

1 **Electrocardiography for Healthcare Professionals**

Chapter 5: Rhythm Strip Interpretation and Sinus Rhythms

2 **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.

3 **Learning Outcomes (Cont'd)**

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.

4 **Learning Outcomes (Cont'd)**

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 **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

6 **5.1 Apply Your Knowledge**

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

7 **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

8 **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
- 9  **5.2 Identifying the Components of the Rhythm – Step One**
Determine the ECG rhythm or regularity
- 10  **5.2 Step One (Cont'd)**
■ At least 10 seconds of tracing should be used for comparison of P-P wave intervals
- 11  **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
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- 12  **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
- 13  **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
- 14  **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?
- 15  **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
- 16  **5.2 Step 4 (Cont'd)**
- 17  **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
- 18  **5.2 Step 5 (Cont'd)**
- 19  **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?

20 **5.2 Apply Your Knowledge**

What are the five steps in rhythm data gathering?

21 **5.2 Apply Your Knowledge**

What are the five steps in rhythm data gathering?

ANSWER:

22 **5.2 Apply Your Knowledge**

What is the measurement of a normal PR interval?

23 **5.2 Apply Your Knowledge**

What is the measurement of a normal PR interval?

ANSWER: 0.12-0.20 second

24 **5.3 Rhythms originating from the Sinus Node (Sinus Beat)**

- Sinus rhythm
- Sinus bradycardia
- Sinus tachycardia
- Sinus arrhythmia

25 **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

26 **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

27 **5.3 Sinus Rhythm**

What You Should Know

- This is the normal, desired rhythm
- Rhythm is typical of patient with normal cardiac output

28 **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

29 **5.3 Troubleshooting**

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

30 **5.3 Law and Ethics**

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

31 **5.3 Apply Your Knowledge**

What is normal cardiac output?

32 **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.

33 **5.4 Sinus Bradycardia**

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

34 **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

35 **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

36 **5.4 Apply Your Knowledge**

What is unique about sinus bradycardia?

37 **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.

■

38 **5.4 Apply Your Knowledge**

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

39 **5.4 Apply Your Knowledge**

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

ANSWER: Drugs or pacemaker

40 **5.5 Sinus Tachycardia**

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

41 **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
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42 **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

43 **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

44 **5.5 Apply Your Knowledge**

What is unique about sinus tachycardia?

45 **5.5 Apply Your Knowledge**

What is unique about sinus tachycardia?

Answer: The heart rate is greater than 100 bpm and all other measurements are within normal limits.

46 **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

47 **5.6 Sinus Dysrhythmia Criteria**

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

48 **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

- Place copy of rhythm strip in patient's record for documentation

49 **5.6 Apply Your Knowledge**

What is unique about sinus dysrhythmia?

50 **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.

51 **5.7 Sinus Arrest**

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

52 **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

53 **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
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54 **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

55 **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

56 **5.7 Troubleshooting**

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

57 **5.7 Apply Your Knowledge**

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

58 **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

59 **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

60 **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
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