EKG Intermediate Tips, tricks, tools

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Birmingham Regional EMS System

Real-time EMS serving Blount, Chilton, Jefferson, Shelby, St. Clair, Walker, & Winston counties in North Central Alabama. BREMSS’s main goal is to serve all providers of emergency care in the region so patient life & limb are saved, to lead with vision the EMSS of the region in development & implementation of a system that delivers patient care at the highest level, to educate the community about emergency medical care, & continue the education of healthcare personnel in the newest lifesaving knowledge, techniques, & skills.
Objectives

- Explain each step in the EKG interpretation process.
- Using the rules of ECG Interpretation, identify sinus rhythms.
- Using the rules of ECG Interpretation, identify atrial rhythms.
- Using the rules of ECG Interpretation, identify junctional rhythms.
- Using the rules of ECG Interpretation, identify ventricular rhythms.
- Using the rules of ECG Interpretation, identify heart blocks.
- Using the rules of ECG Interpretation, identify cardiac arrest rhythms.
- Explain 12 lead EKG Interpretation.
# 1 Problem Students Have with EKG Interpretation?
“Memorization is great!
I don't know why; I just memorized it.”
Memorization vs. Interpretation
EKG Waveforms
Rules of EKG Interpretation

5 Basic Steps

• Rate
• Is it Regular or Irregular?
• Is there a P wave Present?
• What is my PR Interval?
• How wide is my QRS complex?
Inherent Cardiac Rates

The frequency of impulse formation attributed to a given pacemaker location within the heart.

- sinus node, **60 to 100 beats/min**
- atrioventricular junction, 40 to 60 beats/min
- ventricle, **15 to 40 beats/min**.
Rate: 6 Second Method

The second method can be used with an irregular rhythm to estimate the rate. Count the number of R waves in a 6 second strip and multiply by 10.

Heart rate = 7 x 10 = 70/min
Rate: 300 rule

The square counting method is ideal for regular heart rates. Use the sequence 300-150-100-75-60-50-43-37. Count from the first QRS complex, the first thick line is 300, the next thick line 150 etc. Count the number of QRS complexes that fit into 3 seconds.
Rate: ECG Rate Ruler
Regularity

Determining regularity is the second step of analyzing an ECG rhythm. Irregular rhythms are considered abnormal and can be caused by a variety of conditions. If the distance of the R-R intervals or P-P intervals is the same, the rhythm is regular – if the distance differs, the rhythm is irregular.
Regularity: Calipers
P Waves

• Are they present?
• Upright or Inverted?

• The P Wave represents Atrial Depolarization.
• Absence of a P wave indicates that there is no conduction within the atria
• Absent or inverted P Waves with an associated narrow QRS complex may indicate a Junctional origin
P-WAVES

P-WAVES PRESENT
(SINUS RHYTHM)

P-WAVES ABSENT
(ATRIAL FIBRILLATION)
In electrocardiography, the PR interval is the period, measured in milliseconds, that extends from the beginning of the P wave (the onset of atrial depolarization) until the beginning of the QRS complex (the onset of ventricular depolarization); it is normally between 120 and 200ms in duration.
Abnormal PR Interval
QRS Duration

The normal duration (interval) of the QRS complex is between 0.08 and 0.10 seconds — that is, 80 and 100 milliseconds. When the duration is between 0.10 and 0.12 seconds, it is intermediate or slightly prolonged. A QRS duration of greater than 0.12 seconds is considered abnormal.
Wide QRS
Narrow QRS
Normal QRS
Terminology

• Sinus: Originates from the SA Node
• Atrial: Originates from the Atria but not specifically the SA Node
• Junctional: Originates in and around the AV Junction
• Ventricular: Originates in the Ventricles
• Asystole: No Electrical Activity
• Tachycardia: Fast Heart Rate
• Bradycardia: Slow Heart Rate
• Supraventricular: Above the Ventricles
Sinus Rhythms

- Normal Sinus Rhythm
- Sinus Bradycardia
- Sinus Tachycardia
- Sinus Arrhythmia
Normal Sinus Rhythm

Rate: Normal (60–100 bpm)
Rhythm: Regular

P Waves: Normal (upright and uniform)
PR Interval: Normal (0.12–0.20 sec)
1) Rhythm?
2) Rate?
3) P Waves? Partially Hidden
4) PRI? Indeterminate
5) QRS? .08 Sec; Normal
**Sinus Bradycardia (SB)**

- **Rhythm:** Regular
- **Rate:** < 60 bpm
- **P waves:** Upright & uniform; precedes each QRS complex
  - **PRI:** 0.12 – 0.20 sec; constant
- **QRS:** Narrow (≤ 0.10 sec); sometimes wide

***Interpretation: Sinus Bradycardia***

(ST-segment depression ???)
Sinus Arrhythmia

Lead II

25mm/sec 10mm/mV
Atrial Rhythms

- Atrial Tachycardia
- Atrial Flutter
- Atrial Fibrillation
- Prematura Atrial Contraction
Atrial Tachycardia
Atrial Flutter
Atrial Fibrillation
Premature Atrial Contraction (PAC)
Junctional Rhythms

- Junctional Escape
- Accelerated Junctional
- Junctional Tachycardia
- Premature Junctional Contraction
Junctional Escape
Accelerated Junctional
Junctional Tachycardia
Premature Junctional Contraction (PJC)
Ventricular Rhythms

• Ventricular Tachycardia
• Ventricular Fibrillation
• Idioventricular Rhythm
• Accelerated Idioventricular Rhythm
• Polymorphic Ventricular Tachycardia (Torsades de Pointes)
• Premature Ventricular Contraction
Ventricular Tachycardia
Ventricular Fibrillation
Idioventricular Rhythm
Accelerated Idioventricular Rhythm
Polymorphic Ventricular Tachycardia (Torsades de Pointes)
Premature Ventricular Contraction (PVC)
Heart Blocks

- 1st Degree AV Block
- 2nd Degree AV Block Type I
- 2nd Degree AV Block Type II
- 3rd Degree AV Block
1\textsuperscript{st} Degree AV Block
2\textsuperscript{nd} Degree AV Block Type 1 (Wenkebach)
2nd Degree AV Block Type 2 (Classical)
3rd Degree AV Block (Complete Heart Block)
Asystole
12 Lead EKG
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