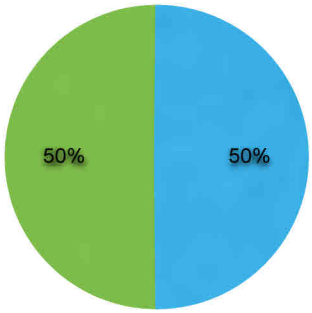
ECG Teaching

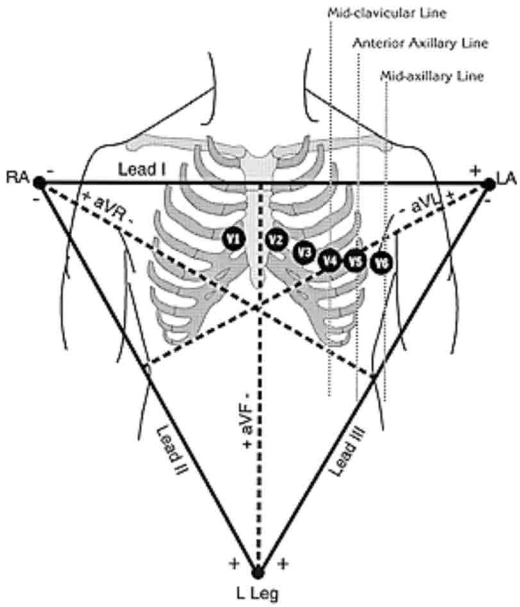
History: This member of staff wishes to understand more about ECGs.

Task: Provide a short teaching on ECG interpretation



Marking criteria	Not Completed	Partially Completed	Completed
Ask for any pertinent history about the patient			
Mentions standard paper and standard speed			
Shows how to assess rate (300/num of big boxes between consecutive R)			
Shows how to assess rhythm (p before each qrs, uses pen and paper assess regularity)			
Shows how to assess axis (normal I, II pos; L axis pos I, neg II; R axis I and II neg)			
If p waves present are they normal size and 1 with each QRS (sinus)			
Define PR interval (atrial contraction, 0.12-0.2 s, 3-5 small squares)			
Discusses significance of PR interval (heart blocks, conduction delays)			
Defines the QRS (ventricular contraction, <0.12 or three small squares)			
Discusses the significance of abnormal QRS (bundle branch blocks)			
Defines QRS amplitude (R wave in V5-6 or S in V2 >35mm)			
Defines Q waves and significance (should not be > one small box or 25% of R)			
Looks for T wave inversion (always abnormal if in I, II, V4-6)			
Discusses significance of T wave inversion			
Looks for ST elevation/depression			
Discusses the significance of ST elevation/depression			
Looks for other findings - delta wave, U wave			
Discusses significance of delta and U waves (hypokalaemia)			
Checks that the student understands what has been explained			
Asks student if they have any questions			
Overall			

ECG Teaching



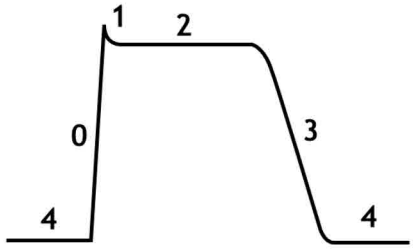
Level 1 Understanding (basic sciences)

Draw Einthoven's Triangle.

What are the positions of the chest electrodes?
V1: right 4th intercostal space
V2: left 4th intercostal space
V3: halfway between V2 and V4
V4: left 5th intercostal space, mid-clavicular line
V5: horizontal to V4, anterior axillary line
V6: horizontal to V5, mid-axillary line

Level 2 Understanding (applied sciences)

Discuss the common lead reversals and their findings.



Right leg and right arm:
- Hardly any signal in lead II.

Right and left arm electrodes:
- reversal of leads II and III
- reversal of leads aVR and aVL

Left arm and left leg:
- reversal of leads I and II
- reversal of leads aVR and aVF
- inversion of lead III

Right arm and left leg:
- inversion of leads I, II and III
- reversal of leads aVR and aVF

Dextrocardia will not show any R wave progression in leads V1-V6, whereas lead reversal will.

Level 3 Understanding (advanced sciences/management)

Draw and Discuss the phases of cardiac action potential.
Phase 4: resting membrane potential, high K permiability
Phase 0: rapid depolarisation, opening of fast Na channels
Phase 1: inactivation of fast Na channels, net outward current of K and Cl
Phase 2: Ca inward movement, K outward
Phase 3: rapid repolarisation, Ca channels close, net outward flow of positive current

How does amiodarone effect the cardiac action potential?
Class III antiarrhythmic agent, and prolongs phase 3 of the cardiac action potential

The resting membrane potential is caused by the difference in ionic concentrations and conductances across the membrane of the cell during phase 4 of the action potential. This potential is determined by the permeability of the cell membrane to various ions. The membrane is most permeable to K+ and relatively impermeable to other ions. The resting membrane potential is therefore dominated by the K+ equilibrium potential according to the K+ gradient across the cell membrane. The maintenance of this electrical gradient is due to various ion pumps and exchange mechanisms, including the Na+-K+ ion exchange pump, the Na+-Ca2+ exchanger current and the IK1 inwardly rectifying K+ current.