#### 1 Electrocardiography for Healthcare Professionals

Chapter 9: Ventricular Dysrhythmias

#### 2 Learning Outcomes

- 9.1 Describe the various ventricular dysrhythmias
- 9.2 Identify PVCs using the criteria for classification, and explain how the rhythm may affect the patient, including basic patient care and treatment.
- 9.3 Identify agonal 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)

- 9.4 Identify idioventricular rhythm using the criteria for classification, and explain how the rhythm may affect the patient, including basic patient care and treatment.
- 9.5 Identify accelerated idioventricular rhythm 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)

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

#### 5 Learning Outcomes (Cont'd)

- 9.7 Identify ventricular fibrillation using the criteria for classification, and explain how the rhythm may affect the patient, including basic patient care and treatment.
- 9.8 Identify asystole using the criteria for classification, and explain how the rhythm may affect the patient, including basic patient care and treatment.

#### 6 9.1 Introduction to Ventricular Dysrhythmias

- Ventricular rhythms occur due to:
  - □failure of the higher pacemaker sites within the heart □rate of automaticity from this portion of the heart is faster □becomes the primary pacemaker within the heart

#### 7 9.1 Introduction to Ventricular Dysrhythmias (Cont'd)

- Rate of automaticity is 20-40 beats per minute
- Current initiated in Purkinje fibers
- QRS duration and configuration will be 0.12 second or greater, suggesting cell-by-cell stimulation

#### 8 9.1 Introduction to Ventricular Dysrhythmias (Cont'd)

- Premature ventricular contractions (PVCs)
- Idioventricular rhythm
- Accelerated idioventricular rhythm

- Ventricular tachycardia (V tach)
- Agonal rhythm
- Ventricular fibrillation (V fib)
- Asystole

#### 9 9.1 Apply Your Knowledge

Why does it take longer than normal to depolarize the ventricles during a ventricular dysrhythmia?

### 10 9.1 Apply Your Knowledge

Why does it take longer than normal to depolarize the ventricles during a ventricular dysrhythmia?

Answer: The current is initiated within the Purkinje fibers, the electrical stimulation occurs from ventricular cell-to-cell conduction.

#### 11 9.2 Premature Ventricular Complex (PVC)

- Caused by an ectopic impulse that occurs early in the cycle and originates from the ventricles
- Caused by an ischemic region in the ventricles □ischemia increases irritability of ventricular myocardium

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#### 9.2 Types of Premature Ventricular Complexes

- Unifocal early complex (has similar shape, suggesting only one irritable focus present)
- Multifocal varied shapes and forms of the PVCs
- Interpolated PVC occurs during the normal R-R interval without interrupting the normal cycle.

#### 13 9.2 Types of Premature Ventricular Complexes (Cont'd)

- Occasional more than one to four PVCs per minute
- Frequent –six or more PVCs per minute
- Bigeminy every other complex is a PVC
- Trigeminy every third complex is a PVC

#### 14 9.2 Types of Premature Ventricular Complexes (Cont'd)

- Quadrigeminy every fourth complex is a PVC
- R on T PVCs PVC occurs on the T wave or the vulnerable period of the ventricular refractory period
- Coupling two PVCs occur back to back

### 15 9.2 Premature Ventricular Complex Criteria

#### Rhythm

□P-P and R-R intervals are regular with early QRS complexes

Early complex has full compensatory pause

Rate

□Atrial and ventricular rates are the same for the underlying rhythm

	□Early complexes make ventricular rhythm faster than normal rhythm
16	9.2 Premature Ventricular Complex Criteria (Cont'd)
	■ P wave configurations
	UShape is that of the underlying rhythm
	■ PR interval
	Follows underlying rhythm
	□P wave not present in early complex
17	9.2 Premature Ventricular Complex Criteria (Cont'd)
	■ QRS duration
	Duration of early complex greater than 0.12 second
	□QRS shape is bizarre, with T wave in opposite direction of ventricular depolarization
18	9.2 Premature Ventricular Complexes What You Should Know
	■ Significance depends on their frequency
	Can occur in normal hearts
	May feel dizziness or other symptoms of low cardiac output
19	9.2 Premature Ventricular Complexes What You Should Know (Cont'd)
	R on T PVCs and coupling increase risk of a more serious dysrhythmias
20	9.2 Apply Your Knowledge
	What is unique about Premature Ventricular Complexes?
21	9.2 Apply Your Knowledge
	What is unique about Premature Ventricular Complexes?
	Answer: A PVC is an early QRS complex that is wide and has a wide and bizarre appearance. There is no P wave.
22	9.3 Agonal Rhythm
	Occurs when all of the pacemakers in the heart have failed The heart is duing
	<ul> <li>The heart is dying</li> <li>Ventricular rate is less than 20 beats per minute.</li> </ul>
23	9.3 Agonal Rhythm Criteria
	■ Rhythm
	□R-R interval may or may not be regular ■ Pate is less than 20 heats per minute
	<ul> <li>P wave is absent</li> </ul>
	■ PR interval cannot be determined
	■ QRS duration and configuration
	LU. 12 second or greater with a wide, bizarre appearance

#### 24 9.3 Agonal Rhythm What You Should Know

- Profound loss of cardiac output
- Patient will be unconscious
- Notify health care practitioner immediately
- ECG strips must be saved and put in medical record
- This is a medical emergency; BLS and ACLS interventions will be initiated

#### 25 9.3 Apply Your Knowledge

What is the ventricular rate in a patient suffering from an agonal rhythm?

#### 26 9.3 Apply Your Knowledge

What is the ventricular rate in a patient suffering from an agonal rhythm?

ANSWER: Less than 20 beats per minute

#### 27 9.4 Idioventricular Rhythm

- Impulse created by the ventricular pacemaker
- Presents with the classic wide QRS complex, slow ventricular rate and absent P waves

#### 28 9.4 Idioventricular Rhythm Criteria

- Rhythm
  - □R-R interval is regular, P-P interval cannot be determined
- Rate

Uventricular rate is 20-40 beats per minute

#### 29 9.4 Idioventricular Rhythm Criteria (Cont'd)

- P wave is absent
- PR interval cannot be measured
- QRS duration and configuration

□0.12 seconds or greater with a wide, bizarre appearance

#### <sup>30</sup> 9.4 Idioventricular Rhythm What You Should Know

- Profound loss of cardiac output
- The patient will likely be unconscious
- Notify health care practitioner immediately
- This is a medical emergency
- Likely to require medication and/or pacing
- ECG strips must be saved and put in medical record

#### 31 9.4 Apply Your Knowledge

What is unique about Idioventricular Rhythm?

#### 32 9.4 Apply Your Knowledge

What is unique about Idioventricular Rhythm?

Answer: This rhythm has an absence of P waves, slow ventricular rate of 20 to 40 bpm, and

wide and bizarre QRS complexes.

#### 33 9.5 Accelerated Idioventricular Rhythm

- Impulse created by the ventricular pacemaker
- The heart rate is faster than an idioventricular rhythm
- QRS complex is wide and bizarre and P waves are absent

#### <sup>34</sup> 9.5 Accelerated Idioventricular Rhythm Criteria

#### Rhythm

□R-R interval is regular, P-P interval cannot be determined

Rate

□Ventricular rate is 40-100 beats per minute

#### <sup>35</sup> 9.5 Accelerated Idioventricular Rhythm Criteria (Cont'd)

- P wave is absent
- PR interval cannot be identified
- QRS duration □Wide, bizarre appearance and 0.12 second or greater

#### <sup>36</sup> 9.5 Accelerated Idioventricular Rhythm What You Should Know

- Decrease in cardiac output due to slow ventricular rate
- Patient may be unconscious
- Notify health care practitioner
- May require medication and/or pacing
- ECG strips must be saved and put in medical record

#### 37 9.5 Apply Your Knowledge

How is an accelerated idioventricular rhythm differ from an idioventricular rhythm?

#### 38 9.5 Apply Your Knowledge

How is an accelerated idioventricular rhythm differ from an idioventricular rhythm?

<u>ANSWER:</u> Rate. Accelerated idioventricular rhythm occurs at a rate of 40 to100 beats per minute while an idioventricular rhythm occurs at a rate of 20 to 40 beats per minute.

#### 39 9.6 Ventricular Tachycardia

#### (V tach)

- Three or more PVCs occur in a row
- Ventricles are in continuous state of contraction-relaxation

#### 40 9.6 Ventricular Tachycardia Criteria

## Rhythm

□P-P interval usually not identifiable

□R-R interval usually regular, can be slightly irregular at times

Rate

□Atrial rate cannot be determined

□Ventricular rate 100-200 beats per minute

#### 41 9.6 Ventricular Tachycardia Criteria (Cont'd)

- P wave configurations usually absent
- PR interval cannot be determined
- QRS duration
  - □Wide, bizarre appearance, greater than 0.12 second
  - □T wave in opposite direction (usually down) from QRS complex

#### 42 9.6 Ventricular Tachycardia What You Should Know

- Lost atrial kick and decreased ventricular filling time results in decreased cardiac output
- Approximately 50% of patients become unconscious immediately
- Notify licensed practitioner

#### 43 9.6 Ventricular Tachycardia What You Should Know (Cont'd)

- If patient is unresponsive, issue Code Blue, begin CPR, use emergency equipment
- Save ECG strips and put in medical record
- If patient is responsive, licensed practitioner may initiate treatment plan of medications and electrical treatments

#### 44 9.6 Apply Your Knowledge

Identify this rhythm.

# 45 9.6 Apply Your Knowledge Identify this rhythm.

ANSWER: Ventricular tachycardia

#### 46 9.7 Ventricular Fibrillation (V fib)

- Chaotic asynchronous electrical activity within ventricular tissue
- Ventricle walls are quivering, which prevents any ejection of blood out of the ventricles
- No cardiac output

No cardiac output

#### 47 9.7 Ventricular Fibrillation Criteria

Rhythm

□P-P and R-R intervals cannot be determined due to chaotic and irregular waveforms ■ Rate

□Atrial and ventricular rate cannot be determined

- P wave configurations not identifiable
- PR interval not identifiable
- QRS duration cannot be determined

# 48 9.7 Ventricular Fibrillation

- What You Should Know
- If patient is conscious and talking, leads are loose or detached
- Patient will be unresponsive
- Code Blue situation is present
- Begin CPR and advanced cardiac life support (ACLS) immediately

#### 49 9.7 Apply Your Knowledge

What is unique about Ventricular Fibrillation?

#### 50 9.7 Apply Your Knowledge

What is unique about Ventricular Fibrillation?

Answer: Ventricular fibrillation is the absence of organized electrical activity. The tracing is disorganized or chaotic in appearance.

#### 51 9.8 Asystole

- Often called straight line or flat line
- No electrical activity is present in the myocardium

#### 52 9.8 Asystole Criteria

- Rhythm no waveforms are present
- Rate no atrial or ventricular rates are present
- P wave configurations no P waves are present
- PR interval none, since no waveforms are present
- QRS duration not measurable, no waveforms are present

#### 53 9.8 Asystole

### What You Should Know

- Situation is life-threatening
- Patient will be unconsciousness and apneic
- Patient is in cardiac arrest; initiate emergency procedures
- Always a Code Blue situation

#### 54 9.8 Apply Your Knowledge

What is asystole also known as?

55 9.8 Apply Your Knowledge What is asystole also known as? Answer: This rhythm is often called the "straight or flat line" of rhythms.

#### 56 Patient Education and Communication for Emergency

- If family/friends are present, calmly explain that there is an emergency and escort them out of immediate area.
- Explain that a licensed practitioner will speak to them as soon as possible concerning their loved one.

#### 57 Safety

- Follow facility's guidelines on stocking of "crash cart" for Code Blue emergencies

#### 58 Chapter Summary

- Ventricular dysrhythmias are similar
  - -missing P waves
  - -wide and bizarre QRS complexes
- Heart rates less than 60 beats per minute can cause "escape beats"

#### 59 Chapter Summary (Cont'd)

- PVCs are caused by:
  - -ectopic complex occurring early in the cycle and originating from the ventricles -hypoxia or abnormal lab values, such as an electrolyte imbalance
- Agonal rhythms: -all of the pacemakers in the heart have failed

#### 60 Chapter Summary (Cont'd)

- Idioventricular rhythm and accelerated idioventricular rhythm both occur when the sinoatrial and junctional pacemakers fail to initiate an impulse.
- The primary difference is the heart rate: 20-40 bpm versus 40-100 bpm for accelerated

### 61 Chapter Summary (Cont'd)

- Ventricular tachycardia occurs:
   -when 3 or more PVCs occur in a row
   -rate is greater than 100 bpm
- Ventricular fibrillation:
   -chaotic, asynchronous activity
   -ventricle walls are quivering

#### 62 Chapter Summary (Cont'd)

#### Asystole

-absence of ventricular activity and depolarization -called "the straight or flat line" of rhythms -no electrical activity is present in the myocardium