



IRISH
HEART
FOUNDATION

Step by step through

HEART

SURGERY

Step by step through

HEART SURGERY

Written for the Irish Heart Foundation by

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This booklet is one of the publications in our patient information series.
For a complete list of patient booklets, see page xx

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This booklet has been written to add to the information that you have already received from your doctor.

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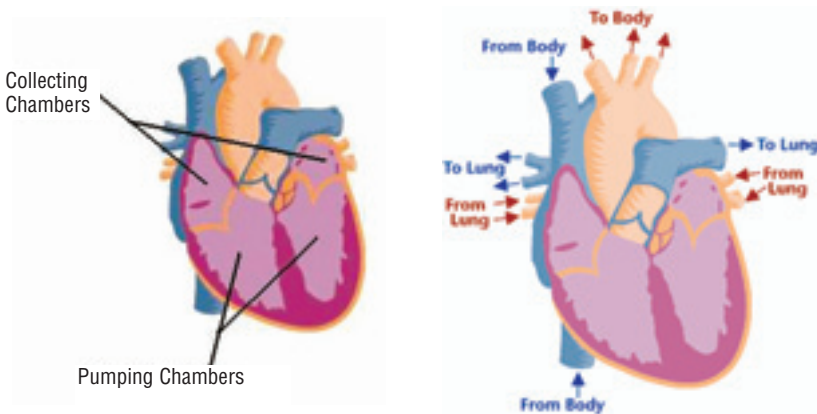
Introduction

The most common types of heart operation are heart bypass operations and operations to repair or replace the valves in the heart. This information leaflet will tell you:

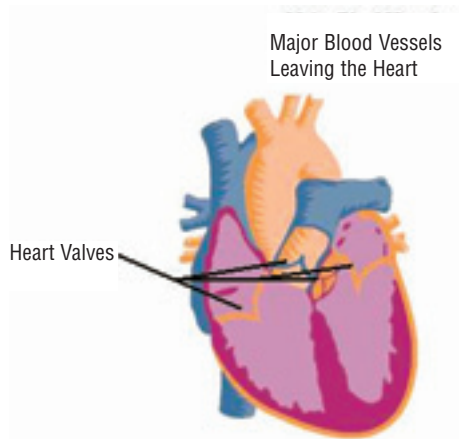
- a bit about the structure of the heart and how it works;
- why you need a heart operation;
- how the operation will correct your heart problem; and
- what you can expect when you go into hospital before the operation and during your recovery in hospital and then at home.

How does my heart work?

Your heart is divided into two parts – a right and a left part. The right part pumps blood to your lungs to pick up oxygen and the left part then pumps this blood full of oxygen around your body to all the organs such as the brain, kidneys, bowels and liver. The right and left parts of the heart each have a small collecting chamber which collects the blood returning to your heart and then pushes the blood into a larger pumping chamber which squeezes to force the blood out to your lungs or the other major organs.

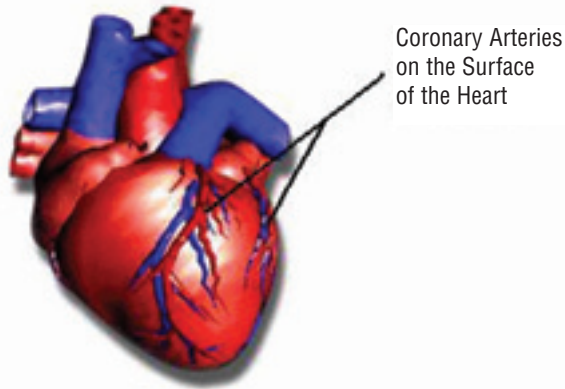


There are four valves in your heart – two in the right part and two in the left part. The valves between the collecting chambers and pumping chambers open to allow blood that has returned to the collecting chamber to pass into the pumping chamber, and then close to prevent the blood leaking back into the collecting chambers when the pumping chamber squeezes. The valves between the pumping chambers and the major blood vessels leaving your heart to your body open when the pumping chamber squeezes to allow blood to leave your heart and close again so that the blood which has been squeezed out of your heart travels around your body and doesn't leak back into your heart. Two main problems can occur with your heart valves. They can become thickened and narrowed so that they don't open properly which then limits the amount of blood that can be pumped out of the heart and puts strain on your heart. They can leak, which means that blood which has been pumped out of your heart leaks back into it, which makes it very inefficient.



The heart muscle squeezes about 70 times a minute when you are sitting down at rest, and more than double this when you are active. To be able to pump this hard it needs a lot of oxygen. The oxygen is delivered in the blood to the heart muscle by blood vessels on the surface of your heart called the coronary arteries. There are two main coronary arteries, which divide into branches on the surface of your heart. Atherosclerosis (a fatty disease of the arteries) is where the

coronary arteries narrow, which reduces the amount of blood that can get to your heart, and so it has less oxygen, which it needs to continue to pump effectively.



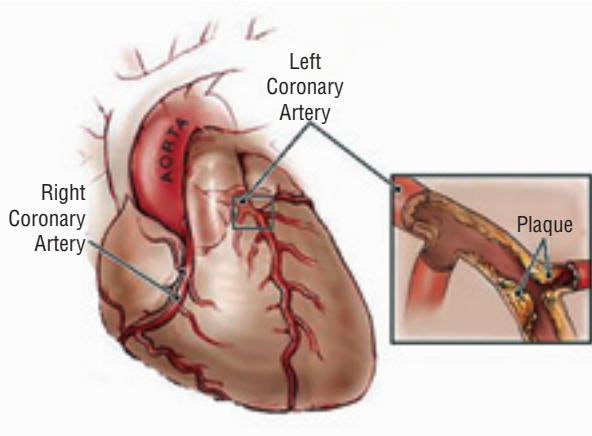
The electrical system of your heart is buried in the heart muscle and generates the electrical signals that tell the heart muscle when to pump. The part of the electrical system where the electrical signals begin is called the ‘pacemaker’.

What can go wrong with my heart and how can surgery correct it?

Problems with the coronary arteries

Atherosclerosis (a fatty disease of the arteries) is a condition where fatty narrowings develop in the coronary arteries that supply your heart with blood. The narrowings reduce the blood supply to your heart so that there is less oxygen available to the heart muscle to pump. At rest, a person with narrowing of their coronary arteries may have just enough oxygen being delivered to their heart to allow it to pump. However, problems arise when the heart has to pump harder or faster or when a person is active (for example, running, walking or sometimes even just getting dressed). Under these circumstances the heart needs more oxygen, but if there are narrowings in the coronary arteries then the

heart cannot get more blood and the person will feel breathless or feel discomfort in their chest called angina. The narrowings in the coronary arteries can block off suddenly, which causes some of the heart muscle to die. This is called a heart attack.



Coronary artery bypass surgery (CABG)

When there are narrowings in both the coronary arteries or in a few of their main branches, this is often best treated with a heart bypass operation. With a heart bypass operation, the surgeon uses a piece of blood vessel from somewhere else in your body to bypass around the narrowings or blockages in the coronary arteries. This means that the blood supply to your heart is restored to normal. This should get rid of the chest pain or breathlessness, and reduce the chance of you having a heart attack.

The piece of blood vessel that the surgeon uses for the bypass can be taken from different places – the leg, the arm, or the inside of the breastbone.

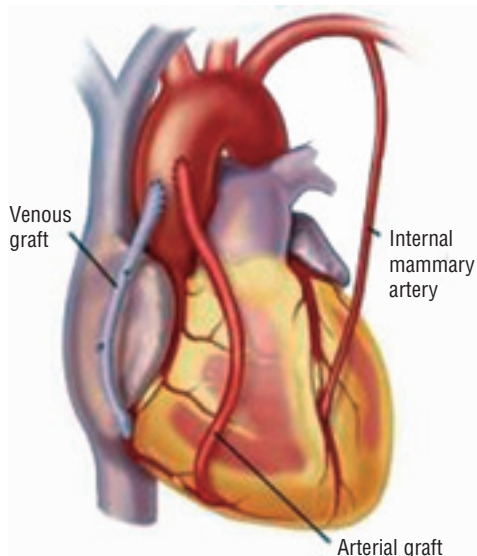
The piece of blood vessel from the leg is a piece of vein. This is the vein that is removed from people who have had varicose vein surgery. The vein is just underneath your skin and the surgeon is able to remove it because the more important veins for supplying blood to the legs are deeper in the leg. The wound is on the inside of the leg, often beginning at the ankle and going up the leg.

The piece of blood vessel from the arm is an artery and is removed from your forearm. The surgeon can remove this artery because most people have two arteries, which supply the forearm and hand with blood, but can manage with one artery. If this artery is used for your bypass, you will be put on a medication called a calcium channel blocker for six months after your surgery to keep the artery widely open.

The piece of blood vessel from the inside of the breastbone is an artery. It is removed through the same chest wound used for the heart operation. This artery has the best long-term results as it remains open and supplies blood to the heart for the longest period of time.

In most bypasses, more than one bypass is done, so for most people the artery on the inside of the breastbone will be used, together with some vein from the leg or the artery from the arm.

Single, double or treble bypass refers to the number of blood vessels used to bypass around narrowings or blockages in the coronary arteries.



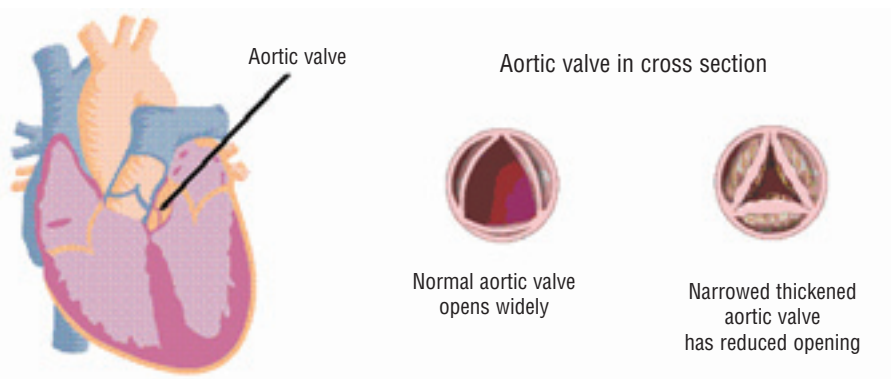
Problems with the heart valves

The valves in your heart can develop two main problems – narrowing or leaking. A heart valve can become narrowed due to thickening and scarring from just simple wear and tear. This is known as degenerative valve disease. Other diseases that cause thickening and narrowing of heart valves are rheumatic fever and infections of the heart valves. A heart valve can leak because the leaflets (leaf-like flaps) of the valve do not meet any more as a result of damage from wear and tear, rheumatic fever or infection, or following a heart attack.

The two most common heart valves that are damaged are called the aortic valve and the mitral valve.

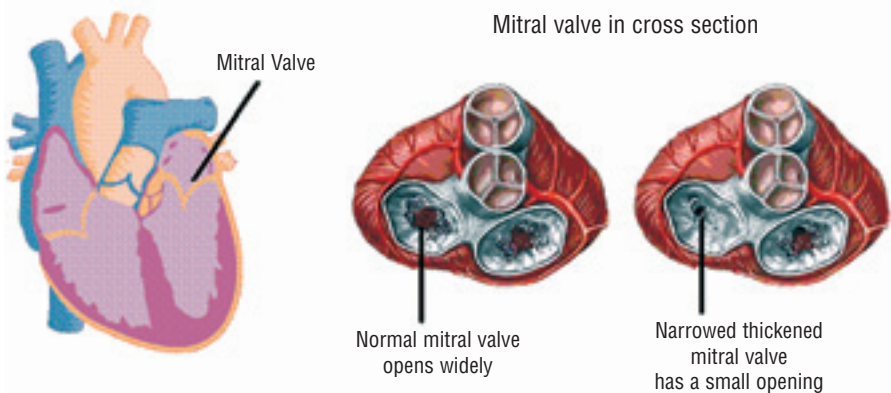
Aortic valve

This is the valve that separates the pumping chamber of your heart from the major blood vessel that leaves your heart to supply all the major organs with blood. If it becomes narrowed or leaky, it puts extra strain on the pumping chamber of the heart. This generally causes breathlessness, but can also cause pain in the chest when you exert yourself and can cause a faint or blackout. In most situations when this valve is damaged, it cannot be repaired and has to be replaced.



Mitral valve

This is the valve that separates the pumping chamber for your body from the collecting chamber that collects the blood returning from your lungs. If it becomes narrowed or leaky, it puts back pressure on the collecting chamber and the lungs. This back pressure can then cause the collecting chamber to enlarge, creating an irregular heart rhythm which gives you the feeling of palpitations. The back pressure on the lungs can cause them to become wet and make you feel breathlessness when you exert yourself, or even sometimes when you are lying in bed at night. These valve problems can often be repaired. If the valve has to be replaced, it is usually replaced with a mechanical metal valve.



Replacement valves

Replacement valves are divided into two types – tissue valves and mechanical valves.

Tissue valves are either human, pig or cow valves. Mechanical valves are metal valves. Human valves (Homograft) come from a person who donated their heart valves when they died. Which type of valve you use depends on the person's age, their medical history and their lifestyle, but your surgeon will discuss with you what the best option is for you. If you have a mechanical valve, you have to be

on a drug called warfarin for the rest of your life, but with a tissue valve you may only have to be on warfarin for three months. Warfarin is a blood-thinning drug that is used to prevent clots on the valve. When a person is on warfarin, they have to have regular blood tests done in a hospital clinic or by their GP to make sure that their blood is thin enough. You also have to be careful only to have one alcoholic drink a night or none at all when on warfarin, and you can bleed more than normal if you cut yourself. Although you have to be on warfarin for life, mechanical valves last longer than tissue valves. Typically, a tissue valve will last 10 to 15 years and a mechanical valve should last longer.



Mechanical Valve

Once your heart valve is repaired or replaced your symptoms will improve or disappear, and your exercise tolerance will get better.

Problems with an irregular heart rhythm

Often, people develop an irregular heart rhythm from problems with their valves or narrowings in their coronary arteries. This irregular heart rhythm is called atrial fibrillation. It happens because other areas in the collecting chambers of the heart start producing irregular electrical impulses, which override the natural pacemaker in the electrical system of the heart. It causes the heart to work harder than it needs to, because it can't work as efficiently. In recent years a new procedure was developed to try to correct this irregular heart rhythm when people are having heart surgery. The new procedure creates scar

tissue in the walls of the collecting chambers to isolate the abnormal electrical impulses so that they don't interfere with the natural pacemaker in the electrical system of the heart. The new procedure is called a Cox-Maze procedure. It works in about 60% of people to get rid of the irregular heart rhythm. Your surgeon will offer this procedure to you if you have an irregular heart rhythm and he or she feels that it might work for you.

What can I expect before my heart operation?

Before you are referred to a surgeon for your heart operation

Your GP will have referred you to a heart specialist called a cardiologist, or you may have gone to an A and E Department (accident and emergency) because your symptoms were sudden or severe. For some people, their symptoms will gradually get worse or they may experience breathlessness or chest pain, and they may find that they can't do what was no problem to them a year ago. Other people suddenly develop symptoms of breathlessness or chest pain, or may even have a heart attack as the first warning that they have a problem with their heart. Your cardiologist will do tests to find out what the problem with your heart is. These tests usually include blood tests to measure your cholesterol and will look at how well your kidneys and liver are working, as well as your blood count. A chest x-ray and a tracing of the electrical activity of the heart are painless, straightforward tests. Most people will have had an ECHO or an angiogram, or both.

1. An **ECHO** is an ultrasound scan of the heart. It is done by putting some jelly on your chest and then placing a probe on your chest to give some moving pictures of the inside of your heart. It is painless and gives very good pictures of your heart valves, as well as any problems with the chambers of your heart.

2. An **angiogram** is a specialised test, which involves passing a small needle through a blood vessel in your groin. Dye can then be injected through this needle that will show up your coronary arteries on x-rays, so that any narrowings or blockages can be seen. It also allows the cardiologist to look at your heart valves And assess how well your heart is working.
3. More recently, **CT scans** are also being used to see the coronary arteries. This is a non-invasive x-ray test that can show narrowings in the coronary arteries.

Once the cardiologist makes the diagnosis, they will discuss your problem with a cardiac surgeon at a weekly meeting to come to a joint decision as to whether your problem might best be treated with surgery and to plan the timing of surgery.

The day before your operation

You will be admitted to hospital the day before your operation. The surgical team may ask you to stop certain medications before you go into hospital, especially blood-thinning drugs such as plavix or warfarin, but you should not stop these unless you are told to. The surgical team will talk to you about your medical history, examine you, and assess all of your investigations that have been done. Your blood tests, ECG, and chest x-ray will be repeated to make sure there are no new problems. The surgical team will discuss the operation with you and explain what you can expect during your recovery. You should ask questions. The anaesthetist who will be looking after your anaesthetic will also meet with you to talk about what you can expect and any pain relief needed after the operation. The nurses on your ward will also tell you what you can expect and answer any other questions you may have. The physiotherapist will show you some breathing exercises that you need to do after the operation, to prevent a chest infection. You can help yourself and the surgical team by doing the following.

- ♥ Stop smoking. People who smoke have more mucus in their lungs, which is hard to remove after surgery and will put smokers at more risk of suffering a chest infection.
- ♥ You should bring all your normal medication with you to show to the surgical team. The nurses on the ward will then give you your medication while you are in hospital.
- ♥ Do not bring valuables such as jewellery or money with you to the hospital.
- ♥ You should make arrangements for what is going to happen when you are ready to leave the hospital. For the first two weeks at home you need to relax as you did in hospital, do no work, and have your meals prepared for you. You should organise to have somebody at home with you for those two weeks.

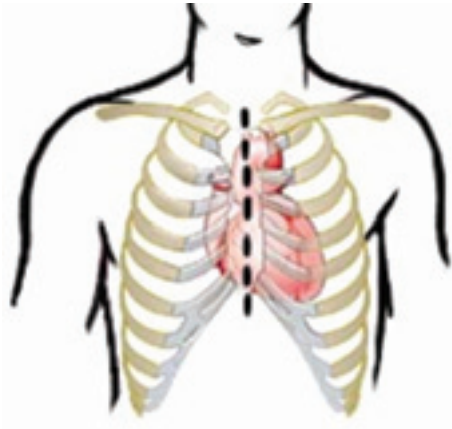
The night before your surgery, the nurses on the ward will give you a special soap to shower with to kill skin germs. Your chest and legs will be shaved for you if needed. You will probably be asked not to eat anything from midnight, and if you have diabetes the surgical team may put you on a drip to control your blood-sugar levels if needed.

The morning of your operation

You will be given a theatre gown and a sterile hat to wear. The nurses on the ward will give you your medication with a small sip of water. An hour before you go to theatre you may be given a relaxant tablet to take if you want. You will be asked to remove any false teeth and non-permanent bridgework, hair clips, jewellery and nail polish before going to the operating theatre. A porter will collect you from the ward and bring you on a trolley to the operating theatre with a nurse. At the operating theatre, you will be taken in to the anaesthetic room where you will meet your anaesthetist again. The anaesthetist will put a needle in your arm and then give you the anaesthetic drugs to put you asleep and block any pain. You will not be awake during the surgery.

What happens during the heart operation?

You will be asleep during the operation. The operation usually takes between three and five hours. Most heart operations are done through the front of the breastbone to get access to the heart.



In most heart operations, you will be placed on the heart and lung machine, which takes over the functions of your heart and lungs so that your heart can be stopped to do the operation. The heart bypass, valve repair or valve replacement will then be done. After this, the surgeon gets your heart beating again and then stops the heart and lung machine. The surgeon then stops any bleeding and puts in some temporary wires that come out through your skin so that they can be attached to an artificial pacemaker if there are problems with the heart rhythm following the surgery. They will then close your breastbone with wires to give it strength while it is healing. These wires are buried within the bone and you won't be able to feel them. The wires are left there forever, but you will not be aware of them and they rarely cause a problem. The wound is then usually closed with absorbable stitches.

What can I expect after my heart operation?

Immediately after the operation

You will be kept asleep after your operation and brought back to the intensive care unit (ICU). In the ICU, you will have one nurse who will be responsible for looking after you. You will be connected to monitors to watch your blood pressure, heart rhythm and temperature. You will be kept asleep and on the ventilator for at least the first few hours after your operation. Your family may come in briefly to see you in the ICU within the first few hours after your operation, but you will be asleep.

Once your blood pressure has settled and there is no bleeding, the ICU team will wake you up and, when you are breathing well, they will take you off the ventilator and take the breathing tube out. You will then be given an oxygen mask to wear for the first few days after your surgery.

When you wake up in the ICU you may feel confused at first. The ICU is a busy, noisy place, and it is normal to lose track of what time it is. You will notice that you have a line in your arm for monitoring your blood pressure, and a small tube in your bladder to drain your urine for monitoring your kidneys. You will have some tubes in your chest to drain away any blood from around your heart and re-expand your lungs. These tubes are usually removed the morning after your surgery before you leave the ICU. You will be given regular painkillers, but if you are still in pain it is important to tell your nurse who will give you extra drugs to ease the pain. You will be allowed to eat and drink the day after your surgery.

Most patients are in the ICU for one to two days, and then transferred to the high dependency unit (HDU) or the ward, but some patients need more time in the ICU.

Two to three days after the operation

Once you are back on the ward or in the high dependency unit, you will still be connected to a monitor for the first couple of days. You will be off the drip and eating and drinking again. The nurses will help you to sit on a chair on the second day after the operation. You should get up as soon as you can and talk to family and friends. This may speed up your healing and helps family and friends feel less worried about you. You should ask for help when you need it.

Each morning, the surgical team sees all of the patients to check how you are doing, change your medication to help your heart recover from the operation most effectively, and deal with any problems. You will have blood tests taken regularly to check your blood count and keep an eye on how well your kidneys and liver are working.

The nurses will give you your medication for the day, help get you up, dress your wounds, and regularly check your blood pressure, pulse and oxygen levels. The physiotherapist will see you again to remind you of the breathing exercises that you were taught before the operation.

You must take deep breaths and cough 10 to 20 times an hour to prevent fluid building up in your lungs. It is normal after heart operations to have swelling in your legs, and you will be given water tablets to get rid of this extra swelling. You should raise your legs on a stool or your bed when you are sitting on the chair to help the swelling to go down. You should not cross your legs, and will be given an anti-clotting injection once a day and special stockings to wear to prevent a clot forming in your leg or the lungs.

Four to six days after the operation

At this stage, you should be walking around your bed and the physiotherapist will take you for a walk to make sure that you are steady on your feet. You will no longer be connected to the monitor so you should not wait for the nurses to get you up walking. Instead, you should go for walks on the corridor with your

family and friends. Walking makes you feel better, improves your breathing, and helps the swelling in your legs to go down.

The surgical team will take the dressings off your wounds each morning to make sure they are healing well, and to treat any infections early with antibiotics. Most of your stitches will be absorbable and on the inside, so will not have to be taken out. Sometimes staples are used to close the wound, and these will be taken out before you go home. You will be sore, especially in your chest, and should continue to take regular painkillers.

The following things may happen while you are recovering in hospital after the operation:

- ♥ You will have lost blood during your heart operation. Your blood count will be checked regularly, and if it is low you may be given a blood transfusion. The transfusion will give you more energy.
- ♥ If your wound develops an infection, you will need daily dressings and antibiotics.
- ♥ It is quite common for a person's heart rhythm to become irregular suddenly after a heart operation. You may not be aware of the irregular heartbeat so this is why you are connected to a monitor for the first three days. If it becomes irregular, you will be put on medication to convert it back to a normal heart rhythm.
- ♥ You may notice night sweats.
- ♥ People often get confused two to three days after their heart operation. This is quite common, and in most cases is related to the heart and lung machine that was used during the operation. It usually only lasts one to two days.
- ♥ Your sleep pattern will often be upset in hospital.
- ♥ Many people find that their taste for food is poor for the first two weeks after the operation.

- ♥ Most people feel fine in the first day or two after the operation but then feel as if they have a lack of energy for the next few days. This improves gradually.
- ♥ To give your breastbone extra support while it is healing, you may be given a chest binder to wear while in hospital.
- ♥ Women often find that it is very uncomfortable to wear a bra just after the operation.
- ♥ Your chest, arm or leg wounds may feel numb for a few months. This feeling can often change to slight pins and needles as the numbness wears off. However, sometimes the numbness persists.

On the sixth day after your operation, the physiotherapist will check to make sure that you can cope with going up and down stairs. You will have a final chest x-ray and ECG done. You will be given advice about what to do when you go home and what medication you should now take. You will normally be able to go home six or seven days after your operation.

What do I need to look out for when I go home?

In the first six weeks

For the first two weeks, you should just rest at home as you were doing in hospital. You should take regular short walks, eat regularly, and have somebody prepare your meals for you. Somebody should stay with you for a couple of weeks if you live alone. You should not drive or work for at least six weeks, until you see your surgeon again in the outpatient clinic six weeks later. You can have sex in three to four weeks, depending on how quickly you recover. If you notice your wounds becoming red, painful, hot, swollen or weeping, you should contact your doctor or the surgical team. You will need to continue to take some form of painkillers, even if it is just paracetamol for a few weeks. Your

surgeon and the nurses on the ward will give you specific guidelines for your recovery, including instructions on how to care for your wound and general health after the surgery.

Outpatient check-up at six weeks

You will have an appointment to come back to the outpatient clinical after six weeks. The surgical team will talk to you about your recovery, and examine you to make sure your wounds have healed well, and your heart is recovering well. They may stop some of the medication that you were on immediately after your heart operation. At this stage, they will tell you when you can go back to work and whether you can start driving again. Please ask questions at this clinic visit.

From six weeks to three months

You will be allowed to start driving again, and should gradually ease back into this. You should not drive heavy vehicles such as a van, and should not drive long distances until three months after your operation. Generally, most people take three months off before returning to work, but your surgeon can give you more advice on this.

The cardiac rehabilitation unit in your local hospital will contact you at this stage to start your rehabilitation programme. The rehabilitation programme involves going into the hospital for a few hours a week to use the physiotherapy gym, and get advice on diet, exercise, and avoiding more heart problems. Although your heart problem may have been fixed, your heart will take time to recover from having to cope with this problem for a while. The idea of rehabilitation is to strengthen your heart muscle to get the best possible recovery from it.

Longer term

It is extremely important to allow your heart bypass or repaired or new valves to last as long as possible. Lifestyle changes should include:

- stopping smoking;
- exercising regularly;
- managing your weight;
- treating high blood pressure and cholesterol;
- controlling diabetes;
- changing your diet;
- taking your medication regularly; and
- visiting your GP regularly.

Step by step through heart surgery is an Irish Heart Foundation patient information publication. Other titles in this series are

- Stroke, a guide for patients and their carers
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- Heart attack
- Step by step through cardiac catheterization and angioplasty
- Step by step through angina
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The Irish Heart Foundation is the only national voluntary organisation dedicated to the reduction of death and disability from heart disease through research, education and community service.



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