ECG

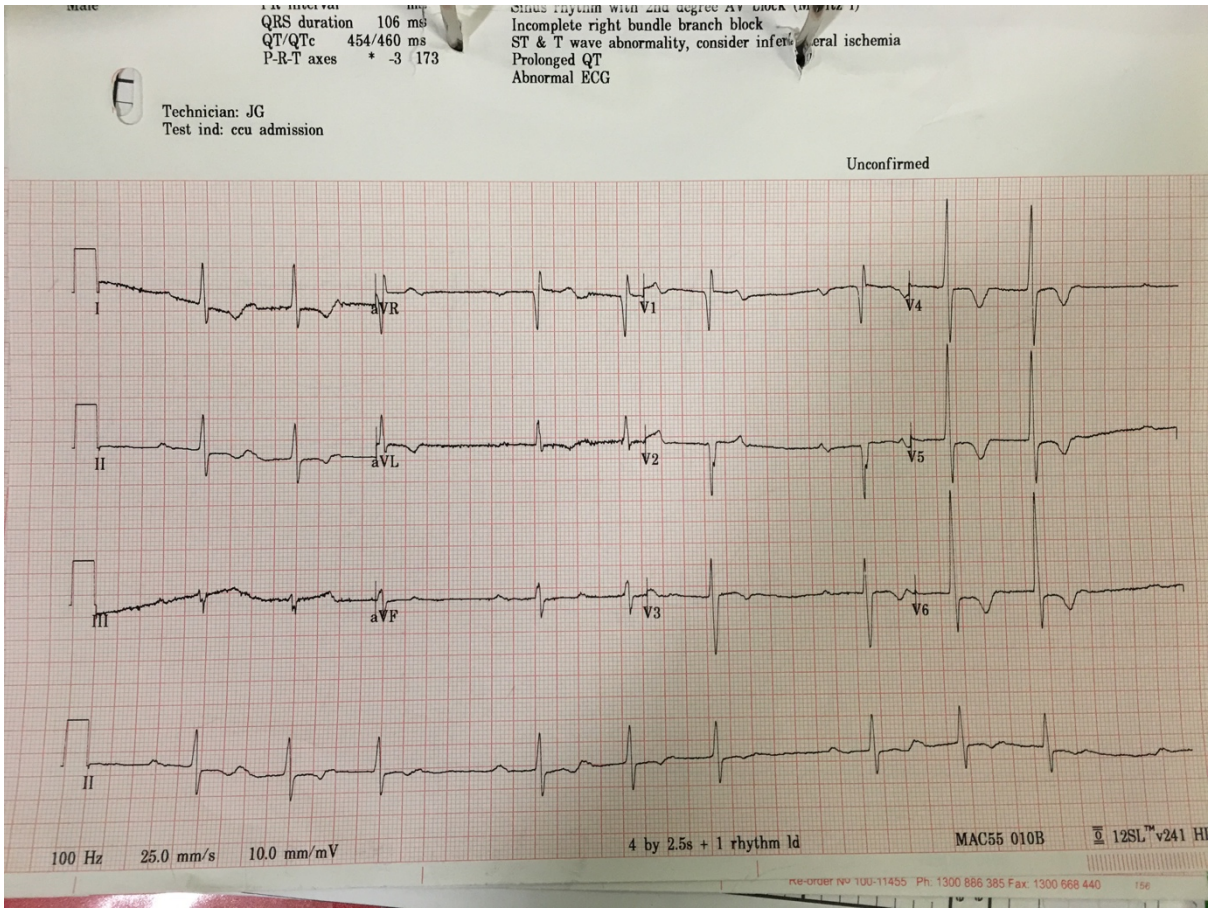
Aims:
To increase understanding amongst nursing students and junior nurses of the basic principles of ECG, the features of a normal ECG, and some common pathological findings. For senior nurses to refresh and consolidate the above. This session is separate from the arrhythmia session.

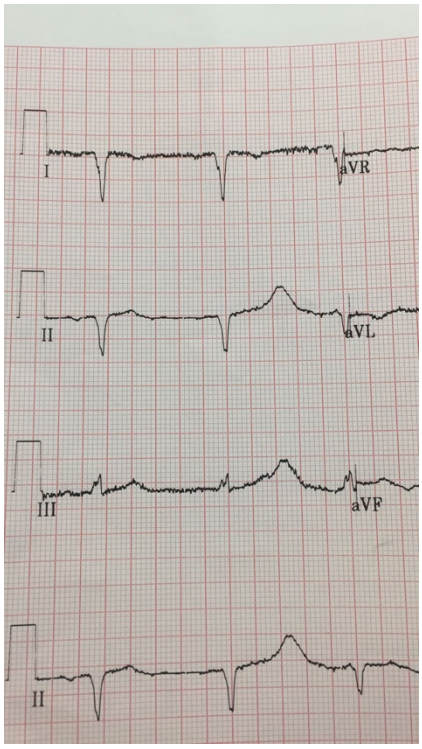
Structure:
Start with ECG history, underlying physics, lead placement and technical aspects (speed, amplitude, baseline). Then discuss axis and go through normal ECG findings sequentially (P, PR, QRS, ST, QT, T). Mention common pathologic findings (P pulmonale, P mitrale, PR prolongation, pathologic Q wave, QRS broadening, ST elevation and depression, TWI, QT prolongation).

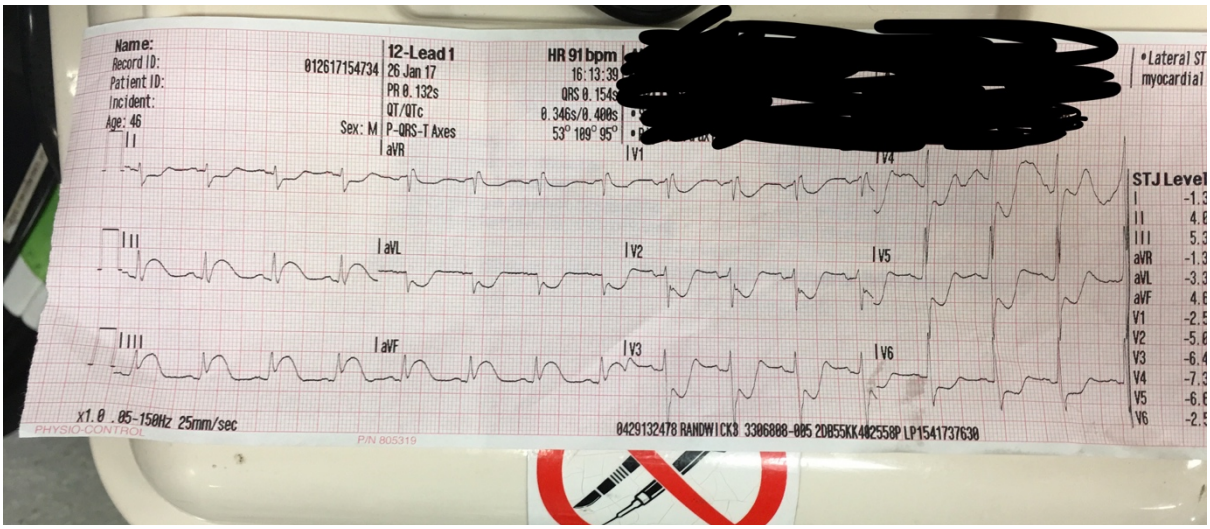
Content:
First use of galvanometer for bedside electrocardiography in 1902 by Dr Willem Einthoven. Terminology still in use – Einthoven triangle, PQRS labels.
Draw patient schematic and explain unipolar versus bipolar leads.
This is a good point from which to segue into a description of the axis of the heart and how to determine normal versus abnormal axes.
Discuss the technical aspects of the ECG ie 25mm/s 10mm/mV
From here go through the normal morphology of each component and which part of the cardiac cycle they correspond to:

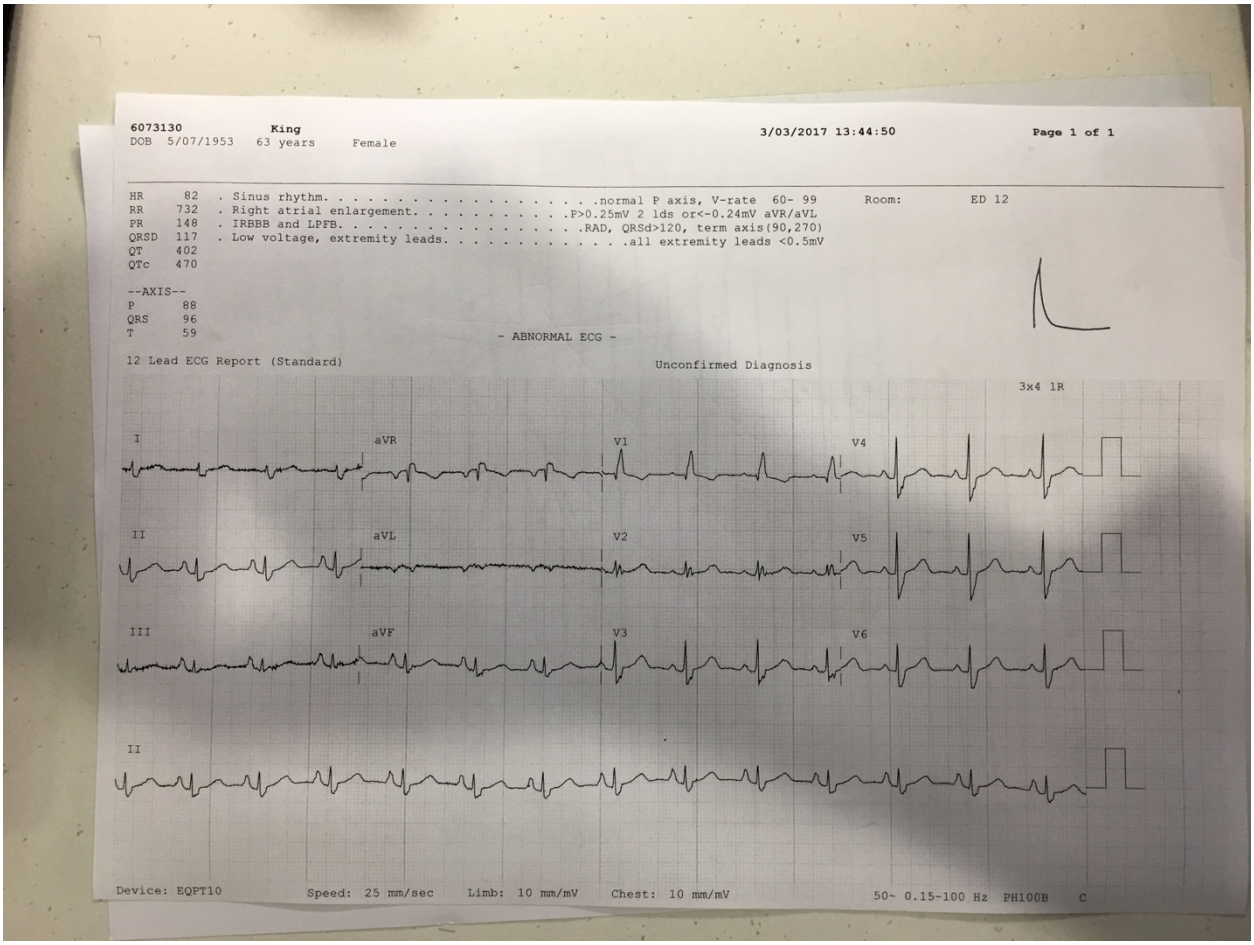
- P wave <2mm tall, <110ms duration
    - Mitrale and pulmonale morphologies and corresponding heart pathology
- PR interval, brief mention of degrees of heart block
- QRS morphology
    - <120ms, determinants of magnitude of deflection
    - LVH
    - Pathologic Q waves
    - Interventricular conduction delay, bundle block morphologies
- ST segment
    - Depression, elevation, coronary territories
    - Mention Wellen's sign
- T wave
    - Importance of serial assessment
- QT interval
    - Correction for rate (/root(R-R))

Next you can treat the nurses to some example ECGs and invite analysis from the audience. I think it's best to find some examples from patients on the floor, as that would underscore the relevance of ECG analysis. Otherwise here are some examples.


QRS duration 106 ms
QT/QTc 454/460 ms
P-R-T axes * -3 173
Incomplete right bundle branch block
ST & T wave abnormality, consider infer eral ischemia
Prolonged QT
Abnormal ECG
Technician: JG
Test ind: ccu admission
Unconfirmed
I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
II
100 Hz
25.0 mm/s
10.0 mm/mV
4 by 2.5s + 1 rhythm ld
MAC55 010B
12SL™v241 HI
Re-order No 100-11455 Ph: 1300 886 385 Fax: 1300 668 440


I
aVR
II
aVL
III
aVF
II


Name:
Record ID:
Patient ID:
Incident:
Age: 46
012617154734
Sex: M
12-Lead 1
26 Jan 17
PR 0.132s
QT/QTc
P-QRS-T Axes
aVR
HR 91 bpm
16:13:39
QRS 0.154s
0.346s/0.400s
53° 109° 95°
V1
V4
aVL
V2
V5
aVF
V3
V6
*Lateral ST
myocardial
STJ Level
I -1.3
II 4.6
III 5.3
aVR -1.3
aVL -3.3
aVF 4.6
V1 -2.5
V2 -5.6
V3 -6.4
V4 -7.3
V5 -6.6
V6 -2.5
X1.0 .05-150Hz 25mm/sec
PHYSIO-CONTROL
P/N 805319
0429132478 RANDW ICK3 3306888-005 2D855KK482558P LP1541737630


6073130 King
DOB 5/07/1953 63 years Female
3/03/2017 13:44:50
Page 1 of 1
HR 82 . Sinus rhythm. . . . . .normal P axis, V-rate 60- 99
RR 732 . Right atrial enlargement. . . . . .P>0.25mV 2 lds or<-0.24mV aVR/aVL
PR 148 . IRBBB and LPFB. . . . . .RAD, QRSd>120, term axis(90,270)
QRSD 117 . Low voltage, extremity leads. . . . . .all extremity leads <0.5mV
QT 402
QTc 470
Room: ED 12
--AXIS--
P 88
QRS 96
T 59
- ABNORMAL ECG -
12 Lead ECG Report (Standard)
Unconfirmed Diagnosis
3x4 1R
I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
II
Device: EQPT10
Speed: 25 mm/sec
Limb: 10 mm/mV
Chest: 10 mm/mV
50~ 0.15-100 Hz PH100B C