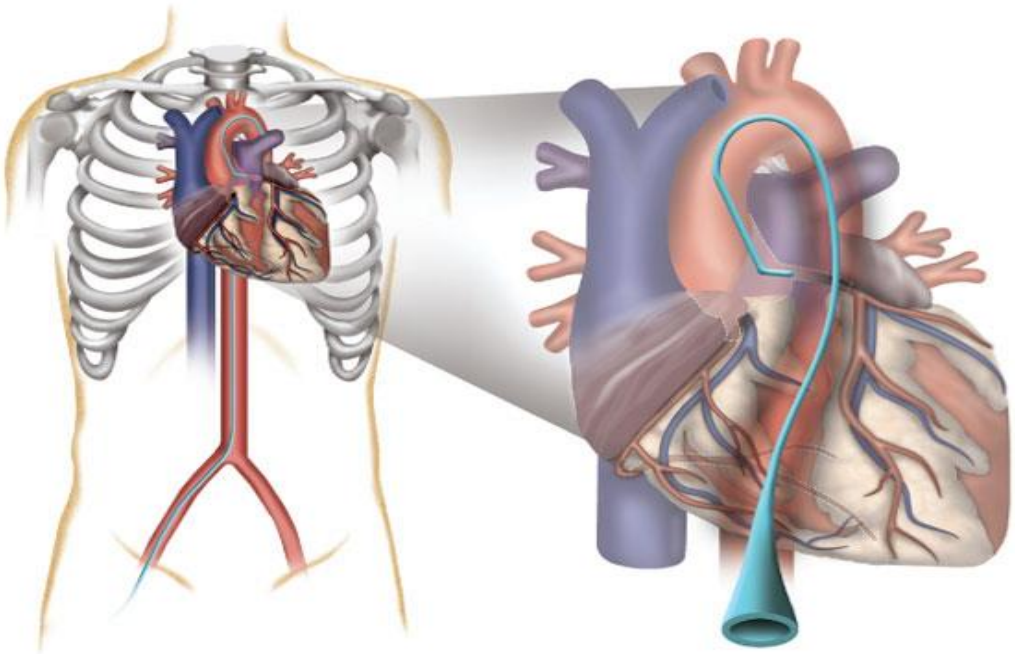
Royal Preston Hospital

Cardiac Catheter Lab

Student Nurse Information Pack



Assessor Name:

_____

PEF:

_____

Placement Co-ordinator:

_____

Welcome

Welcome to the Cardiac Catheterisation Suite at Royal Preston Hospital. This pack has been prepared to provide you with information for your placement with us so you can have the greatest learning outcome and enjoy the experience.
Whilst on placement you will be assigned two mentors – a Mentor and an Associate Mentor. We will endeavour to synchronise your shift rota with them so you can have the maximum support for your learning opportunities.
In order to achieve high standards and a quality service, practice will be research/evidence based within a multidisciplinary environment adhering to latest technologies and researches.

Unit philosophy: The Cardiac Catheterisation Suite at Lancashire Teaching Hospitals aims to provide a state of the art service to patients who are in need of diagnostic procedures and treatments relating to Heart Disease.

'We will acknowledge each patient as an individual ensuring dignity, respect and a very high standard of care is had by all. We will all communicate effectively offering confidentiality, guidance and support to every patient and their family.
Our goal is to provide an excellent informed service, before, during and after procedures offering the best care available.'

Lancashire Teaching Hospitals NHS Foundation Trust operates a Zero Tolerance policy to safeguard the staff, patients & relatives. As such aggressive verbal or physical behaviour will not be tolerated.

General Information

Contact Number: 01772 524383
Shift Times: 08:00 – 18:00
Students are **NOT** allocated for on-call shifts.

Off Duty:

As mentioned, we will endeavour to synchronise your shift rota with your Assessor so you can have the maximum support for your learning opportunities. If your Assessor is not working with you directly or is absent you will have the support of the Supervisors and other members of the team.

If you anticipate any problems with off duty please let either your Assessor or Supervisors know as soon as possible.

Breaks:

When possible there is a morning break of 15 minutes and 30 minutes for lunchtime between 12:00 and 13:30, allocated by the shift coordinator.

Study Days:

All study days need to be confirmed with your Assessor (where possible please print off a copy of the details from university website).

Sickness and absence:

All students need to leave their contact information (including an emergency contact) with the department in case of emergency or if staff need to change any shifts due to illness or any other unforeseen reason.

All absences must be reported daily to the nurse in charge (please call the CCS around 08:00 am) and you must notify your university as per policy. A record of attendance for all students is kept and submitted to your university.

Uniform:

Please use the blue scrubs provided in the department. They are stored in the changing rooms. Due to the physical space of the male changing room is not possible to store a lot of scrubs in there. There is a cabinet where a large stock of scrubs is kept in the female changing room, so please ask one of your female colleagues to get you the size that you need.

Use the shoes provided by the department. Shoes that you use outside the department or hospital are not allowed inside the Cath Lab procedure rooms.

No jewellery allowed (except plain wedding band) and for people with long hair please tie
it up so that it does not touch the shoulders – please refer to the uniform policy and the infection control policy.
Please present yourself in a professional manner, use light perfume because strong smells may disturb the patients.
No nail varnish or false nails allowed – please refer to the infection control policy.

Reporting Accidents and Occurrences:

Any accident or occurrence affecting a member of staff, a patient, a relative or any visitor to the department must be recorded and documented via the online incident reporting system. Always report any incident to the senior nurse in charge of the department and they will guide you through the incident reporting process.

ALL Emergencies: DIAL 2222

Stating where the emergency is and the nature of the emergency, such as Cardiac Arrest; fire or security alert, Massive Haemorrhage situation, i.e.: *"Cardiac Catheterisation Suite, Adult cardiac arrest or Massive Haemorrhage".*

Policies and Procedures:

Please familiarise yourself with the following Trust and Department Policies and protocols which you can find on the intranet:

- Uniform Policy
- Infection Control
- Manual Handling
- Sharps injury
- Fire safety
- Radiation Protection
- Massive Haemorrhage protocol
- ANTT
- Confidentiality and data protection
- Same sex accommodation procedure
- Clinical waste management
- Renal protocol

What you can expect from us

During your placement, you will be allocated an Assessor and there will also be Supervisors to work alongside.

They will give you an induction into your work area to ensure you are familiar with the environment and are able to practice safely.

An initial meeting will be performed between you and your Assessor where it is possible to discuss your learning needs and outcomes at the beginning of the placement.

Your Assessor will assess your performance with your learning outcomes with input from the Supervisors and provide regular feedback.

You will have the opportunity to work within all areas of the Cardiac Catheterisation Suite (Recovery and Laboratories) and with different members of staff who can offer varying experiences and learning opportunities. You will always receive supervision during your clinical practice.

You will be given the opportunity to work with other MDT members and experience the whole patient journey.

Due to the specific nature of this department, you may have the opportunity to do some shifts on the Coronary Care Unit and Ward 18 (Cardiac Ward) so you can practice and be evaluated in specific responsibilities such as support in the patient's hygiene care, drug rounds and ward rounds.

What do we expect from you?

We expect you to be punctual, and arrive on time for shifts (08:00am prompt, changed and ready to start the shift).

We expect you to dress in accordance with your College/University uniform policy, and also in accordance with the Trust /CCS uniform policy.

We expect you to act in a professional manner, at all times.

You should inform your Assessor or nurse in charge if you are unwell and not able to attend your placement. Please refer to the Sickness/Absence policy mentioned above.

We expect you to maintain and promote patient's privacy and dignity at all times regarding patient information and discussions between yourself and your Assessor.

We expect you to ensure your Assessor is aware of your learning outcomes for the placement and specific learning needs.

It is expected that you refer to the student board to check when the meetings with your Assessor are due so you can have the relevant documentation ready for the day.

It is expected that you arrange days for your SPOKE placements. The contacts and respective extension numbers are available on the student board and in the student file. Insert the dates agreed on the student board.

If you have any concerns or issues, please discuss them with your Assessor, Supervisors or PEF if this is not possible.

We expect your total adherence to the Trust and our Department Policies and Protocols. Please familiarise yourself within your first week of placement. You can find them on the Intranet.

Learning Outcomes

- Experience in the management, delivery and evaluation of care to patients requiring cardiac investigations or treatment of cardiac arrhythmias
- Basic life support skills and cardiac rehabilitation
- Working as part of a Multidisciplinary Team
- Working in a theatre environment
- Working in a theatre recovery/admission and discharge area
- Working in a procedure room performing less invasive procedures
- Familiarisation with cardiac drugs
- Understanding basic ECG readings
- Basic understanding of medical and cardiac terminology
- Gain knowledge of anatomy and physiology of the heart, systemic and pulmonary circulation
- Be exposed to emergency situations where immediate cardiac intervention is needed.

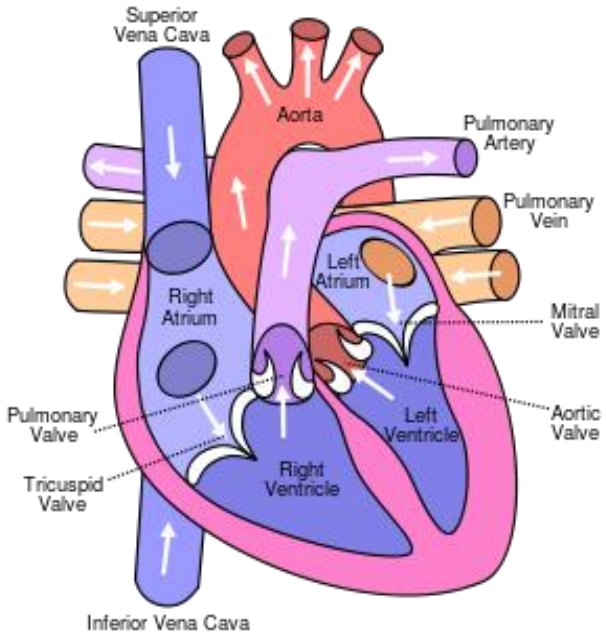
Learning Resources

Royal Preston Hospital is a teaching hospital. It holds an excellent library on site, based in Education Centre 1, or in Chorley District Hospital in Education Centre 3. It holds a professional information service for all staff and students on placement. A wide range of services and resources can be accessed electronically via the trust intranet. There is also a student folder that you can use for reference. Please feel free to add any articles that you find interesting and are related with this area of Cardiology!

Basic Cardiac Knowledge

Please note that the information does not replace the reading of a good anatomy and physiology book. The content below just reflects the basic knowledge required for this placement so you can understand the procedures performed in the Cardiac Catheter Suite.

Anatomy of the Heart



The essential function of the heart is to pump blood to various parts of the body.
The heart consists of four chambers: **Right Atria**; **Right Ventricle**; **Left Atria**; **Left Ventricle**.

De-oxygenated blood returns to the Right Atria via the Inferior & Superior Vena Cava, then enters the Right Ventricle (through the Tricuspid Valve). This blood is then pumped through the Pulmonary Valve into the Pulmonary Artery which then carries the blood to the lungs where it is oxygenated.

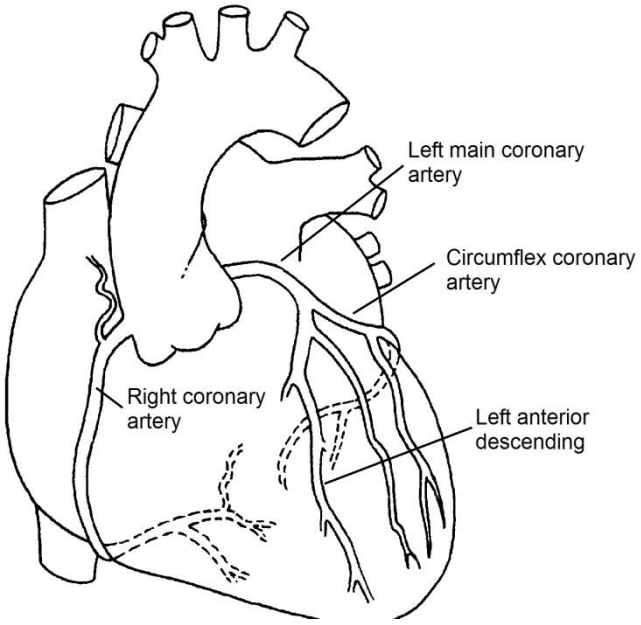
The Pulmonary Vein then carries blood back to the left side of the heart into the Left Atria and on into the Left Ventricle (through the Mitral Valve).

Oxygen rich blood is then passed via the Aorta into the rest of the body.

The valves mentioned above prevent the back flow of the blood.

All these actions occur simultaneously.

The heart is supplied by 3 main arteries that deliver oxygen and nutrients to the cardiac cells: **Right Coronary Artery** (**RCA**), **Left Anterior Descending** (**LAD**) and **Circumflex Artery**.



Electrophysiology of the Heart

Pumping Function:

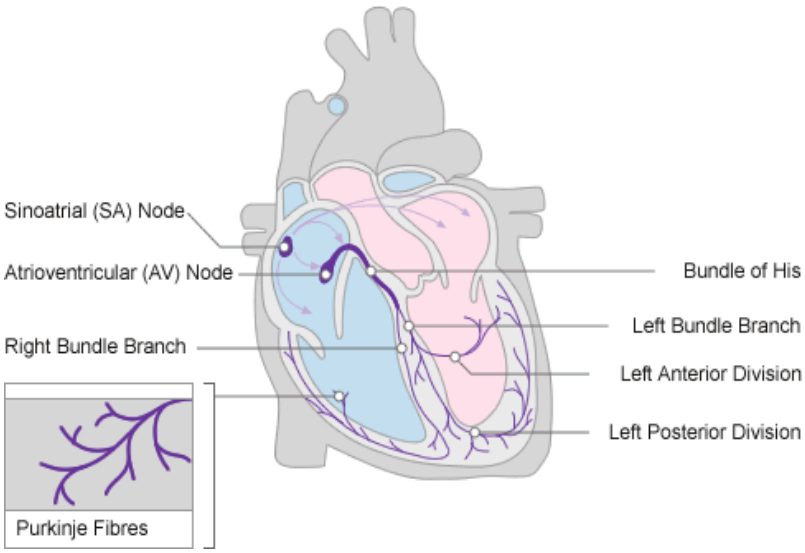
The heart's pumping action starts with the simultaneous contraction of both Atria. This contraction serves to give an added push to get the blood into the ventricles at the end of the slow-filling portion of the pumping cycle called ***Diastole***. Shortly after that the ventricles contract marking the beginning of ***Systole***. The Aortic and Pulmonary valves open and blood is forcibly ejected from the ventricles, while the Mitral and Tricuspid valves close to prevent backflow. At the same time the Atria start to fill with blood again. After a while the

ventricles relax, the Aortic and Pulmonary valves close, the mitral and tricuspid valves open and the ventricles start to fill with blood again, marking the end of systole and the beginning of diastole.

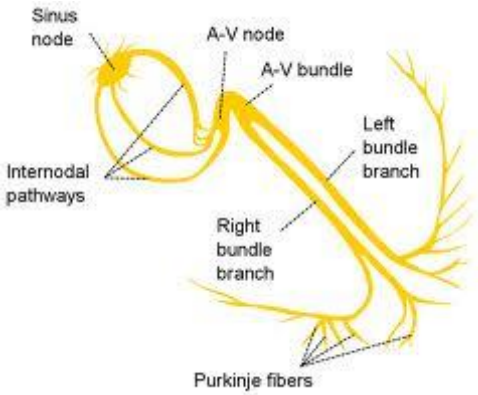
Electrical Conduction:

To ensure the filling and emptying of the Atria and Ventricles is coordinated, it is important that the contraction of the Atria and Ventricles is organised.

Each normal heartbeat is the result of an electrical impulse that originates in a specialised area of the wall of the right atrium called the **Sinoatrial (SA) node**. It normally discharges impulses at a rate of 60 to 100 times a minute in rhythmic fashion. As the SA node controls the heart rate, it is known as the Pacemaker. Other areas of the heart have the ability to initiate impulses, but only do so under abnormal circumstances.



The impulse is transmitted from the SA node through the atria, causing atrial contraction, to the **Atrioventricular (AV) node**. From here it is passed on to the **Bundle of His** and down the **right and left Bundle Branches**. The impulse reaches the **Purkinje fibres** causing ventricular contraction.



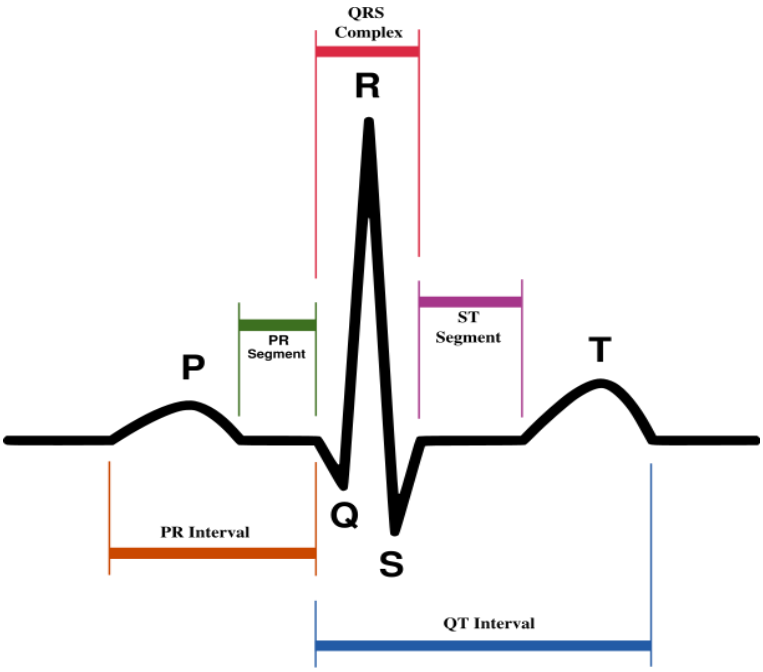
The Normal ECG Complex

An Electrocardiogram (**ECG**) is a way of recording the electrical activity of the heart through electrodes, which are placed on the body.

The standard ECG is composed of six limb leads and six chest leads.

Leads I, II, III, aVR, aVL and aVF are obtained from the electrodes placed on the patient's arms and legs.

Leads V1 – V6 are obtained from electrodes placed on the patient's chest.



The electrodes pick up a wave of activity or depolarisation, moving along each cell within the heart. This wave of depolarisation results in myocardial contraction. After contraction, the muscle cell repolarizes (returns to its resting state). This produces a picture of a sequence of electrical events which are labelled as P,Q,R,S and T. The distances between the waves are known as segments or intervals.

P Wave

The P wave is the first wave of the cardiac cycle. It represents the electrical activity associated with the impulse from the SA node and its passage through the atria.

If a P wave is present and of normal size and shape, the impulse must have arisen from the SA node and therefore be a "sinus" beat. The P wave is upright from the iso-electric line.

P - R Interval

The P - R interval reflects the contraction or depolarisation of the atria. It is the period from the beginning of the P wave to the beginning of the QRS complex. It represents the time taken for the original impulse to pass from the SA node, through

the atria and to the ventricles. The normal P - R interval should be between 0.12 and 0.20 seconds (5 small squares).

Short P - R interval (less than 0.10 seconds) indicates that the impulse reached the ventricle through a shorter than normal (accessory) pathway.

A prolonged P - R interval (greater than 0.20 seconds) indicates that there is a delay in conduction across the AV node.

Q, R, S Complex

These waves represent the depolarization of the ventricle muscle:

- Q wave - initial downward deflection followed by iso-electric line
- R wave - tall upward deflection
- S wave - second downward deflection

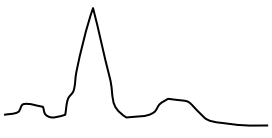
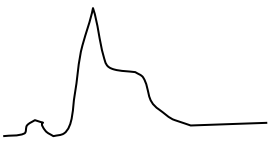
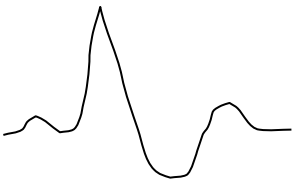
These waves may vary in size, and occasionally one or more of the three components may be missing. The QRS interval should be 0.11 seconds in duration or less.

Types of Q, R, S Complex

S – T Segment

The S – T segment represents the time between the completion of depolarization of the ventricles and the beginning of repolarization of the ventricular muscles.

The S – T segment is normally ISOELECTRIC – neither elevated or depressed.

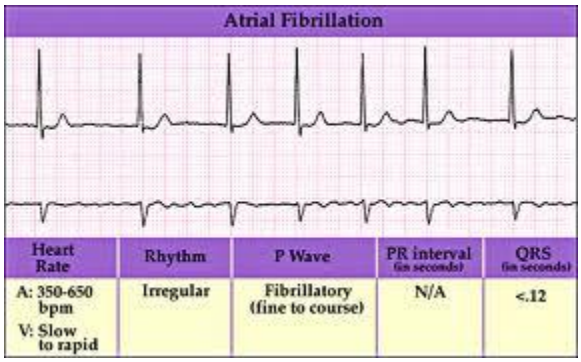
		
Isoelectric/Normal ST segment	Elevated ST segment	Depressed ST segment

The Q-T segment

The Q-T interval is the period from the beginning of the QRS complex to the end of the T wave. A normal Q-T interval should be less than half of R-R interval and 0.42 seconds in duration or less. A prolonged Q-T interval can lead to ventricular Tachy-arrhythmias and even death.

The T Wave

The T wave represents repolarization of the cardiac cells where the muscles return to their resting state.



Sinus Rhythm

The features of a sinus rhythm are:

- A normal heart rate (60 – 100 bpm)
- Regular rhythm
- A normal P wave followed by a QRS complex and T wave
- P – R interval of 0.10 – 0.20 seconds
- QRS complex of 0.04 – 0.12 seconds

If the heart rate is less than 60 beats per minute the rhythm is known as Sinus Bradycardia. If the heart rate is greater than 100 beats per minute the rhythm is known as Sinus tachycardia. Every QRS complex is preceded by P wave and every P wave must be followed by QRS.

Abnormal Cardiac rhythms

In this section, we will cover **some** of the abnormal cardiac rhythms that you may come across during your placement in the Cardiac Catheterisation Suite.

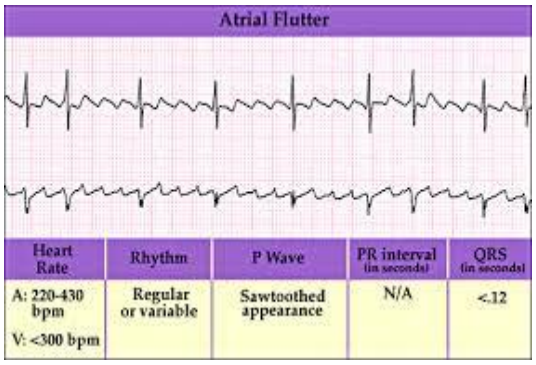
Atrial Fibrillation

Involves the atria. These are often said to be quivering. In atrial fibrillation the normal electrical impulses that are generated by the Sinoatrial node are overwhelmed by disorganised electrical impulses that originate in the atria and the pulmonary vein, leading to a conduction of irregular impulses to the ventricles that generate the heartbeat. The result is an irregular heartbeat. The defining characteristics of Atrial

fibrillation are the absence of P waves, with disorganised electrical activity in their place, and irregular R-R intervals due to irregular conduction of impulses to the ventricles. Sometimes it is difficult to assess the R-R interval when the heart rate is rapid.

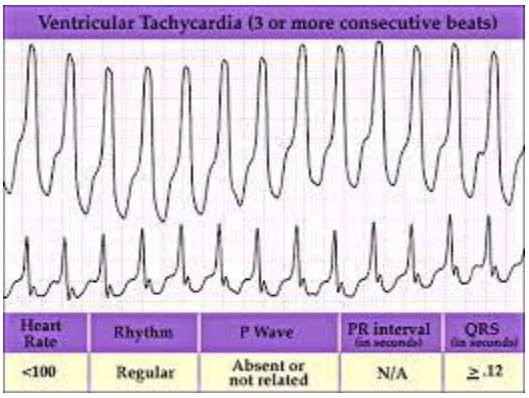
Atrial Flutter

Is known as a re-entry rhythm. It is usually initiated by premature electrical impulse starting in the atria. Atrial Flutter is spread due to differences in refractory periods of the atrial tissue. This creates electrical activity that moves in a loop. For each cycle around the loop, results an electrical impulse that spreads through the atria.



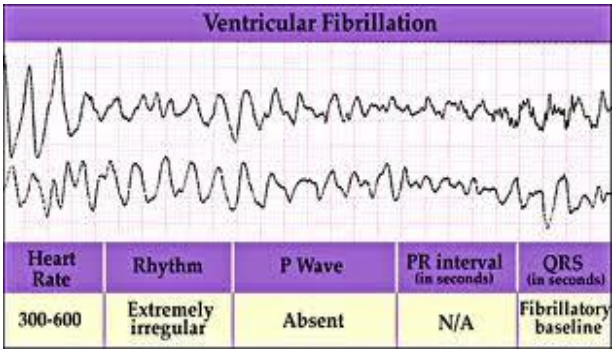
Ventricular Tachycardia

VT is a serious arrhythmia, which usually has important prognostic implications. The ECG diagnosis of VT depends upon recognition of three or more consecutive beats of ventricular origin with R-R intervals corresponding to rates in the range 100-250 beats per minute. Most commonly, the QRS complexes of such beats are abnormally wide (≥0.12 sec), are regular and are all of the same morphology but it is possible for the rate and morphology to vary. P waves may be visible and independent of QRS complexes.



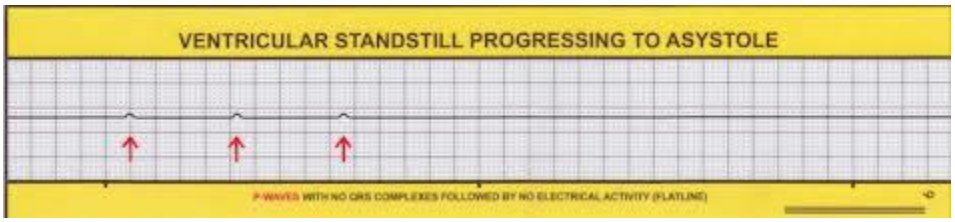
Ventricular Fibrillation

The ECG during VF shows irregular undulations of varying configuration and amplitude. There are distinct QRS complexes, S-T segments and T waves are absent and even if P waves are present they will be always completely obscured. There is, of course, complete cessation of cardiac output.



Asystole

It is a life threatening cardiac condition characterized by the absence of electrical and mechanical activity in the heart. Sometimes just P waves will be visible showing atria activity but the QRS complex is absent showing no ventricular activity – Ventricular standstill/P wave asystole. This may progress for a complete iso-electric line where no electrical activity is seen at all – asystole.



What is an Angiogram?

Angiography or arteriography is a medical imaging technique in which an X-ray picture is taken to visualize the inner opening of blood filled structures, including arteries, veins and the heart chambers. Its name comes from the Greek words *angeion*, "vessel", and *graphien*, "to write or record". The X-ray film or image of the blood vessels is called an angiograph, or more commonly, an angiogram.

Cardiac Pacemaker

The Cardiac Pacemaker also known as the "artificial pacemaker" should not to be confused with the heart's natural pacemaker. It is a medical device designed to regulate the beating of the heart. The purpose of an artificial pacemaker is to stimulate the heart when either the heart's native pacemaker is not fast enough or if there are blocks in the heart's electrical conduction system preventing the dissemination of electrical impulses from the native pacemaker to the lower chambers of the heart, known as the ventricles.

How is the Artificial Cardiac Pacemaker Used?

Artificial pacemakers can be used in order to help with and/or treat these conditions:

- Arrhythmias - an abnormal heartbeat
- Sick sinus syndrome - when the sinoatrial node does not fire properly to contract the heart

Myocardial Infarction (M.I)

The term Myocardial Infarction refers to the process which results in the death of myocardial tissue. This process occurs when a coronary artery is unable to sufficiently supply the heart (myocardium) with oxygen rich blood. The process usually begins when a blood clot forms in a coronary artery and occludes blood flow. As time lengthens and pain persists injury and death occur. The injury can be extensive enough to produce a decrease in pump function or electrical conductivity in the affected cells. Unless the occlusion is corrected all the affected cells will die.
An ECG is used to identify underlying cardiac rate and rhythm, but in the case of MI we rely on the detection of changes in the shape of the QRS complex and a raise in cardiac enzymes (Troponin, CKMB).

Angina

The term Angina relates to an uncomfortable feeling in the chest. It usually feels like a heaviness or tightness in the centre of the chest which may spread to the arms, neck, jaw, back or stomach. Symptoms usually fade within 10-15 minutes. Angina is usually brought on by physical activity or emotional upset. The coronary arteries which supply oxygen rich blood to the heart can become narrowed by a gradual build-up of fatty material. The arteries may become so narrowed that they cannot deliver enough oxygen rich blood to the heart, causing pain or discomfort called angina.

Heart Failure

Heart failure is the term used when the heart becomes less efficient at pumping blood round the body. Heart failure may result from damage to the heart muscle i.e. a heart attack, a virus infection or a congenital defect. The symptoms include severe tiredness, breathlessness and swelling of the ankles, all generally caused by a build-up of fluid in the body. Heart failure may occur acutely (suddenly) or over a period of time. Most patients admitted to CCU are acutely unwell and unstable.

Common Cardiac Medication

- **ACE Inhibitors** (pril's) i.e. Ramipril, Lisinopril, Enalapril.
  Angiotensin Converting Enzyme Inhibitor, prevents synthesis of Angiotensin II which is a vasoconstrictor. This lowers peripheral resistance and blood pressure.

- **Anti coagulants** i.e. Warfarin, Sinthrome.
  Prolongs blood clotting time.

    - **Novel Oral Anticoagulants** (NOAC's) or
      Direct Oral Anticoagulants (DOAC's) (ban's) i.e. Apixaban, Rivaroxaban, Edoxaban, Dabigatran.
      Less influenced by diet and other medications. Do not require regular monitoring. Shorter acting than Warfarin.

    - **Low Molecular Weight Heparin** i.e. Enoxaparin (Clexane).
      Treatment of ACS, DVT, PE and prophylactic treatment to guard against these.

- **Anti platelet agents** i.e. Aspirin, Clopidogrel.
  Interfere or inhibit the adherence of platelets to collagen at site of vascular injury.

- **Beta Blockers** (olol's) i.e. Atenolol, Bisoprolol, Sotolol.
  Decrease heart rate, contractility and oxygen demand.

- **Calcium Channel Blockers** i.e. Diltiazem, Amlodipine.
  Relieve angina pain by decreasing myocardial contractility and oxygen demand.

- **Cholesterol lowering drugs** (statin's) i.e. Atorvastatin, Pravastatin, Simvastatin.

Act by inhibiting the synthesis of cholesterol and increasing the excretion of cholesterol.

- **Diuretics** i.e. Furosemide, Bumetanide, Spironolactone, Co Amilofruse.
  Promote diuresis, the formation and excretion of urine.

- **Nitrates** i.e. GTN spray, patches, isosorbide mononitrate or IV GTN.
  Relieve angina pain by decreasing oxygen demand, dilate veins and in higher doses dilate all major arteries.

- **Thrombolytic Agents** i.e. Streptokinase, rTPA (recombinant tissue plasminogen activator), TNK (tenecteplase).
  Initially used to treat STEMI's but now replaced by Primary Percutaneous Coronary Intervention. Dissolves a clot by converting plasminogen to plasmin.

- **Benzodiazepines** i.e. Midazolam, Diazepam.
  Enhance the effect of the neurotransmitter gamma-aminobutyric acid (GABA) at the $GABA_A$ receptor, resulting in sedative, hypnotic (sleep-inducing), anxiolytic (anti-anxiety), anticonvulsant, and muscle relaxant properties.

Opioids i.e. Fentanyl, Morphine, Diamorphine.
Inhibit neurotransmitter release. Used primarily for pain relief.

Glossary

This is a list of words often used in a cardiac environment. Each word comes with a brief meaning. For in depth interpretation please research online or ask a member of staff.

Acute Coronary Syndrome

Acute conditions of the heart such as STEMI, NSTEMI and Unstable Coronary Artery Disease.

Aneurysm

A balloon like swelling which weakens the wall of an artery which could rupture.

Angina

Discomfort in the chest, arms, jaw, face, neck or back caused by narrowing of the arteries, reducing blood supply and oxygen to the heart muscle.

Angiography

A test to show where arteries are narrowed and to what extent.

Angioplasty

A treatment to improve blood supply to the arteries. A fine hollow tube (catheter) with an inflatable balloon device is inserted into an artery in the groin/wrist and passed through to the narrowed artery. The balloon is then gently inflated to widen the artery.

Arrhythmia

An abnormality of the heart rhythm.

Atrial fibrillation

An irregular heart rhythm (arrhythmia) which originates in the atria and the ventricles respond by beating quickly and irregularly. The rate is often fast and can cause the patient to experience palpitations, shortness of breath and chest discomfort.

Atrial flutter: Another irregular heart rhythm (arrhythmia) originating in the atria.

Blocks

This is the term used to describe a rhythm that does not follow the normal electrical pattern due to a “block” in the pathway.

Bradycardia

Slow heart rate, below 60bpm.

Coronary artery disease

When the walls of the coronary arteries (blood vessels that supply blood rich in oxygen to the heart) gradually become narrowed due to a build up of fatty plaque known as atheroma, leading to angina, heart attack or sudden death.

DVT

Deep Vein Thrombosis, a blood clot in one of the lower limbs.

Echocardiogram

An ultrasound scan of the heart that looks at the structure of the heart i.e. valves, pericardial effusion, etc.

Electrocardiogram (ECG)

A recording of the hearts rhythm looking at it from ten different views from which a lot of information can be gained.

Electrode

Paper, plastic or metal device that contains conductive material and is applied to the patients’ skin.

Enzymes

Particular enzymes that are released from damaged muscle. Two particular enzymes, Creatinine Kinase (CK) and Troponin T are more specific to the myocardium (heart muscle).

Exercise test (also known as treadmill test or ETT)
This is when the patient is attached to an ECG and then exercised on a treadmill. Exercise can induce angina and this is used to diagnose angina.

Left ventricular failure
Failure of the left ventricle to pump adequately, resulting in a build up of fluid in the heart and lungs causing sudden shortness of breath and distress due to the feeling of “drowning”.

NSTEMI
Non-ST Elevation Myocardial Infarction.

Myocardial Infarction
The correct terminology for a heart attack. A blockage caused by a clot in an artery supplying the heart muscle with blood and oxygen. Consequently the heart muscle is damaged.

Pacemaker
A device that stimulates the contraction of the heart muscle by electrical pulses. A pacemaker is implanted into the body and the lead(s) secured to the heart.

PCI
Percutaneous Coronary Intervention. Use of a balloon or stent to open up narrowed coronary arteries.

PE
Pulmonary Embolism. A blood clot that forms in the lung.

PPCI
Primary Percutaneous Coronary Intervention. This is first line treatment using balloons and/or stents to open up narrowed arteries. It is ideally performed within 90 minutes of the onset of chest pain.

STEMI

ST Elevation Myocardial Infarction

Stent

An expandable scaffolding device inserted into the coronary arteries to maintain patency of the artery. Inserted during PCI.

TOE

Transoesophageal Echocardiogram. An ultrasound scan of the heart produced from a probe passed down the oesophagus.

UCAD

Unstable Coronary Artery Disease commonly known as Unstable Angina.

Coronary anatomy abbreviations

LAD: Left Anterior Descendent (Artery)
LMS: Left Main Stem (Coronary Artery)
RCA: Right Coronary Artery
IM: Internal Mammary (Artery)
SVG: Saphenous Vein Graft
OM: Obtuse Marginal (Artery)
CABG: Coronary Artery Bypass Grafts
AVR: Aortic Valve Replacement
MVR: Mitral Valve Replacement
AR: Aortic Regurgitation
AS: Aortic Stenosis
PFO: Patent Foramen Ovale
ASD: Atrial Septal Defect
PDA: Patent Ductus Arteriosus
ICD: Implantable Cardioverter Defibrillator