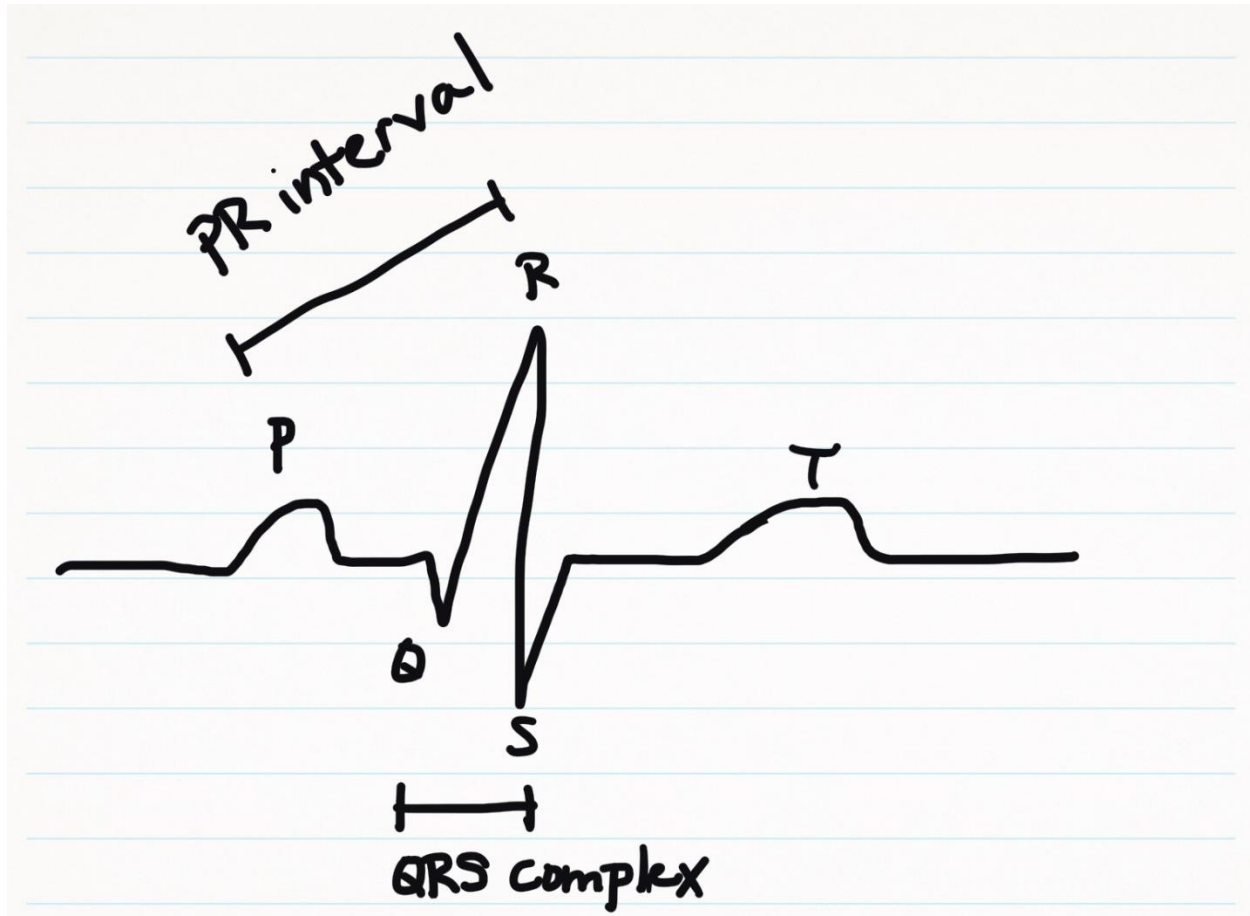


Dysrhythmias- Cardiovascular Nursing

Electrocardiogram (ECG or EKG) Review



Provides a graphic representation of the electrical activity of the heart

P wave- represents atrial depolarization- generated from the SA node

PR segment- from the end of the P wave to the beginning of the QRS complex- when the electrical impulse is travelling through the AV node

PR interval- measured from the beginning of the P wave to the end of the PR segment (0.12-0.20 seconds)

QRS complex- represents ventricular depolarization- QRS duration is the time required for depolarization of both ventricles (0.06-0.10 seconds)

ST segment- early ventricular repolarization

T wave- ventricular repolarization

U wave- may result from slow repolarization of ventricular Purkinje fibers

QT interval- represents the total time required for ventricular depolarization and repolarization

Normal Sinus Rhythm (NSR)



Characteristics:

- 60-100 beats per minutes
- Atrial and ventricular rhythms are **regular**
- P waves are present with **consistent configuration**, one before each QRS complex
- PR interval- 0.12-0.20 seconds and **constant**
- QRS duration is 0.04-0.10 seconds and **constant**

Sinus arrhythmia

Variant of NSR; results from the change in intrathoracic pressure during breathing

Heart rate slightly increases with inspiration and decreases slightly during expiration

Characteristics:

- 60-100 bpm
- Atrial and ventricular rhythms are **irregular**
- P waves are present with **consistent configuration**, one before each QRS complex
- PR interval is normal and **constant**
- QRS duration is normal and **constant**

Tachydysrhythmias

Characteristics:

- Heart rate is greater than 100 bpm
- Cardiac output and blood pressure begin to **decrease**

- **Decreased** coronary perfusion time
- **Increased** work of the heart

S/S:

- Palpitations
- Chest discomfort
- Restlessness and anxiety
- Pale, cool skin
- Syncope from hypotension

May lead to heart failure

Bradydysrhythmias

Characteristics:

- Heart rate is less than 60 bpm
- Myocardial oxygen demand is **reduced**

If heart rate is too slow, cardiac output may not be adequate

If blood pressure is adequate, **the patient may be able to tolerate**

If blood pressure is NOT adequate, it may lead to **myocardial ischemia or infarction, dysrhythmias, hypotension, and heart failure**

Premature Complexes

Occur when a cardiac cell or cell group, other than the SA node, fires an impulse before the next sinus impulse. This is called an **ectopic focus**

The patient may experience palpitations or may be unaware

May occur in a repetitively, rhythmic fashion

- Bigeminy- normal and premature complexes occur alternate in a repetitive **two-beat pattern**
- Trigeminy- repeated **three-beat pattern**- usually occurs as two normal complexes followed by a premature complex and a pause
- Quadrigeminy- **four-beat pattern**- usually occurs as three normal complexes followed by a premature complex and a pause

Sinus Dysrhythmias

Sinus tachycardia:

Characteristics:

- >100 beats per minute
- Decreased coronary perfusion
- Increased myocardial oxygen demand

Causes:

- May be normal physiologic response to activity such as exercise
- Anxiety
- Pain
- Stress
- Hypoxemia
- Hyperthyroidism
- Drugs- epinephrine, atropine, caffeine, alcohol

S/S:

- Patient may be **asymptomatic**
- Fatigue
- Weakness
- SOB
- Orthopnea
- Decreased oxygen saturation
- Decreased blood pressure
- Restlessness and anxiety- due to decreased cerebral perfusion
- Decreased urine output- due to impaired renal perfusion

Treatment:

- Treat **underlying cause**

Sinus bradycardia

Characteristics:

- <60 beats per minute
- Increased coronary perfusion time but may decrease coronary perfusion pressures
- Decreased myocardial oxygen demand

Causes:

- Valsava maneuvers

- Suctioning
- Vomiting

S/S

- May be **asymptomatic**
- Syncope
- Dizziness and weakness
- Confusion
- Decreased blood pressure
- Diaphoresis
- SOB
- Chest pain

Treatment:

- Treat underlying cause
- If cause cannot be determined- IV fluids, oxygen therapy
- Pacing may be needed

Atrial Dysrhythmias

Premature Atrial Complexes (PAC)

Occurs when atrial tissue becomes irritable

Causes:

- Anxiety
- Stress
- Fatigue
- Caffeine, nicotine, alcohol
- Myocardial ischemia
- Electrolyte imbalance

S/S

- Likely asymptomatic
- Palpitations

No intervention is needed unless there is a cause such as **heart failure**

Supraventricular tachycardia (SVT)

Rapid stimulation of atrial tissue at 100-280 beats per minute

May be intermittent or sustained

Sustained:

- Palpitations
- Chest pain
- Weakness
- Fatigue
- SOB
- Nervousness
- Anxiety
- Hypotension
- Syncope

Cardiac deterioration can occur and cause angina, heart failure, and cardiogenic shock

Nonsustained (intermittent)

- May be asymptomatic
- **Occasional palpitations**

Treatment:

- No intervention needed in a patient who is healthy and which SVT stops on its own
- Preferred treatment for recurrent SVT is **radiofrequency catheter ablation**
- Antidysrhythmic medications

Atrial fibrillation (A. Fib)

Associated with atrial fibrosis and loss of muscle mass

Multiple rapid impulses from the atria depolarize in a disorganized manner at a rate of 350 to 600 times per minute

Risk factors:

- Hypertension
- Previous ischemic stroke
- Transient ischemic attack
- Coronary artery disease
- Diabetes
- Heart failure
- Mitral valve disease

Characteristics:

- Chaotic rhythm
- No clear p waves
- No atrial contractions
- Loss of atrial kick
- Irregular ventricular response
- The atria simply quiver
- Decreased ventricular filling
- Decreased cardiac output

Thrombus formation can occur and increases the risk of stroke or other embolic events

S/S:

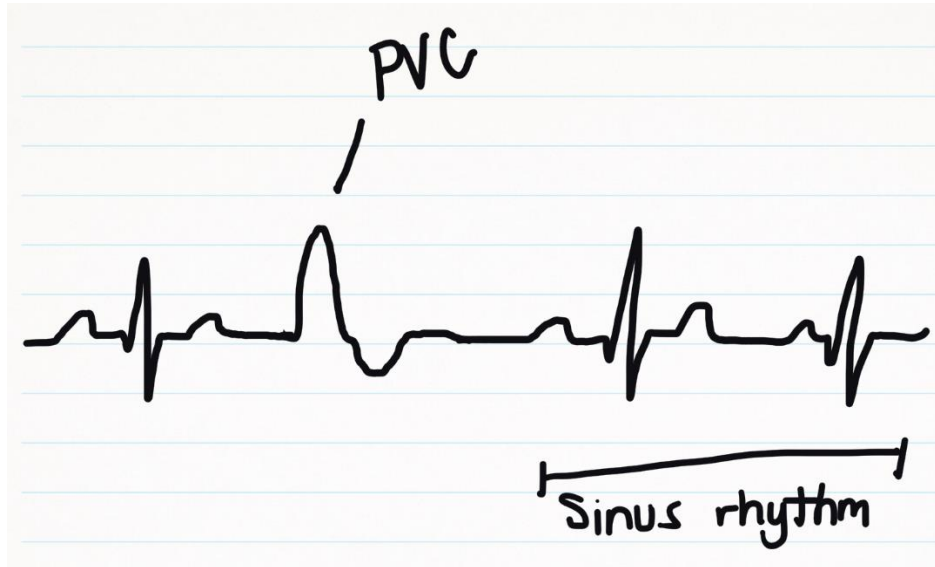
- Some patients may be asymptomatic
- Fatigue
- Weakness
- SOB
- Dizziness
- Anxiety
- Syncope
- Chest discomfort

Treatment:

- Antidysrhythmic drugs
 - o Calcium channel blockers- diltiazem, amiodarone, dronedarone
- Beta blockers- metoprolol and esmolol to slow ventricular response
- Digoxin for patients with A.Fib and heart failure
- Anticoagulants
 - o Heparin
 - o Enoxaparin (Lovenox)
 - o Warfarin (Coumadin)
- Cardioversion
 - o When drug therapy is not effective
 - o Anticoagulation for 6 weeks
 - o Transesophageal echocardiogram (TEE) before to check for atrial clots
- Other alternatives
 - o Percutaneous radiofrequency catheter ablation
 - o Biventricular pacing
 - o Surgical maze procedure (for patients with A. Fib and heart failure)

Ventricular Dysrhythmias

Premature Ventricular Complex (PVC)



Early ventricular complexes followed by a pause

Frequently occur in repetitive rhythms such as bigeminy or trigeminy

Can be insignificant or occur with issues such as MI, COPD, or chronic heart failure

S/S

- May be asymptomatic
- Palpitations
- Chest discomfort
- Decreased peripheral perfusion

Treatment:

- Eliminate contributing factors such as caffeine or stress
- Amiodarone and oxygen therapy can be used with acute myocardial ischemia
- Beta-blockers for severe cases (>5000 PVCs in a 24 hour period)

Ventricular Tachycardia (V. tach)



May be nonsustained or sustained

Causes:

- Ischemic heart disease
- MI
- Cardiomyopathy
- Hypokalemia
- Drug toxicity

V. tach is commonly the initial rhythm before V. fib in people who go into cardiac arrest

Manifestations partially depend on ventricular rate- slower rates are better tolerated

Treatment:

- Stable V. tach= elective cardioversion or antidysrhythmic drug such as mexiletine
- Unstable V. tach without pulse= same treatment as v. fib (see below)= DEFIBRILLATE

Ventricular fibrillation (V. Fib)



LIFE THREATENING!!

Characteristics:

- Ventricular contraction cannot occur
- Ventricles merely quiver

- NO cardiac output
- **Life threatening if not ended within 3-5 minutes**

Causes:

- MI
- Hypokalemia
- Hypomagnesemia
- Hemorrhage
- Rapid SVT
- Shock
- Surgery
- Trauma

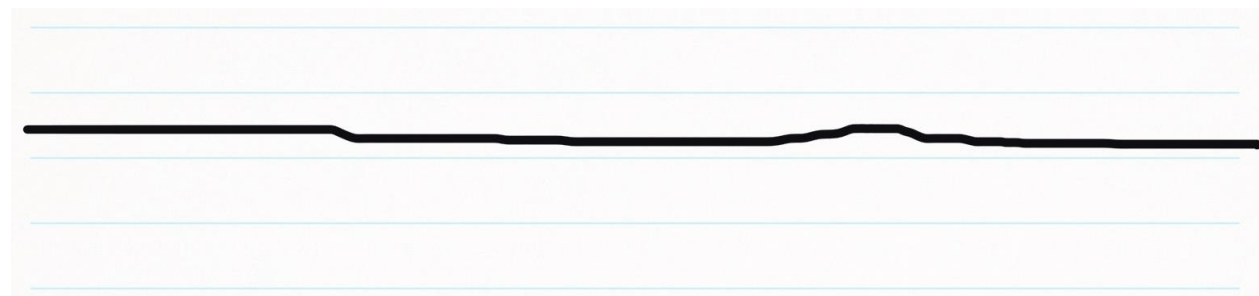
S/S:

- Patient loses consciousness
- No pulse
- No breathing
- No blood pressure
- No heart sounds
- Seizures may occur
- Pupils become fixed and dilated
- Skin is cold and mottled

Treatment:

- **DEFIBRILLATE**
- If AED is not available, perform CPR until defibrillator arrives
- Airway management, oxygen therapy
- Drug therapy- vasopressin, epinephrine, amiodarone, lidocaine, magnesium sulfate

Asystole



Characteristics:

- No electrical activity

- No cardiac output
- No pulse
- No blood pressure
- No respirations

FULL CARDIAC ARREST

Treatment:

Do NOT shock- will not be effective

Drug therapy- epinephrine, atropine

must be confirmed on two leads

Pulseless electrical activity (PEA)

No pulse, but electrical activity on the screen may be sinus rhythm

Has underlying **treatable** cause

Causes:

The 6 H's	The 6 T's
Hyperkalemia	Tamponade
Hypoxia	Tension pneumothorax
Hypothermia	Thrombosis (pulmonary embolus)
Hydrogen ion excess (acidosis)	Thrombosis (myocardial infarction)
Hypovolemia	Toxins
Hypoglycemia	Trauma

Treat as without pulse- **initiate CPR but do NOT shock**

AV Blocks

Supraventricular impulses are block or delayed in the AV node or ventricular conduction system

- SA node continues to function normally
- P waves occur regularly
- QRS complex are delayed or blocked

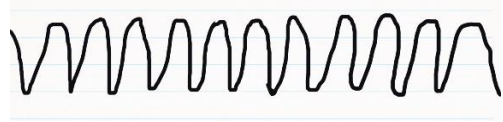
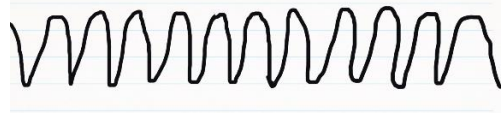



1st degree- all sinus impulses eventually reach the ventricles

2nd degree- some sinus impulses reach the ventricles, but others are blocked

3rd degree- complete heart block- none of the sinus impulses reach the ventricles

Treatment:

- Oxygen
- Drug therapy
- Pacing/permanent pacemaker

Rhythm		Treatment
Ventricular tachycardia		Cardioversion Mexiletine
Pulseless ventricular tachycardia		DEFIBRILLATE
Ventricular fibrillation		DEFIBRILLATE (Defib the V. fib)
Pulseless Electrical Activity (PEA)	 Might be normal sinus rhythm (but with no pulse)	Initiate CPR DO NOT SHOCK
Asystole		Initiate CPR DO NOT SHOCK Meds- epinephrine, atropine

