Learning Outcomes

5.1 Explain the process of evaluating ECG tracings and determining the presence of dysrhythmias.

5.2 Describe the criteria used for classification of dysrhythmias, including rhythm, rate, P wave configuration, PR interval measurement, and QRS duration measurement.

5.3 Identify normal sinus rhythm using the criteria for classification, and explain how the rhythm may affect the patient, including basic patient care and treatment.

5.4 Identify sinus bradycardia using the criteria for classification, and explain how the rhythm may affect the patient, including basic patient care and treatment.

5.5 Identify sinus tachycardia using the criteria for classification, and explain how the rhythm may affect the patient, including basic patient care and treatment.

5.6 Identify sinus dysrhythmia using the criteria for classification, and explain how the rhythm may affect the patient, including basic patient care and treatment.

5.7 Identify sinus arrest using the criteria for classification, and explain how the rhythm may affect the patient, including basic patient care and treatment.

5.1 Rhythm Interpretation

- ECG is an important tool in diagnosing and treating various cardiac diseases
- Determining cardiac dysrhythmia can be challenging
- ECG analysis involves a systematic approach

5.1 Apply Your Knowledge

True or False: The ability to evaluate an ECG waveform is an important skill for many health professionals.

ANSWER: True

5.2 Identifying Components of the Rhythm

- Five-step process
  - Rhythm (regularity)
  - Rate
P wave configuration
PR interval measurement
QRS duration measurement
Use lead II for rhythm evaluation

5.2 Identifying the Components of the Rhythm - Step One
Determine the ECG rhythm or regularity

5.2 Step One (Cont'd)
At least 10 seconds of tracing should be used for comparison of P-P wave intervals

5.2 Step One (Cont'd)
Next, measure the rhythm of the QRS complex
- R-R interval is usually easiest
- If R wave is not present, use the Q and S wave junction

5.2 Identifying the Components of the Rhythm - Step 2
Determining the atrial, ventricular rate
- Regular rhythm
  - Atrial rate - divide number of small boxes between P waves into 1500
  - Ventricular rate - divide number of small boxes between R waves into 1500

5.2 Step 2 (Cont'd)
- Irregular rhythm
  - Atrial rate - multiply number of P waves in 6-second strip by 10
  - Ventricular rate - multiply number of QRS complexes in 6-second strip by 10

5.2 Identifying the Components of the Rhythm - Step 3
Identifying the P wave configuration
- Are shapes and waveforms all the same?
- Does each P wave have a QRS complex following it?

5.2 Identifying the Components of the Rhythm - Step 4
Measuring the PR interval
- Measure the distance from the start of the P wave to the start of the QRS complex
- Normal range is 0.12 to 0.20 second
- Calculate in multiples of 0.02 because the human eye cannot determine 0.01 second

5.2 Step 4 (Cont'd)

5.2 Identifying the Components of the Rhythm - Step 5
Measuring the QRS duration
- Helps in discriminating between different dysrhythmias
- Normal limits 0.06-0.10 second
- Measure from beginning of QRS complex to J point

5.2 Step 5 (Cont'd)
5.2 Step 5 (Cont'd)
Important QRS questions
- Are all QRS complexes of equal length?
- Is actual measurement within normal limits?
- Do QRS complexes look alike?
- Are unusual QRS complexes associated with ectopic beat?

5.2 Apply Your Knowledge
What are the five steps in rhythm data gathering?

ANSWER:

5.2 Apply Your Knowledge
What is the measurement of a normal PR interval?

ANSWER: 0.12-0.20 second

5.3 Rhythms originating from the Sinus Node (Sinus Beat)
- Sinus rhythm
- Sinus bradycardia
- Sinus tachycardia
- Sinus arrhythmia

5.3 Sinus Rhythm (SR) Criteria
- Rhythm- from the SA node
  - Interval between two P and two R waves occurs in a consistent pattern
- P-wave configurations
  - Uniform shape, upright deflection
  - P-wave appears prior to every QRS complex

5.3 Sinus Rhythm (SR) Criteria (Cont’d)
- Rate
  - Between 60 to 100 beats per minute
- PR interval
  - Between 0.12 and 0.20 second
- QRS duration
  - Between 0.06 and 0.10 second

5.3 Sinus Rhythm
What You Should Know
- This is the normal, desired rhythm
- Rhythm is typical of patient with normal cardiac output
5.3 Sinus Rhythm

What You Should Know (Cont’d)

- If patient has returned to sinus rhythm from another dysrhythmia
  - Check for low cardiac output
  - If symptoms of low cardiac output are present, inform a licensed practitioner

5.3 Troubleshooting

- A pale, rapidly breathing patient with sinus rhythm should be reported to a licensed practitioner

5.3 Law and Ethics

- ECG rhythm is a legal document and must include
  - Patient’s name
  - Date
  - Time recorded

5.3 Apply Your Knowledge

What is normal cardiac output?

Answer: The heart is beating adequately, pumping blood to the body’s vital organs to maintain normal function.

5.4 Sinus Bradycardia

- Originates from the SA node
- Rate less than 60 beats per minute

5.4 Sinus Bradycardia Criteria

- Criteria for rhythm, P wave configuration, PR interval, and QRS duration and configuration are the same as in sinus rhythm

5.4 Sinus Bradycardia

What You Should Know

- Patient may or may not exhibit signs of low cardiac output
- If symptoms of low cardiac output are present, inform a licensed practitioner
- Rhythm may require drugs or pacemaker

5.4 Apply Your Knowledge

What is unique about sinus bradycardia?

Answer: The heart rate is less than 60 bpm, and all other measurements are within normal limits.

5.4 Apply Your Knowledge

What treatment may be required in a patient who has sinus bradycardia?
5.4 Apply Your Knowledge

What treatment may be required in a patient who has sinus bradycardia?

ANSWER: Drugs or pacemaker

5.5 Sinus Tachycardia

- Originates from the SA node
- Rate greater than 100 beats per minute

5.5 Sinus Tachycardia Criteria

- Criteria for rhythm, P wave configuration, PR interval, and QRS duration and configuration are the same as in sinus rhythm and sinus bradycardia

5.5 Sinus Tachycardia What You Should Know

- Increased heart rate could be normal response to recent exercise
- ST can cause low cardiac output
- Patient may complain of heart fluttering/palpitations

5.5 Sinus Tachycardia How Patient Is Affected

- ST may be life-threatening in patients with recent myocardial infarctions
- If symptoms of low cardiac output are present, inform a licensed practitioner immediately
- Medication may be necessary

5.6 Sinus Dysrhythmia

- Rhythm is irregular, caused by pressure on the heart from respiratory cycle and variations of vagal tone
- Rate is 60-100 beats per minute
- Originates from the SA node

5.6 Sinus Dysrhythmia Criteria

- Criteria for P wave configuration, PR interval, and QRS duration and configuration are the same as in sinus rhythm

5.6 Sinus Dysrhythmia What You Should Know

- Patient usually shows no visible signs
- Severe rhythm irregularity may cause dizziness or palpitations due to slow rate

Answer: The heart rate is greater than 100 bpm and all other measurements are within normal limits.
5.6 Apply Your Knowledge
What is unique about sinus dysrhythmia?

Answer: The P-P and R-R intervals will progressively widen then narrow following the patient’s breathing pattern.

5.7 Sinus Arrest

- SA node stops firing, causing pause in electrical activity
- During the pause, atrial and ventricular contractions do not occur

5.7 Sinus Arrest Criteria

- Rhythm – interval between two P and two R waves is irregular
- Rate – atrial and ventricular rates will be the same, but rate will vary depending on amount of electrical activity in SA node

5.7 Sinus Arrest Criteria (Cont’d)

- Criteria for P wave configuration, PR interval, and QRS duration and configuration are the same as in sinus rhythm

5.7 Sinus Arrest Criteria (Cont’d)

- Length of pause
  - Measure the R-R interval around the pause
  - Multiply number of boxes by 0.04
  - Note frequency of pauses

5.7 Sinus Arrest

What You Should Know

- Seriousness depends on length of pause
- Frequent pauses of two seconds will cause symptoms of decreased cardiac output
- Immediate treatment required

5.7 Troubleshooting

- Sinus arrest over 6 seconds is considered asystole and life threatening
- CPR and Code Blue required

5.7 Apply Your Knowledge

A condition in which the SA node stops firing, causing a pause in electrical activity, is known as:

5.7 Apply Your Knowledge

A condition in which the SA node stops firing, causing a pause in electrical activity, is known as:

ANSWER: Sinus arrest
Chapter 5 Summary

- Evaluating an ECG requires basic knowledge of the components of the rhythm
- The process of evaluating an ECG tracing includes determining the rhythm, rate, P wave configuration, PR interval, and QRS duration and configuration

Chapter 5 Summary (Cont’d)

- Sinus rhythm is a normally functioning rhythm
- Dysrhythmias are abnormal rhythms
- Dysrhythmias result in low cardiac output
- Each of the dysrhythmias may affect the patient with varying degrees of severity