Basic Skills Qualification
EKG

Evaluation Process
Prior to seeking BSQ certification, a resident should be confident in their skills. The "Basic Skills Qualification" is printed and given to the supervising physician, whereafter, the resident performs the procedure under direct observation of the supervising physician. The competency assessment is completed by the supervising physician with their signature and given back to the resident. The resident then returns the competency assessment to the Academic Coordinator.

You will be asked to list, for each, the rate, axis, rhythm, and interval, as well as determine the presence of hypertrophy, ischemia, or infarction (six components x 5 EKGs = 30 possible points). To be deemed competent you will need to achieve 25 points and correctly identify all instances of ischemia or infarction, if present.

Resident: ____________________________

<table>
<thead>
<tr>
<th>EKG</th>
<th>Points earned</th>
<th>Points possible</th>
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<tbody>
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<td>1</td>
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Faculty: ____________________________

Date: ____________________________
EKG Reading

All EKG tracings should be evaluated for the following:

**Rate (fig 1)** is calculated by:
1) Finding an R wave that falls on a heavy black line. Find the next R wave and count the large boxes between them as follows: 300; 150; 100; 75; 60; 50.

To determine **Axis (fig 2):**
1) Look at the R waves in leads I and aVF
2) If both are positive, axis is normal
3) Down in I, up in AVF = RAD
4) Up in I, down in AVG = LAD
5) To more closely estimate axis, find the most isoelectric lead (parts of the QRS above and below baseline are equal); the axis will be 90° away from that.

**Rhythm (fig 3a-d)** is determined by:
1) Do QRS complexes occur regularly? (rhythm strip)
2) P before every QRS? QRS after every P?
3) Yes + Yes + Yes = NSR
4) If irregular, determine pattern: regularly or irregularly irregular
   a. If **regularly** irregular, determine intervals. Does P-R interval lengthen?
   b. If **irregularly** irregular, look for dropped complexes, abnormal appearing complexes, and presence of P waves

**Intervals (fig 4)** determined by:
1) PR interval – count the small boxes from the beginning of the P wave in to the beginning of the R wave
   - One small box = 0.04 seconds
   - **Normal PR <0.2 Normal PR; > 0.2 First degree AV block**
   - Note whether intervals or constant or variable
   - Need to recognize second degree AV Block Mobitz Type 1 and Mobitz Type 2 (figure 5)
   - Need to recognize third degree AB Block (figure 6)
2) QRS interval – beginning of the Q wave to end of the S wave
   - Normal = < 0.08 sec
   - Interventricular conduction delay = 0.08 – 0.12 sec
   - Bundle branch block = > .12 sec
      - Look at morphology in anterior chest leads to determine RBBB vs LBBB
3) QT interval
   - Start of the Q wave to end of the T wave
   - **QT length is heart rate dependent. If >0.44 sec for corr. QT = prolonged**
4) Wave size is determined by counting small boxes from the beginning to the end of the wave; > 3 boxes (0.12 sec) = QRS widening

**Hypertrophy**
1) LVH: Count small boxes vertically
   a. S in V1 + R in V5: >35 is positive, or
   b. S in V2 + R in V6: >25 is positive, or
   c. R in AVL: > 11 is positive

2) Atrial hypertrophy:
   a. Look at P wave in V1
      - If P wave is diphasic (upward and downward component) atrial hypertrophy is present
        - If initial component of diphasic P wave in V1 is largest = Right atrial hypertrophy
        - If terminal component of diphasic P wave in V1 is largest = Left atrial hypertrophy
The signs of *ischemia/Infarction* (fig 7) are:

1) Ischemia:
   a. ST depression > 2 mm  
   b. Inverted or flattened T waves

2) Infarction:
   a. ST elevation > 1 mm  
   b. Q-wave = completed infarction. Significant Q is one small square wide or 1/3 the height of the QRS complex

3) Distribution of changes across leads describes location  
   a. Anterior = V1-V4;  
      Inferior = II, III, AVF;  
      Lateral = I, AVL

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![Figure 1](image1.png)  
**Figure 1**

![Figure 2](image2.png)  
**Figure 2**

![Atrial fibrillation](image3.png)  
**Atrial fibrillation**

![Atrial flutter](image4.png)  
**Atrial flutter**

![Multifocal atrial tachycardia](image5.png)  
**Multifocal atrial tachycardia**

![Figure 3a](image6.png) (sinus rhythm)  
**Figure 3a**

![Figure 3b](image7.png)  
**Figure 3b**

![Figure 3c](image8.png) (ventricular tachycardia)  
**Figure 3c**

![Figure 3d](image9.png) (ventricular fibrillation)  
**Figure 3d**

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![Heart Diagram](image10.png)