

An elderly couple is walking on a beach at sunset. The man is on the left, wearing a light blue polo shirt and khaki shorts, and the woman is on the right, wearing a white and grey striped long-sleeved shirt and khaki pants. They are holding hands and looking towards the ocean. The background shows a calm sea and a bright, hazy sky from the setting sun.

**Medtronic**

Engineering the extraordinary

Life with  
an extravascular<sup>\*</sup>  
implantable  
cardioverter  
defibrillator  
(EV-ICD)

\* an ICD with the lead outside  
the heart & blood vessels

# What is in this booklet

Help with some of the technical words in this booklet .....	4
The heart .....	6
What is tachycardia? .....	7
Signs of tachycardia .....	7
Causes of tachycardia .....	8
What is heart failure? .....	8
What is a heart attack? .....	9
What is sudden cardiac arrest (SCA)? .....	9
What are the differences between heart attack and SCA? .....	9
Who is at risk of SCA? .....	10
Know your ejection fraction .....	10
Treating SCA through defibrillation .....	12
What is the difference between a traditional ICD and an EV-ICD? ....	13
How does an EV-ICD work? .....	14
Getting an EV-ICD put in .....	14
Follow-up care and monitoring .....	17
Remote monitoring of your EV-ICD .....	19
Can I still have an MRI scan? .....	19
The EV-ICD in your daily life .....	20
Commonly asked questions .....	22
Safety measures .....	26
Household and hobby items .....	26
Tools and industrial equipment .....	29
Communications and office equipment .....	32
Medical and dental procedures .....	36
Vehicles and related items .....	37
Questions you may want to ask your doctor when they suggest an EV-ICD .....	38
Keeping a positive attitude towards living with an EV-ICD .....	40
Educational resources and support .....	40



If you or someone you love has been diagnosed with a fast heartbeat (tachycardia), has had a heart attack or has heart failure, this booklet is to help you understand the heart condition. It explains how a defibrillator fitted inside your body (ICD) can help to treat it. It also looks at what to expect before and after you get an ICD.

# Help with some of the technical words in this booklet

Words typed in orange in the rest of this booklet are explained here.

Word or phrase	Meaning
<b>Arrhythmia</b>	When your heart is not beating normally. It could be too fast, too slow or not beating regularly
<b>ATP or anti-tachycardia pacing</b>	Small, electrical signals sent to your heart from a device called an internal cardioverter defibrillator (ICD). This type of treatment can correct your heart rate without a shock if your heart is beating too fast or not beating regularly
<b>AED or automated external defibrillator</b>	A heart treatment machine that can be carried around. It is usually just called a defibrillator. It is used by emergency response teams or the general public to send shocks to someone's heart to reset a normal heartbeat
<b>Cardioversion</b>	A treatment used to bring back a normal heartbeat. This can be done using medicine or a device called a defibrillator.
<b>Defibrillation</b>	When a device called a defibrillator is used to send an electrical signal or shock to your heart to bring back a normal heartbeat.
<b>Ejection fraction or EF</b>	A measure of how well your heart is pumping blood around your body. Your care team will usually measure your EF through a test called an echocardiogram. This test can tell what percentage of blood is pumped out of your heart with each heartbeat. The number is given as a percentage, which is called your ejection fraction or EF

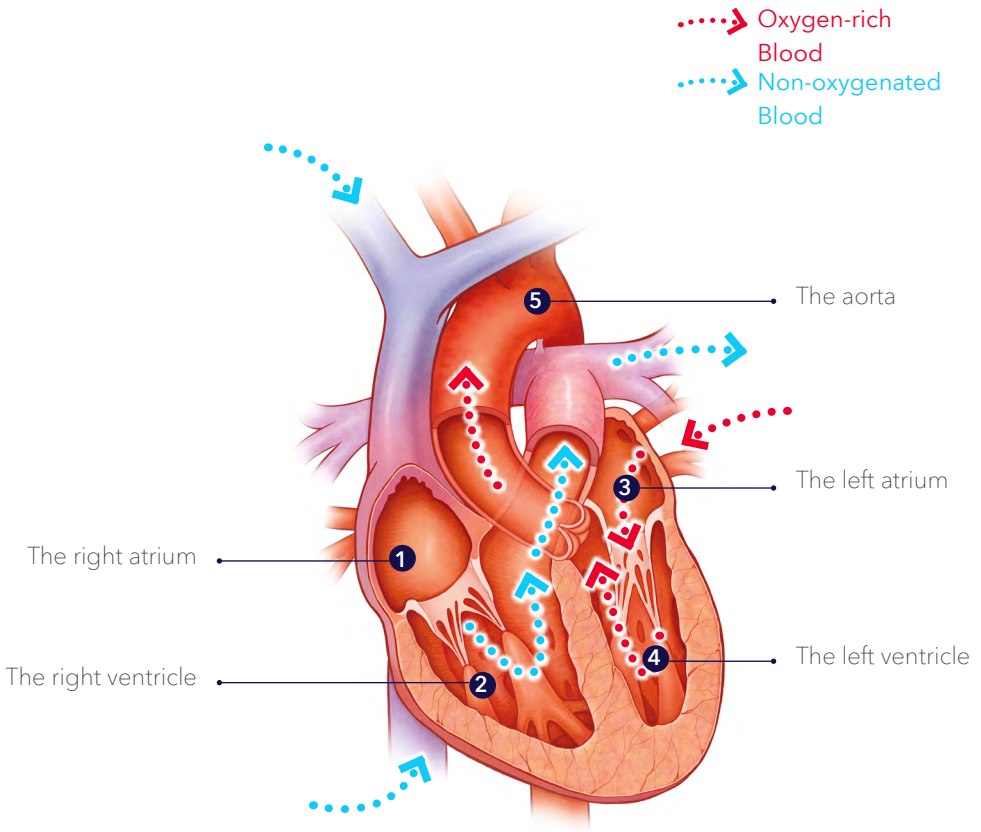
Word or phrase	Meaning
<b>Extravascular</b>	Outside the system that circulates blood around your body. When talking about an 'extravascular implantable cardioverter defibrillator or EV-ICD', extravascular means that the lead sending signals from the ICD part of the machine to your heart is fitted outside your heart. But both the lead and the ICD are fitted inside your body.
<b>Heart attack</b>	When not enough blood is reaching your heart. A heart attack is also sometimes called a myocardial infarction or MI
<b>Heart failure</b>	When your heart cannot pump your blood round your body properly
<b>ICD or internal cardioverter defibrillator</b>	A small computer that is fitted inside your body to keep a constant check on your heart rate. It can automatically send electrical signals or shocks when needed to reset a normal heartbeat
<b>Lead</b>	A thin soft wire that sends signals from the ICD to your heart. It also sends information from your heart to the ICD
<b>Remote monitoring</b>	When your EV-ICD can send information to your care team from wherever you are
<b>SCA or sudden cardiac arrest</b>	When your heart stops suddenly. This happens because the natural electrical signals that usually keep it pumping have gone wrong
<b>Programmer</b>	A small computer kept at your doctor's office. Your doctor uses the programmer to read information stored in your EV-ICD.
<b>Tachycardia</b>	When your heart is beating too fast

# The heart

The heart is a fist-sized organ that pumps blood round the body. Regular electrical signals keep the heart pumping. The heart has four sections:

- Two top sections - a right atrium and a left atrium.
- Two bottom sections - a right ventricle and a left ventricle.

The right atrium (number 1 in the picture below) pumps blood that has had all its oxygen used up in the rest of the body to the right ventricle (2). The right ventricle sends this blood to the lungs. The lungs add oxygen to the blood, which travels to the left atrium (3) then on to the left ventricle (4). This pumps the blood, which is now full of oxygen, to the rest of the body through a large blood vessel called the aorta (5). The oxygen is used to give the body energy.



# What is tachycardia?

**Tachycardia** is when your heart beats too fast. A healthy heart beats 60 to 100 times per minute, pumping about 280 liters of blood every hour. Exercise, stress or fear can cause your heart to beat faster, but this is normal. With tachycardia, your heart beats at more than 100 beats per minute for no specific reason. It can beat as fast as 400 times per minute. When your heart beats too fast, it cannot pump blood effectively to the body and brain.

There are different types of fast heartbeat. They have different names. They can happen in any of the four sections of the heart:

- Atrial flutter and atrial fibrillation start in the top sections of the heart.
- Ventricular tachycardia and ventricular fibrillation start in the bottom sections of the heart.

## Signs of tachycardia

If your heart beats too fast you may have a range of symptoms such as:

- Being short of breath.
- Being dizzy.
- Suddenly feeling weak.
- A fluttering feeling in the chest.
- Feeling lightheaded.
- Fainting.

# Causes of tachycardia

Tachycardia can be caused by different things, including:

- Heart-related conditions such as high blood pressure (hypertension).
- Poor blood supply to the heart because of coronary artery disease (atherosclerosis), heart valve disease, heart failure, heart muscle disease (cardiomyopathy), tumors or infections.
- Other medical conditions such as thyroid disease, some lung diseases, electrolyte imbalance, and alcohol or drug abuse.
- Emotional stress.
- Drinking lots of alcoholic drinks or drinks with caffeine in them.

## Risk factors:

Certain conditions can increase your risk of having tachycardia, including:

- Coronary artery disease (atherosclerosis).
- Heart failure.
- Heart attack (myocardial infarction).
- Heart problems you are born with (congenital heart defects).
- Illnesses that cause your heart to be inflamed or that make parts of it weaker over time.
- Long-term lung disease.

# What is heart failure?

**Heart failure** is when your heart cannot pump blood round your body properly. It does not mean your heart has stopped pumping completely. Because your heart is not pumping enough blood to meet the needs of your body, you might feel tired, not have enough energy, be short of breath and notice extra fluid collecting in your body.

# What is a heart attack?

A **heart attack** happens when not enough blood is reaching your heart because of a blockage somewhere. A heart attack is also called myocardial infarction.



# What is sudden cardiac arrest?

**Sudden cardiac arrest (SCA)** is when an electrical problem in your heart sets off a dangerously fast heart rhythm (ventricular fibrillation). The fast, heartbeats that are not regular means your heart stops pumping. This means oxygen cannot reach the body and brain. If not treated straight away, SCA can be fatal. SCA is one of the top killers. It claims more lives than breast cancer, AIDS or lung cancer<sup>1</sup>.

## What are the differences between heart attack and SCA?

Sudden cardiac arrest is not the same as a heart attack, although the two are often confused.

A heart attack happens when not enough blood is reaching your heart because of a blockage somewhere. A heart attack is also called myocardial infarction.

	Heart attack	Sudden cardiac arrest
<b>What kind of problem</b>	A circulation or plumbing problem	An electrical problem
<b>Cause</b>	Blockage in a vessel that supplies blood to the heart. A blockage like this can permanently damage part of the heart	Electrical problem in the heart which stops the heart pumping so that there is no blood flow to the body and brain
<b>Risk factors</b>	High cholesterol, high blood pressure, obesity, smoking, family history of a heart attack, diabetes and coronary artery disease	Previous heart attack, heart failure, abnormal heart rhythm, low ejection fraction (EF of 35% or less), family history of SCA
<b>Signs</b>	Signs include a feeling of pressure in the chest, pain spreading to the arm, being short of breath, sweating, and being or feeling sick	Often no signs. Sometimes a racing heartbeat, feeling lightheaded, dizzy and fainting

# Who is at risk of SCA?

Often, SCA strikes without warning. People who are at a higher risk for SCA include<sup>2</sup>:

- People who have had a heart attack.
- People who have heart failure.
- People who have had a previous SCA or who have a family member who has had an SCA .
- People with a low ejection fraction (EF).

## Know your ejection fraction (EF)

Your EF - or **ejection fraction** - is the percentage of blood pumped out of your heart with each heartbeat. Your doctor uses your EF number to find out how well your heart is pumping. Your EF number can change over time, so it is important for you and your doctor to check it regularly. Your doctor will tell you how often it needs to be checked.

The most common way to measure EF is with an echocardiogram. This test is usually done in a doctor's office or a hospital.

Chart of typical EF ranges<sup>3</sup>.

50-75%

Heart's pumping  
ability  
**is normal**

36-49%

Heart's pumping  
ability  
**is below normal**

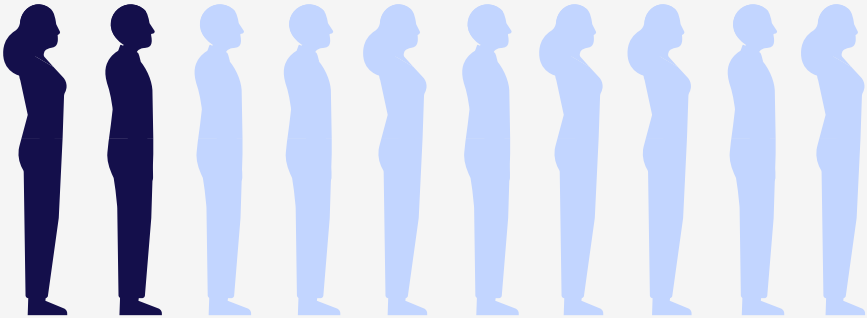
35%

and below. Heart's  
pumping ability  
**is low**

## The risks of SCA

People with a low EF - 35% or below - are at an increased risk for SCA<sup>3</sup>.

Sudden cardiac arrest causes around **20% of all deaths in Europe**<sup>4</sup>.



# Treating SCA through defibrillation

The best way to treat SCA is through defibrillation<sup>2</sup>. Defibrillation is when an electrical shock is sent to your heart to bring back a normal heart beat.

There are two main forms of defibrillation:

- An **automated external defibrillator, or AED**, is a machine that can be carried around. It is used by emergency response teams or the general public to send shocks to someone's heart to reset a normal heart beat.
- An **internal cardioverter defibrillator, or ICD**, is a small computer that is fitted inside your body to keep a constant check on your heart rate. It can send electrical signals or shocks when needed to reset a normal heartbeat.



EV-ICD with lead

# What is the difference between a traditional ICD and an EV-ICD?

ICDs and an EV-ICDs both have a defibrillator and a **lead**.

- **The defibrillator** part is a small computer that keeps a constant check on your heart rate. If it sees that your heart is beating too fast it automatically sends electrical signals or shocks to bring back a normal heartbeat. The defibrillator is about the size of a matchbox. A traditional ICD is put in just under your collarbone. The EV-ICD goes under the left armpit.
- **The lead** is a thin soft insulated wire about the size of a spaghetti noodle. It sends electrical signals from your heart to the defibrillator. It also sends electrical signals or shocks to your heart from the defibrillator.

**With a traditional ICD, the lead is placed in your heart through a vein. With an EV-ICD, the lead is put in outside the heart but still inside your body.**



An EV-ICD compared to a one Euro coin



# How does an EV-ICD work?

An EV-ICD keeps a check on your heartbeat 24 hours a day. If your heart is beating too fast or not beating regularly, the ICD will first send small electrical signals to correct your heart rate (this is called **anti-tachycardia pacing** or ATP). If the fast heartbeat carries on, the defibrillator will send an electric shock to reset your normal heartbeat. This electric shock is called **cardioversion** or **defibrillation**.

The EV-ICD can also treat a heartbeat that is too slow by sending electrical signals to the heart.

Your doctor will set up the EV-ICD so that you get the best treatment for your specific heart condition.

## The EV-ICD battery

The energy needed for the EV-ICD to work comes from a battery. The battery is sealed inside the ICD. How long the battery lasts depends on several things. For instance, how often the EV-ICD sends signals to your heart.

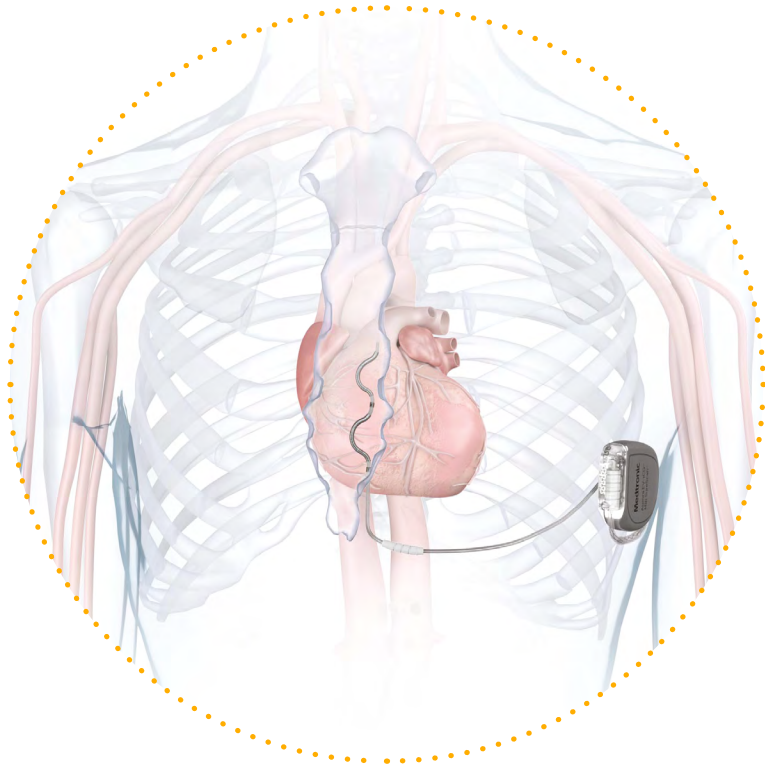
The battery can last up to 10 years<sup>6</sup>. When the battery power falls to a low level, the ICD will need to be replaced. The lead does not usually need to be changed.

# Getting an EV-ICD put in

A cardiologist (heart doctor) will put in your EV-ICD. You will be given a general anesthetic. You will have a chance to ask your care team questions and talk with them about any concerns and or fears.

## How is an EV-ICD put in?

- Your surgeon makes a small cut just below the tip of your breast bone (sternum). The lead is pushed through this cut and into the space underneath your breast bone. The lead has curves in it to help keep it in place next to your heart.
- Once it is in place, the lead is tested to make sure it can accurately keep a check on your heart rate and send the right treatments.
- Next, your surgeon makes a cut under your left armpit . A tool guides the free end of the lead out through the new cut so that the lead can be joined to the ICD.
- Your doctor sets up EV-ICD to give you the best treatment for your specific heart condition. The ICD is then placed under your skin and the cut is closed.



After the surgery, you may have discomfort or pain and there can be bruising. Any pain should improve over time, usually in one to two weeks. Your doctor can tell you how to manage any pain or swelling. This might be with pain killers, use of ice-packs, rest and so on. It is best to follow your doctor's advice. Let your care team know if what you have been asked to do is not keeping your pain under control.

In the first few weeks after your surgery:

- **Call your doctor straight away** if there is any swelling, warmth around the wound under your arm, or liquid draining from it.
- **Call your doctor straight away** if your body temperature rises.
- Ask your doctor what to do about exercising and bathing.
- Wear loose tops so you do not irritate your wound.
- Do not lift anything weighing more than 15 pounds or seven kilograms.
- Do not push or pull anything heavy.
- Do not twist the main part of your body suddenly.

Follow your doctor's suggestions about the best way to get back to normal activities. Expect to get better slowly.

It is normal for the EV-ICD to cause a slight bulge under your skin.

Give yourself a few weeks to get used to your EV-ICD.

You will be given an EV-ICD identification card. Always carry it with you as it contains important information about your EV-ICD.

Tell your other doctors and your dentist that you have an EV-ICD. They may prescribe antibiotics for you to take before and after surgery or dental work. Antibiotics will lower the risk of any infection.

## Replacing your EV-ICD

The EV-ICD is set up to let your doctor know when the battery power falls to a low level. When this happens, the whole ICD needs to be replaced as the battery is sealed inside it. To replace it, your surgeon makes a cut over the old scar and removes the old ICD. The lead is fastened securely to the new ICD and, after it has been checked, the new ICD is connected, tested and put in place. The lead hardly ever needs to be changed.



# Follow-up care and monitoring

Your doctor will set follow-up appointments. During a follow-up appointment, you should tell your doctor about any problems you have had. You can also ask questions and talk about any concerns and fears.

The ICD can be thoroughly checked at a follow-up appointment. Your doctor may:

- Check the battery
- Check the lead
- Check and adjust (if needed) the programming of the EV-ICD
- This is done through a **programmer**, a small computer kept at your doctor's office. Your doctor will use the programmer to read information stored in your EV-ICD

As well as these appointments, you should contact your doctor if any of the following list happens:

- If the scar under your arm becomes red, moist or swells.
- If your EV-ICD starts to beep. Your EV-ICD does automatic self-checks. If it starts to beep, this lets you know that something needs attention. Usually, you should contact your doctor as soon as possible for instructions. You do not need to contact your doctor if you hear a solid, 10-second sound. This means your ICD came close to a strong magnet. You can simply move the magnet away from your ICD and carry on with your day.
- If your EV-ICD sends you a shock. Your EV-ICD will only send a shock if it is needed. The EV-ICD will first try to reset your normal heartbeat as gently as possible. If this does not work, the ICD will send a shock to your heart.

## What does a shock from your EV-ICD feel like?

Some people are unconscious when their ICD gives them a shock, but others are not and may feel what is happening. Different people feel the shock differently. It can feel like a sharp or painful kick in the chest. The muscles in your chest and upper arm may tighten so strongly that you jump up in fright. Try not to worry if this happens as it simply means that the ICD is doing its job. Anyone touching you at the time you get the shock may feel it as a muscle spasm or a tingle. It will not hurt the person touching you.

It is normal to be worried about getting a shock but it may save your life.

You and your doctor should have a shock plan, which says what to do if you get a shock. Different doctors might have slightly different plans depending on your condition and local facilities.

A shock plan will be something like the example below.

Call your doctor during normal business hours:

- If you had only one shock
- If you feel OK.
- If you do not have symptoms such as chest pain, shortness of breath or fast heartbeat

Call your doctor immediately or go to the emergency department:

- If you passed out.
- If you have symptoms like chest pain, shortness of breath, lightheadedness, confusion, dizziness or fast heartbeat.
- If you got shocked more than once in 24 hours.

**Ask your doctor for a shock plan.  
Different doctors may have  
different plans.**



# Remote monitoring of your EV-ICD

In some cases, it is possible for your EV-ICD to send information to your care team from wherever you are. This is called remote monitoring. It gives your doctor easy access to information that helps them look after your heart condition and your EV-ICD.

Millions of people who have ICDs fitted are remotely monitored.

## How remote monitoring works

A small bedside monitor or an app on your smartphone or tablet sends information from your EV-ICD to your care team. Information is sent automatically as set up by your doctor. Your EV-ICD is able to let your doctor know when it notices that your heart is not beating regularly, for example.

Your doctor and care team can look at the information sent by your ICD on a secure website.

Your EV-ICD and the information it sends have built-in protection to stop hacking. It can only be programmed by your doctor using the programmer in their office.

## Can I still have an MRI scan?

Your EV-ICD is designed so that you can safely have a magnetic resonance imaging (MRI) under certain conditions. Your doctor needs to check a few things first and then program your device accordingly. An MRI scan is a type of test that allows your doctor to see inside your body. It is used to help doctors treat lots of illnesses and injuries.

# The EV-ICD in your daily life

Most people quickly get used to their EV-ICD. Once the cut under your arm has completely healed, you should be able to get back to all sorts of activities such as walking, working in the garden, playing sports or bathing. But rough physical contact that could cause you to fall or to hit your implant site could damage your ICD or the lead. Check with your doctor which activities you can safely start again.

Speaking with your family and friends about the ICD can make you feel more secure.

Support groups and associations can also be helpful.

Most items that you use or come into contact with in daily life will not affect how your EV-ICD works. However, items that make or use electricity, or transmit wireless signals, have electromagnetic fields around them. If you get too close to an electromagnetic field it can sometimes stop your device from working properly for a short while. For example, it might send a treatment that is not needed or not send a treatment that is needed. For this reason, it is best to keep a distance of at least six inches or 15 centimeters between certain items and your ICD, as explained in the next few pages.

Electrical equipment that is not in good working order or not properly put together can cause an electrical current to flow into your body. If this happens, it could affect how your ICD is working.

## What to do if you think an item is affecting your ICD?

If you feel dizzy, lightheaded, have a change in your heart rate or you get a shock while using an item, let go of whatever you are touching or move away from it. Your ICD is designed to quickly return to working normally if it is affected. It is not likely to be damaged. But if your symptoms carry on, contact your doctor as soon as possible.



# Commonly asked questions

## Use of a cell phone

Mobile devices are safe to use as long as you keep at least six inches or 15 centimeters between them and your ICD. Keep this distance in mind when using a cell phone, tablet computer or other mobile device. Also, try to use your phone on the right ear and do not put your phone in a pocket near your ICD.

## Activities and intimacy

Your ICD will allow you to get back most activities and hobbies. For instance, bowling, golfing, playing tennis, gardening, fishing and so on. But the heart condition your ICD is treating might have an effect on what you can do. You need to discuss this with your doctor.

Most people are able to return to work. You and your doctor will make this decision together. The timing will depend on many things, including the type of work you do.

Intimacy is a normal part of life. People usually get back to sexual activity when they feel comfortable. Your ICD will allow your heartbeat to rise normally, for example when having sex, without giving you a shock. If you receive a shock during intimacy or other activities, contact your doctor. Your doctor will then work out what caused the shock and can make changes to the ICD settings if needed.

## Anti-theft detectors and airport security systems

It is unlikely that your ICD will be affected by metal detectors (walk-through archways and hand-held wands) or full body imaging scanners such as those found in airports. To lower the risk of any problems while going through security screening, do not pause or stop in a walkthrough archway. Instead, walk through at a normal pace. If a hand-held wand is being used, ask the security operator not to hold it over your ICD and not to wave it backwards and forwards over your ICD. You can also ask for hand screening instead. If you are worried about electronic security screening, show your EV-ICD identification card and ask for hand screening. Flying is perfectly safe for people with an EV-ICD. The pressure and altitude will not affect your ICD.

## Travelling

Talk to your doctor before going on a long journey. They can give you contact details of hospitals in the countries you are visiting in case of any emergency. They can also help you to find a heart doctor in these hospitals if you need a follow-up visit.

## Driving

People fitted with a defibrillator are at risk of sudden treatment or a heart problem that might cause harm while driving a car. Driving rules are different across different countries in Europe<sup>7</sup>.

Talk to your doctor about rules you might need to follow.

## Household appliances

Most household appliances are safe to use as long as they are in good working order. This includes microwave ovens, washing machines, tumble dryers, electric blankets and heating pads.



## Magnets

There is a small sensor built into your ICD that stops it from sending any treatment when it detects a strong magnetic field. For this reason, it is sensible to **keep any item that has magnets in it at least six inches or 15 centimeters from your ICD**. If your ICD is affected by a magnet, it will sound out a solid tone for 10 seconds. If you hear a 10-second tone from your ICD, find the magnet and move it away from your device. There is no need to contact your doctor.

You may not always know if an item has a magnet in it. However, if you use household items as they are meant to be used and they are properly looked after, they should not affect your ICD even if they contain a magnet. This includes microwaves, kitchen appliances, cordless phones, radios, televisions, video games, CD players, hair dryers, electric shavers, electric toothbrushes, electric blankets, leaf blowers, lawn mowers, garage door openers, computers, children's toys and small shop tools.

It is hard to keep magnets in magnetic mattress pads and pillows away from your ICD so it is sensible not to use them.

## Welding and chainsaws

Unlike most household power tools, welding equipment can sometimes affect how your ICD is working. If you need to do any welding, talk to your doctor first.

Welding with currents above 160 amps is especially likely to affect how your ICD works. It is sensible not to use welding currents above 160 amps.

When welding with currents under 160 amps, you can follow the safety steps below:

- Work in a dry place with dry gloves and shoes.
- Keep a 60 centimeter or two-foot distance between the welding arc and your ICD.
- Keep the welding cables close together and as far away as possible from your ICD. Place the welding unit approximately five foot or 1.5 meters from the work area.
- Connect the ground clamp to the metal as close to the point of welding as you can.



- Arrange the work so the handle and rod will not contact the metal being welded if they are dropped.
- If you have trouble starting a weld, wait several seconds between tries.
- Work in an area that offers firm footing and plenty of room for movement.
- Work with a partner who you have talked to about your situation and who understands these steps.
- Immediately stop welding and step away from the area if you start feeling lightheaded or dizzy, or your ICD has delivered a shock.

Your doctor can tell you how much risk there is with welding and your particular medical condition. Aprons or vests will not shield your device from the electromagnetic energy generated by welding equipment.

Although a chainsaw is not likely to cause problems with your ICD, it is a very dangerous tool. So if it does affect your ICD and you have symptoms such as becoming dizzy or lightheaded, a running chainsaw might be more dangerous than some other power tools.

You can follow the safety steps below to keep the risk low of your chainsaw affecting your ICD:

- Keep a distance of six inches or 15 centimeters between the motor of an electric chainsaw and your device.
- Be sure an electronic chainsaw is properly grounded.
- Run it through a ground fault circuit interrupter or circuit breaker.
- If using a petrol or gas-powered chainsaw, keep a distance of 12 inches or 30 centimeters between the ignition system and your ICD. It is better to use a saw that has the spark plug located away from the hand grips.
- If you start feeling lightheaded or dizzy, or your EV-ICD has delivered a shock, immediately stop cutting and turn off your chainsaw.
- Do not work on the engine while it is running.
- Do not touch the coil, distributor or spark plug cables of a running engine.

# Safety measures

The next few pages give guidelines for safety measures for different tools and activities:

- Household and hobby items.
- Tools and industrial equipment.
- Communications and office equipment.
- Medical and dental procedures.
- Vehicles and related items.

## Household and hobby items

Most household and hobby items are unlikely to affect your ICD. Items should be in good working order, be used as they are meant to be used and be kept at the suggested distances from your ICD. For items that transmit power through an antenna, it is recommended that you follow the distances noted below between the antenna and your ICD.

### Special considerations

**Keep at least the distances given below between the item and your ICD:**

---

#### **12 inches or 30 centimeters**

---

- Car and motorcycle ignition systems
- Electric fence
- Transformer box (sometimes a green box in yard or garden)

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#### **Two feet or 60 centimeters**

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- Search head of metal detector
- Induction cooking hob

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#### **Not recommended**

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- Abdomen stimulator
- Magnetic mattress pad or pillow

## Minimal risk

Keep at least a **six inches or 15 centimeters** between the item and your ICD:

- Air filter—ionized
- Bingo wand
- Disney MagicBand reader
- Exercise bike—wheel magnet
- Guitar speakers—electric
- Hair dryer—handheld
- Hair shaver or trimmer—corded
- Home security system—from transmitter
- House arrest bracelet
- Jewelry clasp—magnetic
- Kitchen appliances—electric handheld
- Laser tag—from magnet or transmitter in some vests
- Magnetic chair pad
- Magnetic therapy products
- Magnets
- Massager—handheld
- Model cars, airplanes, video drones—remote controlled, from controller antenna
- Pet shock collar for electric pet fence—including remote control and base with antenna
- Qi inductive mobile telephone charger
- Refrigerator door—from magnetic closure strip
- Sewing machine or serger overlocking machine—from motor
- Smart meter—used by utility companies
- Static electricity generator—plasma ball
- Tattoo machine
- Toothbrush—electric, from charging base
- Toy trains—electric, from transformer and rails
- Treadmill—from electric motor
- Ultrasonic pest control device
- Vacuum cleaner—from motor

## No known risk

**If the item is used as it is meant to be used and is in good working order there is no known risk:**

- Battery charger for household batteries
- Bed-adjustable
- Casino slot machine
- Clothes iron
- Curling iron or hair straightener
- Digital weight scale
- Disney MagicBand wristband
- Electric blanket or electric mattress pad
- Electronic weight scale
- Flashlight
- Garage door opener-remote control
- Guitar, electric
- Hair dryer, hooded salon
- Hair shaver or trimmer-battery powered
- Heart rate monitor-chest band
- Heating blanket or heated mattress pad
- Heating pad
- Home security system-infrared or ultrasonic
- Hot tub-must be properly grounded
- Ionized bracelet
- Kiln, 115, 120, 220 or 240 volts alternating current
- Kitchen appliances-large: dishwasher, microwave oven, refrigerator, stove
- Kitchen appliances-small: blender, food processor, toaster
- Massage chair, bed or pad
- Medical alert necklace or pendant
- Residential power line
- Sauna, electric
- Swimming pool-must be properly grounded
- Tanning booth-electrostatic



# Tools and industrial equipment

It is important that your power tools and equipment are in good working order and properly wired, using a three-prong plug if applicable. They should be used as set out by the maker of the item. Corded electrical items should be run through a safety device called a ground fault circuit interrupter (GFCI or GFI) or circuit breaker.

## Special considerations

**Keep at least the distances given below between the item and your ICD:**

---

### **12 inches or 30 centimeters**

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- Boat motor
- Car battery charger
- Cattle prod or stock prod, from electrodes
- Degausser or demagnetizer
- Gas or petrol ignition systems—from components of ignition system
- Gas or petrol-powered tools—from components of ignition system (lawn mower, snowblower, weed whacker, chainsaw)
- Generator, electric portable, up to 20 kilowatts
- Lawn and garden tools and gas or petrol-powered engines—from spark plugs (for example, backpack leaf blower)
- Soldering gun
- UPS (uninterruptible power source) - commercial power failure back-up system, up to 200 amps

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### **Two feet or 60 centimeters**

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- Bench-mounted or free-standing tools—for motors 400 horsepower or less (air compressor, drill presses, grinder, pressure washer, table saw)
- GPS (global positioning system) survey equipment
- Jumper cables
- Welding equipment (with currents under 160 amps)

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### **Not recommended**

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- Welding equipment with currents over 160 amps\*

*\* see page 24 for more information*

## Minimal risk

Keep at least **six inches or 15 centimeters** between the item and your ICD:

- Circular saw–skill saw
- Drills–battery and electric powered
- Electric chainsaw
- Grinder–hand-held
- Hedge trimmer–electric powered
- Lawn mower– electric powered
- Leaf blower–electric powered
- Reciprocating saw (Sawzall™\*)
- Router
- Sander
- Screwdriver–battery powered
- Tools–battery-powered
- Tools–handheld electric, from motor
- Tools–small electric, from motor
- Weed whacker–electric powered

## No known risk

**If the item is used as it is meant to be used and is in good working order, there is no known risk:**

- Anti-theft detection pedestals or electronic article surveillance equipment to stop shoplifting\*
- Calipers–battery powered
- Flashlight–battery powered
- Laser level
- Polygraph or lie detector test
- Soldering iron
- Stud finder

\* see page 22 for more information



# Communications and office equipment

These guidelines for using communications and office equipment safely include details such as transmitting power, frequency and antenna type.

**Caution:** Do not carry a wireless device in a pocket over your ICD or in a shoulder bag near your ICD.

## Special considerations

**Keep at least the distances given below between the item and your ICD:**

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### 12 inches or 30 centimeters

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- Amateur radio, ham radio, walkie-talkie—3 to 15 watts, from antenna
- Citizens Band (CB) radio—5 watts or less, from antenna
- Marine radio—3 to 15 watts, from antenna
- Pager—two-way, 3 to 15 watts, from antenna
- Transmitter, portable—3 to 15 watts, from antenna
- Uninterrupted power source (UPS)

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### Two feet or 60 centimeters

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- Amateur radio, ham radio, marine radio, walkie-talkie—15 to 30 watts, from antenna
- Marine radio—20 to 25 watts, from antenna
- Radio transmitter—vehicle-mounted, 15 to 30 watts, from antenna
- Satellite dish—two-way receiving

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### 30 feet or nine meters

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- Amateur or ham radio—1,000 to 2,000 watts

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### 20 feet or six meters

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- Amateur or ham radio—500 to 1,000 watts



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### **12 feet or four meters**

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- Amateur or ham radio, 250 to 500 watts

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### **Nine feet or three meters**

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- Cellular tower
- Commercial broadcast tower—125 to 250 watts
- Amateur radio, ham radio, marine radio, or walkie-talkie—125 to 250 watts, from antenna (Note: For transmitters with power levels higher than 250 watts, avoid restricted areas that contain the antenna.)

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### **Six feet or two meters**

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- Walkie-talkie—50 to 125 watts, from antenna

---

### **Three feet or one meter**

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- Walkie-talkie—30 to 50 watts, from antenna

## Minimal risk

Maintain at least a **six inches or 15 centimeters** between the item and your ICD:

- Activity band or wearable fitness monitor—if it has a magnet
- Amateur radio, ham radio, marine radio or walkie-talkie—less than three watts, from antenna
- Badge (name tag) with magnetic clasp
- Badge (security) with externally activated electronic circuit
- CB (citizens band) radio—three watts or more, from antenna
- CD / DVD / DVR player, —with speakers
- Cellular adaptor for laptop computer
- Computer keyboard—wireless
- Computer—personal, laptop, or electronic tablet\*
- Cordless microphone—from transmitter
- Cordless telephone—from antenna and base station
- eReader
- Gaming console and wireless controllers\*
- Wireless headphones\* or earbuds—from magnets
- Magnetic cover for phones or tablets
- Network router
- Pager—two-way, three watts or less, from antenna
- Radiofrequency (RF) wireless charger
- Remote keyless entry and remote car starter key fob
- Satellite dish, receiving
- Security badge wall scanner
- Smart watch, smart meter
- Stereo speakers, from magnet
- Television audio headset—from transmitter near television
- Wi-Fi modem or transmitter or receiver—less than three watts
- Mobile phones including cell phones, iPhones and other smartphones\*

\* There is no known risk for wireless communication with these items via Bluetooth

## No known risk

**If the item is used as it is meant to be used and is in good working order, there is no known risk:**

- Barcode scanner
- Bluetooth technology
- CD, DVD or DVR player—without speakers
- Copy machine
- Digital music player—for example, iPod
- Fax machine
- GPS (global positioning system)
- Pager—receiver only
- Printer—scanner office
- Radio, AM, FM or DAB
- Remote control for CD or DVD player, television and so on
- Television



## Medical and dental procedures

Many medical procedures will not affect your ICD. But before you have any medical procedure, tell your treating doctor, nurse or dentist that you have an EV-ICD. Also, ask your heart doctor or nurse to evaluate any possible risk. This is important because some medical procedures can lead to serious injury, damage to your ICD or they can stop your ICD from working properly.



# Vehicles and related items

## ● Special considerations

Keep at least the distances given below between the item and your ICD:

### Two feet or 60 centimeters

- Anti-theft tag deactivator
- Forklift–battery powered, from battery
- Jumper cables–during use

### 12 inches or 30 centimeters

- All-terrain vehicle (ATV)
- Boat motor
- Car battery charger for gas or petrol engines
- Car battery charger or charging station for electric cars
- Car, truck, motorcycle or other vehicle powered by gasoline or petrol
- Equipment and vehicles used for agriculture or construction
- Forklift fueled by gas or petrol, propane, or natural gas
- Jet ski

## ● Minimal risk

Maintain at least a **6 inches or 15 centimeters** between the item and your ICD:

- Extractor wand–for car mechanics
- Electric bike–from magnet in wheel
- Golf cart–electric, from battery during charging
- OnStar Technology, –from antenna
- Personal scooter or electric grocery cart–from battery

## ● No known risk

If the item is used as it is meant to be used and is in good working order, there is no known risk:

- Diesel engine
- Electric golf cart
- Motorcycle vest–heated
- Car–electric or hybrid

# Questions you may want to ask your doctor when they suggest an EV-ICD

- Why do I need an EV-ICD?
- Are there any alternatives to a device fitted inside my body?
- Can medications help with my condition?
- How does an EV-ICD work?
- Where will the device be placed?
- How will it be fitted?
- How is EV-ICD different from a traditional ICD?
- What will the scar look like when it heals?
- Will the device move after it has been fitted?
- What restrictions should I follow after it has been fitted, and for how long?
  - What should I do if there is pain or swelling right after the fitting?
  - Will you prescribe pain killers?
  - Shall I use ice-packs?
- Can I get back to exercise after the fitting and recovery?
- When can I have sex again?
- Will the ICD stop my career or my hobbies?  
(Write down work tasks or hobbies that might be a worry. For example: driving a forklift or truck, working with machinery nearby, welding, swimming, hunting and so on.)
- Will I feel my device working?
  - Will I feel anti-tachycardia pacing?
  - Will I feel a shock?
  - What does a shock feel like?

- Can we talk about a shock plan?
  - What should I do if I am shocked once?
  - Multiple times?
  - Will anyone touching me during a shock feel the shock or get hurt?
- Do I need to contact my clinic if I fall or painfully bump my ICD
- How long will my EV-ICD battery last and how will I know when to replace it?
- Can I get an MRI scan in the future?
- Can I safely travel through airports and on planes with an EV-ICD?
- What kinds of household items can interfere with my EV-ICD and what safety measures should I take?
- Can I be near ordinary magnets?
  - What happens when I get too close to a magnet and the device sends out a tone?
- Can you let me hear the sounds my EV-ICD could make?
  - What do the different sounds mean?
  - What should I do when I hear each of the sounds?
- Can my EV-ICD be monitored remotely?
- How does remote monitoring work?
  - Is there anything specific I need to do, or does it work without my help?
- Where should I go if I have more questions?



**This list of questions was drawn up with the help of the “Living with an ICD” patient support group <https://www.facebook.com/groups/icdsupport>**

# Keeping a positive attitude towards living with an EV-ICD

Remind yourself of the benefits. Remind yourself that your ICD protects you from the serious consequences of heartbeats that are not regular.

Block negative thinking. Catch yourself if you start thinking about what could happen in the worst case. Remind yourself that most people feel positive about having an ICD.

Discuss concerns. Make a list and discuss any worries you might have about your condition or ICD with your doctor and with your loved ones.

Plan for the best possible quality of life. The treatment is meant to help you to have the best possible quality of life. Note down of the activities that are most important to you and talk to your doctor about getting back to doing those activities.

Explore the unknown. Learn about your medical condition and your ICD from your doctor, nurse and device manufacturer.

## Educational resources and support

Experts at Medtronic can give you answers and reassurance. They can also point you to other resources and support groups.

**00800-266-632-82\***


Monday-Friday 8am-4pm\*\*





## References:

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  - 3 Ponikowski P et al. 2016 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure: The Task Force for the diagnosis and treatment of acute and chronic heart failure of the European Society of Cardiology (ESC) Developed with the special contribution of the Heart Failure Association (HFA) of the ESC. *Eur Heart J* 2016 ; 37(27) : 2129-2200
  - 4 <https://www.erc.edu/projects/escape-net>
  - 5 Daya M, Schmicker R, May S, Morrison L. Current burden of cardiac arrest in the United States: Report from the Resuscitation Outcomes Consortium. Paper commissioned by the Committee on the Treatment of Cardiac Arrest: Current Status and Future Directions. June 30, 2015.
  - 6 Medtronic Aurora EV-ICD™ MRI SureScan™ DVEA3E4 Device Manual.
  - 7 Vijgen J, et al. Consensus statement of the European Heart Rhythm Association: updated recommendations for driving by patients with implantable cardioverter defibrillators. *Eur J Cardiovasc Nurs*. 2010. PMID: 20170847
- \* Free-of-charge number
- \*\* You can leave a voicemail if it is outside office hours



Life with  
an extravascular\*  
implantable  
cardioverter  
defibrillator  
(EV-ICD)

\* an ICD with the lead outside  
the heart & blood vessels

The information in this booklet is not medical advice and should not be used instead of talking to your doctor or care team. Discuss indications, contraindications, warnings, precautions, potential adverse events and anything further with your health care professionals.

**Important reminder:** This information is meant only for people in places where Medtronic products and therapies are approved or available for use as indicated within the respective product manuals. This content is about a specific Medtronic product is not meant for people in places that do not have authorization for its use.

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