ECG Measurement and Interpretation
6KNIC314

Level: 6
Credits: 15

Module leader: Dr Ehsan U Khan
Tel: 020 7848 3509
Email: Eu.khan@kcl.ac.uk

Module deputy: Amanda McNaughton
Tel: 020 7848 3679
Email: Amanda.McNaughton@kcl.ac.uk

This handbook must be read in conjunction with module information provided on KEATS, the King’s E-Learning And Teaching Service. You will be given access to KEATS on enrolment. Important information relating to assessment and related regulations can be found in the Undergraduate Programme Handbook, available on KEATS.

This handbook can also be provided in alternative formats (such as large print) upon request to asc@kcl.ac.uk.
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Module overview

This module forms part of the BSc Cardiac Nursing. The module contributes to your programme of study by offering students an opportunity to understand and critically analyse the principles of cardiac electrophysiology and apply these principles in identification and evaluation of ECG recordings. The module will primarily address ECG interpretation skills, both rhythm strip analysis and 12-lead ECG interpretation. The course utilises online resources to reinforce classroom lectures. The module also relies on hands-on interpretation sessions to help consolidate interpretation skills.

The module can also be taken as a freestanding module.

Module aim

This course aims to offer students an opportunity to understand and critically analyse the principles of cardiac electrophysiology and apply these principles in identification and evaluation of ECG abnormalities.

NB: The course will draw heavily from examples of abnormal ECG’s gained from the student’s clinical area.
Teaching arrangements
A variety of teaching approaches will be used to reflect the learning outcomes of the course. There will be mixed student and teacher and web based led approaches using such methods as:

- Lectures with practical sessions.
- Web-based learning materials reiterating lecture content, providing students to revisit the lectures at their own pace.
- Practical Workshops.
- Directed reading/guided study
- Individual tutorials
Dates for examinations
You will be notified of dates for examination on the Student Records section of the King’s Intranet. It is essential that you use your candidate number on all assignments/examinations. Your candidate number, which will begin with Y for the academic year 2017/18, will be available via Student Records on the King’s Intranet approximately one month after you enrol.

Results and resits for examinations
Unratified results from exams will be available on your KEATS module site 4 weeks from the date of the examination.

Faculties are required from this academic year 2016/17 to make examination scripts available to any student who makes a request, free of charge. Any requests for examination scripts should still be managed in accordance with the Data Protection Act 1998. Students may request access to their exam paper at any time (after the Assessment Sub Board meeting) during their programme of study. This policy applies to all summative, unseen, written examinations. MCQs and OSCEs are exempt from this process.

Re-sit dates will available on your KEATS module site. If you are unsuccessful, it is recommended that you contact the module leader before submitting your second attempt or re-sitting your examination.

The university and its Examination Boards in the ten Faculties (Institutes/Schools, King’s Learning Institute and the Association of King’s College (AKC), work with over 500 external examiners to ensure the quality and standard of our taught awards. Find the latest report on the External Examiners Report page, navigate to the Faculty of Nursing and Midwifery section.

Resubmission date
Tuesday 17 July 2018
Learning outcomes
On completion of this course the student will be able to:

- Demonstrate an understanding of the principles of electrophysiology and their relationship to the cardiac cycle.
- Describe the proposed mechanisms of arrhythmia formation.
- Identify diagnostic criteria for the following abnormalities from a 12-lead ECG:
  - Atrial, junctional and ventricular arrhythmias
  - Infarction & ischaemia
  - Chamber enlargement
  - Conduction abnormalities
- Recognise the possible signs and symptoms associated with ECG arrhythmias
- Review the evidence for appropriate treatment modalities for ECG abnormalities and analyse the nurse’s role.

Session 1 — Physiology for ECG Interpretation
The student will have an understanding of cardiac anatomy relevant to cardiac electrophysiology.

- The student will have an in depth understanding of the importance of the different tissues involved in normal ECG generation
- The student will be able to display an exact knowledge of how a normal ECG is generated.

Indicative reading


E-learning rhythm strip interpretation.
Session 2 — Arrhythmia Formation

- The student will be able to critically evaluate how normal electrolyte balance contributes to cardiac depolarization and repolarisation.
- The student will be able to provide a basic analysis of the roles of important electrolytes in the generation of the action potential.
- The student will be able to provide a critical analysis of the different ways an arrhythmia may be generated.
- The student will be able to apply this knowledge to evaluate risk of arrhythmias in particular patient groups.

Indicative reading

E-learning action potential.

Session 3 — Lead Placement

The student will be able to demonstrate the underpinning physical basis behind normal ECG vector movement:
- The student will be able to provide an analysis of the need to appropriately placement of ECG electrodes to acquire a 12 lead ECG.
- The student will be able to provide an in-depth understanding of the views a 12 – lead ECG have on the heart and be able to discuss the most appropriate lead to use for cardiac monitoring
- The student will be able to extrapolate the use of limbs leads in relation to R wave axis determination.

Indicative reading

E-learning lead placement.
Session 4 — Principles of ECG Interpretation.
The student will be able to learn the principles of rhythm strip interpretation including:
- Assessing rhythm rate
- Rhythm regularity
- Atrial activation
- Relationship between atrial and ventricular depolarisations
- Narrow ventricular complexes
- Broad ventricularly complexes

Session 5 — Atrial Arrhythmias
The student will be able to interpret a number of atrial arrhythmias including:
- Sinus bradycardia
- Sinus tachycardia
- Atrial fibrillation
- Atrial flutter
- The student will have knowledge of atrial ectopics and sick sinus syndrome.

The student will be able to evaluate the rhythm in relation to its influence on patient safety and prognosis.

Indicative reading

E-learning rhythm strip interpretation.
Session 6 — AV Node and AV Junction Arrhythmia

By the end of the session:

- The student will be able to differentiate between atrial and junctional or nodal arrhythmias
- The student will be able to interpret the different forms of nodal/junctional rhythms
- The student will be able to evaluate the rhythm in relation to its influence on patient safety and prognosis.

Indicative reading


E-learning rhythm strip interpretation.
**Session 7 — Ventricular Arrhythmias**
The student will be able to identify the causes behind broad complex rhythms.

The student will be able to interpret a number of important ventricular rhythms including:

- Ventricular ectopics
- Bigeminy / trigemny
- Ventricular tachycardia

Ventricular fibrillation
- The student will be able to evaluate the risk associated with and possible prognosis of the patient with these rhythms.
- The student will be able to give an understanding of the reasons behind QT prolongation and show an understanding of Torsade de pointes.

**Indicative reading**


**E-learning rhythm strip interpretation.**
Session 8 — AV & Ventricular Conduction Blocks

The student will be able interpret and differentiate between the 4 different forms of AV block:

- 1st degree AV block
- 2nd degree type 1AV block
- 2nd degree type 2 AV block
- 3rd degree AV block

The student will be able to provide an analysis of the prognosis of these rhythms and possible treatment modalities required in the different forms of AV block.

The student will be able to interpret ECG changes associated with the main ventricular conduction blocks:

- Left bundle branch block
- Right bundle branch block
- Hemiblocks

Indicative reading


E-learning rhythm strip interpretation.

Session 9 — Rhythm Strip Workshop

The student will have the opportunity to consolidate their rhythm strip interpretation skills by a hands on small group rhythm strip assessment exercise.

E-learning rhythm strip interpretation.
Session 10 — Chamber Enlargement and Axis
The student will be able to interpret ECG changes associated with hypertrophic changes associated with the:
- Right atrium
- Left atrium
- Right ventricle
- Left ventricle

Session 11 — Ischemia and Myocardial Infarction Interpretation
The student will be able to:
- Critically evaluate the evolution of an acute myocardial infarction by applying a theoretical understanding of ECG changes that occur.
- Apply current clinical guidelines to the interpretation of:
  - Acute coronary syndrome
  - Established myocardial infarctions
  - Myocardial ischemia

Indicative reading


**Session 12 — Lead ECG Interpretation and Drugs**

- The student will be able to display an understanding of the classes of anti-arrhythmic medications
- The student will be able to display an understanding regarding the pharmacodynamic-related / type A adverse effects of these medications in relation to patient safety.
- The student will be able to suggest signs and symptoms relevant to each drug class in order to maintain patient safety.
- The student will be able to critically evaluate nursing care for a patient on a anti-arrhythmic medications

**Indicative reading**


**Session 13 — Introduction to Pacemakers and Nursing Practice**

The student will be able to:

- Evaluate the need for different modalities of pacemaker therapy
- Interpret a single chamber ventricular paced rhythm.
- Critically evaluate the nursing care required by patients receiving intra-cardiac devices.

**Indicative reading**


Module evaluation
As part of the university’s Student Voice Strategy, King’s uses an electronic module evaluation system known as EvaSys. This provides an opportunity for you to feedback on different aspects of the module through a series of pre-set questions and qualitative comments. At the end of the module you will receive an automated invitation via your KCL email account to complete your evaluation online.

Please take the time to complete as your feedback is important. It informs ongoing developments to individual modules to ensure that the learning needs and expectations of the Faculty’s student community are met to a high standard.

To strengthen the feedback cycle, a report summarizing the quantitative results for the module as a whole and the module lead’s reflections on your feedback will be sent to you after the online evaluation survey has closed.

Action from previous evaluations
More hands on practice was requested, therefore a flipped classroom approach will be instigated for interpretation sessions to provide participants with more time for hands on practice of ECG interpretation.
<table>
<thead>
<tr>
<th>Lecture</th>
<th>Date</th>
<th>Time</th>
<th>Topic</th>
<th>Facilitator</th>
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</table>

**Location key:**
FWB – Franklin-Wilkins Building, Waterloo Campus

**Lecturer key:**
EK= Ehsan Khan
AM= Amanda McNaughton