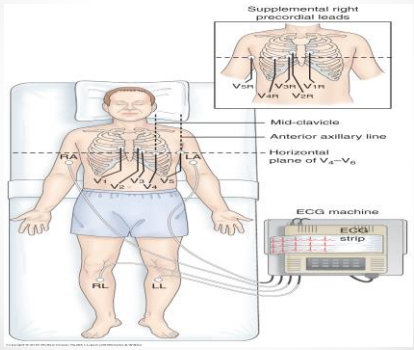
Dysrhythmias and Conduction Problems

Dr. Rexi Thomas

Normal Electrical Conduction

- SA node (sinus node)
- AV node
- Conduction
- Bundle of His
- Right and left bundle branches
- Purkinje fibers
- Depolarization = stimulation = systole
- Repolarization = relaxation = diastole

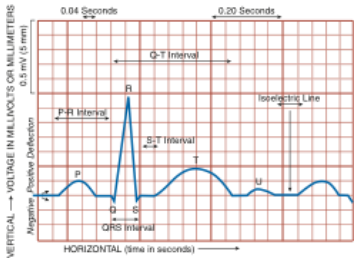
12 lead ECG

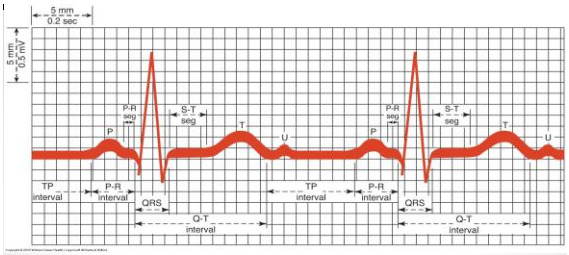


The Electrocardiogram (ECG)

- Electrode placement
  - Electrode adhesion
- Types of ECG
- ECG interpretation
  - P wave
  - QRS complex
  - T wave
  - U wave
  - PR interval
  - ST segment
  - QT interval
  - TP interval
  - PP interval

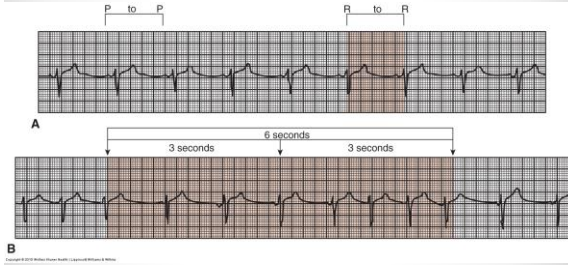
ECG Graph and Commonly Measured Components



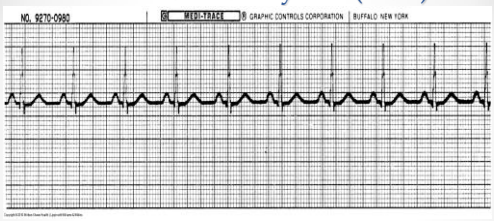


- P wave
- QRS
- PR interval
- T wave
- ST segment
- U wave
- QT interval
- PP interval
- RR interval

Ventricular and Atrial Rates



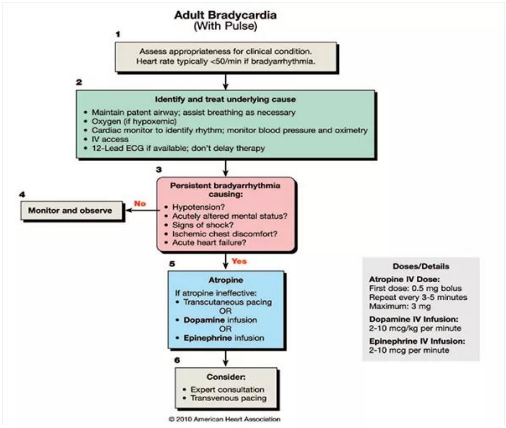
Normal Sinus Rhythm (NSR)



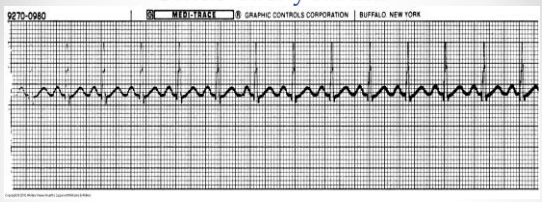
- Rate: 60-100
- Rhythm: regular
- QRS shape: usually normal; can be regularly abnormal
- P wave: normal shape, in front of QRS
- PR interval: 0.12- .20
- P:QRS ratio: 1:1

Sinus Bradycardia

- Rate: < 60
- Rhythm: regular
- QRS shape: normal
- P wave: normal
- PR interval: 0.12 – 0.20
- P:QRS ratio: 1:1

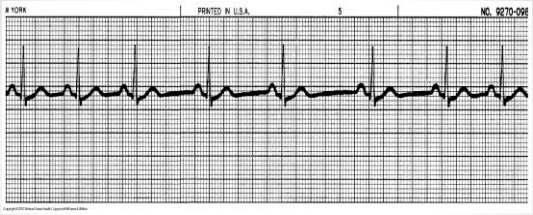


Sinus Tachycardia



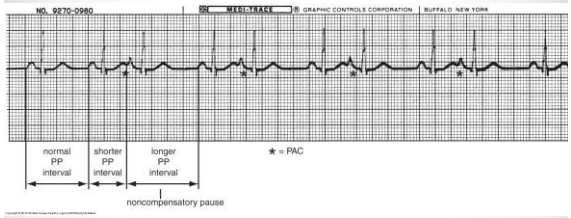
- Rate: > 100
- Rhythm: regular
- QRS shape: normal or regularly abnormal
- P wave: normal, consistent
- PR interval: 0.12 - 0.20 sec
- P:QRS ratio: 1:1

Sinus Arrhythmia



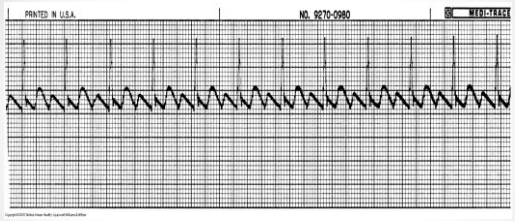
- Rate: 60-100
- Rhythm: irregular
- P wave: normal
- P:QRS ratio: 1:1

Premature Atrial Complexes (PAC's)



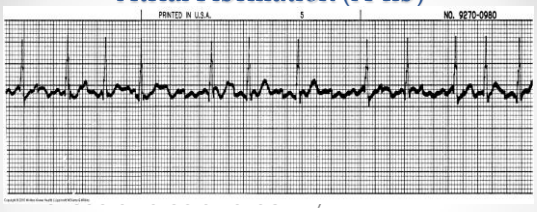
- Irregular PP intervals

Atrial Flutter



- Atrium rate 250-400
- Atrium faster than AV node conduction
- P wave: sawtooth

Atrial Fibrillation (A-fib)

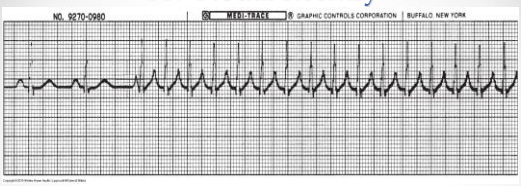


- Twitching of atrium
- Rate: Atrial 300-600; Vent 120-200
- P wave: ?
- PR interval: cannot measure
- P:QRS ratio: many:1

Junctional Rhythm

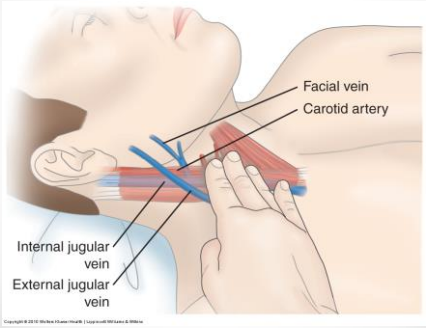
- Rate: 40-60
- P wave: may be absent
- PR interval: if P < 0.12 sec
- P:QRS ratio: 1:1 or 0:1

AV Nodal Reentry

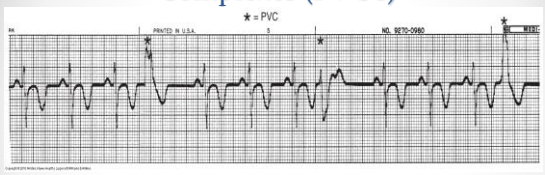


- Rate: Atrial 150-250; Vent 120-200
- P wave: difficult to discern
- PR interval: < 0.12 sec
- P:QRS ratio: 1.1, 2:1

Carotid Sinus Massage

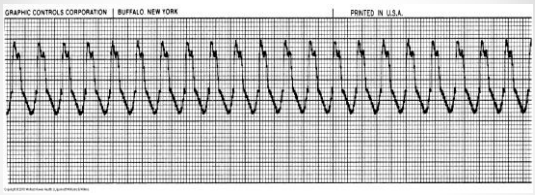


Multifocal Premature Ventricular Complexes (PVC's)



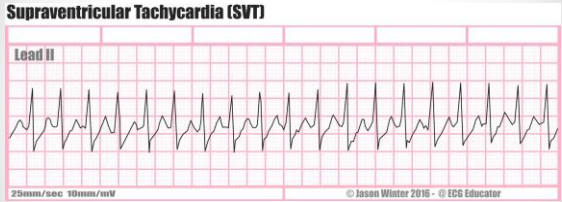
Ventricular impulse

Ventricular Tachycardia

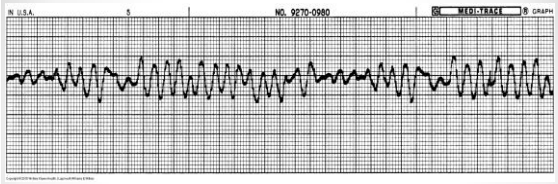


- Ventricular Rate: 100-200
- Rhythm: regular
- P wave: difficult to identify

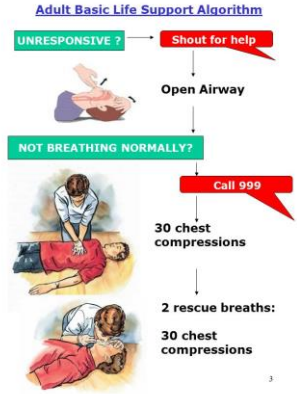
Supraventricular Tachycardia (SVT)

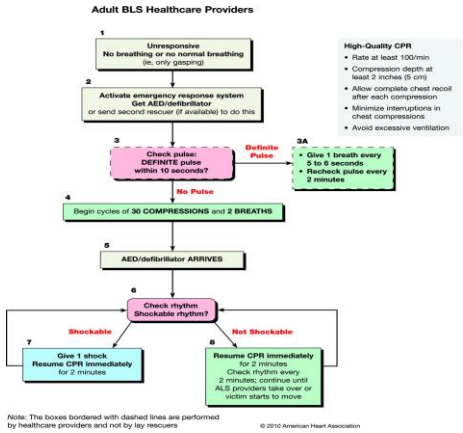


Ventricular Fibrillation

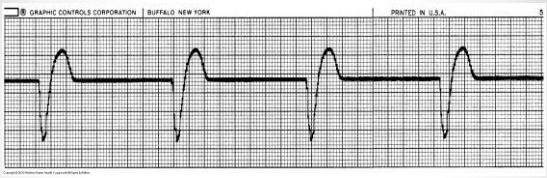


- Irregular
- Unrecognizable QRS



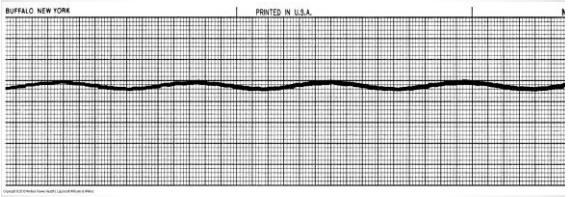


Idioventricular Rhythm

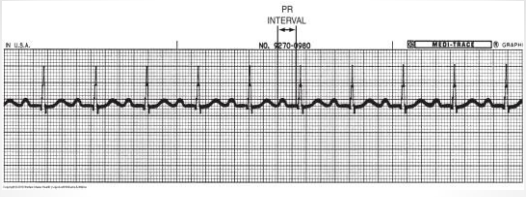


- Ventricular Rate: 20-40
- Rhythm: regular
- QRS shape: bizarre, abnormal shape

Asystole

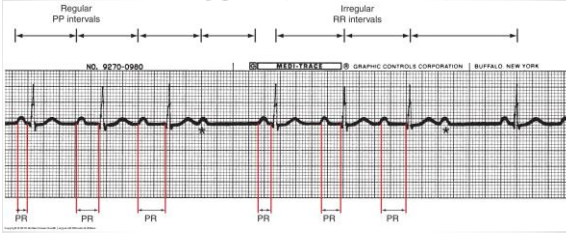


Sinus Rhythm with First Degree AV Block



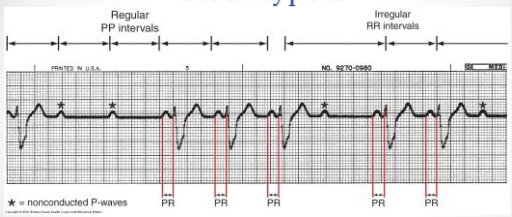
- PR interval: constant but > 0.20 seconds

Sinus Rhythm with Second Degree AV Block Type 1 (Wenckebach)



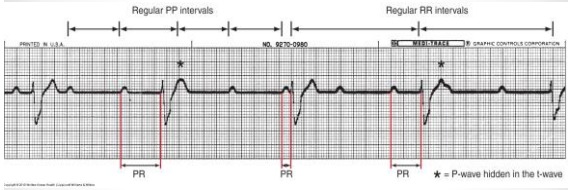
- Longer PR duration then no QRS after P wave

Sinus Rhythm with Second Degree AV Block Type II



- More P waves than QRS

Sinus Rhythm with Third Degree AV Block

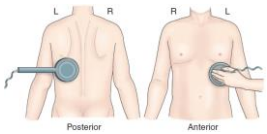


- Irregular PR intervals

Cardioversion and Defibrillation

- Treat tachyarrhythmias by delivering electrical current that depolarizes critical mass of myocardial cells
  - When cells repolarize, sinus node is usually able to recapture role as heart pacemaker
- In cardioversion, current delivery is synchronized with patient's ECG
- In defibrillation, current delivery is unsynchronized

Paddle Placement for Defibrillation

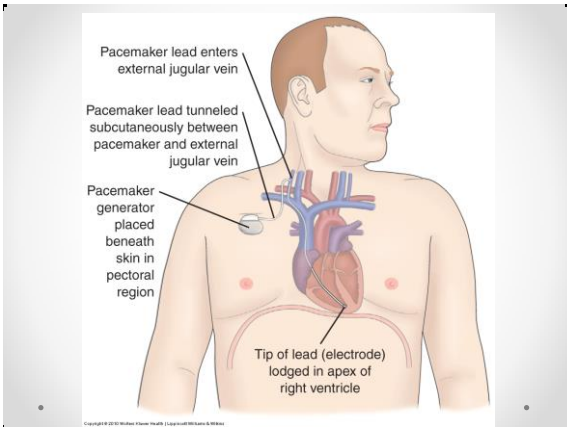


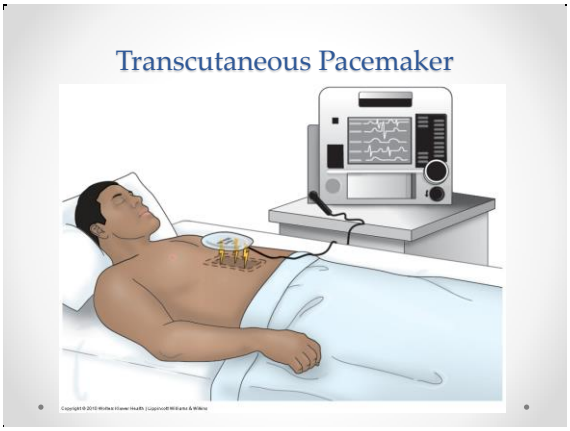
Safety Measures for Defibrillation

- Ensure good contact between skin, pads, and paddles
  - Use conductive medium, 20 to 25 pounds of pressure
- Place paddles so they do not touch bedding or clothing and are not near medication patches or oxygen flow
- If cardioverting, turn synchronizer on
- If defibrillating, turn synchronizer off
- Do not charge device until ready to shock
- Call "clear" three times; follow checks required for clear
  - Ensure no one is in contact with patient, bed, or equipment

Pacemakers

- Electronic device that provides electrical stimuli to heart muscle
- Types
  - Permanent
  - Temporary
- Pacemaker generator functions
  - NASPE-BPEG code for pacemaker function





Pacing

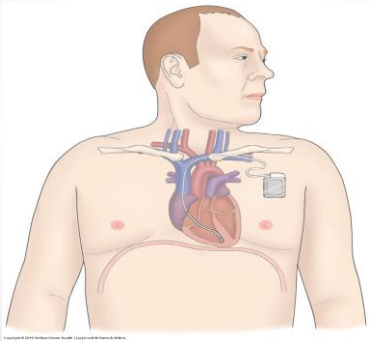
Complications of Pacemaker Use

- Infection
- Bleeding or hematoma formation
- Dislocation of lead
- Skeletal muscle or phrenic nerve stimulation
- Cardiac tamponade
- Pacemaker malfunction

Implantable Cardioverter Defibrillator (ICD) #1

- Device that detects and terminates life-threatening episodes of tachycardia and fibrillation
- NASPE-BPEG code
- Antitachycardia pacing

Implantable Cardioverter Device (ICD)



Nursing Management of the Patient with a Permanent Electronic Device

- ECG assessment
- CXR
- Nursing assessment
  - CO and hemodynamic stability
  - Incision site
  - Signs of ineffective coping
  - Level of knowledge and education needs of family and patient

Wolff Parkinson White Syndrome