Cardiac Emergencies

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Setting the Stage

- Chest Pain Pathophysiology
- Chest Pain Assessment
- Chest Pain Guideline
- Acute MI
- Congestive Heart Failure Guideline
- Hypertensive Crisis Guideline
- Bradycardia Guideline
- Narrow Complex Tachycardia Guideline
- Wide Complex Tachycardia Guideline
- Cardiac Arrest Guideline

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Chest Pain Pathophysiology

- Mediastinum:
  - Angina: Stable or Unstable
  - AMI
  - Esophagitis, Esophageal Rupture
  - Pericarditis
  - Thoracic dissection
  - Mitral valve prolapse

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Chest Pain Pathophysiology

- Chest Wall:
  - Traumatic contusion/Tamponade
    - Can you see on a 12-lead?
  - Cysts and infections
  - Rib cartilage inflammation
  - Shingles (Herpes Zoster)
  - Muscle strain, overuse syndromes

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Chest Pain Pathophysiology

- Lungs and Pleura:
  - Pleurisy
  - Pneumonia
  - Pneumothorax, Hemothorax
  - Pulmonary Embolus
  - Asthma, Bronchitis, URI

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Chest Pain Pathophysiology

- Abdomen:
  - Gallbladder
    - Cholecystitis, Stones
  - Stomach
    - Gastritis, GERD, Perforated peptic ulcer
  - Pancreas
    - Pancreatitis
  - Esophagitis
    - Perforation

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Chest Pain Pathophysiology

- Psychogenic:
  - Stress
  - Hyperventilation
  - Anxiety and panic attacks

Initial Assessment

60-second clinical picture to determine if:

Sick or Not Sick (Oxygen)

Based upon your initial impression:

- Body position
- skin signs and color
- respiratory rate and effort
- mental status
- pulse rate and character

Correct immediate life threats!!

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Focused Exam

Your subjective findings are based upon what the patient or historian tells you:

- Patient Age
- Sex
- Chief Complaint

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Focused Exam

SAMPLE History

Signs/Symptoms (associated with cardiac C.P):

- Diaphoresis
- Shortness of Breath
- Pain/discomfort
- Nausea/vomiting
- No signs or symptoms

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Focused Exam

Onset –

"When and at what time did it start"

Provocation –

"Does anything make it better or worse?"

"Does it change with position, palpitation, inspiration?"

Quality –

"Describe the pain/discomfort in your own words"

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Focused Exam

Region/Radiation –

- “Where does it start?”
- “Does it radiate anywhere?”

Severity –

- “On a scale of 1 to 10, what was the pain/discomfort at onset?”
- “What is the pain/discomfort at now?’

Time –

- “When did this episode start?”
- “How long has it been going on?”

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Focused Exam

Allergies

Medications –

- Cardiac meds = cardiac problems.
- Ask about OTC meds, natural supplements, vitamins?

Past Medical History –

- “Do you have any cardiac history?”
- “Risk factors such as smoking, diabetes, HTN, weight/diet?””

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Focused Exam

- Last Oral Intake
- Events Leading to Call –
  - “What were you doing when this event started?”
  - Think activity induce vs. non activity

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Focused Exam

Objective findings from your physical exam of the patient.

Look for evidence of trauma/injury

Evaluate:

- Level of consciousness
- Skin color and temperature
- Respiratory rate and effort
- Pupillary reaction
- Pulse rate
- Blood pressure (bilateral for chest pain!)

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Focused Exam

- ❑ Listen to breath sounds
- ❑ Palpate chest
- ❑ Palpate abdomen
- ❑ Check pedal pulses
- ❑ BGL if diabetic with AMS/+LOC
- ❑ SpO2 after BP, confirm with pulses & administration of O2.
- ❑ Cardiac monitor/12-Lead

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Focused Exam

Based upon your clinical findings:

1. Observe the patient while they are talking with you, note any distress/discomfort (Levine sign)

2. Watch for acute clinical signs: JVD, tracheal deviation, paradoxial chest movement.

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Detailed Exam

Complete and thorough neck, head to toe examination with non-critical patients if needed or time permits.

- Elicit further information and necessary interventions.

Key in on critical findings!!

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Assessment

- This is your best educational medical (or rule out) suspicion as to what is going on with the patient.
    - Plural vs. Cardiac Pain?
- It is based upon YOUR Subjective and Objective findings and should help you develop and implement your Plan for patient care.

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Creating A Treatment Plan

- Assessment and Treatment for all patient contacts
- Focus on Chief Complaint
- OPQRST / SAMPLE
- Associated symptoms / Pertinent Negatives
- Initial Exam – ABC's – Life threatening issues
- Detailed Exam – Vital Signs
- Other Data – Following specific guideline
- Therapy – Guideline specific
- Monitoring – Guideline specific

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Treatment Plan

- ABC's/Monitor vitals
  - ETCO2
- Cardiac Monitor/12-Lead
- Oxygen Therapy
  - NRB/N.C.
  - CPAP?
- Treat Life Threats
- Be a patient advocate
  - Listen to what patients tell you!
- Medication Treatment Plan
  - Follow Guidelines
- Rapid transport!
  - Lights & Sirens?

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Atypical Presentation

Common in the elderly, diabetics & females.

- Unusual fatigue
- Sudden onset of unusual SOB
- Nausea, dizziness
- Belching, burping, indigestion
- Palpitations, new dysrhythmia
- Pain only in jaw, neck, back, arm

Not ALL MI's appear on cardiac 12-Lead as STEMI's

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Angina Pectoris

- Chest pain caused when heart tissues do not get enough oxygen for a brief period of time.
- Typically crushing or squeezing.
- Usually resolves with rest/medications
- Onset with the 5-E's.
  - Exercise, Exertion, Emotion, Exposure, Eating
- May be difficult to diagnose from AMI

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Anginal Equivalent's

Considered to be symptoms of myocardial ischemia.

- Dyspnea
- Diaphoresis
- Extreme Fatigue/Weakness
- Shoulder/Back Pain
- Jaw pain/Tooth pain

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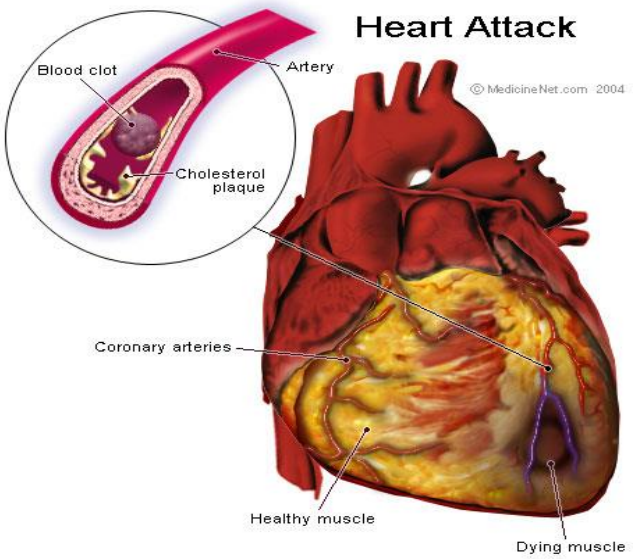
Acute Myocardial Infarct

Usually caused by the same mechanism as angina only with resulting tissue death.

Time Is Myocardium:

Consequences can be serious:

- Congestive heart failure
- Cardiogenic shock
- Sudden death



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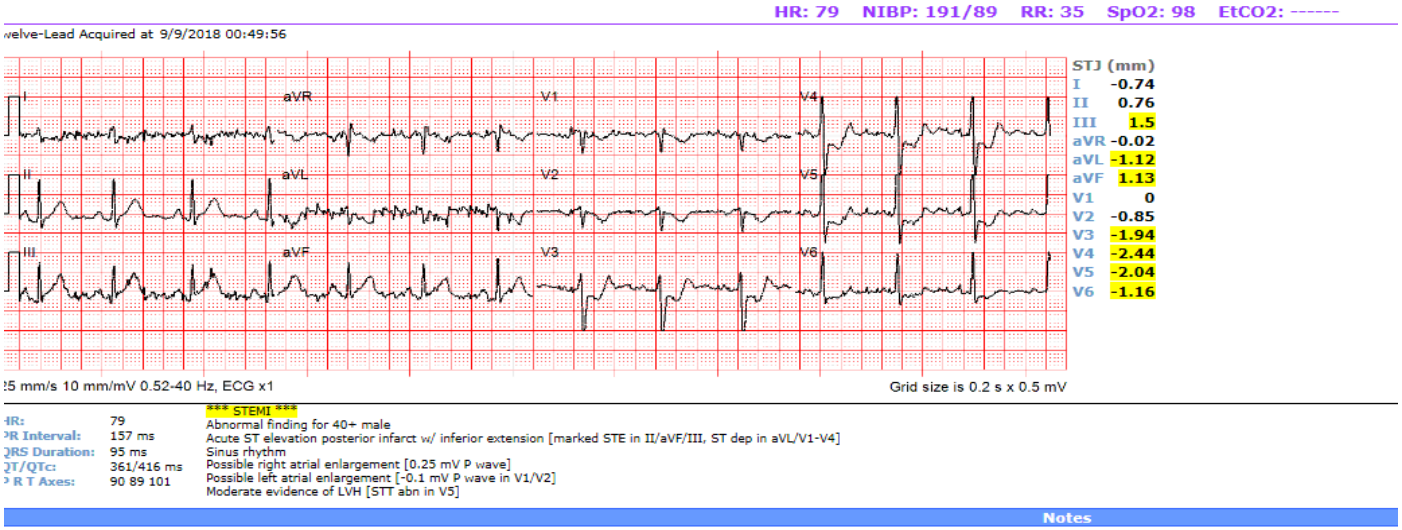
Who Are You Going To Call??



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Dot Your I's and Cross Your T's

ALS upgrade is NOT mandated for patients with chief complaint of "chest pain".

When would you call?

- Pain Control
- Hemodynamic instability
- Airway compromise

**All STEMI's need to be transported to a STEMI/Cath lab facility. **

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Nitroglycerin MOA

Nitroglycerin is relaxation of vascular smooth muscle. Although venous effects predominate, higher doses of nitro cause dilation of *both arterial and venous beds.*

- Dilation of post-capillary vessels, including large veins, promotes peripheral pooling of blood, decreases venous return to the heart, and reduces left ventricular end-diastolic pressure (preload).

Chest Pain

- Provide Routine Medical Care
- Oxygen therapy
- Aspirin
  - Contraindications
  - Dosage
    - 324mg
  - Route

- If applicable-
  - 12- Lead EKG
- ALS upgrade
- Nitroglycerine Assist
  - Contraindications
  - Dosage
  - Route

EMR Level

EMT-Basic

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Chest Pain Paramedic

- Nitroglycerine
  - .4mg Tab

OR

  - 1-inch nitro paste

Not a pain medication

- Pain Management
  - *Fentanyl-If Unrelieved*

100mcg IV/IO/IN/IM

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CHF Risk Factors

- Coronary Artery Disease (CAD)
- Hypertension (HTN)
- Valvular disease
- Diabetes Mellitus
  - Cardiomyopathy and progression of CAD

Remember that acute myocardial infarction may present with shortness of breath (alone) and new onset acute congestive heart failure!

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How They Present…

- Clinical Symptoms
  - Moderate to Severe Respiratory Distress
  - Using accessory muscles, signs of fatigue; two-word sentences?
  - Swelling/Dependent edema
  - Fatigue, Weight gain

Acute myocardial infarction may present with shortness of breath (alone) and new onset acute congestive heart failure!

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Assessment & Physical Exam

- Respiratory Distress
- Peripheral edema
- Jugular venous distension (JVD)
- Tachypnea
- Rales (Wet), Wheezing
  - Pink, Frothy Sputum
- Tripod positioning; Severity of distress
- Skin: Cool, moist and pale? Warm, dry and flushed? Cyanotic?

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CHF Goals of Therapy

- Differentiate CHF from other causes of dyspnea.
- Reduce the work of breathing
- Improve pump function
  - How do we decrease pre-load?
- Improve oxygenation & ventilation.

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Critical Thinking Is A Must…

1. Pneumonia can also cause patients to have crackles on auscultation and a rectangular shaped ETCO2 reading, as well as low SPO2.
    - As lactic acid increases, CO decreases

2. Don’t get burned!!
    - A detailed history & physical exam is needed to differentiate Heart failure vs. Pneumonia.
        - Fever??

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The CHF Suggestive “Box” of Meds

- Digoxin (Lanoxin)
- Furosemide (Lasix)
- Bumetanide (Bumex)
- ACE inhibitor (Vasotec, Zestril)
- Warfarin (Coumadin)- A-fib
- Long-acting nitrates (Isordil)
- Home oxygen

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CHF vs. Pneuomonia

CHF

- Quick on-set
- Bilateral crackles/wheezing
- Difficulty laying flat or waking up with SOB.

Pneumonia

- Crackles localized to effected areal.
- Gradual on-set
- Productive cough
- Hypo/Hyperthermic

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Congestive Heart Failure

EMR Level

- Routine Medical Care
- Oxygen therapy
- Consider albuterol for wheezing
- Consider aspirin if chest pain
- Ventilation assist

EMT-B Level

- Nitroglycerine assist
- 12-Lead EKG
- CPAP
- BIAD & Ventilation

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Congestive Heart Failure Paramedic

- IV access
- Administer Nitroglycerine
  - *Parameters*
  - *Nitro Tab .4mg*
  - *Nitroglycerine Paste (1inch)*
- Push Dose Epinephrine 1:100,000
- Indications for considering RSA

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Hypertensive Crisis Guideline

- Hypertensive patients who are asymptomatic should not be treated in pre-hospital setting

- Define Hypertensive Crisis
  - Symptomatic WITH
  - Systolic/Diastolic Readings
    - >220 systolic
    - >120 diastolic

- Confirm with multiple measurements
  - Be sure appropriate size BP are used for most accurate reading!

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EMR/EMT-B Level

- Provide Routine Medical care
- Oxygen Therapy
- Patient Positioning
- Suspected Stroke
  - *Reference Stroke Guideline*
    - GFAST

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Paramedic Level

- IV therapy
- Goal for B/P reduction
  - No more then 20%
- Labetalol
  - Labetalol 10mg IVP over 2 min
  - May repeat 20mg IVP in 10 min to a max of 100mg.
- 1” Nitro paste as alternative to Labetalol for BP control.

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Labetalol Contraindications

- AV block - second or third degree.
- Clinically significant bradycardia.
- Hypotension.
- Cardiogenic shock.
- Acute COPD or Asthma.

Why??....Beta 2 effects will be blocked!!

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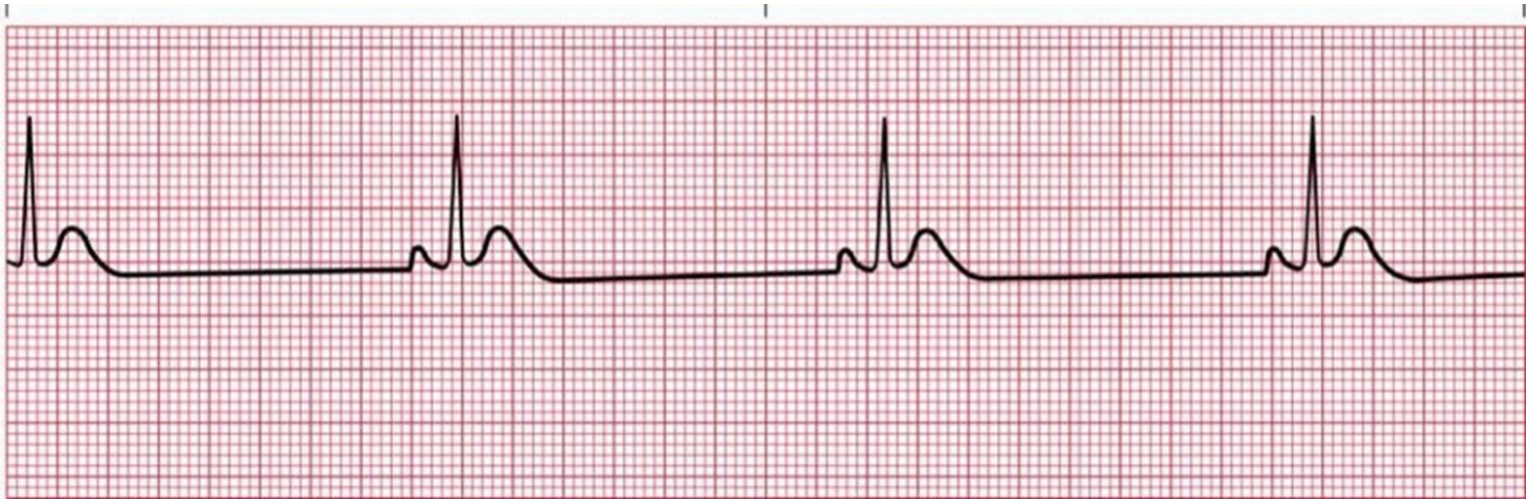
Bradycardia Guideline



Pediatric Bradycardia – Usually a result of hypoxia

For adult patients, identify if stable or unstable

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EMR / EMT-B

- Provide Routine Medical Care
- Oxygen therapy
- 12-Lead EKG
  - Transmit
- Refer to appropriate Guidelines if applicable
  - Chest Pain
  - CHF

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Paramedic Level

- IV access
- Determine if Stable or Unstable
- Medication for Stable patient
- Treatment for unstable patient

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Transcutaneous Pacing (TCP)

- Ensure Pacer function is operating
- Sedation Considerations
- Setting Heart Rate
- Setting Energy Level
- Verifying Capture
  - Mechanical & Electrical

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If no improvement….

- Some other things to consider
  - Beta blocker OD
    - Glucagon 0.05 mg/kg IV/IO/IM
  - Calcium channel blocker OD
    - Calcium Chloride 20 mg/kg IV/IO
    - Consider Glucagon 0.05 mg/kg IV/IO/IM
  - Opiates
    - Narcan (.5mg-2mg)

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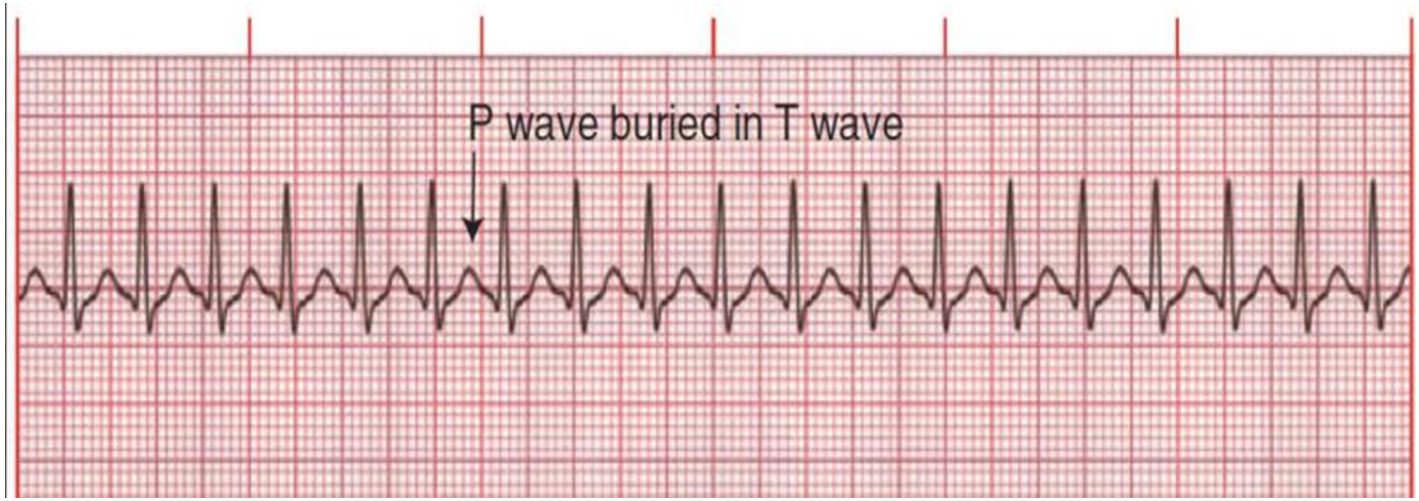
Narrow complex Tachycardia Guideline



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Sinus Tachycardia

- Consider Differential Dx.
  - Do Not Treat with Medication or Cardioversion
- Treatment should focus on underlying causes
  - *Dehydration*
  - *Shock*
  - *Pain*
  - *Hypoglycemia*
  - *Hypoxia*
  - *Anxiety*
  - *Drug induced*

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SVT Treatment

STABLE

- Valsalva Maneuvers
- Modified Valsalva Maneuver

- Medication
  - *Name*
  - *Dose*
  - *Administration*
  - *Coach Patient*
  - *Record EKG Strip*

UNSTABLE

Synchronized Cardioversion

- *Pain Management*
- *Verify Sync Mode*
- *Initial Joule Settings*
- *Subsequent Joule Settings*

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EMR/EMT Tachy

- EMR Level
  - Routine Medical Care
  - Oxygen therapy
- EMT-B Level
  - 12-Lead EKG
  - Refer to appropriate Guidelines if applicable
    - Chest Pain

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Paramedic Level

- IV access
  - *Site preference*
  - *Fluid bolus?*
- Rhythm identification by 12-Lead EKG
  - *Sinus Tachycardia*
  - *Rapid Atrial Fibrillation*
  - *Rapid Atrial Flutter*
  - *SVT*
- Determine if patient is stable/unstable

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Special Considerations

Stable Rapid Atrial Fibrillation/Atrial Flutter

- *Cardizem*
  - 0.25 mg/kg (standard dose is 15mg) IV slowly over 5 min

Stable Tachycardia with Hx of WPW Syndrome

- *Amiodarone*
  - *Amiodarone 150 mg IV over 10 minutes.*

Pediatric Patients

- *Identified rates for treatment*
- *Adenosine dosages*
- *Joule settings for Cardioversion*
- *Broselow tape*

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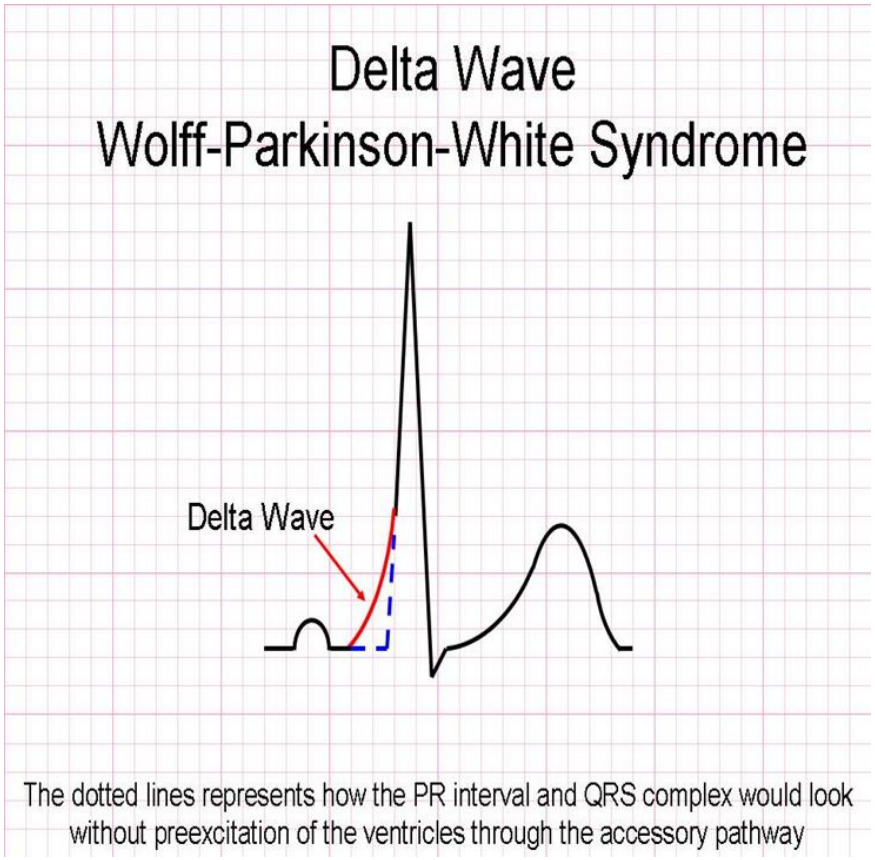
WPW
Wolff-Parkinson-White Syndrome



Extra Electrical pathway between the atria and ventricles.

Common Symptoms

- Tachycardia
- Palpitations
- Lightheadedness/Dizziness
- Atrial Fibrillation

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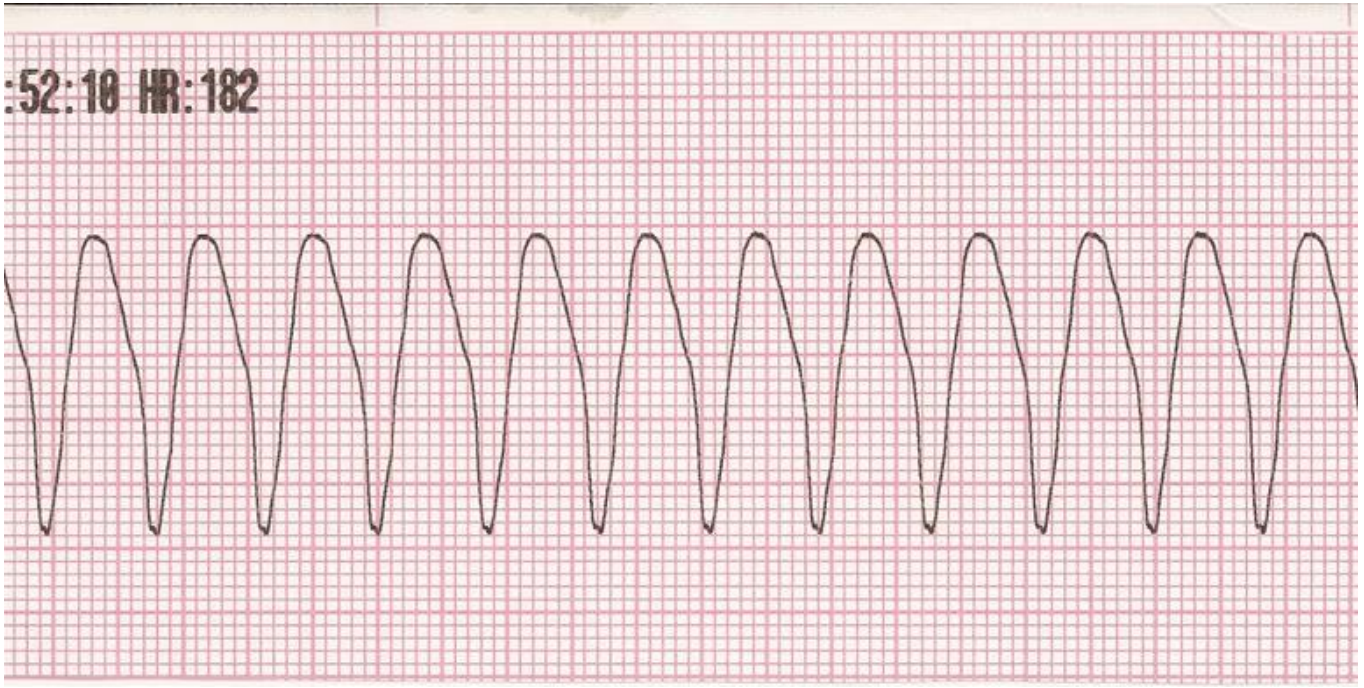
Wide Complex Tachycardia's



Sometimes ya just gotta ride the wave!

- Pulse/Pulseless
- Stable vs. Unstable

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Monomorphic

Stable

- *Amiodarone*
- *Magnesium*

Unstable

- *Synchronized Cardioversion*

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Wide Complex Tachycardia With Pulses

- EMR Level
  - Routine Medical Care
  - Oxygen therapy
  - Be prepared for patient to go into cardiac arrest
- EMT-B Level
- Perform 12 Lead EKG
- If patient experiences chest pain
  - Assist with Nitro
    - Parameters
    - Doseage

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Paramedic Level

- IV access and fluid bolus if needed
- Perform 12 Lead EKG if not done
- Differentiate Between
  - *Monomorphic V-Tach*
  - *Polymorphic V-Tach*

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Polymorphic

Stable

- Magnesium
  - Magnesium 2 grams IV slowly.
    (over 10 minutes)

Unstable

- Defibrillate

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Wide Complex Tachycardia Considerations

- Tricyclic Anti-depressant overdose
  - Sodium Bicarb
    - Amitriptyline
    - Amoxapine
    - Desipramine (Norpramin)
    - Doxepin
    - Imipramine (Tofranil)
    - Nortriptyline (Pamelor)
    - Protriptyline (Vivactil)
    - Trimipramine (Surmontil)

- Suspected Hyperkalemia
    - Calcium Chloride
    - Sodium Bicarb
    - Albuterol

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CARDIAC ARREST

1. Emphasis on quality of chest compressions
2. Positive pressure ventilations an obstacle
3. Use of capnography – quality of compressions – ROSC
4. Pediatric arrest usually a result of respiratory failure

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EMR/EMT-B Level

- Code Commander (MCMAID)
- Rule out situations when CPR should not be started
- Quality CPR (MC – Metronome/Compressions)
  - Compressions
- Defibrillation (M – Monitor/Defibrillator)
- Airway – Ventilations (A – Airway)

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Paramedic Level

- IV/IO access (I – IV)
- Medication therapy (D – Drugs)
  - Epinephrine – Shockable / Non shockable rhythms
  - SoluMedrol – Shockable / Non shockable rhythms
  - Amiodarone – Shockable rhythms
  - Magnesium Sulfate – Shockable rhythms

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Underlying reversible causes

H's

- Hypovolemia
- Hypoxia
- Hydrogen ion (acidosis)
- Hyperkalemia (Footnotes)
- Hypokalemia
- Hypothermia

T's

- Tablets (Toxins)
- Tamponade
- Tension Pneumothorax
- Thrombosis (cardiac)
- Thrombosis (pulmonary)

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ROSC

- Recognition
  - ETCO2 target values?
- Airway Management
- 12 Lead EKG
- Push Dose Epi to maintain blood pressure

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In Conclusion

- Cardiac-related emergencies are a significant problem.
- EMS plays a role in reducing the death rate associated with heart attacks.
- Time is critical; early recognition is key to effective treatment.

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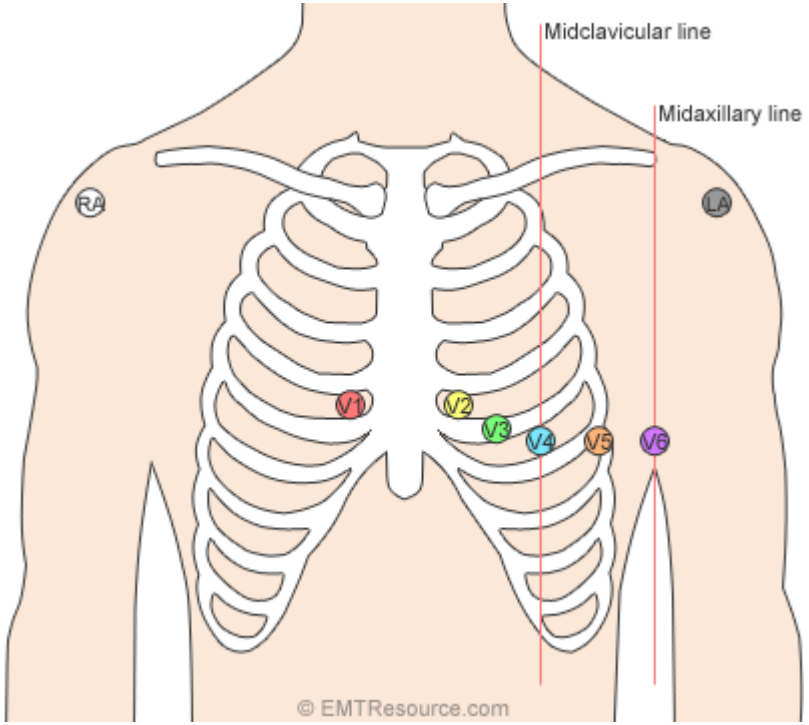
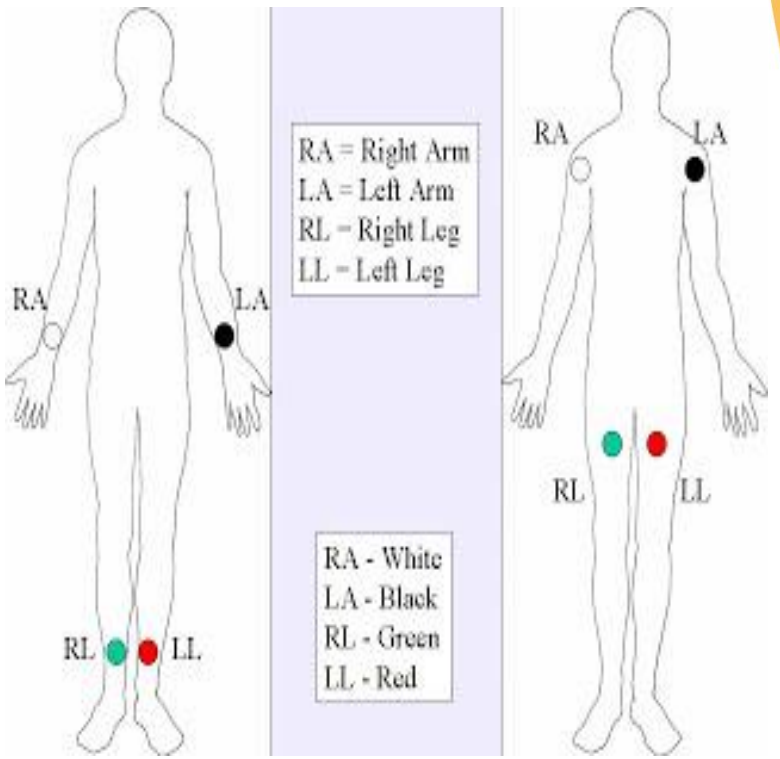
12-Lead EKG Lead Placement





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12-Lead Interpretation

I Lateral	aVR	V1 Septal	V4 Anterior
II Inferior	aVL Lateral	V2 Septal	V5 Lateral
III Inferior	aVF Inferior	V3 Anterior	V6 Lateral

EMS12Lead.com

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Any questions?

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