Heart Rate

Fast & Easy ECGs – A Self-Paced Learning Program
Dysrhythmias

• Irregularities in heart rate or rhythm
  – Some are of little significance whereas others are life threatening
ECG Analysis

• Five Step Process is a logical and systematic process for analyzing ECG tracings
Normal Sinus Rhythm Characteristics

- **Rate:** 60 - 100 BPM
- **Rhythm:** Regular
- **P waves:** Upright and round, one preceding each QRS complex
- **QRS complexes:** Narrow, 0.06 - 0.12 seconds in duration
- **PR Interval:** 0.12 - 0.20 seconds in duration
- **T waves:** Upright and slightly asymmetrical
Determining Heart Rate

• First step in analyzing an ECG rhythm
• Begin by quickly checking ECG monitor or tracing to see if rate is slow, normal or fast
Calculating Heart Rate

- Several methods can be used including:
  - 6-Second Interval x 10 Method
  - 300, 150, 100, 75, 60, 50 Method
  - 1500 Method
  - Rate Calculator
6-Second Interval x 10 Method

• Quick and easy and does not require tools or devices
• Not as accurate as other methods
• Multiply by 10 the number of QRS complexes found in a six second portion of ECG tracing
Practice Makes Perfect

- Determine the heart rate using the 6-second interval x 10 method
Practice Makes Perfect

• Determine the heart rate using the 6-second interval x 10 method
Practice Makes Perfect

- Determine the heart rate using the 6-second interval x 10 method
300, 150, 100, 75, 60, 50 Method

- Quick, fairly accurate, requires no special tools, or calculations
- Cannot be used with irregular rhythms
- Find an R wave located on a bold line. Then find the next consecutive R wave. Bold line it falls on (or is closest to) represents the heart rate.
300, 150, 100, 75, 60, 50 Method

- If the second R wave does not fall on a bold line the heart rate is approximated
  - Example: if it falls between the 4th and 5th bold line the heart rate is between 60 and 75 BPM
300, 150, 100, 75, 60, 50 Method

- If the second R wave falls in between two bold lines the heart rate can be more precisely determined using the identified values for each thin line.
Practice Makes Perfect

- Determine the heart rate using the 300, 150, 100, 75, 60, 50 method
Practice Makes Perfect

- Determine the heart rate using the 300, 150, 100, 75, 60, 50 method
Practice Makes Perfect

• Determine the heart rate using the 300, 150, 100, 75, 60, 50 method
1500 Method

- Most accurate and requires no special tools but math calculation must be done to determine heart rate
- Cannot be used with irregular rhythms
- Count the number of small squares between two consecutive R waves and divide 1500 by that number

1500 divided by 38 small boxes = 40 beats per minute
Practice Makes Perfect

- Determine the heart rate using the 1500 method
Practice Makes Perfect

- Determine the heart rate using the 1500 method
Practice Makes Perfect

• Determine the heart rate using the 1500 method
Rate Calculators

- Easy to use but not always available
- Ineffective on irregular rhythms where a consistent baseline is not present
- Position the “start mark” on an R wave
- Then find the next consecutive R wave – where it lines up is the approximate heart rate
Heart Rates

• Average adult has a heart rate of 60-100 BPM
• Heart rate < 60 BPM called *bradycardia*
• Heart rate > 100 BPM called *tachycardia*
Sinus Bradycardia

- Slow rate that arises from SA node
- May or may not have an adverse affect on cardiac output
- In extreme cases it can lead to severe reductions in cardiac output and eventually deteriorate into asystole
Sinus Arrest

- Transient failure of SA node to initiate a heart beat
- Can lead to a slow heart rate
AV Heart Blocks

- Blockage of the impulse traveling through the AV node can cause a slow heart rate
- 2nd – degree AV heart block
AV Heart Blocks

- 3rd - degree AV heart block occurs with complete blockage of AV node
Rapid Atrial Rates With Slow Ventricular Rates

• Because of the rapid rate not all atrial impulses are conducted through to the ventricles
• A slower than normal ventricular rate can result if the number of atrial impulses reaching the ventricles falls to less than normal
Atrial Flutter

Not all the atrial impulses are conducted through the AV node. This results in more P waves than QRS complexes.

With atrial flutter an ectopic site in the atria fires at a rate of 250 to 350 times per minute.
Atrial Fibrillation

Only some of the atrial impulses are conducted through the AV node.

In atrial fibrillation, ectopic sites in the atria fire at a rate of more than 350 times per minute.

Not conducted

Conducted
Sinus Tachycardia

- Fast rate, > 100 BPM, arises from the SA node
Tachycardia From an Ectopic Pacemaker

- Results from rapid depolarization that overrides the SA node
- *Supraventricular tachycardia* is term used for ectopic tachycardia arising from above the ventricles
  - Atrial tachycardia
    - Generally 150-250 BPM
  - Junctional tachycardia
    - Generally 100-180 BPM
Tachycardia From an Ectopic Site
Tachycardia From an Ectopic Pacemaker

- Ventricular tachycardia arises in the ventricles and has a rate of 150-250 BPM
Rapid Atrial Rates With Fast Ventricular Rates

- In addition to having either a normal or slow ventricular rate in atria flutter the ventricular rate can also be fast.
Rapid Atrial Rates With Fast Ventricular Rates

• In addition to having either a normal or slow ventricular rate in atria fibrillation the ventricular rate can also be fast.
Approach each ECG tracing analysis in a logical and systematic manner.

Some dysrhythmias are of no problem to the patient whereas others are life threatening.

Five steps to analyzing an ECG rhythm are determining the:

1. Heart rate
2. Regularity
3. Presence of and characteristics of P waves
4. Presence of and characteristics of QRS complexes
5. Presence of and characteristics of the PR intervals
Summary

• To determine the heart rate first check to see if the rate is slow, normal or fast.

• The 6-second interval x 10 method multiplies by 10 the number of QRS complexes found in a 6-second portion of the ECG tracing.

• The 300, 150, 100, 75, 60, 50 method involves locating an R wave on a bold line on the ECG paper, then finding the next consecutive R wave and using the 300, 150, 100, 75, 60, 50 values for subsequent bold lines to determine the rate.

• To use the 1500 method count the number of small squares between two consecutive R waves and divide 1500 by that number.
Summary

• A heart rate less than 60 beats per minute is called bradycardia.
  – Slow heart rates are seen with sinus bradycardia, junctional escape rhythm, idioventricular rhythm, AV heart block and atrial flutter or fibrillation with slow ventricular response.

• A heart rate greater than 100 beats per minute is called tachycardia.
  – Fast heart rates are seen with sinus tachycardia, atrial tachycardia, junctional tachycardia, ventricular tachycardia and atrial flutter or fibrillation with rapid ventricular response.