

My lung surgery



Introduction

If you or someone you care for has lung cancer and surgery is a possible treatment, then it's almost certain that you will have a lot of questions.

We have produced this booklet in partnership with lung cancer experts and people affected by lung cancer to help you make positive, informed choices about your care and treatment. Use this booklet along with the information provided by your healthcare team.

Remember that most healthcare professionals are only too happy to answer your questions and help with things that may be unclear or causing you concern.

We hope that this booklet answers your questions about lung surgery. If you would still like to talk to someone about this, call our free and confidential **Ask the nurse** service on: **0800 358 7200** or email: lungcancerhelp@roycastle.org

You can also contact one of the many support organisations available in our *Living with lung cancer* booklet. Order a copy by calling us on **0333 323 7200 (option 2)**, or look on our website: www.roycastle.org/usefulcontacts

“Our patients who have gone through surgery said knowing what to expect helped them cope with the journey.”

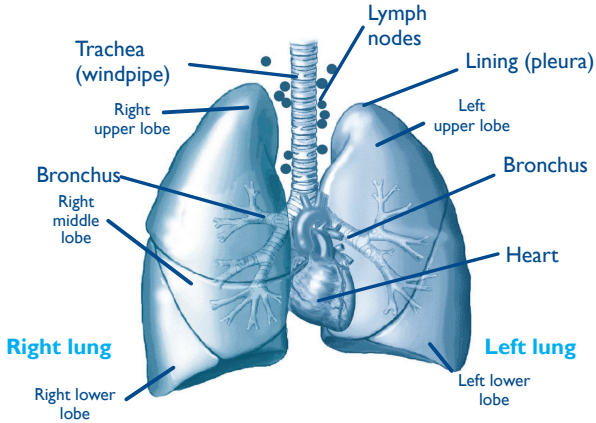
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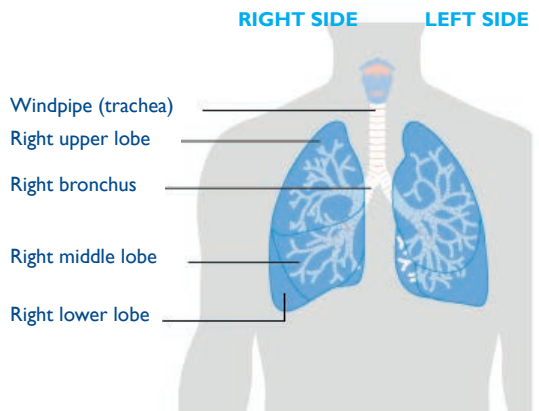
About your lungs

You have one lung in each side of your chest. The right lung has three lobes and the left has two to allow space for the heart (see diagram below), with each lobe divided further into segments. There are 19 segments in total, 10 in the right lung and 9 in the left.



The inside of your lungs are like a large sponge. Every part of your body needs oxygen to function. When you breathe in, fresh air brings new oxygen into your body and when you breathe out, “used” breath is removed.

Each time you breathe in, the air flows into your nose or mouth down through your throat and into your windpipe (trachea). This then divides into the right and left main (bronchi), one going into each lung. These air passages divide repeatedly until they end in tiny air sacs called alveoli. Within these air sacs, oxygen and carbon dioxide are exchanged.



Understanding lung surgery

What does your lung surgery involve?

Surgery for lung cancer involves removing part of the lung with tumour in it and surrounding lymph nodes. This tissue is then sent to the laboratory for testing.

The results help confirm the stage of the cancer and help your doctors decide if you would benefit from further treatment such as chemotherapy or radiotherapy (see our *Chemotherapy for lung cancer* and *Radiotherapy for lung cancer* booklets).

How will it be decided if I am suitable for surgery?

Surgery is usually suitable for people with early stage disease, who are fit enough for an operation.

A team of health professionals (including a thoracic surgeon) will work together on your care, directly or indirectly. This is the multi-disciplinary team or MDT. This team will review your CT scans, PET scans and lung function tests to decide on the best treatment (see pages 7 to 12 for more information on these tests).

They will also decide if further tests are needed to accurately diagnose your tumour. You will then see the appropriate specialist to treat your lung tumour, such as a thoracic surgeon or oncologist. An oncologist is a cancer doctor who specialises in chemotherapy, immunotherapy and radiotherapy treatments.

Some people with early stage lung cancer may not be able to have surgery if their tumour is too close to their heart or other major structures in their chest such as large blood vessels.

“Being told I was going to have surgery, was the ‘best’ possible news for me personally, as I felt there was going to be a ‘positive outcome’.”

Pat

Your surgical team

Who will carry out my operation?

Lung operations are done by thoracic or cardiothoracic surgeons. Your surgeon will have regular experience of lung cancer surgery, and should work as part of the multi-disciplinary team or MDT. Your surgery will be carried out in your nearest thoracic (chest) surgery department or unit.

What will affect whether I am able to have surgery?

Deciding whether surgery is right for you depends on three factors:

- the type of tumour you have
- how far it has spread (known as *stage*)
- how fit you are

The tests you will have before surgery aim to answer these three questions.

Surgery is usually offered for lung cancer that hasn't spread beyond the lung, lymph nodes or local structures in the chest.



Occasionally, if your cancer is more advanced (where the cancer has spread to outside the chest) you may be offered surgery together with other treatments. Some people may be offered surgery after a good response to a combination of chemotherapy and radiotherapy.



For more information on the MDT and staging for lung cancer, see our *Managing your lung cancer diagnosis* booklet. See page 2 for details on how to get a copy.

Imaging tests

Imaging tests use X-rays, magnetic fields, ultrasound, or radioactive substances to create pictures of the inside of your body. Imaging tests might be done for a number of reasons both before and after a diagnosis of lung cancer.

CT (computerised tomography) scan: This scan is carried out by a radiographer and takes a series of X-rays to build up a 3D image of the inside of your body. This helps to find the exact area and size of a cancer and whether it's spread to other organs in your body, your lymph nodes (a key part of your immune system) or your blood vessels.

The scan is painless and should take around 10–30 minutes. You may be given a drink or an injection of a dye to highlight areas in your body more clearly. Once the scan is over you'll probably be allowed to go home.



Source: Provided by the North West Lung Centre.

MRI (magnetic resonance imaging) scan: This test uses magnetism rather than X-rays to create detailed images of areas of your body. Sometimes people are injected with a dye (contrast medium) to help make the images show up more clearly.

The procedure is painless and carried out by a radiographer. Because you have to lie in a long tube for about 30 minutes, you may find it a little uncomfortable.

Having something metallic in your body doesn't necessarily mean you can't have an MRI scan, but make sure you tell the radiographer if you have a metal plate, an artificial joint or a cochlear implant, for example. If you have a pacemaker, it usually means you will not be able to have a scan.

PET (positron emission tomography) scan: A scan that gives pictures showing where there is active cancer throughout the body. A PET scan should be used before lung cancer surgery and radical radiotherapy to make sure that curative treatment is possible (a PET scan is more accurate than a CT scan for this). A PET scan can also be used to investigate a suspected cancer if diagnosis has not been possible using other tests.



Source: Photo kindly supplied by The Christie.

You will be given an injection containing a radioactive substance to highlight any active cancer cells. The scan is painless and quiet and you will not be fully encased during the examination. Modern PET scans are usually combined with a CT scan and performed at the same time – a PET-CT scan.

CT guided biopsy: A radiology doctor will decide the best place to take a sample by using the CT scanner. You will be given an injection of local anaesthetic by your doctor to numb part of your chest. The doctor will then pass a needle through the numbed area and into the tumour to take a tissue sample.

Occasionally, air can find its way into the space between the lung and the chest wall. This is called a pneumothorax (new-mo-thor-ax). It may be treated by putting a drain (tube) into the chest to let the air escape.

Tests with local or general anaesthetic

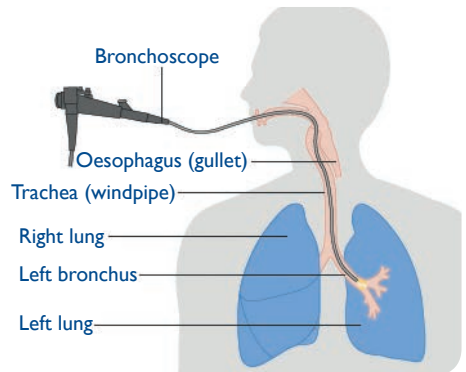
One or more of the tests below may be carried out under local or general anaesthetic to assess your cancer to find out if surgery is an option. Diagnosis is usually based on a tissue sample (lung biopsy). The tests usually take place during a CT scan and there are several biopsy procedures:

Bronchoscopy: This normally involves a doctor or specially trained nurse using a thin, flexible tube (*bronchoscope*) to examine inside the lung airways and take sample cells. The procedure isn't painful, but it can be uncomfortable, as the tube will be inserted down your nose or throat.

You will usually have this procedure as an outpatient, or day case. You may be given a mild sedative to help you relax. A local anaesthetic will be sprayed in your throat to numb it.

If you need a *rigid bronchoscopy*, where the tube is not flexible, you would have a general anaesthetic.

A *navigational bronchoscopy*, which uses CT images to guide the bronchoscope, can help to get a biopsy in some more difficult-to-reach areas.



Source: Cancer Research UK.

Endobronchial ultrasound (EBUS): This uses a bronchoscope with a small ultrasound probe that creates images of the area around your heart and lungs, and can show if any nearby lymph nodes are bigger than normal. A needle may be passed down the bronchoscope to take a sample of tissue.

Your doctor will carry out the procedure under local anaesthetic and you will also be offered a mild sedative to help you relax. It will usually take less than an hour and you should be able to go home the same day.

Fine needle aspiration: This type of biopsy involves a doctor inserting a fine needle into an area of abnormal swelling or lumps located under the skin such as cysts (fluid-filled lumps), nodules or masses (solid lumps) and enlarged lymph nodes. A numbing medication may be injected under your skin to reduce discomfort. The procedure should take less than 10 minutes.

Mediastinoscopy: This is a surgical procedure that's used to examine the lymph nodes under the breastbone (those closest to the lungs). A doctor will make a small cut at the base of your neck, just above the breastbone, and insert a thin, flexible tube with a camera on the end of it. This procedure is done under general anaesthetic. Though often done as a day case, some people may need a short stay in hospital.

Getting the result

Your doctor may ask you to go to hospital when your test results come through. But this is bound to take a little time, even if only a few days.



This is a very anxious time for most people. You can contact your thoracic nurse specialist if you have any concerns or questions, or call our free and confidential **Ask the nurse service on 0800 358 7200.**

Pre-operative lung surgery tests

Before your operation, your surgeon and their team of nurses and other healthcare specialists will make a plan regarding your tests and treatment. Some of these tests will not involve anaesthetic and some tests will be performed under anaesthetic. It is usual to be admitted on the day of your surgery.

It may be necessary to admit you earlier for some final tests and to help prepare you for surgery. Take all your medicines, tablets or inhalers with you into hospital, with their original containers and instructions.

Before your operation, other checks will be arranged to assess your general state of health and fitness for surgery.

Tests without anaesthetic

Blood test: This can help in finding out about your general health. It can provide information on many aspects of health including:

- how well your kidneys are working
- checking your liver function (creatinine/LFTs)
- if your body's biochemistry is balanced (for example, does it have enough calcium and protein)
- ongoing/vulnerability to infection (white cell count)
- anaemia/lack of circulating oxygen (haemoglobin)
- susceptibility to bruising/bleeding (platelets)

Echo (echocardiogram): This is an ultrasound scan of your heart. Jelly and a probe are placed on the skin, in the same way pregnant women have scans. The test is not painful but the operator may need to press on the skin. It may be needed if you have had heart problems or breathing problems.

Exercise tests: Exercise tests measure your overall fitness. They are sometimes needed if other tests show you may have a problem with your heart or your breathing. These tests may be done in various ways, such as measuring how far you can walk or how long you can exercise on a bike whilst monitoring your pulse and fitness levels.

Perfusion or ventilation scan: This tests the function of different parts of the lung. A perfusion scan measures blood flow, while a ventilation scan measures airflow. A small dose of radioactive fluid is needed for the scan.

Lung function tests: As a surgical patient, you may be asked by your doctor to do some breathing tests. These will help to determine how well your lungs are working. Follow the directions of your technician and blow into machines via a mouthpiece as long and hard as you can.

This will record how much air you can breathe in and out and how much air (oxygen) your lungs absorb. The results will be accurate and help to predict how your body would cope if part of a lung was removed.



Source: Provided by the North West Lung Centre.

“ I felt prepared for the tests. The respiratory consultant kept me informed about what the tests would entail. There were leaflets that provided information about the tests. ”

Tracey

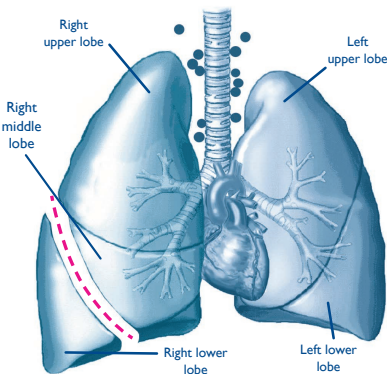
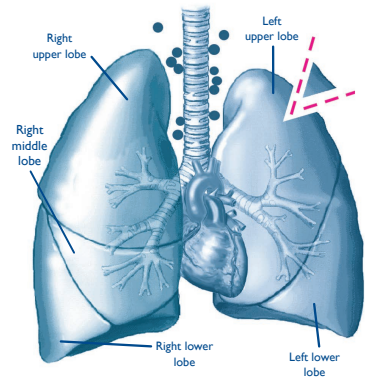
Types of lung surgery

What are the different types of operation that can be performed on the lung?

During surgery, a part or all of a lung may need to be removed, particularly if it contains a tumour. The amount of lung that is removed will depend on location, size of your tumour, biopsy results, spread of your cancer and sometimes on your levels of fitness before surgery.

After your operation, you will be encouraged to exercise regularly in order to make the remaining lung tissue recover and work harder for you.

Segmentectomy/wedge resection: Each lobe of the lung is made up of several segments. If your fitness will not allow more extensive surgery, or the cancer is small, your surgeon may be able to remove just a segment, or a small piece of lung tissue surrounding the cancer, rather than the whole lobe.



Lobectomy: This is the most common operation for lung cancer. It is chosen if your cancer is contained in a single lobe, and you are reasonably fit. There are two lobes on the left and three on the right. It involves the removal of a lobe of the lung. The remaining lung will expand to fill the space left by the tissue that has been removed.

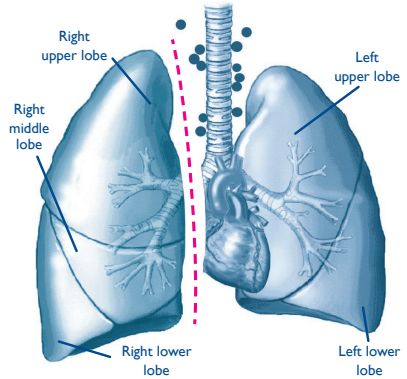
Bi-lobectomy: This is the removal of two lobes of the lung on the right side.

Sleeve lobectomy: This is removing part of the main airway or lung artery, with the lobe being removed. The two ends are sewn together. This procedure can avoid removing the whole lung for some patients.

Pneumonectomy: This means removing a whole lung and is chosen when the tumour extends beyond just one lobe.

You may experience breathlessness after surgery. This is a little more common after this procedure.

Along with removing the tumour using one of these techniques, the surgeon will remove lymph glands or nodes from your chest. This helps decide if further treatment, such as chemotherapy, is needed after surgery.



Lung surgery does carry risk. Generally speaking, this risk, including the risk of dying, increases with the size and scope of the operation. For example, segment removal carries less risk than a lobectomy which in turn carries less risk than having a whole lung removed.

There are also different risks relating to the operations methods described below. Your surgeon can tell you more about this.

Methods for lung surgery

Your surgeon will discuss with you which operation is most suitable to remove your tumour, and let you recover as quickly as possible.

Thoracotomy: An incision is made around the side of your body, below your shoulder blade and between your ribs. The ribs are spread to get access to the lungs.

VATS – Video Assisted Thoracoscopic Surgery (Keyhole Surgery): Your surgeon uses a video camera and one to three small cuts (between 1 and 5cm) to perform the operation. Incisions are generally made under the arm and/or just below the shoulder blade. The ribs are not spread.

RATS – Robotic Assisted Thoracoscopic Surgery: An alternative, minimally invasive approach to lung surgery using three-dimensional, high-definition (3DHD) video, and a fully articulated robotic arm that can allow surgeons to perform complex operations in tight spaces through small openings in the chest wall. This is only offered in a few specialist surgical units.

Median sternotomy: This is a cut made vertically down the chest over the breastbone, which allows the surgeon to see both the left and right side of the chest. It is occasionally used for some lung operations.

Your surgeon will discuss with you which operation is most suitable to remove your tumour, and let you recover as quickly as possible.

“Before my surgery, the surgeon explained that when I woke up, what would be in me (drains, pain relief, etc) and what sort of machines I’d be wired up to.

This helped reduce fear and reassure me that things were normal.

Janette

Deciding if lung surgery is right for you

At your pre-assessment appointment with your surgeon, you will discuss removing your lung tumour and the possible benefits and risks.

The main benefit of the operation is your tumour will be taken out. If you have an early stage lung cancer, then surgery offers you the best chance of a cure. After their surgical recovery period, some people experience less breathlessness and improved lung function, as well as living longer.

Lung surgery does have risks. Your surgeon will give you as much information as they can to help you make your decision, but everyone is different and it isn't possible to know exactly how you will be affected.

Looking at bare statistics for lung surgery can be off-putting. However, the numbers represent averaged outcomes and may reflect significant risk factors that don't apply to you. The relative probabilities of certain outcomes can be influenced by having other serious health conditions, your age and your general fitness. Many people who have lung surgery have their tumour successfully taken out and are healthier for many years.

One big factor that affects the outcome is the type of operation you are having, including whether the surgery will be open or keyhole (see pages 13 to 15), and how much of the lung will be removed. Where your lung cancer is (within your chest area) also plays a part, as does whether you have other medical problems that may impact your surgery or recovery and your fitness for surgery.

It is important also to consider the outcomes and possible significant side effects of other treatments such as chemotherapy and radiotherapy so you are making a balanced decision. You should also consider the risks associated with choosing not to have surgery or any other treatment.

See pages 44 and 45 for side effects and other complications of surgery.

Preparing for your operation

What will happen before my operation?

If you have been to a pre-surgical assessment clinic, it is more than likely you will be admitted on the day of your surgery. Sometimes you may need to be admitted sooner to make sure you are ready for surgery.

Can I do anything to help prepare me for the surgery?

The weeks before surgery are a good opportunity to prepare yourself physically and emotionally. You can increase your fitness significantly in just a few weeks.

Activity and fitness: Exercise is good for your body and for your wellbeing. Walking for 20 to 30 minutes every other day is enough, if you are able to do so. Everyone's different, but try to build up your activity over time.

You should do enough that you feel mildly short of breath. Being active before surgery can improve your fitness for the operation and support your recovery. The exercise you choose will depend on your level of fitness, but it is important that you introduce exercise into your daily routine.

Some people swim or cycle, potter about in the garden, or do slower sports like bowls. You can also make small changes such as taking the stairs instead of the lift.

Your hospital may offer exercise and education classes and other support as part of prehabilitation programmes.

On the next page are three simple exercises you may want to try at home. You don't need to do them every day, but try to do something as often as you feel able, perhaps on just four or five days in the week.

Start by repeating each exercise five times, pausing if you feel too tired. Build up how much you can do over time.



Marching on the spot. This is a good lower limb exercise to improve lower leg strength and overall fitness. It can be done in a variety of ways.



Raising a ball above your head. This is a good exercise to improve your shoulder mobility and improve your breathing.



Walking upstairs or doing step ups.

If you have any questions or concerns about the level of exercise that is right for you, speak to your surgical team or GP before you start.

Stopping smoking before surgery

If you smoke and are waiting for an operation, then it's very important that you stop smoking as soon as possible. This will improve your body's ability to heal and how well you recover from the anaesthetic.

Stopping smoking will also reduce your risk of complications after surgery. Ask your GP, cancer doctor or lung cancer nurse specialist for advice on giving up smoking.

Should I change my diet before my operation?

Before your operation, it is important to eat a balanced diet as this will help your body recover after surgery. If you are underweight and/or losing weight, recovery can be more difficult and it can take longer for you to feel better.

Try to make sure that you are eating regularly, including snacks and nutritious drinks, such as milkshakes or fruit smoothies, to keep your weight stable. Drinks and soups can also be easier to eat if you are feeling breathless.

If you need to keep your calories up, the recipes on the next page may help.

*Good nutritional care and adequate hydration can improve health and wellbeing.
Eat a varied, balanced diet.*

Mhairi Donald

Oncology specialist group secretary Sussex Cancer Centre

For further information to help you improve your nutrition before surgery, ask your doctor or nurse for a referral to a dietitian.



If you are concerned talk to your healthcare professional or ask to be referred to a dietitian who will be able to give you further advice on fortifying foods, and can recommend a prescription for oral nutritional supplements if you need them.

Here are a couple of simple, everyday ideas to include in your diet:



Honey porridge - Calories: 392 Protein: 21.5g

Ingredients:

- 125ml of small volume, high energy, high protein oral nutritional supplement (vanilla or banana flavour)
- 30g porridge oats
- 1tbsp honey
- 1 banana (optional)

Mix porridge oats with the supplement.

Cook for 90 seconds in microwave.

Add the honey.

Microwave for a further 30 seconds.



Fruit smoothie - Calories: 450 Protein: 21.1g

Ingredients:

- 125ml of small volume, high energy, high protein oral nutritional supplement (vanilla or banana flavour)
- 100g frozen berries
- 1 scoop of vanilla ice cream
- Crushed ice

Blend all the ingredients together and pour into a glass to serve.

Alcohol units

Limit the amount of alcohol you drink. The current UK guidelines recommend men and women consume no more than 14 units per week.

For information on calculating units, see NHS Choices Alcohol units:
www.nhs.uk/Livewell/alcohol/Pages/alcohol-units.aspx

When will I have to go into hospital?

Before you go into hospital, you will likely have an appointment at a pre-surgical assessment clinic. At this appointment you will hear about the details of your surgery and care. You will be asked about your general health, previous operations, allergies and medications. It is also a good opportunity for you to ask any questions about your surgery.

You may also have a medical examination with your height, weight, blood pressure and other details recorded. Blood tests, swabs and other tests needed before surgery may be done. You may also meet other members of your medical team such as the anaesthetist or physiotherapist.

You will also be asked to read and sign the consent form for your operation.

Once everything has been checked out, your doctors will let you know when your operation is planned and how long you may be expected to stay in hospital. You will be given advice about not eating or drinking for a certain length of time before your surgery. It is important to follow these instructions.

Some people are invited to take part in research but this is entirely your choice. Research doesn't always involve treatments and procedures. It may be a questionnaire about your experience or look at how doing additional physical activity, such as walking, before or after surgery affects your recovery.

Taking part may help others in the future and many people who have taken part in research feel good about it. The treatments you are offered now have been made possible by people taking part in research in the past.

Preparing your home

Before you go into hospital, it is a good idea to think ahead to when you are able to go back home. By being organised ahead of time, it will help reduce stress and let you concentrate on getting better.

This checklist will help you tick off the things you may need:

- ❑ Stock up on food that will not go off, like tea, coffee, sugar and tinned, dried or frozen food
- ❑ Cook extra portions and freeze them.
- ❑ If you live alone, you may like to have a friend or relative stay with you, or stay with them, when you first leave hospital.
- ❑ Arrange for a relative or friend to call during the day to check if you need anything.
- ❑ Make sure you have a good supply of your regular medications.
- ❑ If you have young children, arrange help to care for them for at least the first week after you leave the hospital.
- ❑ Arrange for a friend or relative to look after for your pets, like walking the dog or feeding the cat.
- ❑ Make sure you have clean comfortable clothes and bedding.

What will I need to take to hospital?

You will need to check with your own hospital but as a general rule pack a bag with the following:

- All tablets that you are taking, in the correct container.
- At least two sets of nightwear, ideally front-fastening pyjamas/loose fitting tops.
- Dressing gown and well-fitting slippers.
- Toiletries – such as soap, toothbrush, toothpaste, tissues, comb.
- Something to occupy your time – like magazines, books and music.
- A small amount of loose change.

Remember to take any of these if you need them:

- Walking aids – frames/sticks/crutches, false limbs, these could be labelled with your name, address and hospital number.
- Hearing aids/glasses labelled with your name, address and hospital number.

It is not advisable to take expensive items or large amounts of money. Your property is your responsibility unless you decide to hand it to the hospital for safe keeping.

**TOP
TIP**

When you are in hospital

What happens when I arrive at hospital for my surgery?

Each hospital will have its own procedure for what happens when someone is going in for surgery.

When you arrive, a member of the nursing staff will usually meet you and show you to your bed or waiting area.



Once you have settled in, the nurse will come and ask you a range of questions. Your temperature, pulse and blood pressure will be taken.

You will have the chance to ask questions and talk about your planned care.

If you have a Living Will or Advance Directive, take a copy with you and make sure it's added to your notes.

You may also meet other members of the hospital team who will be responsible for your care such as a doctor from the thoracic surgical team, member of the nursing team, the anaesthetist and the physiotherapist.

Your operation will be explained to you. If you haven't already done so, you will be asked to sign a consent form.

Please feel free to ask further questions at this point. Remember to mention any previous adverse reactions to medications, so that alternatives can be found.

The above will vary slightly from hospital to hospital.

What happens to me before my operation?

You may not be allowed to eat or drink for several hours before your operation. This is to stop you from being sick during the anaesthetic.

You will be given special compression stockings to wear. These help to improve your circulation and prevent blood clots developing in your legs (deep vein thrombosis or DVT).

A nurse will be able to help you with the stockings (see page 40 for more information).

A member of the surgical team will mark the site of the surgery on your skin.

What will happen to me in theatre?

When it is your turn to go to theatre you will be taken by a member of staff.

The theatre staff will check your details and then take you into the anaesthetic room. Here you will have a small needle inserted into the back of your hand. This will be used to give you the medication that will help you to fall asleep.



Source: Memorial Sloan Kettering Cancer Centre

The theatre staff may start a 'drip' to prevent you from becoming dehydrated. A catheter may be passed into your bladder to enable you to pass water easily and to monitor your urine output. A fine tube (epidural or paravertebral) may be passed into your back as a way of giving you pain relief after the operation (see page 28).

What happens to me after I leave theatre?

After the operation, you will go to the recovery room. This is where you will wake up from your anaesthetic. You may feel a little confused and unsure where you are. The nurses and doctors will monitor you closely until they feel you are ready to leave the recovery area. They will give you oxygen and check that you have enough pain relief.

As you wake up, you may notice that you have some tubes and wires attached to you. These are in place to help your medical team monitor your condition. Chest drains are usually put in to remove any fluid that may build up in your chest because of the surgery.

You will then go to a ward or to the high dependency unit or intensive care unit.

You will feel drowsy but will be able to wake up.

During the first hour of your return, the nurses will make sure you are comfortable and will set up the monitoring equipment, drips and other equipment.



You will be given extra oxygen to help your breathing.

Your chest drains will remove any blood or air in the chest. This is completely normal. The drains are removed when the drainage is minimal and there is no air leaking from the lung. They may be put on suction to help the lungs expand. You will be encouraged to get up and about.

When will I be able to eat and drink?

When you are fully awake you will be able to have sips of water. Once you can manage sips of water you will be able to have a cup of tea or squash. This will usually be about one to two hours after returning from theatre. You may not feel like eating much until the following day.

Am I allowed visitors?

Once the nurses have set up the monitoring equipment and you are comfortable, you will be allowed to see your visitors. You will need plenty of rest, so a short visit only is recommended at this point. Your family or friends can contact the ward at any time for information.

If there is a change in your condition a member of the nursing staff will contact your next of kin.

Will I be in pain after my operation?

After your operation, you are likely to be uncomfortable and it is not possible to take all the discomfort away. However, it should be controlled. Let the nurse or doctor know if you have any pain. They will regularly ask you about your pain relief.

You must have enough pain relief to cough and breathe comfortably. A combination of regional techniques like epidural or paravertebral catheters, intravenous and tablet painkillers is common.

If you have an **epidural** it will normally be in for a few days after your operation. The epidural can supply local anaesthetic and sometimes painkillers like morphine into the area near the spinal cord, creating numbness in the chest wall. If you are able, you can move around the bed area and sit in a chair.

A **paravertebral** catheter may be used instead of an epidural for pain relief. This is a small tube placed into the space between the back bones (vertebrae) near the thoracic spinal nerves.

Patient controlled analgesia (PCA) is often used in the initial period after surgery. It uses a pump that allows you take control of your own pain relief. You can give yourself a small dose of morphine (commonly used to treat cancer pain), by pressing the button on the handset. It is injected through a needle in the back of your hand.

You cannot overdose with a PCA no matter how often you press the button.

It is a good idea to use the PCA before doing anything physical, like moving around or doing your physiotherapy exercises. If you still have pain despite using the PCA regularly then other methods of pain relief can be used.



Your pain relief is likely to cause you to feel constipated. You should take laxatives as prescribed. They, like pain tablets, work best when they are taken regularly. Drink plenty of water and eat fresh fruit and vegetables every day.

**TOP
TIP**

Will I feel sick?

Pain relief and anaesthetic can make you feel sick. This does not happen to everyone, but if it happens to you the nurse can give you anti-sickness medicine to help.





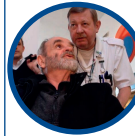


After chest surgery, many women find it very uncomfortable to wear the bras they wore before surgery. This may be because of discomfort around the area of the operation. It may also be of post operative neuropathic pain where nerves have been damaged by the procedure.

Several manufacturers, including some supermarkets, offer a range of non-wired, post-surgery bras.

Milestones to your recovery after surgery

This table outlines the key milestones in your recovery. It covers a typical stay in hospital. The length of time that you spend in hospital depends on several factors including your fitness and the operation you have had.

Milestones					Checklist
AFTER OPERATION	DAY 1	DAY 2	DAY 3	FROM DAY 4	LAST DAY
Coughing and deep breathing exercises	Help with coughing and deep breathing	Help with coughing and deep breathing	Increase walking	Prepare for going home	Getting up and down on my own <input type="checkbox"/>
Drink once awake	Sit in chair	Wash independently	Dress independently	Collect tablets to take home	Able to eat and drink <input type="checkbox"/>
Eat when ready	Walk with support	Walk independently	Fitness assessment with physiotherapist		Passing urine freely <input type="checkbox"/>
	Wash with assistance	Use of tablet pain relief			Bowels working <input type="checkbox"/>
	Removal of some tubes, drips & drains	Removal of tubes, drips & drains			Discharge summary collected <input type="checkbox"/>
					Tablets to take home <input type="checkbox"/>
					Organised transport home <input type="checkbox"/>
					My lung surgery booklet <input type="checkbox"/>

What will happen on the first day after my operation?

Your team will visit and speak to you about how your operation went. It may be possible to remove your drips and monitoring equipment. A chest X-ray and blood tests may be taken.

You will see a physiotherapist or specialist nurse who will encourage you to cough, deep breathe, move around and exercise your arms and shoulders. This is particularly important on the operation side of your body to prevent stiffness or a frozen shoulder.

You should be able to eat a light breakfast. After this the nurse will help you to have a wash. You will be helped to get up and out of bed on the first morning after your surgery and encouraged to walk.

What will happen on the second day after my operation?

Your team may be able to remove further tubes, drips and drains. Another chest X-ray might be taken. The order in which these things happen will vary from hospital to hospital and from person to person.

How will my wounds heal?

It will take two or three weeks for your wound(s) to heal. While you are in hospital, nurses will check them regularly. After surgery like this, it is quite common for there to be some numbness around any scars and the front of your chest, though this may improve.

Any stitches, clips or staples that are not dissolvable may need to be taken out by your GP, practice nurse or district nurse after you leave hospital. This would include stitches used to close the hole when your chest drain is removed. These stitches would usually be taken out after 5 to 7 days.

Avoid using soap, cream and talcum powder directly on any healing scars as they can cause irritation.

How soon will I be active?

As soon as you are out of bed, you should start to exercise. When sitting in your chair or lying in bed, your lungs are not fully expanded. They need to be exercised to get them working properly again.

Mucous and blood can collect in your airways after a lung operation and the physiotherapist or nurse can show you breathing and supported coughing techniques that can help get rid of this. They may also take you for a short, assisted walk.

If your chest drain is attached to wall suction the distance you can move is restricted. If you have a digital drain it can be picked up when you need to walk. If the drain becomes disconnected or alarms let the staff know immediately.

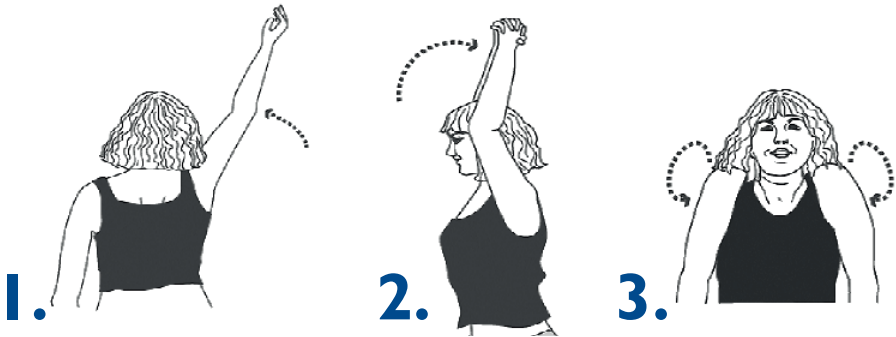
The physiotherapist or nurse may ask you to walk on the spot or try a short session on an exercise bike. You may feel short of breath following exercise. This is normal and shows that you are exercising at the correct level. However, you should not be gasping for breath.

Once you are steady on your feet you can walk around on your own, as long as you feel comfortable. This encourages your lungs to expand and may let you get home faster.

Keeping active after lung surgery will improve your recovery. It will have a positive effect on your heart, muscles and lung capacity.

Shoulder exercises

After your surgery, you may find your shoulder feels stiff. The following exercises will help maintain your shoulder range of movement. Try and do these exercises regularly. Spend a few minutes on these exercises daily.



1. Gradually raise your right arm over your head and slowly lower it, repeat this with your left arm

2. Bring your arms together over your head, swinging them gently, then lower them down again.

3. Pull your shoulders towards your ears, then bring them down slowly forwards. Repeat in reverse.

Will I be able to rest?

It can be difficult to sleep in hospital and you may have a few unsettled nights. You will feel more tired than usual, drowsy and sleepy. Once you are discharged and you become more active your sleep pattern should return to normal.

Sleeping propped up with pillows or back support for the first few days may help. Try to avoid sleeping on your side, especially the side of your operation, to avoid putting pressure on the area.

When will I be able to go home?

This depends on your fitness, the operation you have had and whether you experience any complications. Hospital stay is usually between 2 and 10 days, with an average of 3 to 5 days.

You will be able to go home when your doctors are satisfied that you are eating and drinking, and any problems identified before discharge are addressed.

Any chest drains should be taken out before you go home though it is possible that you could go home with a chest drain if longer-term drainage is needed.

This could happen if you have a small, persistent air leak. This will eventually stop but can take a few weeks. Being at home and able to move about can help.

What will I be given before I go home?

To go home you may be given:

- Medication. In most cases the hospital will supply you with 7-14 days of your necessary tablets. Your nurse or pharmacist will discuss with you how and when to take your tablets. You will need to see your GP for further supplies of medication.
- Thoracic/lung cancer nurse specialist contact details.
- Chest drain information and equipment, if required.
- Spare pair of stockings, if required.
- A copy of your discharge summary (the same summary will be sent to your GP).
- A practice/district nurse letter and date for removal of any clips or stitches.

When will I know that my operation has been successful?

The surgeon will be able to tell you straight away how much of your lung was removed during your operation, however, they will not be able to tell you for sure if all the cancer has been removed.

Pathologists will find this out when they test the tumour, the surrounding lung tissue and lymph nodes. You should find out the results around 7 to 14 days after your operation.

The results from your operation will be discussed again at the MDT meeting to decide if further treatment is necessary (adjuvant treatment). These results along with any recommended treatment will be discussed with you at your next appointment.

Patient transport service

A patient transport service is a non-emergency service that may be available in your area for people who need special support getting to and from healthcare appointment.

Speak to your medical team to find out if you are able to use your local service.

Recovering at home – what to expect

This section gives key information so that you know what is considered normal, when to ask for advice and who to contact if there is a problem once you have been discharged home.

Once home, you should continue to walk regularly, gradually increasing distance and pace. If you do any specific activities, for example, swimming, golf or bowls, ask your physiotherapist for advice on returning to these hobbies.

	Everyday activities	Outside activities	Seek advice
Week 1	<ul style="list-style-type: none"> - Walk around the house - Breathing exercises - Arm exercises - Shower 		<p>Speak to your surgeon before:</p> <p>Heavy lifting Sexual activity Playing sport Flying/holiday</p>
Week 2	<ul style="list-style-type: none"> - Light tasks (washing up, cooking, dusting) - Arm exercises - Shower 	- Walking outside the house	
Weeks 4-6	<ul style="list-style-type: none"> - Ironing - Arm exercises 	<ul style="list-style-type: none"> - Light shopping - Gentle gardening - Cleaning the car 	
Weeks 6-12	<ul style="list-style-type: none"> - Hoovering - Light lifting 	<p>If you are taking medicines, check with your doctor or pharmacist if you are fit to drive. Resume driving (check with your insurance provider)</p>	
After 12 Weeks	- Return to full activity around the house	- Resume normal outside activities	

Patients feel reassured that there is someone who they can contact if they are unsure or need advice about their recovery.

Sandra Dixon
Macmillan Thoracic Surgical Nurse Specialist

How will I feel when I get home?

After your operation, you may feel stressed, anxious or depressed. Being affected emotionally is normal. It may help to talk about how you feel with a member of your family, a friend or your nurse specialist. Sometimes your friends and family need to talk things over as well.

It can help to set yourself realistic goals so that you can see your progress. It can also help you to think more positively.

Learning some relaxation techniques can also help calm your mind and relax your body, reducing stress and anxiety. For example, simply paying attention to breathing more deeply and slowly can really help.

Here are some general relaxation guidelines:

- Choose a place and time where you will not be disturbed for at least 15 minutes.
- Practise your chosen technique at least twice daily (minimum four days a week).
- It may take a few weeks before you notice any benefit – stick with it and do not expect instant success.
- Relaxation should be helpful. If you find it makes you more anxious or increases your pain, speak to your nurse specialist who may be able to suggest other ways to relax.



Please see our *Living with lung cancer* booklet for more information on relaxation, guided imagery and complementary therapies. See page 2 for details on how to get a copy.

How should I look after my wound?

Try not to touch your wound. If you do, there is more chance of infection.

Use a mirror or get a member of your family to check your wound(s) every day. If your wound is clean and dry it should be left without a dressing. This will help it to heal more quickly.

Don't worry about the scabs. They will fall off in their own time. You will usually have at least one stitch where your drains were placed. These should be removed by the practice nurse at your GP surgery. The stitches should be removed around 5 to 7 days after drain removal.

Some swelling around the wound is perfectly normal and should go down after a few weeks.



You should consult your GP for advice if your wound becomes red and inflamed, if you have pain from around the wound, or if fluid is coming from the wound.

I need to go home with a chest drain – how do I look after it?

If you need to go home with a chest drain it will be because a small amount of fluid is still draining into the bag or you have a small air leak caused by the internal wounds taking a while to heal.

You will not be sent home with a drain unless the doctors and nurses are sure that you are able to confidently manage it.

If you live alone and do not have anyone to support you, tell the nurses on the ward.

Your practice nurse or a district nurse will check the drain every few days and change the dressing if necessary. The doctors and nurse specialist may want to see you approximately one week after you have gone home to see whether the drain needs to be removed.

They will want to know how much fluid has drained each day. Record the drainage every night and then empty the bag to prevent spillage.

Here are some simple rules for you to remember:

DO

- Follow and read the instructions you will have been given.
- Empty your bag before you go to bed each night, if that is recommended by your hospital, making sure to record the amount and colour.
- Continue to exercise.
- Get advice if your breathing becomes difficult.
- Contact the ward you were on or your nurse specialist if you are worried.

DON'T

- Disconnect your drain.
- Pull at the drain or the stitches.
- Allow the bag to lay flat as it may spill.
- Block the port for emptying the bag.
- Forget that the bag is connected to you.

Will I be able to look after myself?

You will be able generally to care for yourself, for example, washing and dressing. You will probably be most comfortable in loose fitting clothing. You may have a bath or a shower but do not scrub the wound or use perfumed products.

Although you will be able to cook, don't lift heavy pots and pans. Ready meals are often ideal for the first few days after going home. You may have a reduced appetite and may even lose some weight. Try to eat small meals often that are high in calories.

For the first few nights after you come home from hospital, you may find it more comfortable to sleep propped up in bed with extra pillows.

**TOP
TIP**

Initially I was able to walk around the house to get to the toilet or bed. It was useful to sleep in an upright position. I was taught how to cough using a towel to support the wound.

Brian

How long do I need to wear compression stockings after surgery?

You will have been given special compression stockings to wear. These help to improve your circulation and help prevent blood clots developing in your legs (deep vein thrombosis or DVT).

You should wear the stockings until you have returned to your normal level of activity. Your healthcare team will confirm how long you should wear them. Tell your healthcare team if you have difficulty putting on/taking off the stockings.

Remove the stockings when you go to bed at night. If they are your only pair, launder and dry them so they are ready to use again in the morning.

How do I improve my posture and shoulder movement?

Having a pain in your side can make you tend to lean into it to try to reduce the pain. However, after your operation, it is important to maintain an upright posture as much as you can.

Check your posture in a mirror and keep your shoulders moving. Gentle stretches away from the operated side can help. Taking your pain medication as prescribed will help you be able to do this.

If problems with your shoulders or posture persist, you may need a referral to a physiotherapist. Your GP should be able to help you with this. The shoulder movement exercises on page 33 can also help.

Will I be able to get out and about?

The amount of activity you can do (both in the short term and the long term) will depend on a number of factors, including how much lung you have had removed. You may feel that you lack confidence for a few days after you go home – this is normal. Your confidence will soon return. Try to get a balance between activity and rest. It is important that you try to remain active.

Aim to take a walk once or twice a day. Gradually increase how far and how quickly you walk. You can also go shopping with your family and friends – lean on the trolley if it helps.

Swimming after lung surgery

Speak to your surgeon about how quickly you may be well enough to go swimming. There should be no problems once you are well enough.

If you have had a lung removed, there can be a change in how well you float in water, but it shouldn't stop you from swimming. When you first go swimming, it may be helpful to take someone with you in case you get into difficulty. It's also a good idea to have a flotation aid to hand in case you need it.

Your follow up to lung surgery

How will I be followed up?

After you go home, you will usually be sent a follow-up appointment by the hospital. This will vary from hospital to hospital, but is usually after two to six weeks.

At this appointment, you may have a chest X-ray and your wounds checked to see they are healing. You will be given the results of your operation.

You will need to be followed up long term following your lung cancer operation. This is called lung cancer surveillance and is important as, even though the operation may have been a complete success, there is still unfortunately a chance your lung cancer may recur.

Your follow up will vary depending on your hospital's local policy but will involve clinic appointments with a chest X-ray and CT scans over a period of five years. It may be with your surgeon, specialist nurse, your cancer doctor if you had further treatment such as chemotherapy after the surgery or with respiratory doctors who have looked after you.

Will I need any other type of treatment along with the surgery?

Some people may need further treatment. For some patients further operations may be necessary. This will depend on the stage of the tumour.

If it was a large tumour, or the cancer had spread to lymph nodes, chemotherapy may be offered after surgery. Research shows that chemotherapy may reduce the risk of cancer coming back or spreading.¹

If you are offered this treatment option, talk it through with your clinical team to make sure it is right for you. It is known as adjuvant chemotherapy.

¹Morgensztern D, et al. Adjuvant Chemotherapy for Patients with T2N0M0 NSCLC. Journal of Thoracic Oncology, June 2016, VII, No 10, 1729 – 1735.



Please see our patient decision aids (PDAs) for chemotherapy after surgery. These will help those who have stage 2 or 3 non-small cell lung cancer to decide whether or not to have chemotherapy after surgery.

You can find them on our website at www.roycastle.org

You can also call our free and confidential **Ask the nurse** service on **0800 358 7200** service for more information, or email lungcancerhelp@roycastle.org

If the surgery has not completely removed the cancer you may be offered post-operative radiotherapy or chemotherapy treatment. Your doctor will talk to you about this.

Surgical follow up will differ slightly from region to region in terms of who sees the patient and when. In Leeds the patient is seen once in the surgical clinic with a chest X-ray and then discharged back under the care of the referring physician.

Sandra Dixon
Macmillan Thoracic Surgical Nurse Specialist

Can I stop the lung cancer coming back?

Try and stay as healthy as possible by keeping active, watching your weight and eating a healthy and balanced diet.

If you are a smoker, the most important thing you can do to reduce your chances of having the lung cancer return is to stop smoking.

Will I have any side effects from the surgery?

Surgery for lung cancer is a serious operation and most people have side effects and medical complications of one sort or another, some of which are mentioned below. These depend on the type of lung cancer surgery you have had and vary from person to person.

Some of the more immediate side effects and complications can improve quite quickly. Your surgeon or lung cancer nurse specialist will be able to look at ways to treat and manage any complications or side effects you may have.

Many people find their breathlessness improves in the first 4 to 8 weeks after their operation. Breathlessness after surgery can also depend on how breathless you were before surgery, and how much lung your surgeon has removed.

Medical complications

Common, less serious complications from surgery that may occur in around 1 in 10 people, include irregular heart rate (atrial fibrillation), chest infection (pneumonia), lung collapse (pneumothorax) or prolonged air leak.

You may experience wound infection, excessive bleeding (and need for blood transfusion), blood clot in your leg (deep vein thrombosis or DVT) or in your lung (pulmonary embolism), which may delay your discharge home.

Side effects

Practical advice

Breathlessness

This will depend on the type of surgery you have had and your general fitness level before your surgery. Some shortness of breath is to be expected and is normal. When you are up and about you may feel more breathless. This is normal and shows that you are working hard enough. You may have to adapt your lifestyle to cope with longer term breathlessness.

Side effects	Practical advice
Constipation	You may find your bowel habit is altered. You may become constipated because of the change in eating habits or the painkillers you are taking. Eating three to five pieces of fruit and vegetables a day can help with constipation. Ask your GP or your nurse specialist for advice.
Cough	If your cough was caused by the tumour, it may get better, but cough is often not due to your cancer. You may cough up some mucous or blood after a lung operation. If this continues when you are at home, ask your GP or your nurse specialist for advice.
Numbness	Numbness is common, particularly around the front of the chest, the scar and the drain sites. This may ease with time although some may be permanent. Seek advice from your GP a specific medication will be able to help.
Pain	It is normal to feel occasional shooting or stabbing pains. The nerves and tissues damaged at the time of surgery require time to repair themselves. It is very important to take your pain relief as prescribed. Paracetamol works well if taken regularly (two 500mg tablets four times a day for most adults). Pain due to your surgery should ease with time. If the tablets are not controlling your pain ask your GP or your nurse specialist for advice. When you feel ready to stop your pain tablets, reduce them slowly over a period of time.
Weight loss/ change in appetite	<p>It is common to lose some weight after the operation. This is due to the physical demands of going through a major operation, the natural emotional reaction and worry around the time of the surgery.</p> <p>Many patients following the surgery lose or have a change of appetite. Sometimes food tastes different. Try eating small meals that contain more calories than you normally eat. With time your appetite should return to normal and you will return to your normal weight.</p>

Life after surgery

How long will it take me to recover from my operation?

You are an individual and will recover in your own time so try not to compare your recovery with anyone else's.

At times, you will feel more tired than usual. You may need to adapt some daily activities. Try to remember the three Ps: **Prioritise**, **Plan** ahead and **Pace** yourself.



See our *Living with lung cancer* booklet for more information on managing everyday activities.

Will I be able to return to work?

Talk to your GP or cancer doctor about when you will be fit enough to return to work. It will depend upon how fit you were before the operation, the type of operation you have had, whether the surgery was performed as a keyhole (VATS) or open operation (thoracotomy) and whether you need further treatment, such as chemotherapy.

Returning to work may take anywhere between 1 to 3 months and will depend on how quickly you recover from the operation.

It will also depend on the type of work you do, for example, how physically demanding your job is or whether you have to stand for long periods of time.

Ask your GP or lung cancer nurse specialist for advice and support if you are at all concerned.

**TOP
TIP**

Everybody recovers at different rates from surgery, but I was out of hospital within a week. It was hard at first and I was terrified but I am now back at work part-time and so glad I went ahead with the surgery.

Wendy

Where can I get support after surgery for lung cancer?

Everyone has different needs when it comes to lung cancer support. There are support groups around the UK, which can help you meet other people who have had lung surgery and share experiences. To find your nearest group, visit www.roycastle.org/supportgroups

Surgery for lung cancer is a topic often talked about on our online discussion forum HealthUnlocked. To visit our forum go to www.healthunlocked.com/lungcancer



It is easy to join and you can search for other people's experiences of life after surgery. There is more information on the help and support available in our *Living with lung cancer* booklet. See page 2 for details on how to get a copy.

How long will it be before I can drive?

Don't drive until you have been reviewed by the doctor and are thought to be fit. You must be able to do an emergency stop without pain before you start driving again. The time taken varies from one person to another.

Remember your insurance may be affected if you drive before you are fully fit.

Further guidance can be found from the DVLA:
www.gov.uk/lung-cancer-and-driving

When will I be able to fly?

Lung surgery is a major operation and after such major surgery, you may have to allow up to three months before flying. Speak to your surgeon about your fitness to fly at your first outpatient appointment after the surgery.

It will also depend on the regulations of your airline. Each airline will have its own regulations about flying after surgery, so always check with them. The Civil Aviation Authority (www.caa.co.uk) also give guidelines.

Remember to let your insurance company know about your chest operation.

Please see our *Travelling, going on holiday and lung cancer* booklet for more information on travelling and lung cancer, including travel insurance.

Call our free and confidential **Ask the nurse** service on **0800 358 7200** if you have questions or concerns



Sex and intimacy

Sexual relations can be resumed when your wounds are healed, when you feel comfortable and when you and your partner are ready. This may take several weeks. Remember your partner may be worried about hurting you. Try taking a passive role until you feel more confident.

You may find your confidence or interest in sex has decreased. For some people, close contact, such as kissing and cuddling is important to remind them they are loved. Do what is right for you and your partner when you feel ready.

Questions to ask your thoracic surgeon or nurse

Before choosing surgery as a treatment option, you should understand the expected benefits, side effects and risks. Ask your thoracic surgeon or nurse these questions at your next visit. Learn as much as you can about your treatment, and get an idea of the expected outcome.

1. What type of surgery will I be getting?
2. What is the aim of the surgery?
3. Are there other types of treatment that could be suitable for me instead of surgery?
4. What are the risks and side effects of the surgery I will be having? How do these side effects compare with side effects of other treatments?
5. How long will I have to wait before I get the surgery?
6. Where will I go for the surgery?
7. What can I do to prepare for treatment and reduce the chance of side effects?
8. Will I need to change my lifestyle in any way?
9. If the surgery isn't successful, are there any other treatments I can get?
10. Are there any clinical trials I would benefit from?

Thoracic surgeon

Name:

Phone number:

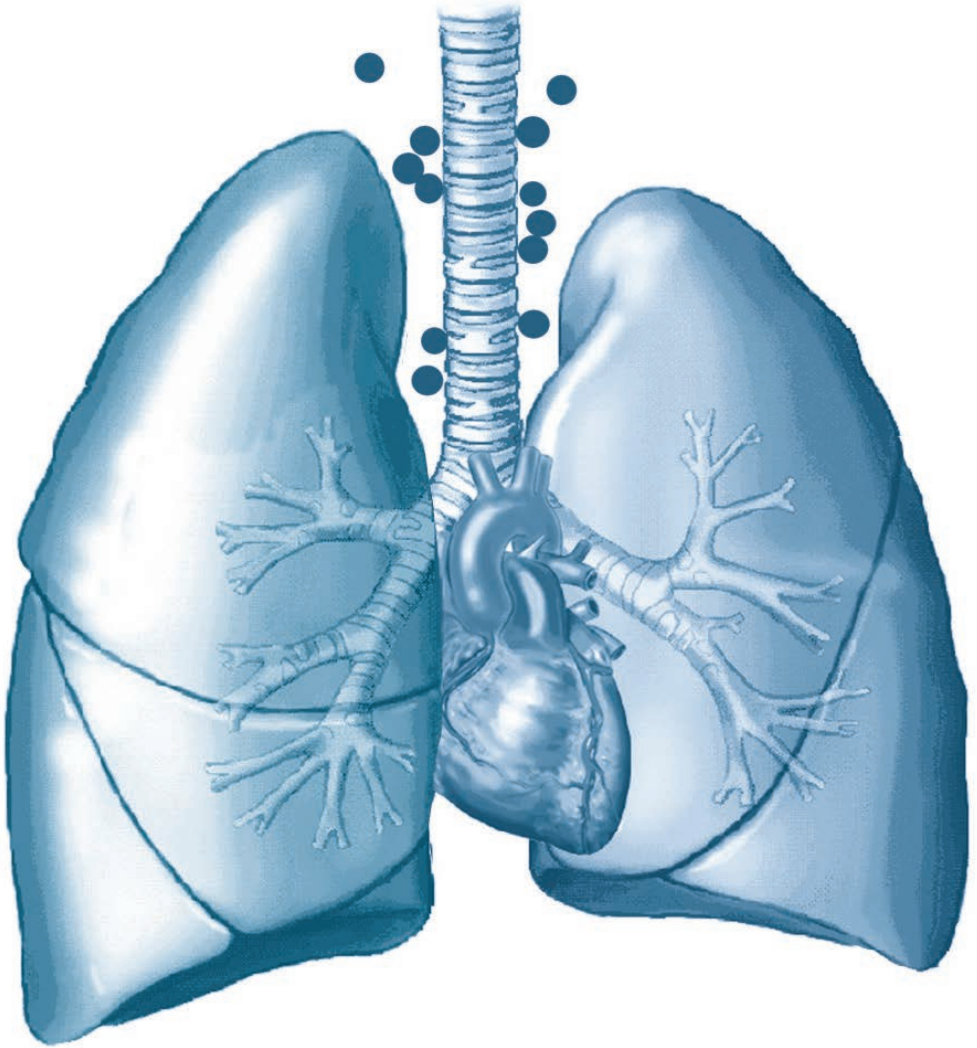
Thoracic nurse specialist

Name:

Phone number:

Your surgery diagram

You might find it useful to ask your surgeon to draw the location of your tumour and the kind of surgery that is planned on the diagram below.



About our lung cancer information

We follow established quality standards and production principles to make our information trustworthy and easy to read. It is evidence based, following national clinical guidelines and best practice for managing lung cancer.

We believe information that is clear, accurate, evidence based, up to date and easy to use allows people to become better informed and more involved in their health and care.

Our information is written either by our information team or by lung cancer experts. We have a panel of lung cancer experts made up of doctors, nurse specialists and other health professionals involved in the treatment and care of people affected by lung cancer. These people help us on a voluntary basis. You can find out about our Expert Panel at www.roycastle.org/expertpanel

This booklet has been published in partnership with Lung Cancer Nursing UK.



Our information is also reviewed by members of our Reader Panel (made up of people who have experience of lung cancer). This makes sure our lung cancer information meets their needs. You can find out about our Reader Panel at www.roycastle.org/readerpanel

You can find references to sources of information within this booklet at www.roycastle.org/evidence

If you have suggestions for new publications or additions or improvements to our existing range of booklets and factsheets, please let us know at info@roycastle.org

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ROY CASTLE
LUNG CANCER
FOUNDATION

Roy Castle Lung Cancer Foundation is the charity that gives help and hope to people affected by lung cancer. The charity has two aims – supporting people living with lung cancer and saving lives.

Supporting people living with lung cancer

Working closely with lung cancer nurses, we provide information, run lung cancer support groups and offer telephone and online support. Our patient grants offer some financial help to people affected by lung cancer.

Saving lives

We fund lung cancer research, campaign for better treatment and care for people who have lung cancer, and raise awareness of the importance of early diagnosis. Our lung cancer prevention work helps people to quit smoking and encourages young people not to start smoking.

Contact us

For more information, call our Lung Cancer Information and Support Services:

0333 323 7200 (option 2)

or visit our website: www.roycastle.org

Head Office

Cotton Exchange Building,

Old Hall Street

Liverpool, L3 9LQ

Email: foundation@roycastle.org

Information and Support Services

98 Holm Street,

Glasgow G2 6SY

Email: info@roycastle.org

Expect Better



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