Permanent Pacemaker Insertion

Darlington Memorial Hospital
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Important Contact Details

Angiography Unit for wound problems (8am – 5pm) – 01325 743934

Follow up clinics:
Darlington Memorial Hospital: 01325 743154
Bishop Auckland General Hospital: 01388 455512
1. Introduction

This booklet has been developed to help you understand how your pacemaker works and any effects it may have on your daily routine. If any problems do occur with the pacemaker wound site, please contact the unit on \textbf{01325 743934} and if you require technical advice or need to change any of your appointments, please ring Darlington \textbf{01325 743154} or Bishop Auckland \textbf{01388 455512}.

2. The Heart and conduction problems

The heart has an electrical circuit running through its muscular tissue, causing the heart to contract regularly and pump blood around the body. The normal healthy heart has a regular beat of between 60 to 100 times a minute. There are four chambers in the heart, the left and right atria and the left and right ventricles.

![Normal electrical signals in the heart](image)

The sino atrial node is the heart’s own natural pacemaker and this is where all the normal heart impulses are generated from. This node is found in the wall of the right atrium. More impulses are generated when exercising and can also vary between individuals depending on age, sex and general fitness.

The impulses follow the conduction pathway from the sino atria node, through the right atrium, across the AV node, where there is a slight delay allowing the lower chambers to fill with blood, and down into the ventricles via the purkinje fibres.

Impulses can be blocked in any part of the conduction system. They can occur with any type of cardiac disease, with unwanted side effects of some drugs and most commonly as a result of the normal ageing process of the heart.
There are 4 common causes of conduction defects:

1. Atrio-ventricular node disease - when the disturbance occurs at the level of the atrio-ventricular node the impulses are blocked causing the pumping action of the heart to become slow. This is more commonly known as heart block and can alter the blood flow to the brain causing symptoms such as dizziness, breathlessness, chest pain and even cause unconsciousness.

2. Sinus node disease - this is generally known as sick sinus syndrome and happens when the impulses either fail to be generated or are generated too fast or slow. Symptoms include dizziness, blackouts and sometimes palpitations. Sick sinus syndrome can affect the atrio-ventricular node in some cases.

3. Carotid sinus syndrome - is a condition known as carotid sinus hypersensitivity. A gland in the neck malfunctions and sends inappropriate messages to both the heart and brain causing the blood pressure to fall as well as the heart rate to be too slow. A pacemaker in this situation will only help with the control of these symptoms.

4. Surgery - In some cases it is only after surgery that people have been found to have a slow heart rate. When this happens a pacemaker is inserted to prevent symptoms rather than cure them. Some people may have had radiofrequency ablation and required pacemaker insertion.

What is a pacemaker?

A pacemaker does two things:

1. Analyzes the function of the hearts own electrical system

2. When necessary, it sends tiny, precisely timed electrical impulse signals to the heart to correct any abnormalities in the hearts electrical system.

![Pacemaker diagram]

The pacemaker consists of two main parts, the pacemaker lead or electrode and the pulse generator.

1. The pacemaker electrode carries the impulses down coils of wire (which are covered by silicon rubber) into the hearts muscle. These electrodes last a lifetime and rarely need replacing.

2. The pulse generator is a small sealed metal case containing a battery and circuitry that controls the delivery of the signal. It has a life of between five to ten years depending on the type and make.
Pacemaker Insertion

They are inserted under local anaesthetic and require an overnight stay in hospital. Special provisions are made for anyone on warfarin (which may require a longer stay in hospital). Most units now only ask patients to be nil by mouth for a couple of hours prior to the procedure, you will be advised about this at pre-assessment. On the day of admission you will be asked to change into a theatre gown and put a dressing gown and slippers on. The nurse will then take your pulse and blood pressure. A check will be made around the insertion site as to whether a shave is necessary or not. You will be given a premed approximately 1 hour prior to the procedure. Following this you should stay on the bed and not wander around. When the time comes you are escorted into the catheter laboratory where the procedure will take place.

Once you are positioned onto the x-ray table sterile drapes are placed over you and the procedure begins. Local anaesthetic is injected into the skin in the upper part of the left chest. The doctor then makes a pocket in your skin, a needle is then inserted into your subclavian vein or the cephalic vein is located. The electrode is threaded through the veins and into the required chambers under x-ray control. The pulse generator is then attached to the electrode and placed under the skin. Your skin is then stitched usually with absorbable stitches (you will be told which type following the insertion). The procedure takes between one and two hours to complete; you may feel some discomfort even with local anaesthetic, if you do, inform the staff in the unit. Routinely you are prescribed antibiotics before and after the insertion. Sterile dressings are placed over the site and you are then taken back to the ward to recover. In the ward you will be sat up slightly and your blood pressure and pulse will be taken. You will also be offered something to eat and drink. Advice will be given about not using the affected side i.e. not lifting the arm up above your head. Following a period of time you will be transferred to a ward for your overnight stay (if you are not already on a ward that is open 24hrs a day i.e. an inpatient).

On the day following the procedure you will be taken for a chest x-ray and also a pacemaker check will be performed by the Cardiac Physiologist. The pacemaker check is performed to see that the pacemaker is performing to the programmed functions that are required for your condition. At this time further advice will be given and a follow up appointment for approximately 4-6 weeks following the insertion. Following this first appointment further appointments will be given to you for 6 months and then yearly after that.
Types of Pacemaker

**VVI**

This is classed as the simplest type of pacemaker. Only one electrode is placed into the right ventricle. The principle of this type of pacemaker is that it temporarily switches off when your own natural heart rate increases and then switches on again when your heart rate falls below the programmed rate of the pacemaker.

**AAI**

This is where an electrode is placed only in the right atrium. If you only have problems with your sino-atrial node then this is the type of pacemaker that will be implanted. As with the VVI pacemaker the AAI pacemaker will still be inhibited by your increased natural heart beat.

**DDD**

With this type of pacemaker two electrodes are placed inside your heart, one in the right ventricle and the other in your right atrium. More commonly known as a dual chamber pacemaker. This means that the pacemaker can supply stimuli to the chambers of the heart in sequence. The DDD pacemaker has the ability to speed the rate of the lower chambers by sensing a signal, which is naturally present in the right atrium, which usually increases in response to exercise. This results in a variable heart rate, which is driven by the needs of the body. It will however always stop the heart from going too slow.
SSIR/DDR

These are rate responsive pacemakers. This additional feature may be present in any of the three pacemakers, which have already been mentioned. With these types of pacemakers you may have two electrodes or only one electrode in either the right ventricle or right atrium. By using a sensor, which can recognise body movements, the rate that the stimulus is delivered at will be automatically increased, giving a normal rise in the heart rate in response to exercise.

The type of rhythm disturbance that you have been diagnosed will dictate which type of pacemaker you have implanted.

Life With a Pacemaker

When you have a pacemaker implanted you are given a special registration card. This has all the details about your pacemaker on it i.e. Type, where the electrodes are, which hospital it was implanted in. You must keep this card in a safe place. If you are travelling anywhere for a period of time i.e. on holiday take it with you.

In general there are few complications that can occur with pacemakers. If in the first few days following implantation you experience any severe dizziness or blackouts please contact the cardiac physiologists on Darlington 01325 743154 or Bishop Auckland 01388 455512 during normal working hours or the CCU on 01325 743360 out of normal working hours.

When you return home, do not over exert yourself but gradually build up your level of activity to that which you could have attempted previously. In the first few weeks vigorous arm movements, which may affect the stability of the pacemaker electrode should be avoided. So if your job requires heavy physical activity care should be taken to avoid damaging the area in which the pacemaker has been implanted. There is no reason why you should not return to work once your wound has healed. Physical exercise may be taken as long as the above are not involved in the activity. Normal sexual activity may also be resumed. Sustained pressure or heavy blows on the area where the pacemaker is buried are also inadvisable.

Your Cardiologist will also advise you on any medications you are taking. If you do need to see any other type of doctor about any more treatment you require please inform them that you have pacemaker. This includes Radiotherapy and Physiotherapy. You should not undergo any type of test that requires the use of radioisotopes or strong magnetic field without seeking advice.

In general you may use all normal household electrical appliances including;

Hairdryers, shavers, electric blankets, vacuum cleaners, remote controls for televisions and hi-fi
Modern microwave ovens can be used with no effect. However because of a problem that existed with earlier types of microwaves you will find in some instruction manuals a warning.
Caution must be taken with the following:

If you use power tools or other equipment with a cable, please pass the electric cable over the other shoulder away from the pacemaker.
Please do not brace guns or heavy equipment against the shoulder where the pacemaker is implanted.
Avoid equipment that produces large electrical or magnetic fields as this could interfere with your pacemaker functions. However once you move away from the source of the potential interference the pacemaker will resume its normal function.
When using a mobile phone keep it at least 20cm away from your pacemaker.

Avoid:

- Direct contact with car ignition systems, high-powered radar or radio/television transmitters.
- Coming into close proximity of any spark producing equipment, such as arc welding.
- Any system that uses theft or weapon detection systems, which use strong magnets, such as those in airports and some shops and libraries. Where possible avoid standing close to detection systems.

Should you accidentally come into contact with any of the above-mentioned devices they would only affect your pacemaker temporarily.

When travelling you should inform your travel agent and insurer that you have a pacemaker. Let the security personnel at the point of departure know as well especially before passing through metal detectors. This could lead to the triggering of the metal detector system and causing you some embarrassment.

You are temporarily suspended from driving after having your pacemaker implanted. Inform both your insurance company and the DVLA. You cannot drive until you have had your pacemaker in for a minimum of one week by law. Most Cardiac centres recommend no driving until the pacemaker has been checked in the OPD, which is at least 4 weeks post implant.

The DVLA Can be contacted at:
Drivers Medical Group
DVLA
Swansea SA99 1TU

A form will be sent to you by post. Alternately this form can be downloaded by email www.dvla.gov.uk/drivers/dmed1_files/group1.htm
Outpatient Appointments

Before you leave hospital, after implantation, you will be given a date to attend the pacemaker follow up clinic at the site most convenient for you, either Bishop Auckland General Hospital or Darlington Memorial Hospital.

It is important that you attend your regular pacemaker follow up clinic appointments in order to ensure your pacemaker is working efficiently and to monitor the battery status of your device.

Appointments can be changed by calling:-

**Bishop Auckland:**  01388 455512  
**Darlington:**   01325 743154

Pacemaker Box Change

Your pacemaker battery cannot be recharged so therefore it needs replacing. The pacemaker is designed in such a way that it will continue to work normally for some considerable amount of time after the first signs of battery ageing appear. The cardiac physiologist will note these and appointment times will be brought closer together to monitor the changes. You will be unaware of this decline in the pacemaker battery as the measurements that are taken are very sensitive and measure heart rate changes in thousands of a second.

Arrangements for this will be discussed at the pacemaker clinic and an appointment will be given to you. You will be required to attend a pre-assessment clinic where all your medical details will be noted and blood samples will be taken. All the details of your admission will also be discussed. An overnight stay may be required and again you will be notified about this at pre-assessment.

Commonly asked questions

**What should my heart rate be?**
This will depend on the type of pacemaker you have.

**Will all my symptoms be cured by the pacemaker?**
Only symptoms caused by your slow heart rate will be cured. A pacemaker cannot cure any symptoms that are due to other causes.

**Is there any need for me to take my pulse?**
Not if you feel well. If you are feeling unwell or have a return of the symptoms that were caused by your slow heart rate, your pulse rate may be of interest.

**Is there a chance the pacemaker may fail?**
It is extremely unlikely as pacemakers are very reliable. The checks that you receive at the clinic can usually predict if a problem is likely to occur in the future.
Does a pacemaker mean I have had a heart attack?
No. Heart attacks are due to a blockage in one or more of your coronary arteries.
Pacemakers are inserted for conduction disorders. Having a pacemaker will not alter
the chances of you having a heart attack in the future.

Do only old people have pacemakers?
No. Anyone of any age can suffer from conduction disorders.

Can I have a mammogram?
You must inform the team doing the mammogram. There are no special precautions
necessary. However because the breast tissue is enclosed in a special cup during
the test there is some pressure on the area surrounding the pacemaker, which may
be uncomfortable.

How do I change my appointment?
You must telephone the number on the appointment card.

When my pacemaker needs to be changed will I be aware of any
symptoms?
No. All pacemaker work just as efficiently when they have been in a long time as
they did when they were first implanted. Any changes in the way the pacemaker is
working are detected at the pacemaker clinic and any alterations will be made there.
It will not fail between clinic appointments.

How long to the batteries last?
The batteries are an integral part of the pacemaker and once depleted the whole
pacemaker is renewed. How long this will last depends on the type of pacemaker
and how much you use it. On average a pacemaker lasts between 5 and 7 years but
it is important to attend your regular follow-ups to monitor this and you will be kept
informed.