



Advice for pacemaker patients



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The aim of this booklet is to provide advice to those patients who have recently had a pacemaker fitted or are about to have one fitted.

What is a pacemaker?

A pacemaker is a medical device that aids the control of the heartbeat.

The pacemaker is made of a battery and electronic circuitry sealed in a metal case. This is then attached with special leads to the heart. The pacing lead is used to relay information about the heart's own activity back to the pacemaker and is also used to send impulses from the pacemaker to the heart.

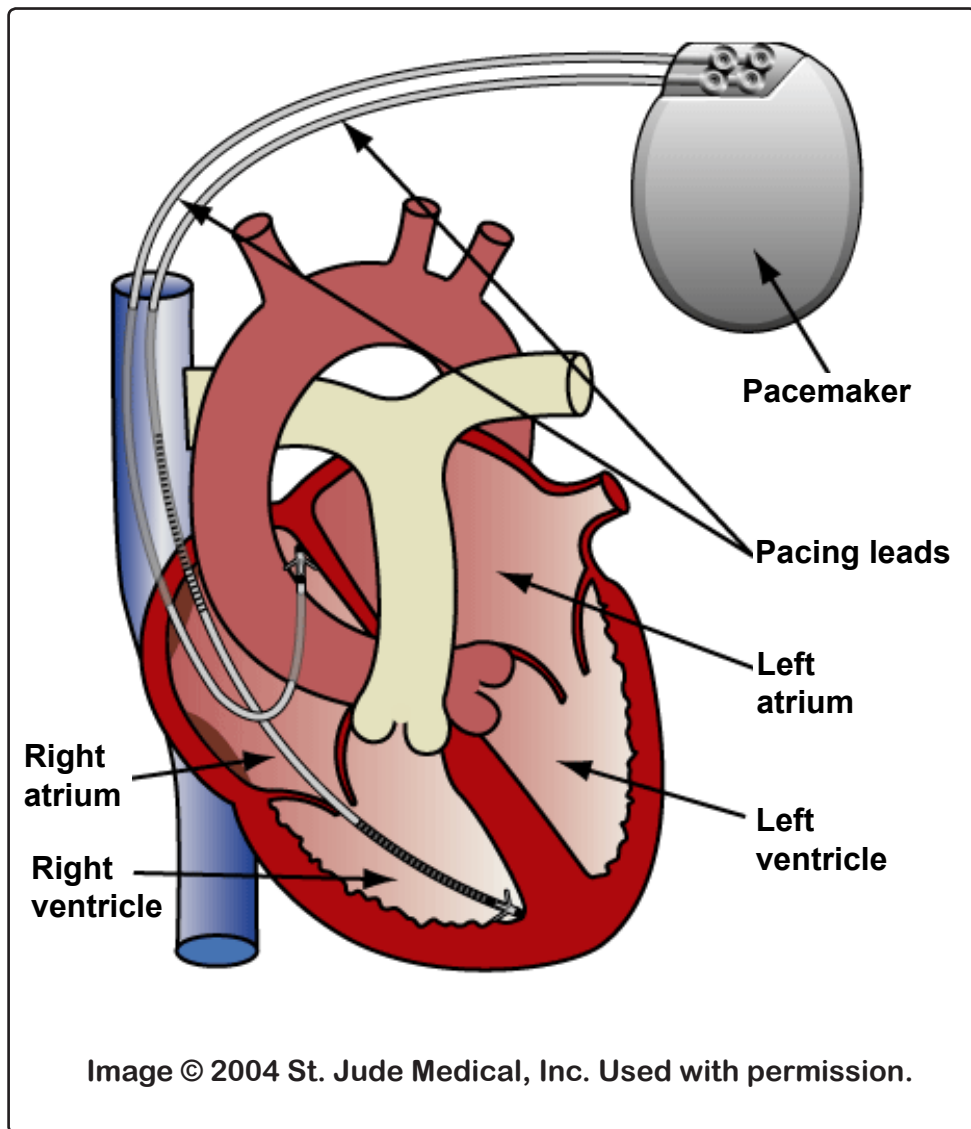
The two essential functions of the pacemaker are pacing and sensing. The pacemaker system paces (stimulates) the heart when the heart's own rhythm is interrupted, irregular or too slow. The pacemaker system also senses the heart's natural electrical activity. If a pacemaker senses an electrical signal indicating that the heart is beating naturally it will not pace the heart. This ability to recognise when the heart is beating on its own is called sensing.

Why do I need a pacemaker?

There are many different reasons for requiring a pacemaker. This may be because the heart is beating too slowly or too fast. The heart has a natural pacemaker called the sino-atrial or SA node, which is located in the upper portion of the right atrium. The SA node produces very small electrical impulses, which vary in rate depending on the body's demands for oxygen and nutrients. After an electrical impulse leaves the SA node it travels through the upper half of the heart causing the atria to contract, to a junction called the AV node. From there the impulse travels down the conduction pathways in the bottom half of the heart

causing the ventricles to contract. Sometimes the heart's natural rhythm can become irregular due to congenital heart defects, surgical repair or because the SA node is sending impulses to the rest of the heart too slowly.

These rhythm disturbances can be treated with a pacemaker.



Will I always need a pacemaker?

The pacemaker is not a cure. It is simply a means by which the heart's rhythm can be regulated. Sometimes the pacemaker simply provides backup support when the heart needs it. Most children will require a pacemaker throughout their life, however, a few children will only need a pacemaker temporarily.

Having a pacemaker fitted

There are two surgical procedures, which may be used for implanting pacemakers into children and teenagers. These are called epicardial (meaning outside the heart) and endocardial (meaning inside the heart).

With the epicardial procedure, the lead is attached to the outside of the heart. The other end of the lead is connected to the pulse generator and placed under the skin in the abdominal area. This procedure tends to be used in children who are having other cardiac surgery at the time of implant and also for those children whose veins are too small for endocardial implants.

For the endocardial procedure, the lead tip is inserted through a vein, in the upper chest, and advanced to the heart. The pulse generator is then attached to the other end of the lead at the connector block. The pulse generator is placed under the skin in the upper chest area near the collarbone or in the abdominal area.

There may be some discomfort at the implant site. Medication can be given to alleviate this.

After the operation

Where the pacemaker is implanted, it may be possible to feel a slight bulge beneath the skin.

Following the operation it is important to avoid lifting the arm on the side of the pacemaker for several days. The arm may have been strapped for this purpose. If it is strapped then this will only be for a day or so. The wound might feel a bit sore but painkillers can be given to relieve this. The cardiac physiologists will check the pacemaker prior to discharge from hospital. This test involves placing a special wand on the chest where the pacemaker is. This communicates remotely with the pacemaker.

The scar should be kept clean and dry while it is Healing. It may be necessary for certain activities to be restricted until the scar has healed.

Contact the cardiac physiologists or the implanting cardiologist (out of normal working hours contact the on-call cardiologist) in the following situations:

- If your scar looks sore, swollen, red or there is discharge present, then out-of-hours you should contact the on-call paediatric cardiologist.
- Fever along with redness at the pacemaker site.
- Unusual fatigue.

The decision as to when to return to school is an individual one to be discussed with the cardiologist.

Pacemaker identification card

This card will be given to you by the cardiac physiologist one day after surgery and should be carried with you at all times. This card provides information about your pacemaker. It is particularly useful at hospital visits, in case of a medical emergency and is necessary to carry with you when clearing airport security. A copy of this card should be given to the school.

Follow-up

It is essential for the pacemaker to be checked regularly to make sure it is working properly. It is important to attend all follow-up appointments. The cardiac physiologists will check the pacemaker settings and the battery status. Most pacemakers are adjustable therefore the pacemaker will be optimised to each individual. The number of times the pacemaker needs to be checked will vary over the years. During clinic you may be required to be referred to have a chest x-ray, echo and / or electrocardiogram (ECG).

On moving house between follow-ups it is important to notify the pacemaker clinic of the change of address and your GP. If possible a transfer to a hospital nearer can be arranged.

How long will the pacemaker last?

The longevity of the pacemaker will depend on the programmed settings and also how often the pacemaker paces the heart.

Changing the pacemaker

At the follow-up clinic the cardiac physiologist will be able to determine when the pacemaker needs to be replaced. A convenient time is then scheduled for the replacement procedure.

Replacement of the pacemaker entails an incision at the pacemaker site to remove the old pulse generator and attach the new. The lead may also need to be replaced at replacement time.

Continued advances in technology means that your replacement pacemaker will be more technologically advanced and may be smaller in size.

Living a normal life

Many people with pacemakers lead completely normal lives. It is important to discuss any hobbies or interests with the cardiologist and cardiac physiologist if you feel that they may be unsuitable now you have a pacemaker.

Exercise

Regular exercise is beneficial to most people. Your interests must be discussed at the pacemaker clinic. You will be advised at your first follow-up appointment at the pacemaker clinic as to when you will be able to resume exercise. After consultation at the pacemaker clinic you will be able to engage in most activities including swimming, riding tricycles or bikes, riding and running. Swimming is an acceptable form of exercise once the wound has completely healed.

You are advised to avoid certain forms of exercise. The type of exercise that involves rough physical contact would be advised against. Avoid any exercise that would involve a heavy blow to the pacemaker. This may include skiing, playing football, rugby and martial arts that involve physical contact.

Diving - please contact your Pacemaker Centre. Diving can be restricted or sometimes advised against depending on the type of pacemaker you have and congenital heart problems you may also have.

Fairground rides - there are certain rides we do not recommend, such as roller coaster rides that will make you feel excited and which will make your heart rate much faster. Fairground rides such as the 'tea cups' are fine. Most rides will have height restrictions.

Similarly it is wise to avoid any activity that would involve pressing on the pacemaker.

Food, diet, normal immunisations, emotional changes and colds will not affect the pacemaker function. However, do not hesitate to discuss any special restrictions or concerns with the pacemaker team.

Electricity and magnets

Electricity and magnets can be found in medical, home, workplace and travel environments.

Tools that use electricity and magnets usually have weak electromagnetic fields around them. However, strong electromagnetic fields can cause electromagnetic interference. This may temporarily alter how your pacemaker works.

If you suspect that your pacemaker is being affected by electromagnetic interference (EMI) simply move further away from the electrical device. Your pacemaker will then return to its normal operation

Electronic toys, or toys with magnets in, should be discussed with the Pacemaker Centre.

Radio controlled toys are safe if the antenna is not placed over the pacemaker site.

Electric instruments example guitar, are safe to use as long as you are six inches away for the amplifier.

Game consoles, example XBOX, PS are safe. Handheld game consoles are safe to use but please keep a safe distance of approx 15 cms from the device. If you are concerned please contact the pacemaker clinic and we can test the hand held console while checking your device. You can also find more information regarding game consoles on the manufacturer's websites (see page 17).

Hospital treatments

Before undergoing any medical treatment tell the doctor, dentist or other medical professional that you have a pacemaker. It may be necessary for them to consult your cardiologist before undergoing the procedure.

The following are not recommended under normal circumstances:

Hearing aid with coil around the neck. Before using this type of hearing aid, it needs to be tested with a pacemaker in the pacemaker clinic.

Radiation therapy

Often the radiation beam can be directed around the pacemaker to reduce exposure. Once therapy has commenced the pacemaker will need to be checked following treatment. It is important that the pacemaker clinic is contacted prior to commencement of treatment.

TENS

This is not recommended for use on the body. If considering using TENS it is necessary for the pacemaker clinic to be consulted.

MRI

MRI is not recommended for pacemaker patients. If medical conditions require MRI then the pacemaker clinic and the cardiologist should be consulted. Even when the scanner is turned off it still emits a field. If you are in or near the room where the scanner is kept your pacemaker may still be affected.

Other issues

- Lithotripsy
- Radiofrequency ablation
- Planned external defibrillation
- Electrocautery
- Diathermy

If at any time you are to undergo any of these procedures, please inform the Pacemaker Clinic.

For older patients who are thinking of driving or already driving

There are driving restrictions after this procedure too, but usually only for one month. A useful website for detailed information is:

www.dvla.gov.uk/at_a_glance/ch2_cardiovascular.htm

You are obliged to inform the Driver Vehicle Licensing Authority (DVLA) that you have had a Pacemaker fitted and failure to do so may invalidate some insurance. Contact DVLA direct or via a Post Office.

General household items and notes for patient's parents

Most household items will not interfere with pacemaker function. Proper maintenance of household items reduces the chance of electrical interference.

Acceptable

- Electric blankets, heating pads and portable space heaters.
- Cordless electric knives, irons and newer cordless shavers.
- Large appliances including washers, dryers and electric stoves.
- Salon hair dryers.
- Tabletop appliances such as toasters electric can openers and food processors.
- Televisions, FM and AM radios, video cassette recorders, video games, CD players, stereos, desktop / laptop computers and games consoles.
- Treadmills.
- Vacuum cleaners and electric brooms.
- Microwaves.

Telephones

Cordless phones used in the home are perfectly safe to use.

Standard wall or desk telephones are safe for normal use. The ear portion of the phone has a magnet so keep it away from your pacemaker.

Mobile phones can be used with precautions. The phone can be used six inches / 15cm away from the pacemaker site. This distance may be obtained by holding the telephone to the

ear opposite the side of the pacemaker. The phone must not be kept near the pacemaker site. Prior to considering using a mobile phone the pacemaker clinic should be contacted so that appropriate safety checks can be performed.

Portable mobile cellular phones that transmit above three watts – keep the telephone antenna 12 inches / 3cm away from the pacemaker.

Acceptable when six inches / 15cm away

- Hand-held hairdryers with an electrical cord.
- Electric toothbrush and the base charger of an ultrasonic toothbrush.
- Sewing machines (that overcast edges to prevent fraying).
- Large stereo speakers, which often have very large magnets. Do not lift large stereo speakers close to your pacemaker.

Home maintenance

Home power tools

Precautions to patients and parents/carers when in close proximity to a child with a pacemaker.

- It is usually the motor that can cause the electromagnetic field. If you experience dizziness or palpitations simply move further away from the item. Your pacemaker will then operate normally.
- Be certain that power tools are properly grounded. For frequent use, a ground fault-interrupt outlet is recommended.
- **Car engine repair** – Use caution when near the coil, distributor or spark plug cables of a running engine. Turn off the engine before making any adjustments to the distributor

- **Avoid using a power tool locked in the 'on' position.** This would prevent you from quickly turning off the equipment.
- **Avoid using a gas-powered chain saw.** This is recommended because your hands and body come into close contact with the electric spark-generating components.

Home security systems

It is unlikely that your pacemaker will set off or be affected by home security systems.

Workplace guidelines

Not recommended

Heavy electrical or industrial equipment often produces electromagnetic interference. This equipment may affect how a pacemaker works. Check with the pacemaker department before working with the equipment:

Acceptable with precautions

Retail and library systems. To prevent these systems affecting your pacemaker just walk normally through them, do not linger near or lean in these detectors. It is unlikely that your pacemaker will set off these systems. However, should it set off a metal detector or security system it is helpful if you always carry your pacemaker ID card with you.

CB amateur radios (citizen band). These can produce electromagnetic interference. Distance from the antenna to your pacemaker is dependant on many factors. These include the transmitter power, frequency and type of antenna. If the transmitter power is very high, longer distances may be needed. Also if the antenna can be directed very specifically, you may also need to be further away.

Type of amateur radio	Minimum distance
Portable	one foot / 30cm
Car	three feet / 90cm
Home	10 feet / 3m

If you have any other queries, please do not hesitate to call the Pacemaker Clinic.

Travel

Automobiles

Wearing a car seatbelt may be uncomfortable, however, placing a soft towel between the seatbelt and the pacemaker during the first few weeks following surgery may cushion the area.

Airport security systems

When you go through the security at the airport tell the security personnel that you have a pacemaker and show them your pacemaker ID card. You must not go through the scanner. To clear airport security, show your pacemaker ID card and request a hand-held screening device to clear you through the security system. If you do go through the security scanner the security alarms will go off.

Patient support information

www.arrhythmiaalliance.org.uk

www.stars.org.uk

www.Meet@TeenHeart.uk

www.bhf.org.uk (British Heart Foundation)

www.heartforum.org.uk

www.childrens-heart-fed.org.uk

Where to get further information

In addition to the staff mentioned previously, you can also access some helpful information via the following web sites:

www.sjm.com

www.bostonscientific.co.uk

www.medtronic.co.uk

Contact numbers

Cardiac physiologists	0117 342 8473 0117 342 8181 0117 342 8722 0117 930 000 bleep 2538
On-call cardiologist	0117 923 0000 bleep on-call cardiologist (weekends and after 5pm weekdays)
Dr Rob Martin	0117 342 8855 (secretary)
Dr Graham Stuart	0117 342 8852 (secretary)
Ward 32	0117 342 8332
Outpatients	0117 342 8440 / 8441
Cardiac liaison nurses	0117 342 8286

As well as providing clinical care, our Trust has an important role in research. This allows us to discover new and improved ways of treating patients.

While under our care, you may be invited to take part in research. To find out more please visit:

www.uhbristol.nhs.uk/research-innovation
or call the research and innovation team on
0117 342 0233.

For access to other patient leaflets and information please go to the following address:

www.uhbristol.nhs.uk/patients-and-visitors/information-for-patients/



Hospital Switchboard: 0117 923 0000

Minicom: 0117 934 9869

www.uhbristol.nhs.uk



For an Interpreter or Signer please contact the telephone number on your appointment letter.

For this leaflet in Large Print, Braille, Audio, or Email, please call the Patient Information Service:
0117 342 3728 / 3725

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