number of red blood cells because of the problem with oxygen (the medical name is secondary polycythaemia), or becomes low in oxygen at night, or has swelling in the limbs.

Ambulatory oxygen

Ambulatory oxygen is when you use an oxygen supply that you can move around with. It should be prescribed for you if you are already having oxygen therapy and you want to continue having oxygen when you're away from home. It should also be considered if your blood oxygen drops when you do an activity, if it's shown that oxygen helps you do activities and/or helps with breathlessness, and if you're motivated to use it. In general, it shouldn't be offered if a person has a PaO₂ above 7.3 kPa and the blood oxygen doesn't drop during an activity. (See 'When extra oxygen should be given' for an explanation of PaO₂.)

Before you are prescribed this type of oxygen therapy, you should have an assessment by a specialist.

The kind of equipment that should be available if you have ambulatory oxygen depends on how long you use it for each day and the amount of oxygen needed (see box, page 35).

Treatment with short bursts of oxygen

Treatment with oxygen for short periods (using cylinders) is an option only when other treatments have failed to help severe breathlessness. If you try it, you should carry on with it only if the breathlessness improves.

How long you use it for	Best type of equipment
Less than 90 minutes	Small cylinder
90 minutes to 4 hours	Small cylinder with oxygen conserving device
More than 4 hours	Liquid oxygen
More than 30 minutes, with flow rates greater than 2 litres/minute	Liquid oxygen

Pulmonary rehabilitation

If your COPD is limiting what you can do but you are on the best treatment, you should be offered a programme of pulmonary rehabilitation unless you cannot walk, have unstable angina, or have recently had a heart attack. Pulmonary rehabilitation is a programme of care and activities co-ordinated by different types of health professional who work as a team to help you live as normal a life as is possible and to be as self-sufficient as possible. The programme should be designed specifically for you, with your full involvement. It should include exercises, together with information about COPD, diet and other ways of dealing with COPD. The sessions should be held at times and in a place that suits

you, and you should not have to wait too long to start the programme.

It may sometimes be difficult or challenging, but to make the most of a pulmonary rehabilitation programme it is important that you are committed to working as closely as possible with your healthcare team.

Non-invasive ventilation

Non-invasive ventilation (NIV for short) is a method of helping a person to breathe artificially. The person wears a mask that covers the nose (or less commonly, a full face mask that covers the nose and mouth). This is connected to a small machine that pushes air through the mask and into the person's lungs.

If you have a long-term problem getting enough oxygen into your blood and have too much carbon dioxide in it, and you have needed help with breathing (ventilation) in the past, you should be referred to a specialist centre to see whether you need NIV. Similarly, if having long-term oxygen treatment is causing problems, you should be referred for a discussion about NIV.

Guarding against chest infections

Vaccinations

You should be offered a vaccination against pneumococcal infection (this bacterial infection can cause pneumonia and other illnesses). You should also be offered an annual flu jab.

Medicines to fight flu

If you have the start of what seems like flu, you should see your doctor as soon as possible. You may be able to take a medicine called zanamivir or one called oseltamivir to help stop the flu from getting a grip. If you are prescribed zanamivir, your doctor should discuss the possibility that it might make your airways go into a spasm. You should keep a short-acting bronchodilator inhaler close by while you're taking a course of zanamivir.

Cor pulmonale

Cor pulmonale is heart condition that happens as a consequence of a lung condition such as COPD. If there are signs of a heart problem, such as swelling of the ankles, then cor pulmonale should be considered as a diagnosis. Your doctor should check to make sure there isn't another cause of the swelling.

If you have cor pulmonale, your doctor should check whether you need long-term oxygen therapy. The swelling can usually be controlled using a diuretic (water tablet).

Some types of medicine are not generally recommended for cor pulmonale in people with COPD (though they may sometimes be prescribed for other conditions in people with COPD). These are ACE inhibitors, calcium-channel blockers, alpha-blockers and digoxin.

Lung surgery

Some people with very specific conditions may be able to have an operation on their lungs.

A person who is breathless with an FEV₁ of less than 50% of that predicted and who has a large air pocket in the lung (called a 'bullae') should be referred to a specialist to discuss the possibility of an operation to remove the bullae (called a bullectomy). The operation can only be considered if the lung has not become too damaged.

An operation may also be possible for a person with very severe COPD that's mainly affecting the upper part of the lung and who is breathless despite using medicines and having had rehabilitation (see page 35). He or she should be

referred to a specialist to discuss the possibility of an operation to remove part of the lung. Unfortunately, this operation is not possible if the lungs have become too badly damaged, for example if:

- the FEV₁ is less than 20% of that predicted
- there is a higher than normal amount of carbon dioxide in the blood
- there is emphysema in other parts of the lungs (not just in the upper parts)
- the T_LCO is less than 20% of that predicted (see page 17).

A lung transplant may be an option for someone with very severe COPD who is very breathless despite the medicines and unable to carry out basic everyday tasks. Whether or not a transplant is possible depends on the person's individual condition and general health and on the local arrangements for assessing people for this type of operation. Unfortunately many of those accepted for a transplant do not get one.

Spotting and helping with anxiety and depression

Having a long-term illness such as COPD can sometimes make a person depressed or cause anxiety. Health professionals who treat people with COPD should watch out for signs of this.

And if a person with COPD is found to be depressed or anxious, he or she should be treated for this in the same way as someone without COPD would be – with medicines and support.

Dietary checks

Your BMI should have been checked at diagnosis (see page 16). If it's found to be high or low or is very changeable you should be offered advice and information about your diet.

If your BMI is low, you should be given dietary supplements and encouraged to exercise to help build yourself up.

Doing your normal activities

You should be asked regularly how easy you find it to do your normal day-to-day activities and how breathless you become when you are doing them. You should be offered an assessment to check whether you need some extra help (such as specially adapted equipment, or being taught techniques to make tasks easier). If you are having difficulties with day-to-day activities you should also be asked if you would like to be referred to social services for them to check what help might be available for you.

Special considerations

Air travel

If you're having long-term oxygen treatment and want to fly somewhere, your doctor or nurse should check whether it would be OK against a set of recommendations produced by a professional body called the British Thoracic Society. The same applies for people who have an FEV₁ less than 50% of that predicted.

If your COPD is caused by a bulla in your chest, your doctor or nurse should discuss the possible risk of pneumothorax during a flight. A pneumothorax is where air escapes into the chest from the lung and presses against it, making it more difficult to breathe.

Scuba diving

Scuba diving isn't recommended for people with COPD.

Having an operation

If you need an operation for a problem not related to your COPD, the decision about whether or not you are fit enough to have it should be taken by your consultant anaesthetist and consultant surgeon. It will depend on a number of things, including the severity of your COPD, your general health and how much you

need the operation. If there's time before an operation, your doctor should make sure that your COPD is being treated as well as possible, including having pulmonary rehabilitation (see page 35).

Treatment for exacerbations

Some people with COPD find that they have attacks when their symptoms become particularly bad. These are called 'exacerbations'. The person may become much more breathless, may start to have a cough, or may notice that more sputum is being produced or that the sputum that's coughed up is a different colour than normal. Your regular treatment may need to be adjusted and you may need additional treatment to help you recover from an exacerbation.

Helping yourself

If you and your doctor or nurse think that you are likely to have an exacerbation, you should be given advice about what to do at the first sign that one might be on its way. If you have a carer, he or she should also be given this advice. It should include advice about:

- starting steroid tablets if you think you are developing an exacerbation, that is if you

notice you are coughing more or becoming more breathless and it's interfering with your normal activities (as long as it's OK for you to take steroid tablets, you should be given some to keep at home)

- starting antibiotics if you notice that your sputum has turned green or brown (again, you should be given some of these to keep at home)
- making changes to your bronchodilator medicine to help with your symptoms.

You should also be advised to contact your doctor or nurse if things don't improve.

Deciding whether you need hospital treatment

Most people can be treated at home if they have an exacerbation, but some will need to go into hospital. The decision about whether a person should go into hospital depends on factors such as the severity of the exacerbation and the person's COPD, the person's general health, and how well he or she would be able to cope at home.

Sometimes someone who would otherwise have to go into hospital can be treated at home after assessment at a hospital or after a brief stay in hospital. The schemes that support this are called

'hospital-at-home' or 'assisted-discharge' schemes, and they involve health professionals who have experience in helping people with COPD. Doctors need to look at a person's individual circumstances and preference, and the local arrangements and resources when making a decision.

Tests

If you're staying at home

If you are being treated at home, but your exacerbation seems quite bad, your doctor or nurse may check the level of oxygen in your blood using a pulse oximeter (see page 17). It's not usually necessary to send away a sample of sputum for tests.

If you go into hospital

If you go into hospital because of an exacerbation, you should:

- have a chest X-ray
- have your oxygen and other blood gases checked
- have an ECG (heart trace) to check your heart (to see whether there are any other reasons for your symptoms)
- have a blood test

- have a sputum sample tested if your sputum has turned green or brown.

If you have oxygen, the concentration that you are given should be put in your notes.

If you have been taking theophylline, the amount of it in your body should be checked when you go into hospital.

Treatment

An increase in breathlessness is common during an exacerbation. Usually, the treatment is to increase the dose or frequency of short-acting bronchodilators that a person is taking. These might be given using a nebuliser if, for example, a high dose is needed or you are likely to find it difficult to use an inhaler (see page 30). If you use a nebuliser in hospital, you should be changed back to an inhaler as soon as things are improving because this may mean you can leave hospital more quickly.

If you need to have oxygen at the same time, it might have to be given through your nose.

Steroids

As long as there are no strong reasons why you shouldn't have them, you should be given

steroid tablets when you go into hospital with an exacerbation of your COPD.

If you haven't gone into hospital but your breathlessness has increased so that it's interfering with your normal activities, you should tell your doctor as soon as possible. He or she should think about giving you steroid tablets (as long as there are no strong reasons why you shouldn't have them).

The course of steroids should last for up to 2 weeks. You should be told about the effects of taking repeated courses of steroids, and you should also be advised why, when and how to stop taking them.

If you need courses of steroid tablets often because you get a lot of exacerbations, your doctor should consider giving you preventive treatment for osteoporosis. Osteoporosis can be a side effect of using steroids for a long time.

Antibiotics

If your sputum has turned green or brown during this exacerbation, you should be given antibiotics (the colour change is a sign of infection). Otherwise, you shouldn't have antibiotics unless you have a chest X-ray and it shows signs of infection, or you show signs of having pneumonia.

Theophylline

If you are taking a bronchodilator from a nebuliser and it does not improve your breathlessness, your doctor might try you on theophylline delivered directly into a vein. If this happens, your theophylline level should be checked within 24 hours of starting on it, and afterwards at intervals that your healthcare team thinks are appropriate.

Doxapram

Doxapram is a medicine that can help to stimulate breathing. It should be used only when non-invasive ventilation is not available or is not suitable for an individual. Doxapram is often used when the person isn't breathing well enough to get enough oxygen into the blood and clear carbon dioxide from it (this is called 'respiratory failure').

Oxygen

All the health professionals who treat people with exacerbations of COPD should have a pulse oximeter available to them. This piece of equipment senses how much oxygen there is in a person's blood.

During an exacerbation, the amount of oxygen in the blood (more accurately, the degree to

which the blood in the arteries is saturated with oxygen) should be kept above 90% using extra oxygen if necessary. If your oxygen saturation is not known, you should be given extra oxygen if you are breathless during an exacerbation.

Before the ambulance arrives and during the journey to hospital you should not be given too much oxygen and the amount of oxygen you are given should be adjusted up or down to keep your oxygen saturation between 90% and 93%.

Once you are in a position to have your blood gases measured using a blood test (for example, when you reach hospital), this should be done and the mix of gases that you've been breathing should be noted. This test should be repeated regularly to see the effects of treatment.

Non-invasive ventilation

NIV should be used for people who, during an exacerbation, cannot get enough oxygen into their blood and have too much carbon dioxide in it despite having the right type of medicines. The medical term for what happens is hypercapnic ventilatory failure.

If you have NIV, it should be given to you in a place specially set up for NIV and by staff who are trained and experienced in using it. There should be a clear plan about what to do if you get worse.

Intensive care and ventilation

If you become very poorly during an exacerbation, you should be treated in an intensive care unit. It may also be necessary to connect you to a ventilator to let it do the breathing for you. The decision about when to do this depends on a number of things, such as your FEV₁, your BMI, whether you need oxygen when you're stable and whether you have any other medical conditions.

Clearing sputum

If you have a problem clearing sputum, a physiotherapist may be able to help you using a mask that helps to clear the sputum away (this is called a positive expiratory pressure mask).

Recovery

Your recovery from an exacerbation should be monitored by medical staff who should check your symptoms and watch your breathing regularly. If you had respiratory failure (when your lungs weren't working well enough to get enough oxygen into your blood), then depending on what happened, your blood gases should either be monitored using a pulse oximeter (see page 17) or by testing samples of blood in a machine.

Before you go home from hospital

Before you go home, your lungs should be checked using a spirometer, and you should be back on the best dose of bronchodilator for you.

If you had respiratory failure during the exacerbation, then your blood gas results or pulse oximetry should be satisfactory before you go home.

Before you go home, you and your family should be clear about what you need to do and should know any special instructions for taking the medicines you are on. Before you leave hospital, arrangements should be made about check-ups and any extra help you might need at home. If you, your family or your doctor have any concerns that you might not be able to manage once you leave hospital, you might have a formal assessment of what help you need.

Palliative care

If a person's COPD is at such an advanced stage that other types of treatment can't give any further benefit, the person may need a type of medicine called an opiate to help relieve the breathlessness and make him or her more comfortable. Antidepressants, tranquillisers and

oxygen may also be used if they might help with this.

At this stage, a person and their family or carers should be able to see health professionals and others who specialise in relieving discomfort (they are known as the 'palliative care team'). They should have access to the full range of services offered by these teams, such as hospice services.

Where you can find more information

If you need further information about any aspects of COPD or the care that you are receiving, please ask your doctor, nurse or other health professional. You can discuss the information in this booklet with them if you wish, especially if you aren't sure about anything. They will be able to explain things to you. NHS Direct may also be helpful – phone 0845 46 47 or visit the NHS Direct website at www.nhsdirect.nhs.uk.

For further information about the National Institute for Clinical Excellence (NICE), the Clinical Guidelines Programme or other versions of this guideline (including the sources of evidence used to inform the recommendations

for care), you can visit the NICE website at www.nice.org.uk. At the NICE website you can also find information for the public about other guidance in the following areas:

- the use of nicotine replacement therapy (NRT) and bupropion for smoking cessation, reference numbers N0084 (English) and N0085 (English and Welsh) (based on NICE Technology Appraisal Guidance No. 39)
- the use of zanamivir, oseltamivir and amantadine for the treatment of influenza, N0200 (English) and N0201 (English and Welsh) (based on NICE Technology Appraisal Guidance No. 58).

These can also be ordered from the NHS Response Line (phone 0870 1555 455).



*National Institute for
Clinical Excellence*

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MidCity Place
71 High Holborn
London WC1V 6NA

www.nice.org.uk