



Advice before and after pectus surgery

Created: May 2025
Next review: May 2026
Version 1

About this leaflet

The purpose of this leaflet is to provide information about your Pectus Surgery and what you can expect from your treatment.

What is pectus abnormality?

A Pectus abnormality is an abnormality in the breastbone which creates an indentation in your chest wall.

This is caused by an abnormal growth of the costal cartilage compared to the length of an individual's ribs, leading to the breastbone being pushed inwards (Pectus Excavatum) or outwards (Pectus Carinatum).

This affects around 4 out of every 1,000 people and is more common in males than females.

Effects of pectus abnormality?

Some patients may experience physical symptoms, which include decreased energy and strength, palpitations, pain and respiratory infections.

However, the most common issue of patients with this condition is an impact on their visual appearance. This can lead to psychological issues, lack of confidence, social reclusion and issues with their body image.

There are several treatments for this condition, including surgery carried out by a specialist thoracic surgeon.

Nuss procedure

The Nuss procedure is a minimally invasive technique which inserts an appropriately sized bar(s) across the breastbone. This surgery corrects the deformity by pushing the breastbone into a desirable position.

This operation is carried out under general anaesthesia. Small cuts are made on either side of the chest and using the help of a camera (thorascopic guidance) the bar/s is/are passed across the back of the breastbone.

The ends of the bar are then secured and this can be done using one of many techniques, including: stabilisers, wires or sutures.

Your wounds will be closed with stitches, and chest drains are normally removed in theatre, or soon after during your recovery. Rarely, if clinically required, these may be left in place for longer.

Pain in the post-operative period is managed with medications and often with local anaesthetic via a catheter in the spine (epidural) or next to it.

Patients report a significant “satisfaction rate” (around 90%) after the correction. Nevertheless like any operation there are risks which the surgeon will explain to you prior to the operation. The notable risks include pain, infection, bleeding, bar displacement, infection of the chest cavities (empyema) and injury to internal organs (lung/heart).

To reduce the tendency of the deformity recurring, it is preferable to leave the bar in the body for around 3 years. An operation is then required to remove the bar after the desired period.

Modified Ravitch procedure

This procedure involves making a cut in the front of the chest, lifting the chest wall muscles to expose the breastbone and desired costal cartilages.

The costal cartilages are then removed, and the breastbone is partially cut, allowing it to be lifted forward or pushed backward to correct pectus excavatum or carinatum.

The breastbone is then supported to remain in the desired position using a range of materials, including metal plates, mesh, wires or sutures.

A fine bore drains are used routinely for management of postoperative reactive collections. These drains are expected to be removed in the first few days, but they may need to stay longer, if production of reactive fluid is still high.

This risks of this operation and outcomes are similar to that of the Nuss procedure. Details of those will be provided by your surgeon.

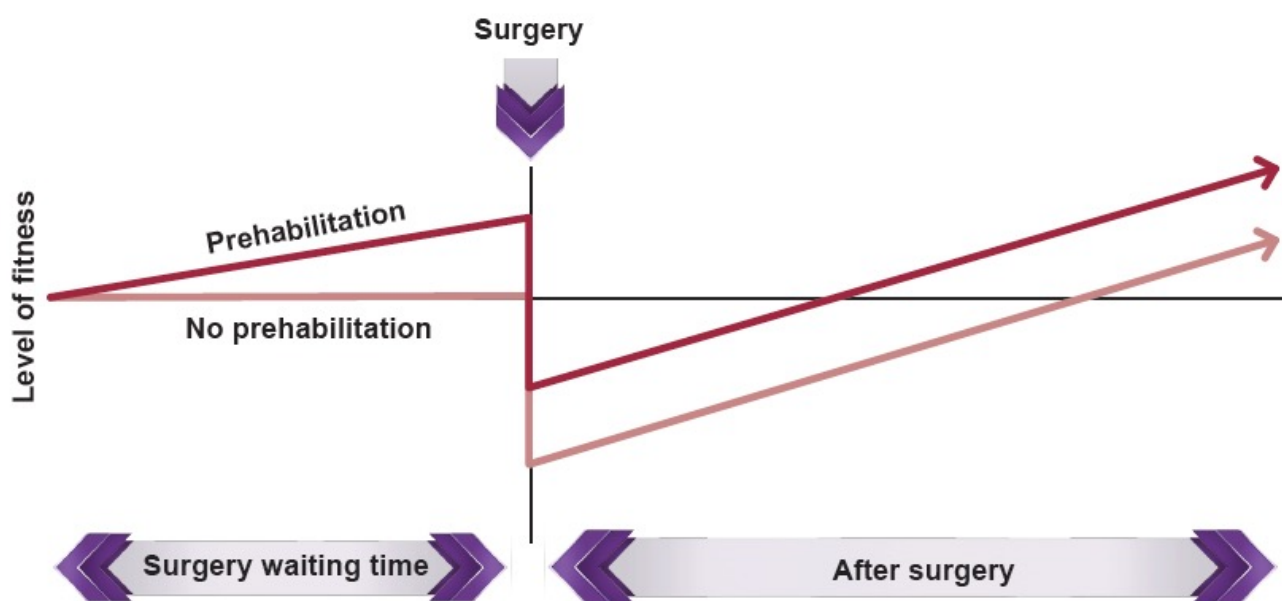
A second operation may be required if the material used to support the breastbone has to be removed.

> What is prehabilitation and why is it important?

Prehabilitation is designed to optimise an individual's overall general health and levels of fitness, enabling them to cope with the effects of surgery and the steps you can take to help when living with heart failure.

Taking action now can help you recover quicker, reduce complications and reduce the time spent in hospital.

Small changes can make a big difference, with prehabilitation benefits seen within 7-10 days.



Prehabilitation means your journey to recovery starts before your surgery has even begun through physical, nutritional and psychological support.

> Benefits of prehabilitation

- Reduce length of stay in hospital
- Reduce complications after surgery
- Improve physical function
- Improve overall fitness
- Improve emotional wellbeing
- Improve nutritional health
- Provide a sense of control and purpose
- Enhance quality of life
- Promote long-term positive health behaviour

Prehabilitation is not a standalone treatment, it consists of many key components to help you 'Get READY' for surgery:

Get **READY**



Respiratory exercises



Eat well



Activity



Dental and oral hygiene



Your lifestyle and wellbeing

What does the programme involve?

The Physiotherapist will complete an assessment where you will be asked questions to understand your current level of fitness. They will create a home exercise programme based on your first assessment which will be made up of cardiovascular, strengthening and lung training exercises as appropriate. We hope you find that Prehabilitation gives you guidance you can use to positively impact the time leading up to your surgery and help you take control of your health and wellbeing.

Respiratory exercises

Below are step by step instructions for using your Incentive Spirometer. It is recommended to use your Incentive Spirometer once a day to record a measurement of your inspiratory breath.

Chest training: Incentive Spirometer

- Step 1: Sit upright.
- Step 2: Hold the device in an upright position.
- Step 3: Put the mouthpiece in your mouth and close your lips around it.
- Step 4: Breathe in slowly through your mouth for as long as you can. The green piston should rise the middle column. The green button should stay between the arrows.
- Step 5: Keep the green button floating for as long as you can and then breathe out slowly.
- Step 6: Rest for a few seconds and repeat steps 1-5 for 3-5 breaths. Record your highest breath daily in the diary provided.



Scan the QR code to view the incentive spirometer video



Deep breathing exercises

Sit upright on a chair or in bed when doing your breathing exercises.

The physiotherapist will explain these with you on post operative day 1 but the deep breathing exercises should be continued from the day of your surgery.

These allow full expansion of your lungs and helps avoid chest infections. This will also allow movement of your newly shaped ribcage. Use a pillow or towel to support your chest when coughing or sneezing.

Continue using your incentive spirometer.

Deep breathing exercise



These are the step-by-step instructions for your deep breathing exercise. If you can, carry out this exercise in a high sitting position.



◀ Step 1

Take a deep breath in through your nose, hold for 3 seconds and breath out slowly through your mouth.

Repeat 3 times.

Step 2 ▶

Huff – sharply breathe out through your mouth. This is the same action as using your breath to steam up a mirror.

Repeat 3 times.



◀ Step 3

Cough.

After your surgery your Physiotherapist will show you how to support the wound in your chest with a towel.

Scan the QR code to view our breathing exercises video



Eating a balanced diet is an important part of maintaining good health to help prepare for your surgery. The Eatwell Guide shows you how much of what you eat should come from each food group.

Fruit and vegetables: Aim to eat at least 5 portions of a variety of fruit and vegetables each day.

Bread, rice, pasta or other starchy carbohydrates: Starchy food should make up just over a third of the food we eat. Choose higher fibre wholegrain varieties, such as wholewheat pasta and brown rice, or simply leave skins on potatoes.

Milk and dairy products: Good sources of protein and vitamins. They are an important source of calcium too. Try to choose low fat varieties to limit your intake of saturated fat.

Meat, fish, eggs and beans: These foods are good sources of protein, vitamins and minerals. Pulses, such as beans, peas and lentils are good alternatives to meat because they are lower in fat and higher in fibre and protein too. Choose lean, low fat, cuts of meat and mince, and eat less red and processed meat like bacon, ham and sausages. Aim for at least 2 portions of fish every week, 1 of which should be oily, such as salmon or mackerel.

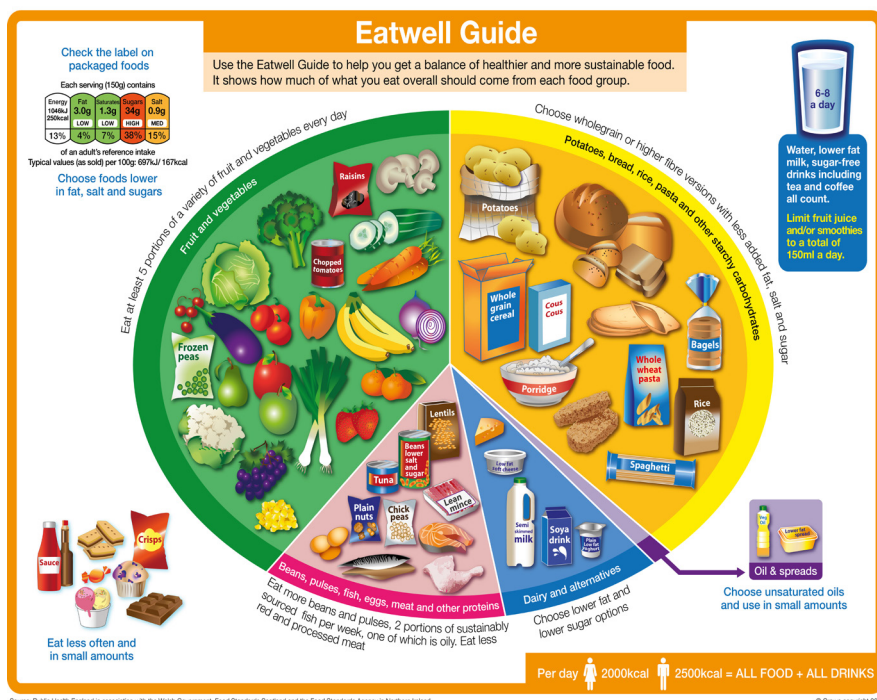
Choose unsaturated oils and spreads, and eat in small amounts: Unsaturated fats are healthier fats and include vegetable, rapeseed, olive and sunflower oils. Remember all types of fat are high in energy, but should be eaten sparingly.

Information source: <https://www.nhs.uk/live-well/eat-well/the-eatwell-guide/>

For people who are underweight, have recently lost weight unintentionally or have a poor appetite, it is important to maintain a stable weight and prevent further weight loss prior to your surgery.

The following ideas may help you to increase your energy and protein intake:

- Eat little and often. Aim to have 3 meals and 3 snacks per day
- Avoid 'low fat', 'sugar-free', or 'diet' products
- Choose the meals you enjoy
- Have a nourishing dessert/pudding – full fat yogurt, rice pudding or sponge and custard
- Have a pint of full fat milk everyday – for example on cereal, milky drinks or in puddings
- Add butter or margarine, cream or cheese to mashed potatoes, vegetables, scrambled eggs and hot pasta
- Have drinks (tea/coffee/juice) with or after meals as these can fill you up if taken just before food.



Source: Public Health England in association with the Welsh Government, Food Standards Scotland and the Food Standards Agency in Northern Ireland

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There is strong evidence that it is safe to stay active in the time leading up to surgery or treatment. You should try and do 30 minutes of moderate level activity every day. If you cannot manage this in one go, try breaking the activity into smaller manageable periods, for example, 10-15 minutes activity in the morning and then 10-15 minutes in the afternoon.

Physical activity does not mean a lot of hard work or expense, it could be going out for a walk, gardening, or using your stairs at home. Avoid sitting for long periods of time. Your physiotherapist will issue you with a personalised exercise programme at your appointment. You may notice changes to your breathing when exercising. This can show if you are exercising to an appropriate level.

You should aim to be a little breathless, but still be able to hold a conversation with someone. If you are too breathless, to do this you must stop, catch your breath and then carry on. You should aim to be working to level 3-5 on the Rate of Perceived Exertion (RPE) scale in this booklet.

I already exercise and am quite fit. What should I do?

If you already exercise regularly and your Consultant is happy for you to do so, then please continue with your routine. Keeping up your fitness will help you cope with the effects of your surgery better and exercise may also help you to cope with the worry and anxiety upcoming surgery brings. Please discuss with a healthcare professional involved in your care if you have any concerns regarding activities or exercises.

Walking

Walking is often overlooked as a form of exercise, but it is simple, free and one of the easiest ways to get more active and healthier. A brisk 10-minute daily walk has a range of health benefits and counts towards your recommended 150 minutes of weekly exercise.

You can tell you are walking briskly if you can talk but cannot sing. If you become breathless enough that you cannot talk to someone, stop, catch your breath and carry on. Your physiotherapist will provide you with a Rate of Perceived Exertion (RPE) scale to guide you.

Tips:

- Plan a route in advance.
- Remember wherever you are going, you must be able to get back.
- Take a mobile phone or inform someone you are going for a walk.
- Get others involved!
- Use a walking aid if necessary.
- Wear comfortable, supportive shoes.

You can monitor your daily step count using a pedometer. Most mobile phones have a pedometer or step count function included. It is recommended that you increase your step count by 10% each week. Please fill in the step count diary to monitor your progress.

Rated Perceived Exertion (RPE) Scale

-
- | | |
|------------|-------------------------------------|
| 0 | At rest (no exertion at all) |
| 0.5 | Very easy (very, very light) |
| 1 | Easy (very light) |
| 2 | Not difficult (fairly light) |
-



- | | |
|----------|----------------------|
| 3 | |
| 4 | A little hard |
| 5 | |
| 6 | Hard |
-



- | | |
|-----------|-----------------------|
| 7 | |
| 8 | Very hard |
| 9 | |
| 10 | Extremely hard |
-



Daily diary

Please record the number of steps you have achieved for each day using a pedometer/ phone/ smart watch, and record the highest breath achieved on your incentive spirometer.

Week 1	Day	M	T	W	T	F	S	S
	Daily step count							
	Highest spirometer							
Week 2	Day	M	T	W	T	F	S	S
	Daily step count							
	Highest spirometer							
Week 3	Day	M	T	W	T	F	S	S
	Daily step count							
	Highest spirometer							
Week 4	Day	M	T	W	T	F	S	S
	Daily step count							
	Highest spirometer							
Week 5	Day	M	T	W	T	F	S	S
	Daily step count							
	Highest spirometer							
Week 6	Day	M	T	W	T	F	S	S
	Daily step count							
	Highest spirometer							
Week 7	Day	M	T	W	T	F	S	S
	Daily step count							
	Highest spirometer							
Week 8	Day	M	T	W	T	F	S	S
	Daily step count							
	Highest spirometer							
Week 9	Day	M	T	W	T	F	S	S
	Daily step count							
	Highest spirometer							
Week 10	Day	M	T	W	T	F	S	S
	Daily step count							
	Highest spirometer							
Week 11	Day	M	T	W	T	F	S	S
	Daily step count							
	Highest spirometer							
Week 12	Day	M	T	W	T	F	S	S
	Daily step count							
	Highest spirometer							

Postural exercises

Sitting posture:

- Sit right back in a chair, making sure your lower back is supported.
- Keep your head straight and look straight ahead.
- Keep your shoulders relaxed and not hunched.
- Keep your feet flat on the ground.



Standing posture:

- Keep your feet a hip distance apart and have equal weight on both feet.
- Keep head straight.
- Keep your shoulders relaxed and not hunched.
- Let your arms hang down naturally.
- Gently pull in your tummy.



These exercises can be done in front of a mirror

Walking posture:

- Look forward, do not look at the ground.
- Keep your shoulders relaxed and not hunched.
- Let your arms swing naturally.
- Gently pull in your tummy.



Shoulder rolls:

- Stand with your arms by your side.
- Roll your shoulders back.
- Make sure the movement is slow and controlled.
- Repeat 10 times.



These exercises can be done in front of a mirror

Scapular squeezes:

- Stand with your arms by your side, making sure your shoulders are relaxed.
- Pull back your shoulders, so that your shoulder blades are squeezed together.
- Hold for 5 seconds, relaxing your shoulders.
- Repeat 5 times.



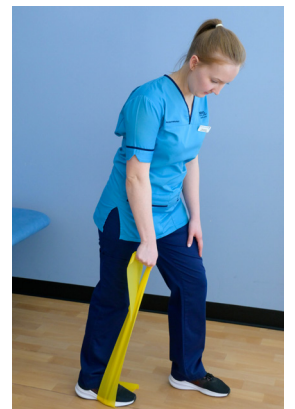
External rotation with TheraBand:

- Standing or sitting with your back straight, bend your elbows keeping them touching your sides.
- Using both your hands, hold each end of the band tightly as possible.
- Pull the band apart keeping your elbows in at your side.
- Slowly return to starting position
- Repeat 5-10 times



Standing TheraBand row:

- Begin with one leg slightly in front of the other.
- Stand on the end of the band with the front foot.
- Bend forward at the hips, keeping your back straight. Hold the end of the band with the opposite hand. Your arm should be straight.
- Bend your elbow to pull the band upwards, bringing your hand to your waist.
- Slowly return to starting position.
- Repeat 5-10 times.



> Dental and oral hygiene

Good dental and oral hygiene reduces the risk of lung complications after surgery and improves your overall general health. You should aim to:

- Brush your teeth for two minutes, at least twice a day
- Use a fluoride mouthwash
- Use dental floss
- Visit your dentist for regular check-ups







For more information on recommendations for dental and oral hygiene including teeth cleaning guide, please refer to the NHS Inform website: www.nhsinform.scot

> Your lifestyle and wellbeing

As well as eating well and exercising, it is important to consider your lifestyle in relation to alcohol.

Alcohol

You should limit the amount of alcohol you drink. It is recommended that you do not exceed national recommendations, which is 14 units per week for both men and women.

					
2.2 units	1.5 units	2.2 units	3.1 units	9.8 units	1 unit
1 pint of beer/lager/ cider (4% ABV)	330ml bottle of beer/later/ cider (4.5% ABV)	175ml glass of wine (12.5% ABV)	250ml glass of wine (12.5% ABV)	750ml bottle of wine (13% ABV)	25ml measure of spirits (40% ABV)

For more information on healthy lifestyle choices, visit: www.nhsinform.scot

After your operation

Precautions

To reduce the risk of your bars moving, it is recommended to avoid the below:

- No forward or side bending at the chest for 6 weeks.
- No twisting your body for 3 months.
- No rolling onto your side for 6 weeks.
- Do not lie on your side for 6 weeks.
- Do not raise your arms above shoulder height for 3 weeks.
- Avoid one-sided movements for 6 weeks.

Pain control

The pain team will be involved throughout your hospital stay to make sure your pain is under control. You will go home with pain relief, and this will be required for up to 8 weeks after surgery.

Deep breathing exercises

Continue your deep breathing exercises as shown on page 5.

Getting moving

Sleep at a 30-45 degree angle for 3-6 weeks (see image on right).

After returning to the ward, you will get up to sit 5-6 hours after returning to the ward if you have had something to eat and drink and the staff are happy with your observations.

A physiotherapist or nurse will help you to get up for the first time. Lying in bed for long periods of time can increase your risk of complications such as chest infections and affects your posture.



When getting out of bed, sit forward by bending at the hips then move your legs to the edge of the bed and sit over the edge.

When standing up, pushing lightly through both arms. Someone will assist you if needed.

It might be uncomfortable to sit and stand up but this will help your chest heal in the best way possible. Being stooped may affect how your chest looks after surgery.

Sit up in the chair for as long as possible. You will be advised to walk to the bathroom in your room if you are able to.

You will continue to walk more each day. Your physiotherapist will give you advice and exercises to help your recovery.

Exercises

Your physiotherapist will go over the exercises you can do after your operation. You should not do any exercises that involve lifting your arms above shoulder height for 3 weeks.

Skin care

If you are not moving around as normal you are at risk of getting pressure ulcers on your bottom and heels. A pressure ulcer is skin damage caused by lying or sitting in the same position for too long.

Please check your skin on your bottom and heels each day of any redness. If you do notice this please tell your nurse.

Wound care

After surgery, your wounds will be covered with dressings, these will stay on until you go home. The dressings will be changed every 2-3 days. Please do not take these off or rub them. If you feel itchy, please let your nurse know.

It is important you shower regularly to prevent wound infections. You should shower at least every second day.

If the skin around your wounds turns red, hot or swollen please contact your GP. If your wounds are leaking fluid or open up, please call ward 3 WEST via the hospital switchboard. They will pass the message to the relevant team/s.

Going home

Continue to sleep at a 30-45 degree angle for 3-6 weeks (see photo on previous page).

Your medical team will advise you on when you are able to return to your normal activities. There is a guide below:

Activity	Timescale
Walking/static exercise bike	Immediately
Raising arms above shoulders	3 weeks
Lying on side or stomach	6 weeks
Return to school/college/work	6 weeks
Twisting of spine	3 months
Pushing up from chair with arms	3 months
Pushing/pulling/lifting heavy objects or bags	3 months
Gentle exercise (e.g. jogging, swimming, cycling)	3 months
Weight training	6 months
Contact/competitive sport (e.g. football, tennis, rugby)	Not until bar removed

Further information

Your healthcare team are here to support you. Any question that is important to you is important to us. Please contact the prehabilitation physiotherapist on 0141 951 5121 or email GJNH.HeartAndLungPrehab@gjnh.scot.nhs.uk if you need help or advice to discuss any of the information in this booklet.

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