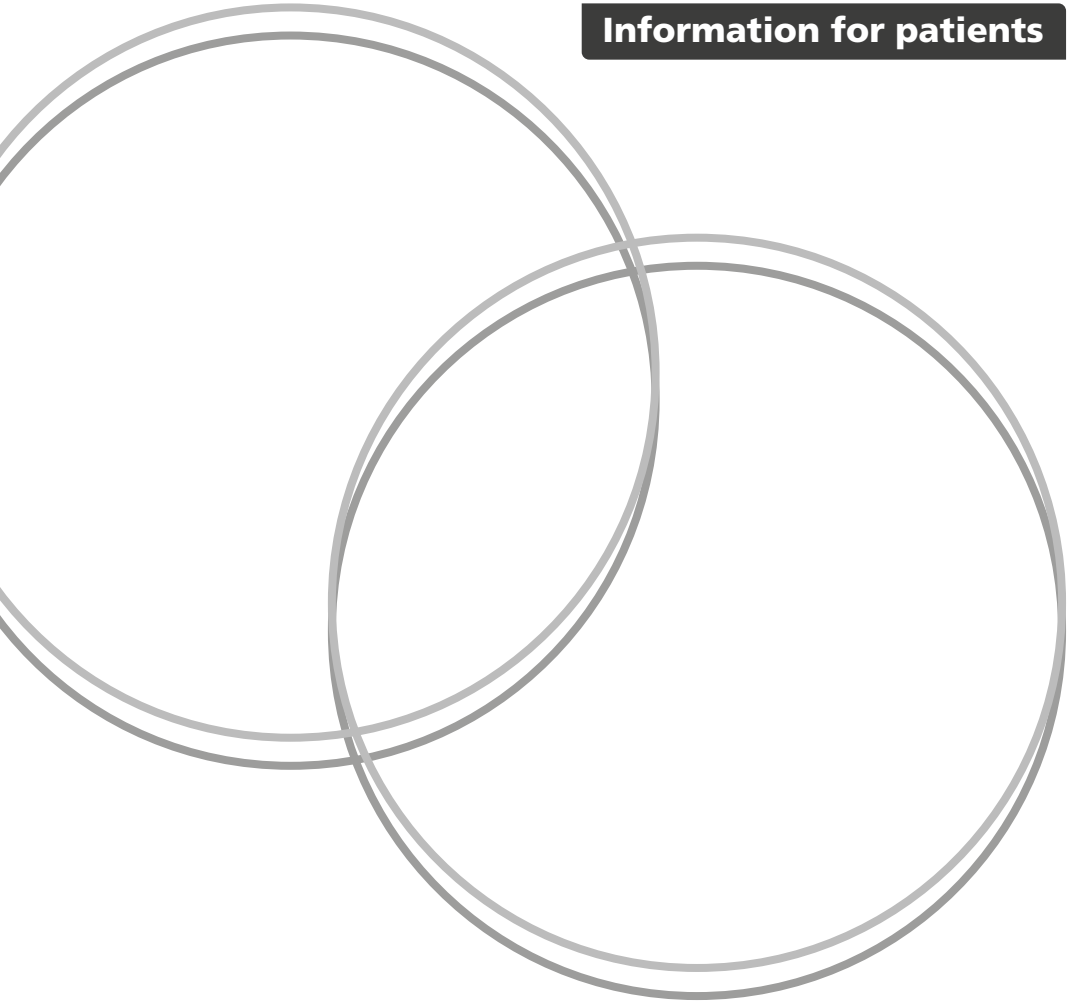
Oxford University Hospitals
NHS Foundation Trust

Thoracic Surgery

Thoracoscopic first rib resection for thoracic outlet syndrome

Information for patients



Welcome to the Oxford Heart and Lung Centre

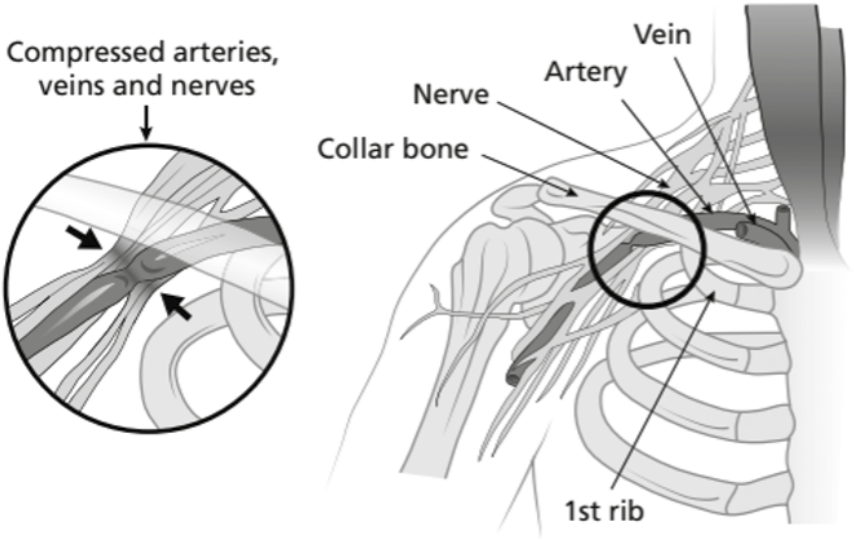
You have been diagnosed with thoracic outlet syndrome (TOS). The information in this booklet will help to prepare you for coming into hospital and surgery. It will help to remind you about explanations and information that the medical or nursing staff will give you. We hope it will be a useful and helpful guide. If you have any questions or need any extra information, please ask any member of the team.

Thoracic outlet syndrome

There is a narrow space between the collar bone (also called the clavicle) and the first rib which arteries, veins and nerves pass through. If the space is too small the blood supply or nerves, or sometimes both, can be compressed. This is called thoracic outlet syndrome. This can cause pain in your shoulders and neck and numbness in the arm and fingers.

Common causes of thoracic outlet syndrome include physical trauma, repetitive injuries from occupational or sports-related activities, certain anatomical defects (such as having an extra rib), and pregnancy.

Treatment for thoracic outlet syndrome usually involves physical therapy and pain relief measures, most people improve with these approaches. In some cases this does not improve the symptoms of TOS and surgical treatment with first rib removal is recommended.



First rib resection

First rib resection is indicated to relieve the compression caused by thoracic outlet syndrome where other treatments haven't been effective.

The goal of the operation is to increase the space between the chest wall and the clavicle, through which the arteries, veins and nerves pass.

There are options to approach the first rib from above or below the collarbone. Video assisted thoracoscopic rib resection approaches the first rib from below and this offer an advantage in case of compression of the main vessels to your arm. Also, this technique offers a better result from cosmetic point of view as opposed to other techniques that are performed from the neck.

Video Assisted Thoracoscopic Surgery (VATS) first rib resection

This is keyhole surgery. The surgeon will insert a telescopic camera in through 1,2 or 3 small cuts in the side your chest. This allows the surgeon to carry out the rib resection from below, avoiding the blood vessels above the rib. The use of high-performance cameras offers a detailed, well-lit and magnified vision. This technique is performed in a very limited number of highly specialised centres in the UK.

What are risks of thoracoscopic first rib resection?

The rib that is removed is located in a confined space and is closely related to several nerves and blood vessels. Your surgeon will carefully move these away from the rib before it is removed. There is a reported risk of injury to the nerves or blood vessels in the neck and the arm but this is small: about 1 in 100. There is also a risk that your symptoms may not fully improve, however this is low and the majority of patients who have this operation have a good improvement in their symptoms. As with any operation there is a risk of wound infection, but this is low. Extremely rarely death or severe damage to the arm circulation, possibly leading to amputation has been reported with this operation due to injury of the artery.

There are several surgical techniques to perform a first rib resection i.e. supra-clavicular, para-clavicular, axillary or thoracoscopic. All these techniques are all available in our Trust. Your case was discussed at a dedicated MDT and it was decided that a thoracoscopic approach is the best option for you

Any operation requiring a general anaesthetic carries with it a risk of complications. Your surgeon will discuss with you the common risks and also any specific risks that relate to you, before you are asked to sign that you are happy to have the operation (give your consent).

Make the most of this opportunity to discuss any questions or worries you might have. You need to feel confident that you understand what the operation involves, as well as the risks, before you sign the consent form.

What kind of assessment will happen before my operation?

Before your operation you will be invited to come to the pre- admission clinic. This is run by the pre-admission nurses. At this clinic you will be assessed by:

- A doctor, who will examine you and ask you questions about your previous medical history. The doctor will explain the operation or examination and why it is necessary, including the risks involved.
- The pre-admission nurse, who will ask you questions about your daily activities and about any support that you may need when you go home. The nurse will take your blood pressure, pulse, weight and height. They will also give you an opportunity to ask any questions you might have about your admission.
- An anaesthetist, who may see you to explain how they will look after you during your operation and answer any question you may have about having an anaesthetic.

What tests will I have before my operation?

Before your operation we will arrange tests to assess your health and fitness for surgery. The tests you will need will depend on the surgery you are having and any other health issues you may have. Some of these tests might be done at the pre-admission clinic.

- **Blood tests** – These can tell us about your general state of health and fitness for surgery.
- **Chest X-Ray** – These images help us to look at your heart and lungs.
- **Electrocardiogram (ECG)** – This machine measures the electrical activity of your heartbeat and muscle function.
- **Spirometry** – This is a simple breathing test during which you will be asked to blow into a machine. It tests how much air you can breathe in, as well as the way you breathe in and out.
- **Lung function tests** – These look in more detail at lung capacity and assess how your lungs are working. You will need to spend up to an hour in the lung function laboratory for these tests.
- **Ultrasound** – This scan uses sound waves to create an image of the inside of your body. It is frequently used to pinpoint any fluid which might be in your lung.
- **Magnetic Resonance Imaging (MRI) scan or Computed Tomography (CT) scan** – These scans give a 3-dimensional picture of your body and can help us to see if any cancer has spread to other organs. Both these scans are painless but can make you feel claustrophobic, as you must lie still whilst the scanner moves you in and out of a large circular machine. However, the radiology staff will reassure you throughout the procedure.
- **Venogram** – This looks in detail at the structure of veins and the blood flow through them. Contrast dye is injected, and x-rays used to see it passing through the veins.
- **Nerve conduction study** – This scan uses small electrical pulses to mimic the electrical signals made by nerves. They are used to look at how well and how fast the nerves send impulses.

Who will look after me during my hospital stay?

You will be admitted under the care of a Consultant Thoracic Surgeon who is assisted by two other doctors, a Registrar and a Senior House Officer.

Nursing staff are all fully qualified and many have specialist cardiothoracic qualifications. This means they specialise in the care and treatment of people with heart and lung problems.

The **Matron** manages the Cardiothoracic Unit. A Sister is responsible for the Cardiothoracic Ward.

Anaesthetists are fully qualified doctors who will put you to sleep for your operation. They monitor your condition very carefully throughout your operation and make sure that you have enough pain relief during your recovery period.

Physiotherapists will visit you after your operation. They will help you keep your lungs clear and will help to get you moving after your operation. This will speed up your recovery and get you back to a level of activity which allows you to go home.

Occupational Therapists are available to give you advice and information about going back to your daily activities after your surgery. They can also give you some useful items of equipment to use at home, if you need them.

A **Dietitian** is available to give you advice and information on what to eat and drink.

A **Pharmacist** will visit the ward each day to monitor your medication and give you advice on your medicines.

What happens on the day of my operation?

When you come to the pre-admission clinic, the nurse will give you instructions about when you should stop eating and drinking before your operation. You will also be given an antiseptic lotion, mouthwash and nasal cream and instructions on how to use them before your admission. You will be told what time to arrive at theatre direct admissions (TDA) on the day of surgery.

When you arrive you will be asked to change into a clean hospital gown and you will be fitted with surgical stockings. These will help prevent blood clots forming during the operation.

Before the operation

The nurse or operating department practitioner (ODP) will check some important details with you such as your name, date of birth, and any allergies you may have. They will also confirm that you have signed your consent form.

When it is time for your operation you will be taken to the anaesthetic room. We will help you to move onto a trolley and the nurses will then connect you to heart and pulse monitors. Your anaesthetist will insert a small needle in your arm to give you drugs to make you go to sleep.

If you are having an epidural for pain relief this will also be inserted before the operation starts. The anaesthetist will discuss this with you before your surgery.

Throughout the operation the anaesthetist will be looking after you and will give you medication to keep you asleep and relieve pain.

What happens after my operation?

When the operation is over you will be woken up. You will be transferred to the recovery ward where specially trained nurses will look after you. They will make sure you have good pain relief and that you are breathing well. You will be given oxygen through a face mask to help you recover.

You will be transferred to the cardiothoracic ward (CTW) once the medical team and recovery nurses are happy that you are recovering well.

Some of the medical equipment used in thoracic surgery

Some of these might be used in your case:

- Chest drains (see separate section).
- Cardiac monitor – this is attached to your chest by sticky pads and helps the nursing staff to monitor your heartbeat.
- Intravenous cannula (drip) – you may have one or two of these going into the back of your hand or arm, through which you can be given fluids and medication.
- Neckline – this goes into a large vein in your neck. It is used for giving intravenous drugs and fluids directly into your bloodstream.
- Urinary catheter – this is a tube used to drain away urine from the bladder. You will have a catheter if we need to monitor how much urine you are producing or if you have difficult passing urine after your surgery.
- Oxygen may be given to you through small tubes, just inside your nostrils, or a face mask over your nose and mouth.

As your condition improves all of these will be removed.

Pain relief

For the first few days after your operation you may be given pain relieving medication in the following ways:

Local and regional blocks

This is an injection of local anaesthetic around nerves to numb the area and reduce pain. It can be given by the anaesthetist or surgeon in theatre and by the surgical team on the ward.

Patient controlled analgesia (PCA)

Pain relieving medication is given via a pump into the drip in your hand. You will be able to control your medication by pressing a button. Alternatively your nurse can control your medication if she feels your pain is not controlled. The dosage is set so there is no risk of overdosing.

Once you are able to eat and drink we will give you pain medication as tablets every four to six hours. Your nurse will assess your pain with you using a scale of 0-3 [0 = no pain, 3 = severe pain]. It is important that you are comfortable enough to carry out your deep breathing and coughing exercises. Please tell us if you have pain so we can make changes to your medication if needed.

Throughout your recovery an anaesthetist will be available to give you advice about pain, sickness or any other problems that may arise.

Chest drains

Chest drains are necessary after lung surgery. Their job is to remove any fluid and air which accumulates in the chest cavity.

The drain is a one-way system that draws fluid and air out and stops it from going back into the chest. The chest drain is a tube which has one end in your chest cavity and the other attached to a chest drain pump. The tube is held in place by a stitch. The drain pump controls the amount of suction on the drain and measures how much air is leaking out. The amount of suction applied to your chest drains may be changed as you recover from your operation.

You can help to open your lungs back up by moving or walking around and by deep breathing and coughing.

Chest drains are usually removed when the doctors are happy that they are no longer required.

How do I look after my chest drains?

Try not to pull on the tubing as this may cause pain or discomfort. Try to avoid kinking and folding the tubing as this slows down drainage.

If the tubing comes out of your body or off the pump, ask for help immediately. Your nurse will need to reconnect the tubing to the pump.

If the tube comes out of your body we will close the hole with a stitch and then assess you to see whether you need to have another drain put in. However, the drain is stitched in place so this is very unlikely to happen.

If the drain either comes off the pump or out of your chest, you may need a chest X-ray. This is to check the drains are working correctly.

Exercise

Exercise is a vital part of your preparation for surgery and your recovery afterwards. It is important to mobilise as soon as possible after your operation. This is usually on the day of your surgery, or if you are not awake until late the first day after your surgery. Early mobilisation helps to prevent complications such as venous thromboembolism (e.g. DVT/PE) or chest infection, and to promote lung function. Staff will help you with all the 'clutter' of drains and tubes relating to your operation to begin with. The amount that you do will gradually increase.

Every day we have a set quiet time between 1-3pm. Please take advantage of this and have a rest on your bed, as you may feel more tired as usual.

There are exercises towards the end of this booklet that will help you regain your shoulder movement and function following surgery.

What can I eat?

You will need more calories (energy) from your diet to help your body heal and regain strength. It is common after an operation to lose your appetite and you may not wish to eat large meals. Most people find that eating 'little and often' is best.

Your nurse can give you high calorie drinks to supplement your meals if necessary.

For more expert advice we can refer you to our dietitian.

Monitoring the success of the surgery

The doctors and nurses will monitor the sensitivity and movement in your hand and arm regularly.

If you notice any changes in how your hand or arm feels or how well you can move it you should report them to your nurse immediately. Also please report any change in colour or shape of your arm such as increased redness or swelling.

When will I be able to go home?

You will be discharged from hospital when we are happy that you are recovering well. This is often after the chest drains are removed.

When you return home you must make sure there is someone responsible with you for the first week, to look after you. If you live alone maybe you could arrange to stay with a relative. If this is not possible please tell us when you come to pre-admission so that arrangements can be made to give you some help at home.

Please arrange for someone to collect you from hospital and take you home. You will need to go home in either a car or taxi. This will be more comfortable for you, and also quicker for you to return to the hospital if there are any complications on the journey home.

When you leave the ward we will give you:

- a supply of medication which your nurse will explain to you and a written plan of when to take your tablets
- a letter for your GP
- an appointment for stitch removal/wound check and letter for your practice nurse at your GP surgery.

Most patients who have thoracic outlet syndrome surgery will require medication to thin their blood after their operation (anticoagulation). This could be injections or tablets. Your anticoagulation plan will be explained to you by the surgical team after your operation.

You may be told about your follow-up appointment, but a date will also be sent to you in the post. This date can vary from two to six weeks after you get home.

Signs and symptoms to look out for

If you have any of the following problems please see your GP or contact the Advanced Nurse Practitioner (contact details are at the end of the leaflet):

- Continued problems with constipation despite taking regular laxatives and eating a high fibre diet.
- An increase in the amount of pain you have despite taking regular painkillers.
- Your wound becoming redder than before, swollen, warm to touch or leaking fluid.
- Any part of your wound coming apart.
- Your breathlessness becoming worse.
- Changes to sensitivity or ability to move the hand or arm should be reported to the surgical team immediately.
- Changes of colour or shape of the hand or arm such as increased redness or swelling should be reported to the surgical team immediately.

Are there any precautions I should be aware of after surgery?

For the first week, do not lift your operated arm above shoulder height. The table below contains advice on things to avoid:

Avoid	Functional example	Time scale
Avoid Shoulder Flexion (lifting your arm up in front of you) or abduction (lifting your arm and elbow up and out to the side) above 90 degrees.	Reaching to get something from that shoulder height.	1 week.
Avoid external & internal rotation of shoulder outside of neutral positions.	Reaching behind you.	1 week.
Avoid extension combined with internal rotation.	Tucking shirts in, using the operative arm for toileting or trying to do a bra up behind the body.	6 weeks at least.
Avoid extension beyond neutral.	Pushing up on the operated arm with the body forward on getting out of a chair. Rest the elbow on a pillow when supine. Instruct patients to always be able 'to see' their elbow.	6 weeks at least.
Avoid extremes of external rotation and also abduction.	Reaching back and out to get a seatbelt.	8 weeks at least.
Avoid lifting.	Only lifting a cup of coffee.	1st week.
Avoid no support of body weight.	Pushing up out of a chair.	12 weeks at least.

Physiotherapy exercises following your surgery

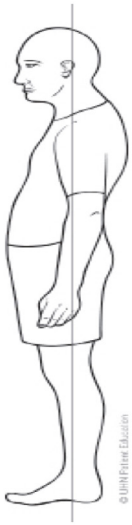
The following exercises help treat TOS after surgery and focus on decreasing symptoms to help you return to normal function. If you do not follow these recommendations, you are high risk of developing further shoulder and neck stiffness, not regaining full function and ha ving a recurrence of your symptoms.

Posture

The position you hold your body in when standing or sitting is called posture. Slouching can cause the muscles in your neck to tighten, so it's important to make a point of correcting your posture.

The images below show good and bad posture. Try and get a family member or friend to observe you sitting and standing and let you know if you are in the right position.

Good posture (recommended)



Slouched posture (not recommended)

Sitting up straight

(recommended)

Slouching

(not recommended)

Breathing exercises

Choose a comfortable position, such as the correct postures advised above. Start with gentle normal breathing, using the lower abdomen (tummy).

You should feel your abdomen gently rise and fall with your breathing.

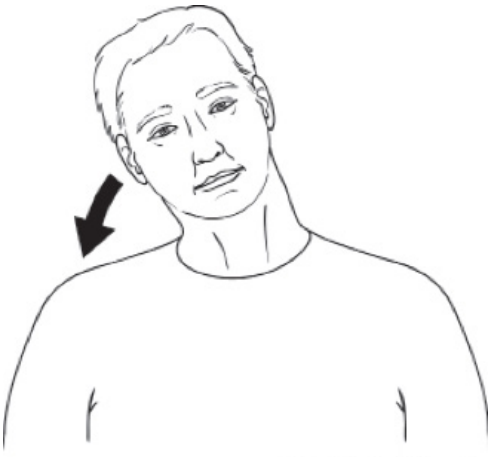
The breath out should be slow and relaxed. Repeat this three times every 30-60 minutes for the first couple of days after your surgery. You can use this technique whenever you feel your breathing is getting out of control and/or your shoulders are becoming tight and elevated.

If you feel your breathing becoming more difficult, or you have a new cough, please contact a doctor.

Exercises to complete from the day after your surgery

The following exercises should be completed daily until your six-week follow-up appointment:

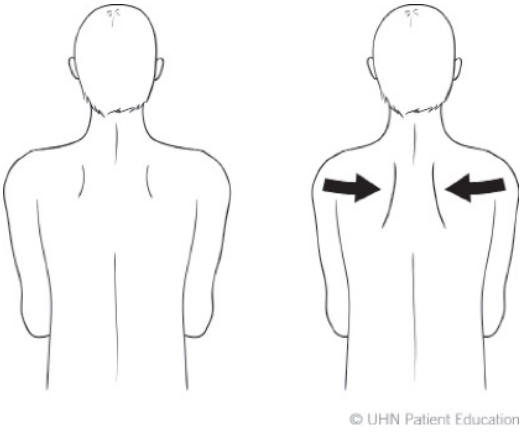
1. Neck stretch



Look straight ahead.

1. Bend your right ear to your right shoulder, without looking down or looking up. Repeat this with your left side.
2. Hold for 20-30 seconds. Repeat three times, three times a day.
3. You can increase the repetitions when the exercise feels easier.

2. Shoulder blade squeeze



Squeeze your shoulder blades down and together.

1. Repeat three times, three times a day.
2. As this exercise becomes easier, you can increase the number of squeezes.

3. Shoulder shrugging

Keep your arms loose and relaxed by your sides. Shrug your shoulders up towards your ears and gently lower them back down.

1. Repeat three times, three times a day.
2. You can increase the repetitions when the exercise feels easier.

4. Shoulder circling

Keep your arms loose and relaxed by your sides. Shrug your shoulders up towards your ears, then circle them back and down.

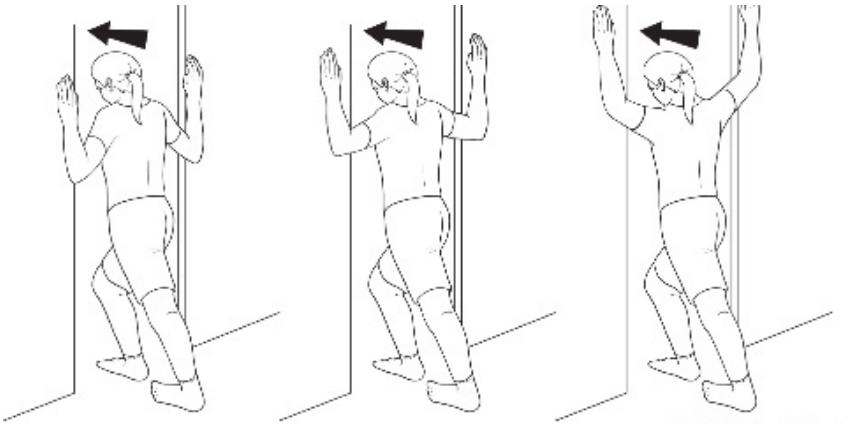
1. Repeat three times, three times a day.
2. You can increase the repetitions when the exercise feels easier.

Exercises to complete after your six-week clinic appointment

You will be given a follow-up consultant clinic appointment about six weeks after your surgery. You should have full range of movement by six weeks after surgery in your shoulder and neck. If you have any concerns about your range of movement before your appointment please contact us, contact details are at the end of this leaflet.

You can start the exercises below once you have been reviewed in clinic and the team are happy with your progress.

1. Shoulder stretch



1. Stand in a door frame. Start with your elbows or arms low or with your arms straight by your side.
2. Lean your body weight forward until you feel a stretch in the front part of the shoulder or chest.
3. Hold for 20-30 seconds.
4. Repeat three times, three times a day.
5. You can increase the repetitions when the exercise feels easier.

2. Thoracic rotations

Cross your arms across your chest.

1. Slowly turn your body as if trying to look behind you, one way, and then the other.
2. Repeat three times, three times per day.
3. You can repeat the repetitions when the exercise feels easier.

Contacts

If you have any question or concerns, please contact one of the numbers below.

Advanced Physiotherapist Practitioner, Thoracic Surgery

(Monday to Friday, 8am to 5.00pm)

Tel: 01865 221 736

Tel: 01865 741 166 and ask for bleep 8113 (if urgent)

Advanced Nurse Practitioner, Thoracic Surgery

(Monday to Thursday, 7.15am to 5.00pm)

Tel: 01865 572 653

Tel: 01865 741 166 and ask for bleep 1184 (if urgent)

Cardiothoracic Ward

(24 hours)

Tel: 01865 572 662

Co-ordinator (if the Ward are unable to answer the phone)

Tel: 01865 741 166 and ask for bleep 1971

Further information

If you would like an interpreter, please speak to the department where you are being seen.

Please also tell them if you would like this information in another format, such as:

- Easy Read
- large print
- braille
- audio
- electronic
- another language.

We have tried to make the information in this leaflet meet your needs. If it does not meet your individual needs or situation, please speak to your healthcare team. They are happy to help.

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