

Implantable cardioverter defibrillators (ICDs)



BEATING HEART DISEASE TOGETHER



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About this booklet

Implantable cardioverter defibrillators – or ICDs for short – have transformed the lives of many people with life-threatening abnormal heart rhythms.

This booklet is for people who are about to have, or have already had, an ICD implanted. It is also useful for their family and friends who want to find out more about ICDs. It explains:

- why you need an ICD
- what an ICD is and what it does
- how the ICD is implanted
- what it can feel like when the ICD delivers its treatment, and
- what happens at follow-up appointments.

It also answers some common questions that people ask about ICDs.

This booklet does not replace the advice that the healthcare professionals looking after you may give you, but it should help you to understand what they tell you.

The normal heart rhythm

If you are going to have an ICD fitted, it's useful to know about how the heart beats normally. This will help you understand why you need an ICD and how it can help you.

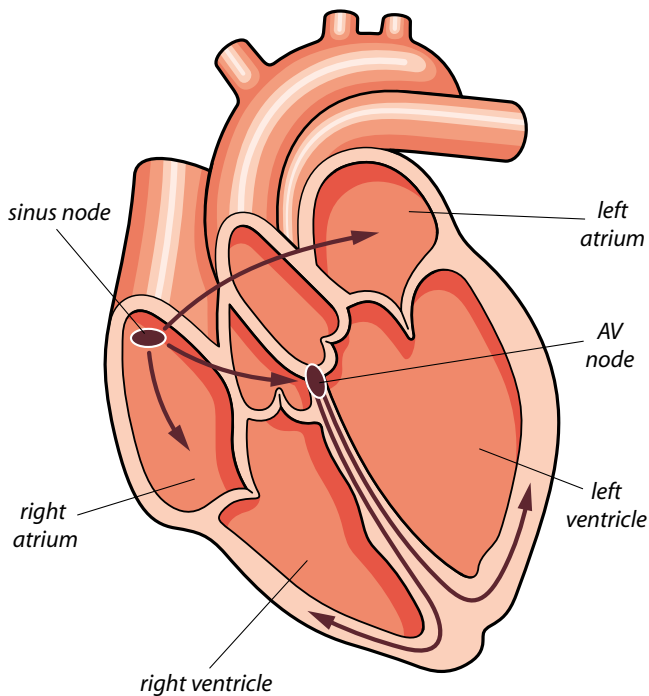
The heart is a pump that is driven by a series of electrical impulses produced by a bunch of special cells in the right atrium, called the **sinus node**. (The right atrium is one of the four chambers of the heart. See the illustration on the next page.) The sinus node is sometimes called the heart's 'natural pacemaker'.

The sinus node produces pulses of electrical activity that spread through the heart's cells, causing the heart muscle to contract. When the electrical signals travel through your heart, it's like electricity going down a circuit of wires.

A normal adult heart has a regular heart rhythm. Your heart rate, when you are not exerting yourself, is normally between 60 and 100 beats a minute. When you exercise, this may go up to a higher rate, depending on your age and how fit you are.

Normal electrical signals in the heart

Pulses of electrical activity spread through the heart's cells.



Abnormal heart rhythms

Abnormal heart rhythms are also known as **arrhythmias** (pronounced 'ah-rith-mee-as'). Arrhythmias are caused by an abnormality in the electrical conduction system. An arrhythmia can make your heart beat too slowly, too quickly, or in an irregular way.

There are many different types of abnormal heart rhythms, and some are more serious than others. This booklet focuses only on ventricular arrhythmias and using ICDs to treat them. For more information on other abnormal heart rhythms, see our booklet *Heart rhythms*.

Ventricular arrhythmias

What are they?

Ventricular arrhythmias are fast, abnormal heart rhythms that start from the ventricles. There are two main types:

- **ventricular tachycardia (VT)**, and
- **ventricular fibrillation (VF)**.

Ventricular arrhythmias can happen suddenly and unexpectedly, and can often be life-threatening. Sometimes they can even be fatal. At least eight in every ten sudden unexpected deaths which are thought to be from heart problems – known as 'sudden cardiac deaths'

– are caused by ventricular tachycardia or ventricular fibrillation. We explain more about these ventricular arrhythmias below.

What causes them?

Most ventricular arrhythmias are caused by underlying heart disease.

Ventricular arrhythmias – such as VT and VF – have many different causes, but they most commonly happen in people with heart muscle damage, including:

- some people who are having or have just had a heart attack
- some people with cardiomyopathy (a disease of the heart muscle), and
- some people who have heart failure. (Heart failure is when the heart does not pump as well as it should.)

Less commonly, they can happen in people who haven't had damage to their heart muscle. For example, some people are at risk of developing ventricular arrhythmias because they have an inherited heart condition, such as Long QT Syndrome (LQTS) or Brugada Syndrome. For more information on these conditions, see our booklet *Inherited heart conditions: Inherited heart rhythm disturbances*.

Ventricular tachycardia (VT)

What is it?

Ventricular tachycardia – or VT for short – happens when cells in the ventricles produce electrical signals that ‘hijack’ the normal heart rhythm and make the heart beat much faster than it should. People with VT usually feel very unwell. Symptoms include having palpitations, dizziness, breathlessness and chest pain. VT can also cause sweating, nausea or collapsing. An episode of VT may last for just a few seconds or minutes, or it may continue for longer. Some episodes do stop on their own.

VT is a difficult rhythm for most people’s bodies to cope with, and if the VT doesn’t stop on its own, the person needs to be treated very quickly.

VT can cause the blood pressure to fall dangerously low, and can lead to a **cardiac arrest**. We explain what this is below.

Ventricular fibrillation (VF)

What is it?

Ventricular fibrillation – or VF for short – is a fast heart rhythm that causes your heart to ‘fibrillate’ or quiver, instead of pumping blood around your body. This is a **cardiac arrest**. A cardiac arrest is a medical emergency and without treatment the person will die within a few

minutes. To find out what to do if someone has a cardiac arrest, see page 54. For information on a course in emergency life support skills, see page 61.

Treatment for ventricular arrhythmias

Emergency treatment

If you are unwell with VT but have not had a cardiac arrest, immediate treatment includes intravenous (through a vein) **medicines**, or a small **electrical shock** (electrical cardioversion) to the chest wall, or both.

If you have VF, or if you have VT that causes cardiac arrest, the treatment for it is immediate **defibrillation** and **cardiopulmonary resuscitation**. (We explain more about these on page 54.) Medicines are also used if the person is being treated by the ambulance paramedics, or in hospital.

Other treatments

For some people, **medicines** can be a good treatment to help prevent ventricular arrhythmias. Some people have a treatment called **catheter ablation** to try to destroy the cells in the heart's ventricles that are causing the ventricular arrhythmia. For more information on these treatments, see our booklet *Heart rhythms*.

However, some people may need to have an **ICD** fitted, depending on the cause of the ventricular arrhythmia and the underlying condition of their heart. We explain more about this on the next page.

Why do I need an ICD?

ICDs are used for some people in the following groups:

- people who have had ventricular tachycardia (VT) and are at risk of having VT again
- people who have previously had a cardiac arrest due to VT or VF (ventricular fibrillation), and are at risk of having VT or VF again
- people who may be at high risk of developing VT or VF due to another heart condition (as mentioned on page 8), and
- people who have taken medicines or had catheter ablation for ventricular arrhythmias, but who need extra protection against the risk of getting these arrhythmias again.

ICDs are only used to treat ventricular arrhythmias. They do not stop heart attacks from happening.

What is an ICD?

ICD stands for ‘implantable cardioverter defibrillator’. An ICD is made up of:

- a pulse generator (the ICD box), and
- one, two or three electrode leads.

A modern **pulse generator** is slightly larger than a small matchbox and weighs about 75 grams (3 ounces). It contains an electronic circuit, powered by a lithium battery, in a sealed metal unit. You can see a picture of a pulse generator on the front cover. The pulse generator is connected to one or more **electrode leads** which pass through a vein – usually the large vein under your collarbone – and into the heart. These are very fine, flexible wires, covered in plastic or silicone rubber. At the end of each lead there are special electrodes which are attached to the heart muscle.

A new type of ICD called a subcutaneous ICD – or S-ICD for short – is suitable for some people. With an S-ICD, the lead is placed under the skin of the chest rather than in the heart.

The ICD constantly monitors your heart rhythm through the electrodes. If it senses a fast ventricular arrhythmia, it

can deliver these two types of treatment:

- pacing, and
- electrical shocks (shock therapy).

Pacing

If the ICD detects ventricular tachycardia (VT), it delivers a short series of low-voltage electrical impulses (paced beats) at a fast rate. This will often correct the heart rhythm and no electrical shock will be needed. This is called anti-tachycardia pacing (ATP).

Pacing

This picture shows the heart rhythm of a person with ventricular tachycardia whose ICD delivers pacing to restore a normal rhythm.

*ventricular
tachycardia*

pacing

*normal
rhythm*



An ICD can also act like a regular pacemaker and pace the heart rhythm if it becomes too slow. This is called anti-bradycardia pacing. The ICD will sense if your heart rate is too slow, and send a series of electrical impulses to the heart to speed it up. These impulses are very small and you won't be able to feel them.

Electrical shocks (shock therapy)

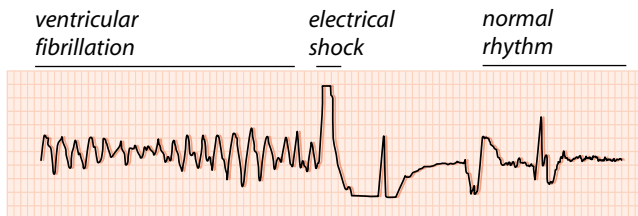
If the ICD still senses VT after delivering the pacing described above, it can deliver a small electrical shock – known as **cardioversion** – to try to restore the heart to a normal rhythm.

If cardioversion doesn't work for VT, or if the ICD detects ventricular fibrillation (VF), the ICD will deliver a larger electrical shock – known as **defibrillation** – to try to get rid of the ventricular arrhythmia and get the heart back into a normal heart rhythm.

There is usually a delay of between 3 and 12 seconds between the ICD detecting a ventricular arrhythmia that needs shock therapy, and actually delivering the shock. Sometimes, more than one shock is needed. An ICD is usually programmed to give a maximum of five to eight shocks for any one event.

Delivering an electrical shock

This picture shows the heart rhythm of a person with ventricular fibrillation. The ICD delivers an electrical shock to restore a normal heart rhythm.



Cardiac resynchronisation therapy with a defibrillator (CRT-D)

Cardiac resynchronisation therapy with a defibrillator – or CRT-D for short – is a particular type of treatment for certain people who have heart failure and who might also be at risk of a life-threatening heart rhythm. It involves implanting a single device which combines a **biventricular pacemaker** and an ICD. (A biventricular pacemaker is a particular type of pacemaker which is used to help people whose ventricles – the two pumping chambers of the heart – are beating out of time with each other.) The CRT-D device has three electrode leads. One lead is inserted into the right atrium and one lead is

inserted into each of the two ventricles.

A CRT-D device can help to resynchronise the ventricles so that they beat in time with each other. This is called **resynchronisation therapy**. The ICD part of the CRT-D works in the same way as any other ICD (see page 13).

CRT-D is a valuable treatment for some people with heart failure, but not everyone who has heart failure will need to have it or will be suitable for it. It can improve the pumping action of the heart. This can help to control your symptoms, but it won't cure your heart failure.

For more on CRT-D, see our booklets *Pacemakers* and *Living with heart failure*.

Before you have an ICD implanted

Before you are given an ICD, you will need to have a number of tests. These tests may include the following.

- An **ECG**, which records the electrical activity of your heart. You may also need to have a 24-hour ECG recording.
- Less commonly, a **cardiac event recorder** or a small device called an **implantable loop recorder** may be used. These devices record your heart rhythm over a longer period of time.
- An **echocardiogram** (an ultrasound scan of your heart).
- An **electrophysiological study** (or **EPS**), which can help diagnose abnormal heart rhythms and identify which part of the heart the abnormal rhythm is coming from.
- If your doctor thinks that you may have underlying coronary heart disease, you may need to have a **coronary angiogram**, which can show if there are any narrowings in the coronary arteries.

For more information on these tests, see our booklet *Tests for heart conditions*.

You may be invited to go to a **pre-assessment clinic** where you may have some of the tests described above, and some other tests such as blood tests. You will then be

invited to come back on another day to have the ICD implanted.

Before you have the ICD fitted, you can discuss any issues or concerns that you may have about having an ICD implanted. The doctor will explain the procedure to you and will discuss with you the risks and benefits of the procedure. He or she will ask you to sign a consent form saying that you agree to having the procedure done.

You will be asked not to eat or drink anything for a few hours before the procedure. Check with the hospital for exactly how long. If you have diabetes, they will give you instructions about your medicines, as you may need to stop taking them or reduce the doses before you go into hospital.

How is the ICD implanted?

If your local hospital does not implant ICDs, you will need to go to a cardiac centre at another hospital to have the procedure done.

It can take anything from one hour to three or more hours to implant an ICD. The length of time needed depends on the type of device you are having.

Sometimes the implant is done as a day case, which means that you don't have to stay overnight in hospital. Other people may need to stay in hospital either overnight, or in some cases for a few days.

Most people will have a local anaesthetic as well as sedation, but some will have a full (general) anaesthetic. Your cardiologist will discuss this with you before you have the procedure.

Most ICD leads are inserted into the heart through a vein. (This is called 'transvenous implantation'.) See the diagrams on pages 21 and 22. Or, if you have an SCD, the lead will be placed just under the skin. (This is called 'subcutaneous implantation'.) The pulse generator is most commonly implanted on the left side of the body, in the upper chest near the shoulder, under the skin.

There are two stages to implanting an ICD.

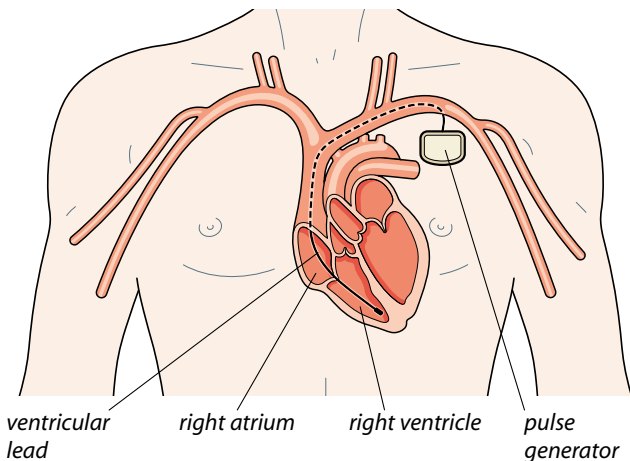
- First, the electrode leads are inserted.
- Then, the pulse generator is implanted.

Inserting the electrode leads

If you are having an ICD implanted, a small incision (cut) is made just under your left collarbone. The electrode lead is then fed through a vein into the right ventricle of your heart. (See the illustration below.)

Implanting an ICD with a single lead

A single lead is placed in the right ventricle.



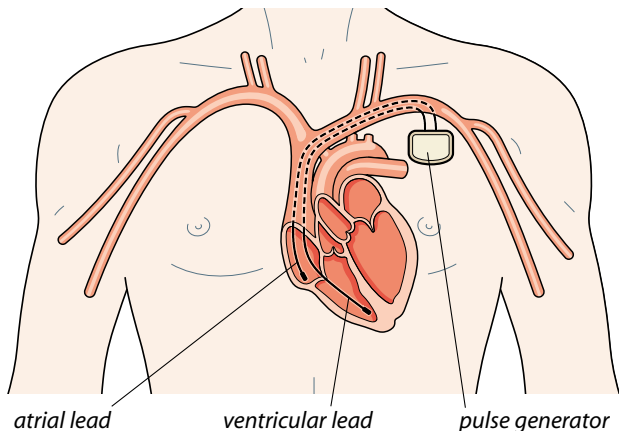
Many people also have a second lead inserted, leading to the right atrium. If you are having CRT-D (as described on page 17), a third lead is placed in the left ventricle.

If you are having an **SICD** implanted, the lead is placed under the skin of your chest.

The position of the electrode lead (or leads) is checked on an X-ray screen. When the leads are in the right place, they are secured with a stitch.

Implanting an ICD with two or three leads

If two leads are used, one is placed in the right ventricle and the other in the right atrium. If a third lead is used, it may be placed in the left ventricle.



Implanting the pulse generator

This is the second stage of the procedure. Once the leads have been put in place and tested, the cardiologist will make a small 'pocket' or space for the pulse generator unit under the muscle or skin, usually below the left collarbone (see pages 21 and 22). Or, if you are having an SCD implanted, the pocket will be on the left side of your chest. The cardiologist then attaches the pulse generator to its leads and places it in the pocket.

The team will check that the ICD can correctly sense the rhythm of your heart, and that it can deliver both pacing and an electrical shock. In some cases they may deliberately put the heart into an abnormal rhythm to make sure that the device will correct it. You would be sedated while they do this. The wound is then closed.

Going back to the ward, and recovering from the procedure

When you get back to the ward, you will probably sleep for a couple of hours, until the sedation or anaesthetic has worn off. A nurse may attach a heart monitor to you for a few hours. The nursing staff will do regular checks when you first get back to the ward. For example, they will regularly take your blood pressure. They will also assess whether there is any bleeding from the incision

site (where the cut was made).

Once you are fully awake, you can have something to eat and drink. Check with your nurse when you can get out of bed. Most people are walking around later the same day and are ready to leave hospital later that day or the day after.

You may feel some discomfort, and there can be quite a lot of bruising at the place where the ICD was inserted, but these problems usually disappear soon afterwards. A doctor should prescribe painkillers for you to take if you need them while you are in hospital or at home.

You will need to be careful not to put too much pressure on the arm nearest the ICD (usually the left arm), or to lift that arm up too far. This is to try to help prevent the ICD leads moving before they settle into the heart's tissue. The staff in the hospital will advise you on the best way to sit up, and on how far you can move your arm – usually no higher than shoulder height.

The incision (cut) will be about 4 to 7 centimetres long. You will have a dressing over the wound. You may also have extra padding over it, to provide pressure to help stop any bleeding. It is important to keep the wound dry for the first few days while it heals, so try to make sure the dressing or padding doesn't get wet.

Before you leave hospital

You may have a chest X-ray before you go home, to check that the leads have not moved out of position.

Testing the ICD

Before you leave hospital, a cardiac physiologist will do some tests to check the ICD. The settings will also be checked. If necessary, the physiologist will program (adjust) the ICD using a special computer.

Information about your ICD

Before you leave hospital, you should be given some information on living with an ICD, including information on driving, and any activities you should avoid doing. For more on this, see page 33.

A cardiac physiologist will also explain any special features of your ICD. For example, some ICDs can be programmed to make a special sound or vibrate when they are about to deliver a shock, or when the battery is getting low, or if there are problems with the electrode leads. These features vary from one device to another.

You will also be given the phone number of your ICD clinic which you can call if you have any questions in the future. Most hospitals ask patients to contact the ICD clinic if their ICD delivers a shock. See page 46.

You will be given an **ICD identification card** which gives information about the type of ICD you have. Always carry this with you so that, if there is an emergency, the doctors, nurses or ambulance staff will know exactly what sort of device you have had implanted.

Arrhythmia nurses

Many hospitals now have specialist nurses such as arrhythmia nurses. You will see one of these nurses both at the hospital and at your follow-up appointments. They sometimes make home visits too.

Stitches

Most hospitals use soluble stitches which dissolve on their own, but sometimes people have stitches that have to be removed. If so, the practice nurse at your local GP practice can do this for you.

Letter for your GP

Before you leave hospital, you should be given a discharge letter which you can take to your GP, explaining that you have had an ICD fitted. The hospital will also write to your GP in the coming weeks to tell them that you have had an ICD implanted.

CASE STUDY Malcolm Coulson, 66

Malcolm was diagnosed with heart failure after having a heart attack. In 2010 he had coronary artery bypass surgery, but by this time his heart was functioning poorly and his heart failure symptoms were getting worse. It was suggested he have a CRT-D device fitted – which combines a special type of pacemaker and an ICD in one.

“I knew something had to be done as my heart muscle was very weak. I couldn’t walk very far and even found it difficult to simply bend down without becoming breathless.

My wife and I spoke to a specialist about the risks and benefits of having an ICD, and although we were given plenty of time to think about it, it was an easy decision.

Of course I was a little nervous about the procedure, but it all went smoothly and soon afterwards I felt an enormous sense of relief.

My heart failure symptoms have improved thanks to the pacemaker, and luckily although my ICD has never fired, I feel more confident knowing it is there should I ever develop a dangerous heart rhythm.”

Possible complications

Serious complications from having an ICD fitted are rare. However, there is always a small risk during any procedure to the heart. Some people who need an ICD already have a damaged heart and may be at greater risk from any form of surgery. Your cardiologist will discuss the risks with you before you have your ICD fitted.

Infection

There is a small risk of getting an infection at the site where the ICD is implanted. If, after you get home, your wound becomes a lot redder or more swollen, if you get a discharge from the wound, or if you develop a high temperature, contact your GP, practice nurse or your ICD clinic immediately. This is because, if you have an infection in the ICD site, it could spread. If you do get an infection, your doctor will prescribe antibiotics for you. Very occasionally, if the infection cannot be successfully treated, the ICD may have to be replaced.

Bruising

Bruising is common after the procedure. You may have bruising on your chest and arm for some weeks. If you are concerned about the bruising spreading or getting

worse, contact your ICD clinic or your GP.

Pneumothorax

There is a small risk of air leaking from the lungs into the chest (a pneumothorax) while the ICD is being implanted. The doctors will check for this on the chest X-ray you have before you leave hospital.

Technical problems

It is unusual to see a technical failure in an ICD although sometimes there can be problems – such as the ICD battery failing, or problems with the leads. When you go for your regular follow-up checks at your ICD clinic, they will make sure that the ICD is working well and will check for any possible problems.

Problems with the pulse generator

Occasionally, you may receive an inappropriate shock – when the ICD incorrectly analyses the rhythm as needing a shock when it does not need one. See page 46 for what to do if your ICD delivers a shock.

In some rare cases, the ICD may not give the correct treatment when it is needed. If you are unwell, and think the ICD may not have responded correctly, call 999 for an ambulance.

If you have a cardiac arrest and your ICD does not seem to have worked, you may need to have **external defibrillation**. This is when someone else uses a device called a defibrillator to give you an electrical shock to help your heart return to a normal rhythm. You may also need cardiopulmonary resuscitation (CPR). We describe what this involves on page 55. Both defibrillation and CPR can be given in the usual way to people who have an ICD.

Follow-up and battery life

Follow-up appointments

It is very important to have regular follow-up appointments at your ICD clinic, so you can have your ICD checked. Your appointments may be every 3 to 12 months, depending on the type of ICD you have and if it has delivered any treatment. You will have to have follow-up appointments for the rest of your life.

During each follow-up visit to your ICD clinic, the ICD will be checked electronically. Your ICD can store information about any arrhythmias you have had and any treatments the ICD has delivered to you. It can also give information about the battery life. This is done using a programmer – a small device which is placed on your skin over the ICD. It reads information from the ICD and can re-program the settings if necessary. You won't feel any pain at all while this is happening.

At your follow-up visit, you can also discuss any questions you have.

If, at any time, you have any problems or concerns about your ICD, you can contact the ICD clinic team.

Remote monitoring

With some ICDs, part of your follow-up can be done from your home by sending information about your heart rhythm and ICD function – either by phone or through the internet – to a remote monitoring centre. If any problems have developed, the centre will tell your ICD clinic about them. This is known as remote monitoring. This is done as well as your follow-up in the ICD clinic. It does not replace those appointments.

Your ICD clinic will tell you if you have an ICD which can be used with a remote monitoring device.

Battery life

An ICD battery lasts, on average, between four and six years, depending on the type of ICD used and how often it has delivered either pacing or electrical shocks. The battery will not be allowed to run out fully. When the battery runs low, you will need to have a new pulse generator fitted. You have to go back into hospital to have this done. A new incision will be made – usually on top of the old scar.

Everyday life with an ICD

Your ICD has been designed to allow you to lead as normal a life as possible. However, there may be some changes that you will need to make.

Driving

If you have an ordinary driving licence

If you have had ventricular fibrillation or ventricular tachycardia

After you have had your ICD implanted, you must tell the Driver and Vehicle Licensing Agency. (DVLA, Swansea, SA99 1TU. Phone 0300 790 6806.)

Many people will not be allowed to drive for the first six months after their ICD has been implanted.

You can start driving again as long as:

- you have had your ICD for at least six months
- your ICD has not delivered any electrical shocks or pacing treatment
- you haven't had any symptoms caused by your arrhythmia or by the ICD
- you go to regular follow-up sessions at your ICD clinic, and

- you don't have any other condition that disqualifies you from driving.

If, after you have got your driving licence back, you have any treatment from the ICD, you may have to stop driving for a further six months. After the six months, your licence will be reviewed again.

It is very important that you report any symptoms to your doctor or ICD clinic, in case they are due to your heart condition. This is because your driving could be affected and could cause a road accident. This could put your life, and other people's lives, at risk.

A small number of people who have had a ventricular arrhythmia and have an ICD implanted may be able to drive again after one month, as long as they meet certain conditions. For more information on this, talk to your doctor or contact the DVLA.

If you have not had ventricular fibrillation or ventricular tachycardia before

If you have not had ventricular fibrillation or ventricular tachycardia before, the driving restrictions described on page 33 apply for only one month rather than six months. This applies to people who have had an ICD fitted because they were at risk of getting ventricular fibrillation or ventricular tachycardia.

If you have to have your ICD battery changed, you must not drive for one week.

If you have to have an electrode lead repositioned, or a new electrode lead put in, you must stop driving for a month.

If you have a passenger-carrying vehicle (PCV) licence or a large goods vehicle (LGV) licence

If you have an ICD implanted, you will not be able to hold a PCV or LGV licence.

For more information on driving restrictions for people with an ICD, visit the DVLA website at www.dvla.gov.uk/medical or call them on 0300 790 6806.

Not being able to drive is a big lifestyle change for many people, so it may be worth planning beforehand how you will get around until you can start driving again.

Physical activity with an ICD

Building physical activity into your everyday routine will help with your recovery and help to keep you and your heart healthy.

After you have had your ICD fitted, you will be advised not to do any strenuous activity for about six weeks. For the first few weeks, don't lift the arm which is on the same side as your ICD above shoulder height, or carry anything too heavy with the arm on the side of the ICD. This is because there is a very small risk that one of the leads of the device might move out of position. However, during these first weeks it is very important to keep your shoulder mobile by gently moving the arm on the side of the ICD. You may need pain relief to help with this, especially in the first few days.

You can usually start most of your normal activities again within a few weeks of having the ICD fitted. Gradually build up your activity. Start slowly at a level that suits you and gradually build up the amount of time you spend doing the activity and how intensely you do it. If you are concerned about how much and what type of activity you can do, the staff at the ICD clinic, or the health professionals looking after you, can advise you about what is a safe exercise level for you.

Moderate-intensity physical activity is safe for most

people who have an ICD. Moderate-intensity activity means activity that makes you feel warmer and breathe harder, and makes your heart beat faster than usual, but you should still be able to carry on a conversation. It is important that you warm up before doing your activity and cool down afterwards. Begin your activity slowly for the first few minutes and build up gradually. When you come to the end of your activity, take time to slow down and cool down for a few minutes, and make sure you don't stop suddenly.

Stop exercising if you feel pain, dizzy, sick or unwell. If the symptoms come back or don't go away, see your doctor or go to your nearest accident and emergency department.

If you play sports such as football, you should take care to avoid collisions, as these could damage the ICD. You should discuss any contact sports with the staff at your ICD clinic. They might advise you to use a protective pad over the ICD site. Or, they may recommend that you don't play the sport at all.

Avoid doing activities that could be dangerous for you if your ICD were to deliver its defibrillation treatment – for example, scuba diving, or swimming on your own. Also, if you have an ICD, it may be difficult for you to get insurance cover for skiing or for sports classed as

'extreme sports'.

Most of the arrhythmias that trigger ICDs to deliver an electrical shock are significantly faster than your normal heart rate would reach, even with strenuous exercise. However, occasionally the ICD needs to be specially programmed to recognise the difference between a normal fast heart rate that you may achieve through strenuous exercise, and an abnormal fast heart rhythm. If you are concerned about this, ask about it at your ICD clinic.

Some people who have an ICD are limited in the type of activity or level of activity they can do, because of the underlying health condition which caused them to need the ICD in the first place. If you think this might apply to you, talk to your doctor or nurse.

For more information, see our booklet *Physical activity and your heart*.

Can everyday equipment interfere with my ICD?

ICDs are made to the highest standards and are rigorously tested. As a result, problems with interference are rare. An ICD has a metal case to protect it from damage and outside interference. It also has special circuits to detect and remove unwanted electrical activity and prevent interference.

If you have any questions, you should contact your ICD clinic or the company that made your particular ICD.

At home

Electrical equipment that you use at home – such as shavers, hairdryers and microwave ovens – will not be a problem, as long as it is well maintained. You can also use household tools such as drills, lawnmowers and electric screwdrivers.

Phones and computer equipment

Mobile phones and cordless phones

You can safely use your mobile phone or a cordless phone, but it is best to keep the phone more than 15 centimetres (about 6 inches) from your ICD. Try to use the ear on the opposite side to your ICD, and don't put either

type of phone in a shirt pocket over your chest.

You don't need to worry if someone else is using a mobile or cordless phone in the same room as you.

Hands-free kits and bluetooth

There has been no clear evidence of these devices affecting ICDs, but some manufacturers suggest that you use the ear on the opposite side to your ICD.

MP3 players, palm PCs and pocket PCs

You can use iPods and other brands of disk-based or solid-state MP3 players and palm or pocket PCs, as long as you don't place them directly over the ICD. Keeping at least 15 centimetres (6 inches) between the device and your ICD avoids any risk of interference. Avoid putting the headphones within 3 centimetres (just over 1 inch) of your ICD. And don't put them in a pocket near the ICD or let them dangle around your neck, even when you are not using them.

WiFi, wireless LAN and wireless internet for computers

There is no clear evidence to say that these interfere with ICDs.

Video-game machines

There is no clear evidence that devices such as Wii, Playstations or Xboxes have an effect on ICDs, but some games manufacturers advise you to keep the controllers at least 9 inches (about 23 centimetres) away from ICDs.

TENS machines and body-toning equipment

TENS machines (devices used for pain relief) and body-toning equipment use fast, short, high-voltage pulses.

TENS machines can be effective in treating joint pain and arthritis. However, if you have an ICD, you should avoid using a TENS machine as it can affect your ICD.

You can use body-toning equipment at or below thigh level, but avoid using it on your tummy area or above.

Airport security systems

Airport screening systems very rarely cause problems with ICDs. If you have an ICD, you should carry your ICD identification card with you when you travel by plane. The security metal detector can detect an ICD, so you need to tell the security staff that you have an ICD inserted. You should either have a hand search by one of the security staff, or be checked with a hand-held metal detector. The metal detector should not be placed directly over your ICD.

In some countries you may still have to go through the security system. If this happens, it is important that you move quickly through the gateway. It is unlikely that your ICD will be affected by going through these systems, but it's best not to stand close to the security screening system for too long.

Security systems in shops

Many shops have anti-theft detection systems in their doorways. If you walk steadily through and don't linger, there should be no effect on your ICD. It's best not to stand too close to this type of security system for long. Keep about one metre (three feet) away from it.

Metal detectors

Metal detectors may affect ICDs, so you should speak to your ICD clinic before using one.

Magnetic devices

Small magnetic devices, such as magnetic fasteners on items of clothing (usually on jackets) could affect your ICD. Clothes with magnetic fasteners usually carry a warning label. You should avoid wearing magnetic fasteners near your ICD.

At work

Some workplaces have strong electromagnetic fields which can interfere with your ICD. Arc-welding is an example. If you are concerned about any equipment used at your workplace, your ICD clinic will be able to give you detailed advice. The MHRA (Medicines and Healthcare Products Regulatory Agency) also has up-to-date information. Their contact details are on the next page.

Medical and dental tests and treatments

Most medical and dental tests will not affect the ICD, but some equipment may cause some interference, so always make sure that you tell whoever is treating you that you have an ICD.

MRI scans are hardly ever used for people who have an ICD, due to the MRI's strong magnetic field. So you must not have this test unless it has been discussed carefully both with you and with the staff at your ICD clinic.

If you have an accident or go to the accident and emergency department of a hospital for any reason, you should tell the doctors and nurses that you have an ICD, in case it needs to be checked again.

For more information

Each ICD manufacturer gives detailed instructions about what sources of electromagnetic interference you should avoid. If you have any questions about electrical interference, ask the staff at your ICD clinic for advice.

For more information, you may want to contact the MHRA. Their contact details are:

Medicines and Healthcare Products Regulatory Agency (MHRA)

151 Buckingham Palace Road

London SW1W 9SZ.

Phone: 020 3080 6000

Email: info@mhra.gsi.gov.uk

Website: www.mhra.gov.uk

Questions and answers

Will I be able to feel the ICD inside me?

Most people are aware of the ICD, but get used to it quickly. You may be able to feel the ICD under your skin, and in some people the outline of the ICD may show under the skin.

What does it feel like when the ICD delivers its treatment?

This varies greatly from one person to another. The information below is a rough guide to what it might feel like.

If an ICD is delivering **pacing** impulses, you may feel some palpitations – like a ‘fluttering’ in your chest.

If you have an arrhythmia that triggers the ICD to deliver an **electrical shock** (either as **defibrillation** or **cardioversion**), it is possible that you may collapse or become unconscious before the treatment is delivered. If this happens, you may not feel anything when you get the electrical shock. However, if you are conscious when the shock is delivered, it may feel like a fairly heavy thump in your chest or back. You may find this distressing – especially the first time it happens. The shock is less

intense than a shock from mains electricity or from a spark plug of a car.

Will I get any warning before the ICD delivers an electrical shock?

Some people don't get any warning before the shock is delivered. Other people can get warning symptoms before the shock – for example, dizziness or palpitations. If the rhythm disturbance is serious, it is possible that you may collapse before the shock is delivered. So, if you do get any warning symptoms, you should sit down or lie down so that you don't hurt yourself.

What should I do after the ICD has delivered an electrical shock?

Once the shock has been delivered and your heart is back in a normal rhythm, you may want to rest for a while afterwards.

Most hospital ICD clinics will ask you to let them know if the device delivers a shock. Ask your ICD clinic about when to contact them once your ICD has delivered its treatment. It may vary from one centre to another.

If you felt unwell before the ICD delivers its shock or feel unwell after recovering from the shock, you should call for an ambulance or get someone to take you to your

nearest accident and emergency department. The staff can then assess you and monitor your heart rhythm. They will contact your ICD clinic if necessary.

What happens if somebody is touching me when my ICD is delivering an electrical shock?

If someone is touching you when your ICD delivers a shock, they may feel a slight tingling sensation which is not dangerous for them.

You may 'jump' or 'cry out' when you feel the shock and this may frighten people who are with you. It is important that they stay calm, stay with you and reassure you.

Relatives and friends need to know that it is safe for them to be there, and also that, if you do get an electrical shock, it can be very comforting for you to have them there with you. Give your friends and relatives the phone number of your ICD clinic so that they will know who to contact if they are with you when your ICD delivers a treatment.

Will I still have to take my medicines?

After you have had your ICD implanted, you may still need to take medicines to help prevent any abnormal heart rhythms. You may also need to continue taking medicines for any other heart conditions that you may have – for

example, if you have angina or heart failure.

Can I travel abroad with an ICD?

If you are travelling abroad, your ICD clinic may be able to give you the name of a medical centre in the country you are visiting, to contact in an emergency. They may also provide you with a 'travel letter' containing information about the current settings for your ICD.

Some people have problems finding travel insurance when they have an ICD implanted. If this happens to you, we, the BHF, can give you a list of companies that may be able to provide insurance for you. This is based on feedback from heart patients.

See page 41 for information about going through airport security systems.

Is it normal to feel 'low' after the ICD has been implanted?

People can experience a range of feelings, both in hospital and when they go home. People take different amounts of time to adjust to having the ICD implanted, and to come to terms with the events that may have led up to having the ICD inserted. Most feel reassured that the device is there to treat a potentially life-threatening heart rhythm that may happen.

You may find that your sleep pattern is disturbed and you may feel more aware of your heartbeat. It will take time to adjust to this, but most people feel back to normal after a few weeks. It is normal to feel low or anxious after the ICD delivers a shock treatment. You may find it helpful to discuss how you are feeling with your GP or practice nurse, or at the ICD clinic.

Can I go back to a normal sex life?

Yes, as soon as you feel that you have recovered from having the ICD implanted – usually a few weeks after the procedure.

Some people worry that having sex may trigger the ICD to discharge an electrical shock. It is very rare for people to get a shock from their ICD during sex. If this does happen, your partner may feel a slight tingling sensation, but this is not dangerous for them.

You may find it helpful for you and your partner to talk to one of your ICD clinic team about sex, so that you can both feel reassured that it is as safe as other physical activities.

ICDs are for treating ventricular arrhythmias, but could I still get a different type of abnormal heart rhythm?

Yes. Some people with an ICD also get arrhythmias that come from the upper chambers of the heart (the atria) –

such as atrial fibrillation – which are not life-threatening. This can sometimes cause the heart to beat very quickly, and the ICD could deliver a shock because it detects a very fast heart rhythm. If this happens, your clinic may re-program your ICD to try to prevent this happening again. It is very important that you report to your ICD clinic any shocks that your ICD has given you.

What's the difference between an ICD and a pacemaker?

A pacemaker can prevent the heart from beating too slowly by 'pacing' the heart to make the heart rate faster. Some pacemakers can also pace to try and slow the heart rate down. Unlike ICDs, pacemakers **do not** give the heart an electrical shock.

An ICD can act as a pacemaker too, but it can also sense dangerous heart rhythms and if necessary delivers one or more small electrical shocks to restore the heart back to a normal rhythm.

What support is available to me and to my partner?

The support available varies from one hospital to another. Ask at your local ICD clinic what services are available. For example, there may be a cardiac rehabilitation programme, or a clinic where you and your partner can talk through any concerns with a specially trained health

professional. Or, there may be a support group where you can meet up with other people who also have ICDs. You and your family or your carer may benefit from meeting other people who have had similar experiences.

Call our **Heart Helpline** on **0300 330 3311** to find out if there is an ICD support group in your area. To find your nearest cardiac rehabilitation programme, ask your GP or your local hospital, visit www.cardiac-rehabilitation.net or call our **Heart Helpline** on **0300 330 3311**.

My partner and family want to restrict my activities now that I have an ICD. How do I reassure them that I can get back to my normal life?

It is not unusual for partners and relatives to be concerned about their loved one returning to normal activities. If you find that your partner or your family is being over-protective, it may help if you ask them to talk to your nurse, who can help to reassure them about your condition. Your friends or family may also find it helpful to read our booklet *Caring for someone with a heart condition*.

Remember:

- Always carry your ICD identification card with you.
- The staff at your ICD clinic can give you advice on any aspect of your ICD.

Deactivating the ICD

There may be certain circumstances in which your ICD needs to be deactivated (turned off). This may be temporary – for example, if you need to have surgery which involves ‘diathermy’ (a technique that uses electricity to produce heat for cutting the skin or sealing a bleeding blood vessel). You may also need to have your ICD deactivated if you are receiving inappropriate shocks. (See page 29.) Your heart rhythm will be closely monitored during this time.

There may also come a time when you decide that shock therapy from your ICD is no longer appropriate. If your health gets much worse and you are nearing the end of your life, deactivating the ICD will help you to die peacefully without unnecessary suffering. A specialist nurse, or another member of your ICD specialist team or from your ICD clinic, will be able to support you and your family in making this decision and arrange for your device to be deactivated.

How your support can help

The BHF has made a substantial contribution in the fight against heart disease and our researchers are continuing to try and understand the causes and effects of abnormal heart rhythms. This research could make it easier to diagnose people who might need an ICD, and hopefully, one day, avoid the need for them altogether.

We aim to play a leading role by continuing to support vital research. The number of people dying from heart and circulatory disease each year in the UK is falling. But this means that more people are living with the disease, so there is still a great deal to be done.

Our next big challenge is to discover how to help the heart muscle repair itself, and find a cure for heart failure. Visit our website [bhf.org.uk/findthecure](https://www.bhf.org.uk/findthecure) to find out about our Mending Broken Hearts Appeal and see how your support can help make a difference.

What is a cardiac arrest?

A **cardiac arrest** is when a person's heart stops pumping blood round their body and they stop breathing normally.

What to do if someone has collapsed and is not responding, and may be in cardiac arrest

Think DRS, ABC.

D = Danger

Check for **danger**. Approach with care, making sure that you, the person and anybody nearby are safe.

R = Response

Check for **response**. To find out if the person is conscious, gently shake him or her, and shout loudly, 'Are you all right?'

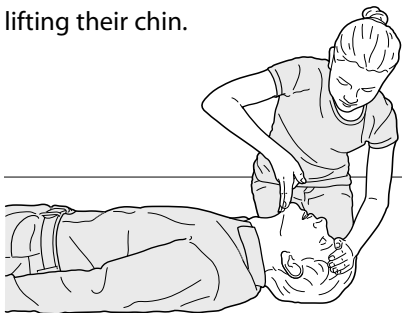
S = Shout

If there is no response, **shout** for help.

You will need to assess the person and take suitable action. Now, remember **ABC** – **airway, breathing, CPR**.

A = Airway

Open the person's airway by tilting their head back and lifting their chin.



B = Breathing

Look, listen and feel for signs of normal breathing. Only do this for up to 10 seconds. Don't confuse gasps with normal breathing. If you're not sure if their breathing is normal, act as if it is not normal.

C = CPR

If the person is unconscious and is not breathing normally, they are in **cardiac arrest**.

Call 999 immediately.

- Send someone else to call 999 for an ambulance while you start CPR.
- **Or, if you are alone with the person, call 999 before you start CPR.**



How to do CPR

If you have not been trained to do CPR, or if you're not able, or not willing, to give rescue breaths, do hands-only CPR. This is described in step 1 on the next page. Keep doing the chest compressions – at a rate of about 100 to 120 times a minute – until:

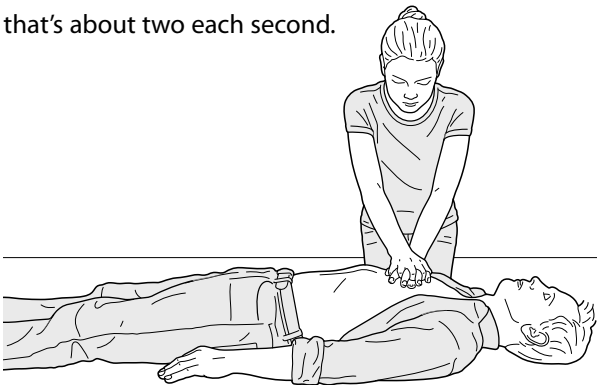
- the ambulance crew arrives and takes over, or
- the person starts to show signs of regaining consciousness, such as coughing, opening their eyes, speaking, or moving purposefully **and** starts to breathe normally, or
- you become exhausted.

CPR

1 Chest compressions

Start chest compressions.

Place the heel of one hand in the centre of the person's chest. Place the heel of your other hand on top of your first hand and interlock your fingers. Press down firmly and smoothly on the chest 30 times, so that the chest is pressed down between 5 and 6 centimetres each time. Do this at a rate of about 100 to 120 times a minute – that's about two each second.

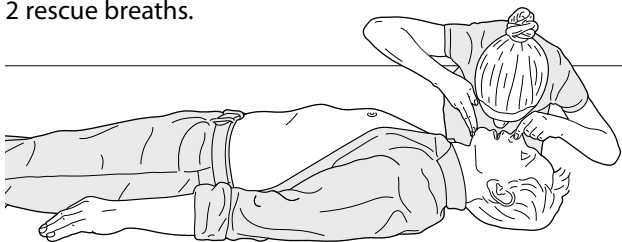


2 Rescue breaths

After 30 compressions, open the airway again by tilting the head back and lifting the chin, and give two of your own breaths to the person. These are called rescue breaths.

To do this, pinch the soft parts of the person's nose closed. Take a normal breath, make a seal around their mouth with your mouth, and then breathe out steadily. The person's chest should rise and fall with each breath. It should take no more than 5 seconds to give the two rescue breaths.

Then give another 30 chest compressions and then 2 rescue breaths.



3 Continue CPR

Keep doing the 30 chest compressions followed by 2 rescue breaths until:

- the ambulance crew arrives and takes over, or
- the person starts to show signs of regaining consciousness, such as coughing, opening their eyes, speaking, or moving purposefully **and** starts to breathe normally, or
- you become exhausted.

For more information

British Heart Foundation website

bhf.org.uk

For up-to-date information on heart disease, the BHF and its services.

Heart Helpline

0300 330 3311 (a similar cost to 01 or 02 numbers)

For information and support on anything heart-related.

Genetic Information Service

0300 456 8383 (a similar cost to 01 or 02 numbers)

For information and support on inherited heart conditions.

Booklets and DVDs

To order our booklets or DVDs:

- call the BHF Orderline on **0870 600 6566**
- email **orderline@bhf.org.uk** or
- visit **bhf.org.uk/publications**

You can also download many of our publications from our website. For a list of resources available from the BHF, ask for a copy of *Our heart health catalogue*. Our booklets are free of charge, but we would welcome a donation. (See page 2 for how to make a donation.)

Heart Information Series

This booklet is one of the booklets in the *Heart Information Series*. The other titles in the series are as follows.

Angina

Atrial fibrillation

Blood pressure

Cardiac rehabilitation

Caring for someone with a heart condition

Coronary angioplasty

Diabetes and your heart

Having heart surgery

Heart attack

Heart rhythms

Heart transplantation

Heart valve disease

Implantable cardioverter defibrillators (ICDs)

Keep your heart healthy

Living with heart failure

Medicines for your heart

Pacemakers

Peripheral arterial disease

Physical activity and your heart

Primary angioplasty for a heart attack

Reducing your blood cholesterol

Returning to work with a heart condition

Tests for heart conditions

Our services

For more information about any of our services, contact the **Heart Helpline** on **0300 330 3311** or visit **bhf.org.uk**

Emergency life support skills

For information about Heartstart – a free, two-hour course in emergency life support skills, including what to do if someone seems to be having a heart attack – call the **Heart Helpline** on **0300 330 3311** or visit **bhf.org.uk**

Heart Matters

Heart Matters is the BHF's **free**, personalised service that provides support and information for people who want to improve their heart health. Join today and enjoy the benefits, including *heart matters* magazine and an online members' area. Call the **Heart Helpline** on **0300 330 3311**, or join online at **bhf.org.uk/heartmatters**

Heart support groups

Local heart support groups give you the chance to talk about your own experience with other heart patients and their carers. They may also include exercise classes, talks by guest speakers, and social get-togethers. To find out if there is a heart support group in your area, contact the **Heart Helpline** on **0300 330 3311**.

Make yourself heard – Heart Voices

Heart Voices gives you the skills, confidence and knowledge you'll need to influence health services for the benefit of heart patients and their families across the UK. It aims to develop a nationwide network of representatives to speak out on behalf of heart patients and their carers, and to provide them with training and opportunities to have their say and get involved.

Useful organisations

Arrhythmia Alliance

The heart rhythm charity

Phone: 01789 450787

Website: www.heartrhythmcharity.org.uk

Email: info@heartrhythmcharity.org.uk

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Have your say

We would welcome your comments to help us produce the best information for you. Why not let us know what you think? Contact us through our website **[bhf.org.uk/contact](https://www.bhf.org.uk/contact)**. Or, write to us at the address on the back cover.

Acknowledgements

The British Heart Foundation would like to thank all the GPs, cardiologists, nurses and other health professionals who helped to develop the booklets in the *Heart Information Series*, and all the patients who commented on the text and design.

Particular thanks for their work on this booklet are due to:

- Dr Andrew Grace, Consultant Cardiologist, Papworth Hospital, and
- Amanda Smith, Lead Heart Failure Nurse, NHS Highland.

We are the nation's heart charity, dedicated to saving lives through pioneering research, patient care, campaigning for change and by providing vital information. But we urgently need your help. We rely on your donations of time and money to continue our life-saving work. Because together we can beat heart disease.

bhf.org.uk

 Heart Helpline
0300 330 3311
bhf.org.uk

Information & support on anything heart-related. Phone lines open 9am to 5pm Monday to Friday. Similar cost to 01 or 02 numbers.

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180 Hampstead Road
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T 020 7554 0000
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