

EKG Review

NURS 380

Objectives

At the conclusion of the presentation and learning activities, learners will be able to:

1. Identify defining characteristics of atrial and ventricular rhythms/arrhythmias
2. Describe signs and symptoms that accompany atrial and ventricular arrhythmias
3. List causes for atrial and ventricular arrhythmias
4. Describe the treatments for atrial and ventricular arrhythmias
5. Apply knowledge of etiology, signs, symptoms when creating a plan of care for a patient with atrial/ventricular arrhythmias
6. List the roles in which a nurse may participate during a code blue or emergency
7. Identify commonly used medications utilized in code blue settings
8. Describe the differences in dosing adult and pediatric code blue medications

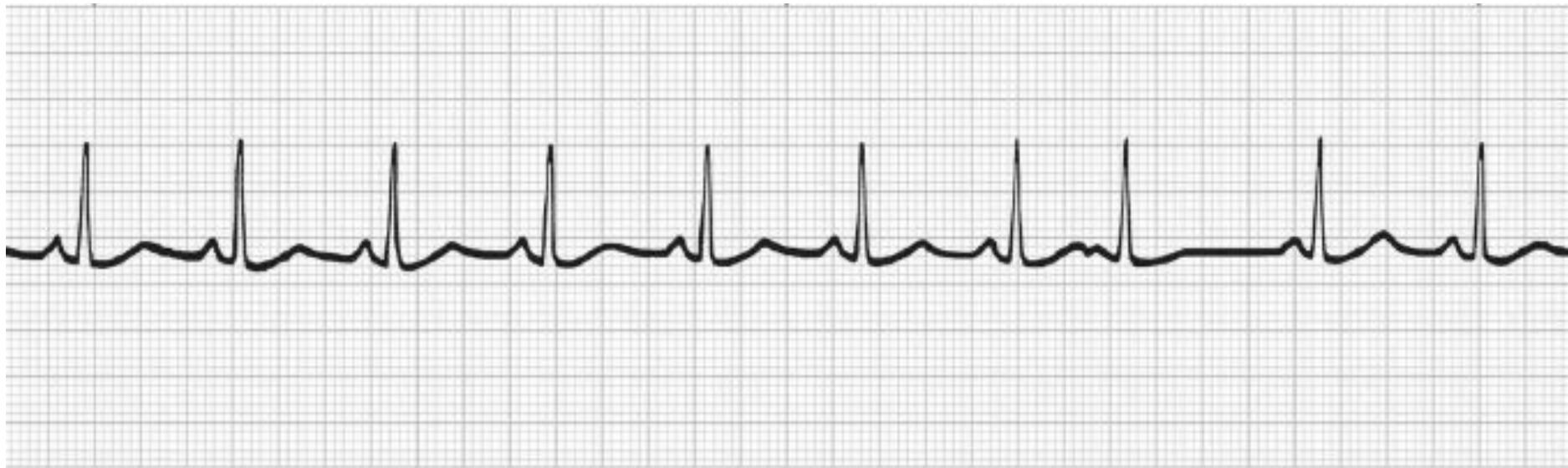


sinus tach

Sinus Tachycardia Identifying Features

Rhythm	Regular
Rate	100 - 160 beats/minute
P waves	Normal in size, shape, direction with one P wave before each QRS complex
PR interval	Normal (0.12 - 0.20 second)
QRS complex	Normal (0.06 - 0.10 second)

Increases blood flow or oxygen demand



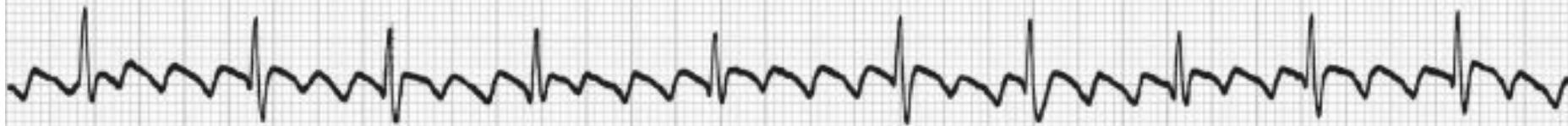
PAC

Premature Atrial Contraction (PAC) Identifying Features

re. sinus rhythm w/ a PAC

Rhythm	Not a rhythm, but a single beat
Rate	That of underlying rhythm
P waves	Premature, abnormal in size, shape, direction <i>In relation to other P waves on the strip</i>
PR interval	n/a; identify underlying rhythm
QRS complex	Premature; normal duration (0.06 - 0.10 second)

atrial flutter



comes from abnormal impulse in atria
somewhere other than the SA node

Atrial Flutter Identifying Features

- typically originates in right atria

causes

) also long QT syndrome
stimulants

) HF, cardiac ischemia
myopathy & surgery

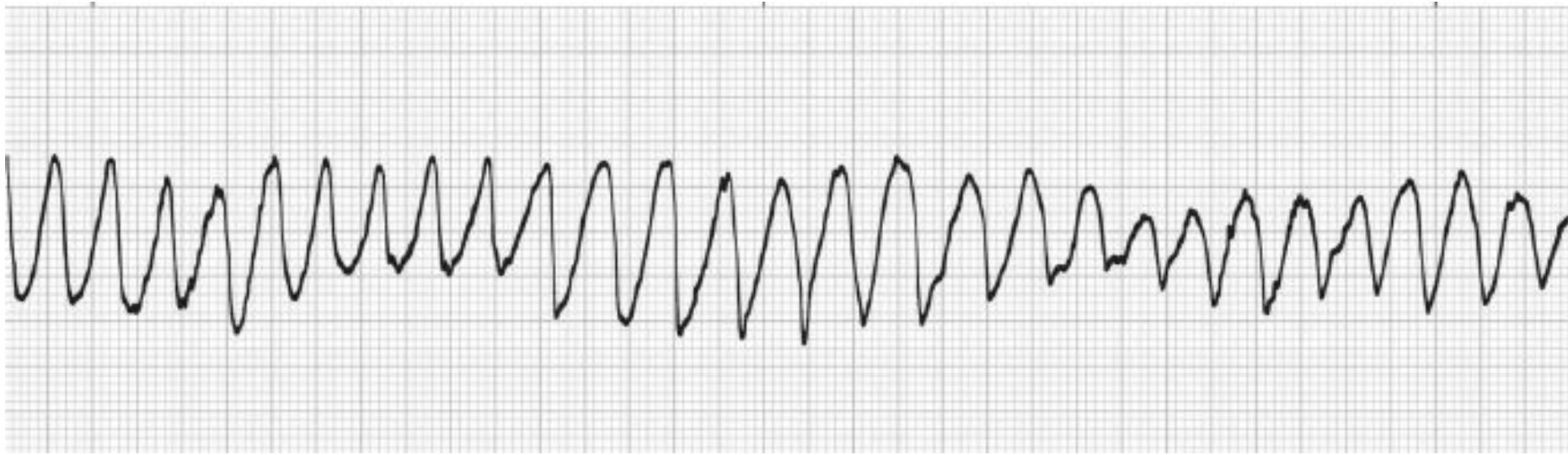
Rhythm	Regular or irregular (depends on AV conduction ratios)
Rate	Atrial rate: 250-400 beats per minute; ventricular rate will be less <i>if you're counting QRS complexes</i>
P waves	Sawtooth waves ("flutter waves"/F waves) on baseline
PR interval	Not measurable
QRS complex	Normal (0.06 - 0.10 second)

(Tx)



*b blockers
cardioversion*

*assess coagulation needs
assessed*



v Tach

Ventricular Tachycardia Identifying Features

Rhythm	Regular or slightly irregular
Rate	140-250 beats/minute <i>(35~155 if v-tach w/ a pulse)</i>
P waves	None
PR interval	Not measurable <i>— can see if it is pulsless v-tach</i>
QRS complex	Wide (> 0.12 second)

causes/
cardiac scarring

too many PVCs

cardiomyopathy

electrolyte imbalances

hypoxia

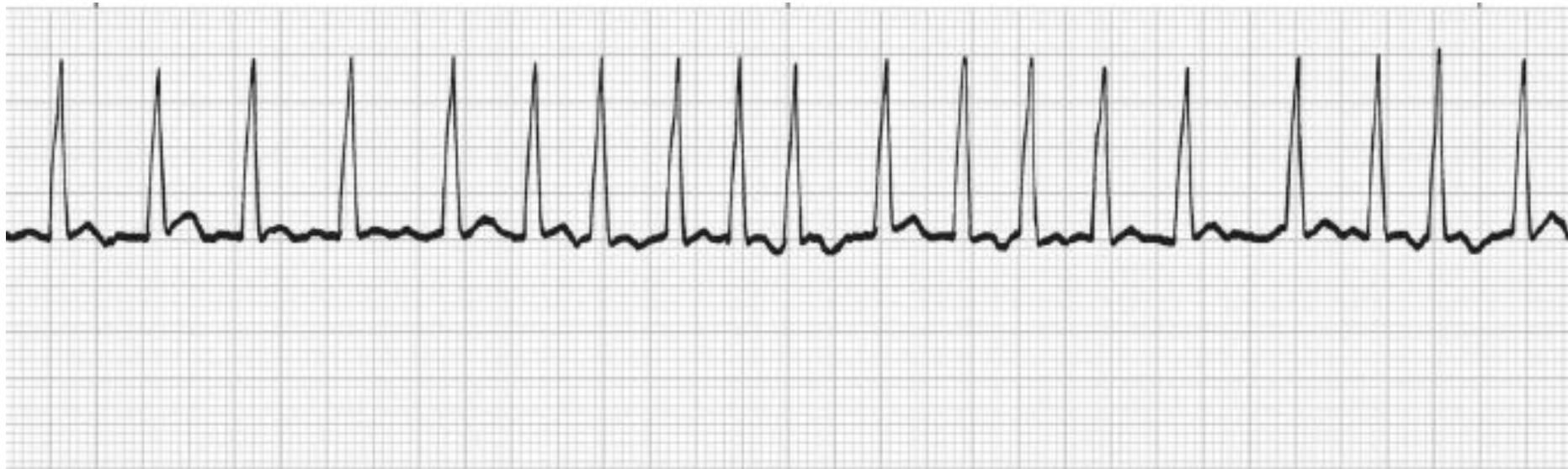
binge drinking

SWAN placements

post MI / CABG

Tx/
cardioversion

amiodarone



afib

most common

Atrial Fibrillation Identifying Features

↑ prevalence w/ ↑ age
can be episodic or chronic

Rhythm	Irregular - always
Rate	Atrial rate 400 beats/minute or more; ventricular rate varies but less than atrial rate
P waves	Irregular wave deflections ("fibrillatory waves") on baseline
PR interval	Not measurable
QRS complex	Normal (0.06 - 0.10 second)

*if unstable afib,
cardiovert*

unstable afib (S/S)
SOB
right-headed

(Tx) anticoagulation
controlling rate
└ CCB (diltiazem)
β blockers (metop)
if episodic & tachy, amiodarone



coarse
vfib

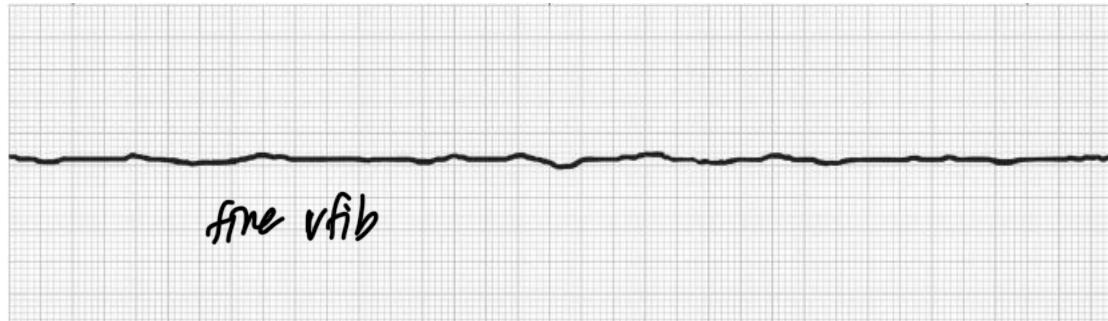
rfib

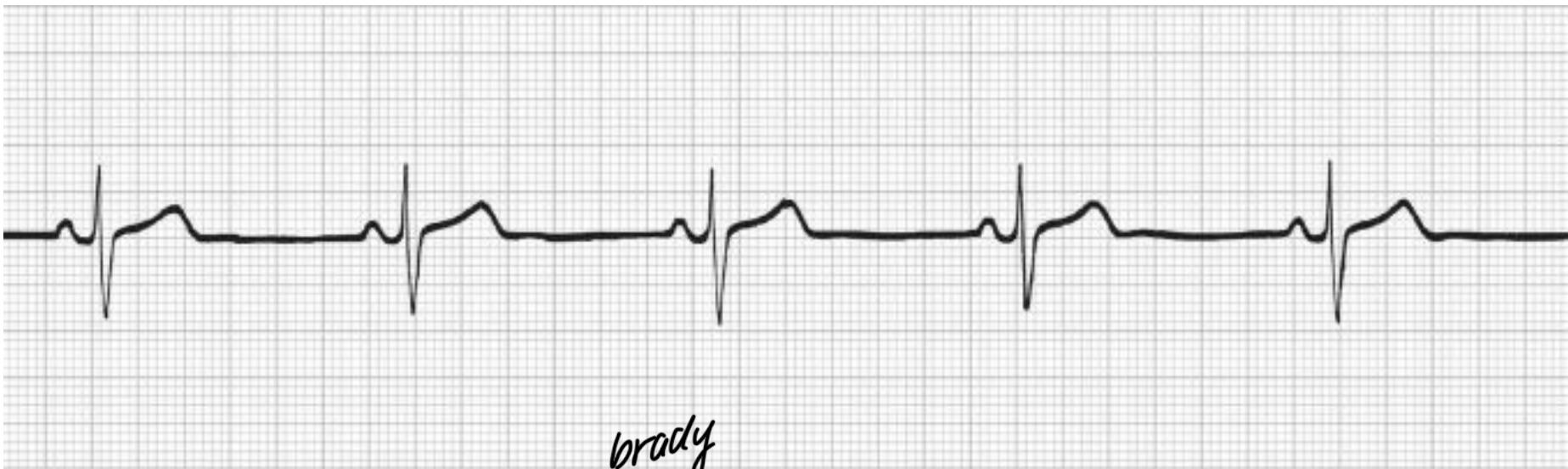
Ventricular Fibrillation Identifying Features

(P) CPR defibrillation
epi

CAUSES
MI
cardiac myopathy electrolyte disturbances
hypoxia cocaine & meth
electrocution accidents
actual physical injury
to the heart
can occur spontaneously or
preceded by
PVCs

Rhythm	Irregular - always
Rate	Not measurable
P waves	Absent; wavy, irregular deflections seen that vary in size, shape, and height. If small, then fine VF, if large, coarse VF
PR interval	Not measurable
QRS complex	Absent





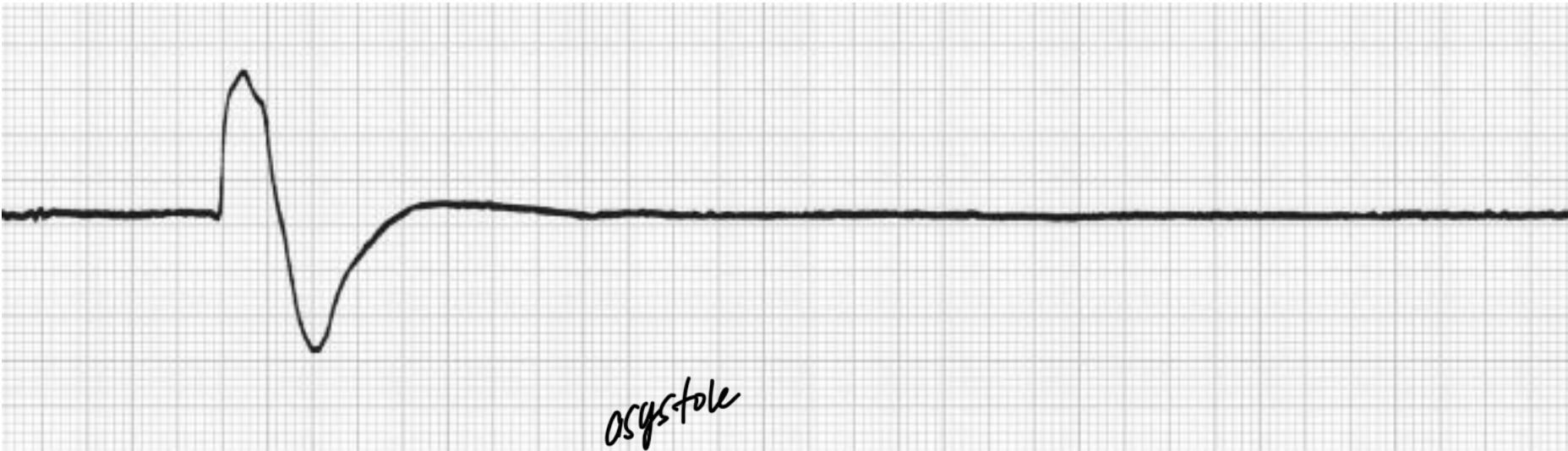
brady

Sinus Bradycardia Identifying Features

Rhythm	Regular
Rate	<60 beats per minute (typically 40-60)
P waves	Normal
PR interval	Normal (0.12-0.20 second)
QRS complex	Normal (0.06-0.10 second)

(Causes)
inferior wall M¹
(SA node)
hypoglycemia
vagal stimulation / vasovagal reaction
vagal implosion
change in position
TCA
CCB
β blockers
digoxin

(Tx) atropine
treat the cause



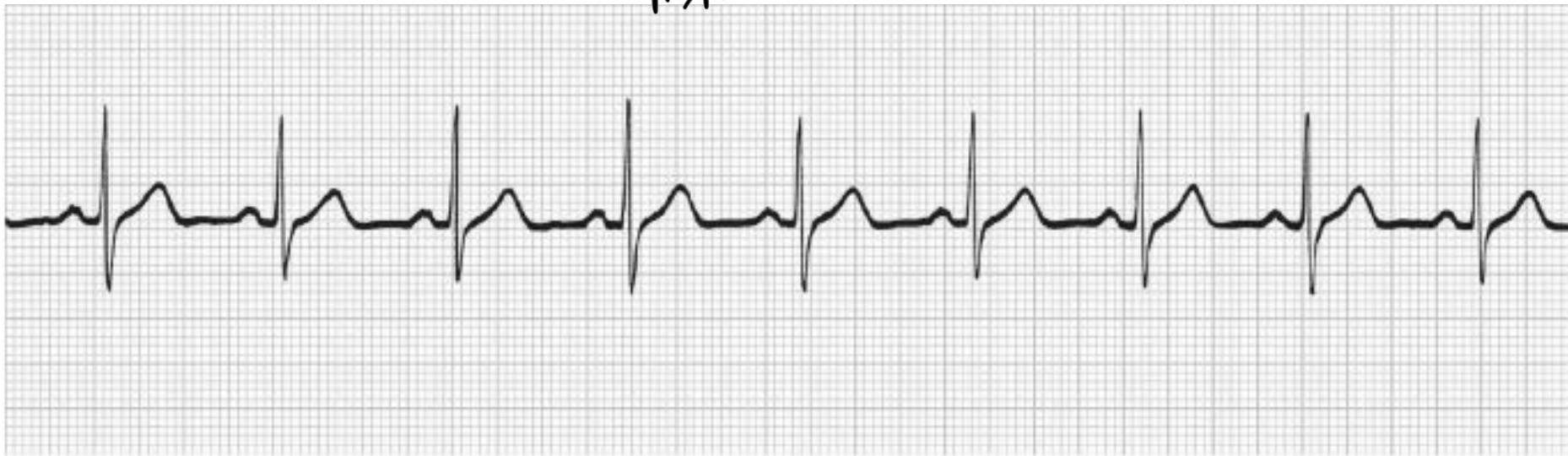
Asystole Identifying Features

(P) CPR emergency shock if it's fine VFib

Rhythm	If P waves are present, will have atrial rhythm
Rate	None
P waves	Will either have a P wave with no associated QRS complex or a straight line
PR interval	Not measurable
QRS complex	Absent



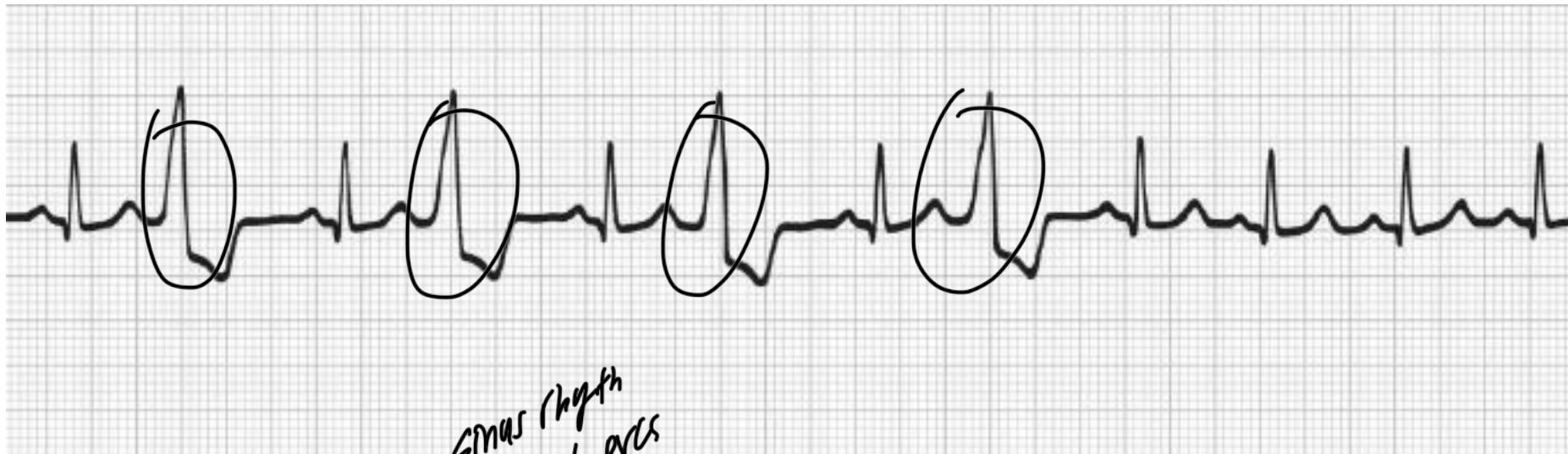
NSR



N

Sinus Rhythm Identifying Features

Rhythm	Regular
Rate	60-100 beats per minute
P waves	Normal; one P wave precedes each QRS
PR interval	Normal (0.12-0.20 second)
QRS complex	Normal (0.06-0.10 second)



sinus rhythm
w/ p-ws

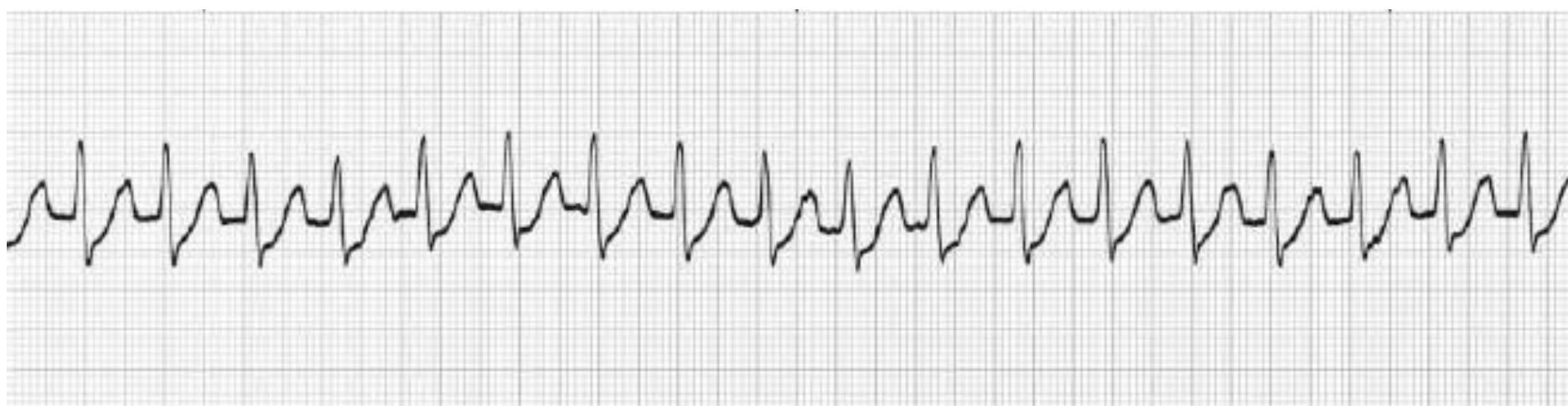
Premature Ventricular Contraction (PVC) Identifying Features

74 can be called ~~a beat of~~
a run of vtach

Rhythm	Not a rhythm, but a single beat. Underlying rhythm usually regular
Rate	That of underlying rhythm
P waves	None associated with PVC
PR interval	n/a; identify underlying rhythm
QRS complex	Premature; wide (0.12 second or greater)

causes

MI
hyp. K⁺
HF
tobacco/caffeine
hypocalcemia
hypomagnesemia



Paroxysmal Atrial Tachycardia (PAT)/Supraventricular Tachycardia (SVT) Identifying Features

most common arrhythmia in children
mostly women

Rhythm	Regular
Rate	140-250 beats/minute
P waves	Abnormal (usually pointed); can be hidden in preceding T wave
PR interval	Usually not measurable
QRS complex	Normal (0.06-0.10 second)

(Tx)

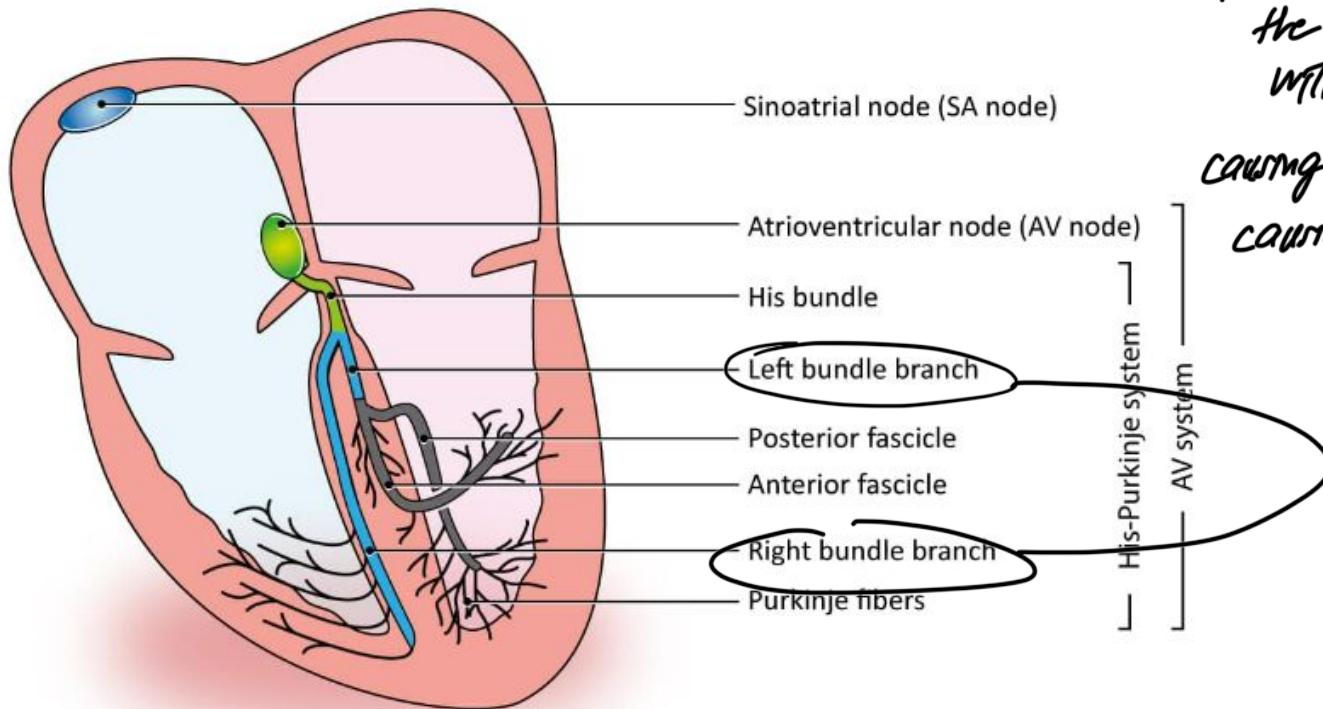
cardioversion & blockers
CIB vagal maneuver

Cause

CMF
tobacco / alcohol
adenosine

Advanced Cardiac Rhythms

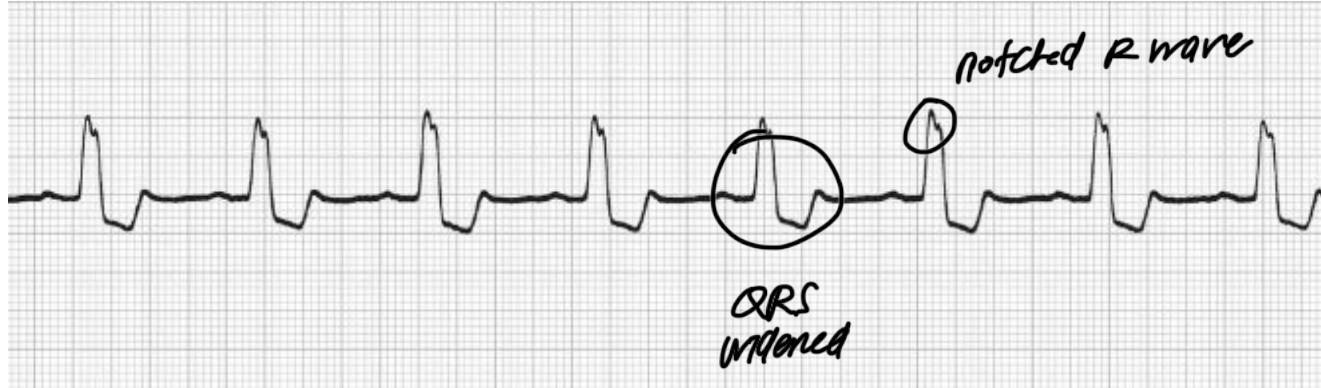
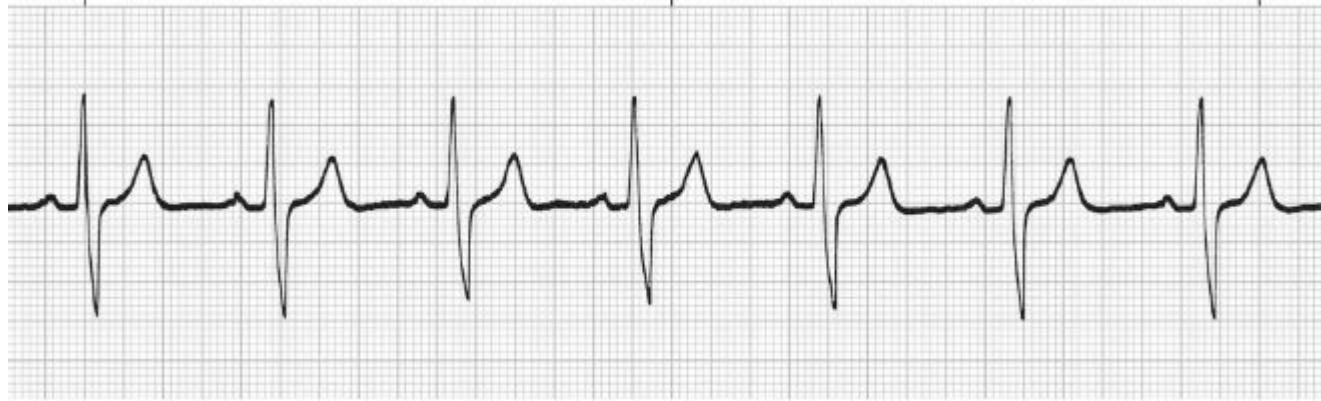
Bundle Branch Block



If one is blocked,
the not blocked are
will depolarize first,
causing a delay
causing a wide QRS complex

normally
simultaneously
depolarizes

Bundle Branch Block (BBB)



Bundle Branch Block Identifying Features

right BBB - can be seen in healthy pt
CAB
can be temp/chronic

Left BBB - typically hasn't have chronic heart disease
Hypertensive heart disease

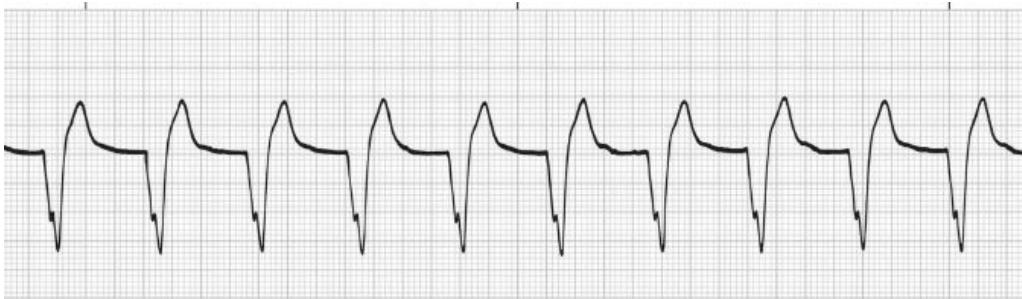
Rhythm	Regular
Rate	Rate of underlying rhythm
P waves	Sinus
PR interval	Normal
QRS complex	Wide (greater than 0.12 second)

(P) none

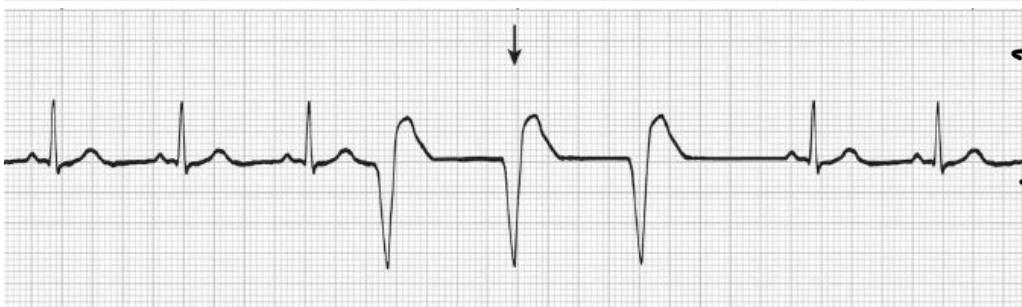
Idioventricular Rhythm (IVR)



SA or AV node
doesn't send a signal
in rate high enough



signal comes from
ventricles



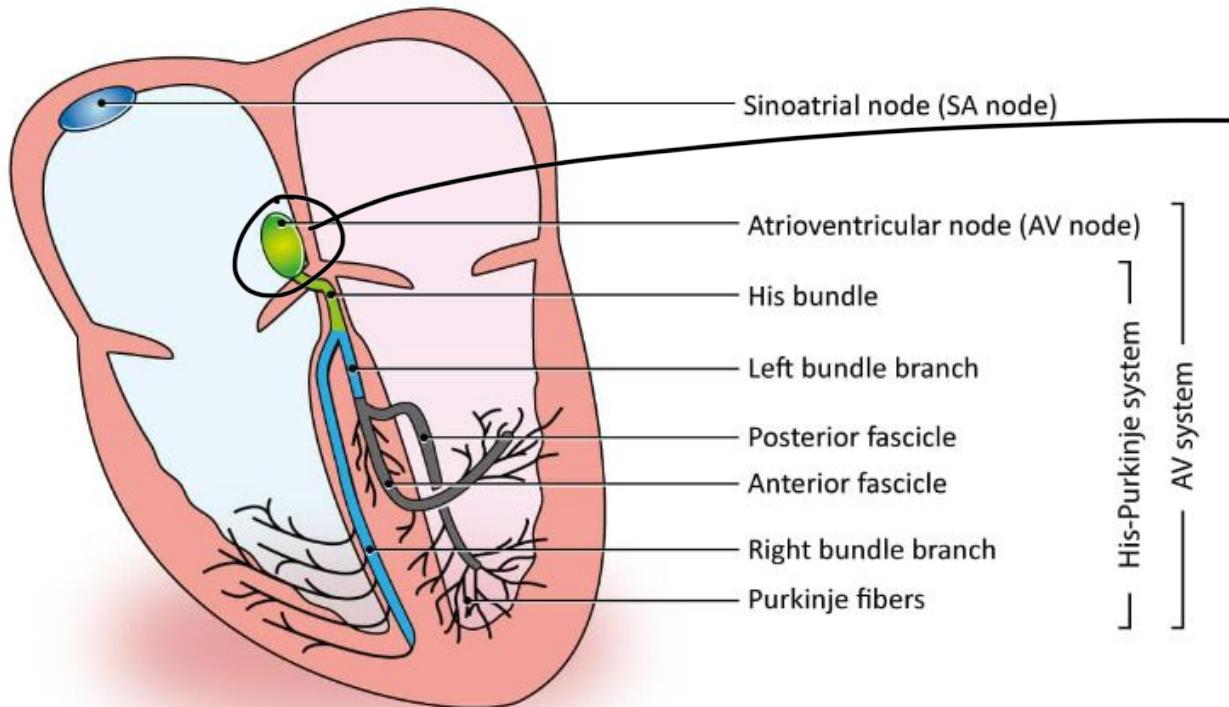
can be intermittent
ie. due to carotid
cough
due to advanced heart
disease

Idioventricular Rhythm Identifying Features

(Tx) chronic I VR usually
leads to asystole
if slow, treat the
asystole

Rhythm	Regular
Rate	IVR slow (30-40 beats per minute); AIVR greater than 50 beats per minute
P waves	Absent
PR interval	Not measurable
QRS complex	Wide (greater than 0.12 second)

Junctional Rhythm



if SA node < AV node signal
then AV node becomes pacemaker
starts here

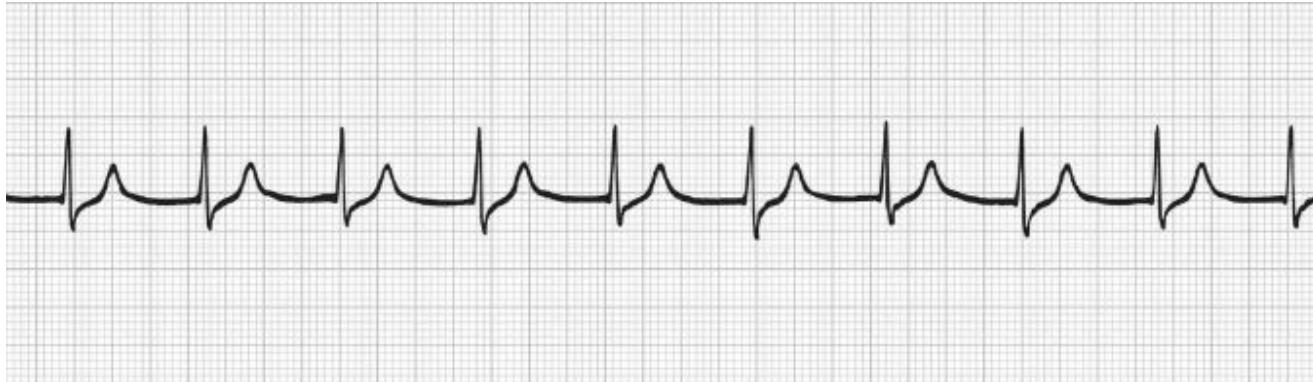
typically < 50 - 60 BPM

Junctional Rhythm

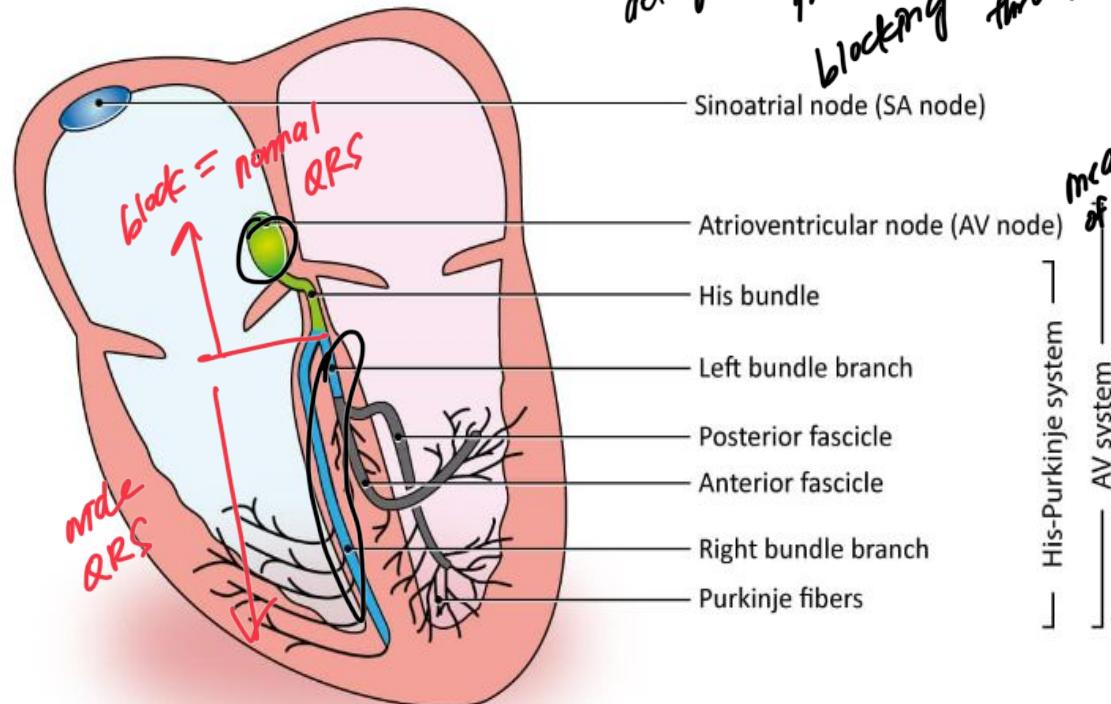


Junctional Rhythm Identifying Features

Rhythm	Regular
Rate	40-60 beats per minute; accelerated 60-100 beats per minute
P waves	Inverted before QRS, immediately after QRS, or hidden within QRS
PR interval	Short (0.10 second) or not measurable
QRS complex	Normal



AV Heart Blocks



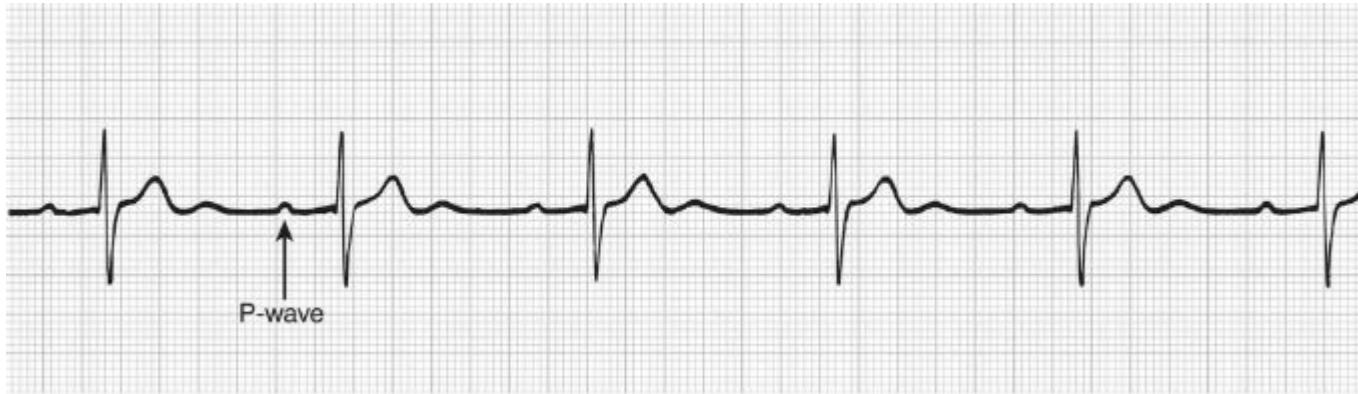
delayed conduction
from AV to ventricles
blocking conduction
through AV node or
bundle branches

mechanism of conduction

- Classification based on type and location of heart block
- PR interval is **key** for type
- QRS width is key for location

- Look for P wave. Is there one or more than one before each QRS?
- Measure regularity
- Measure PR interval
- Look at the QRS complex

First Degree AV Block



1. Look for P wave. Is there one or more than one before each QRS?
2. Measure regularity
3. Measure PR interval *long*
4. Look at the QRS complex
normal

First Degree AV Block Identifying Features

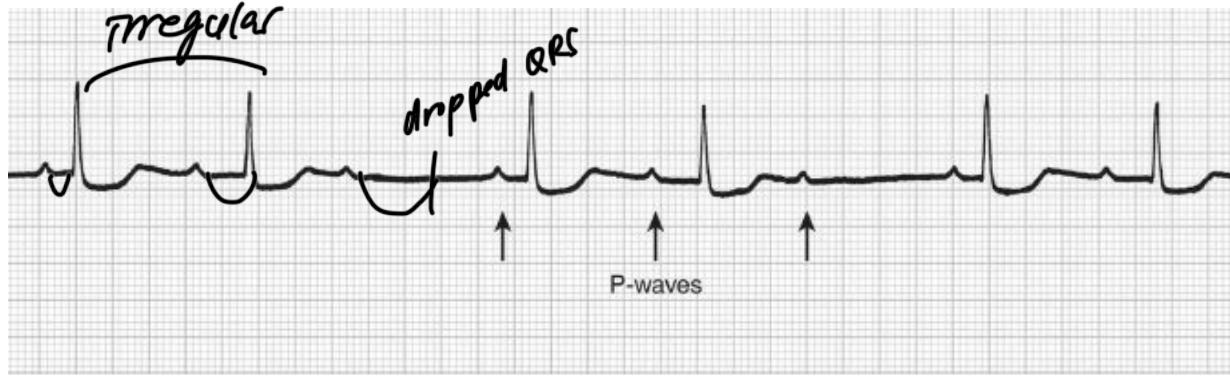
(S/S)
asymptomatic

ischemia
injury to AV node
2 blocker (cB) aware
and aware

Rhythm	Regular
Rate	Rate of underlying rhythm
P waves	Sinus; one P wave to each QRS complex
PR interval	Consistent, prolonged (> 0.20 second)
QRS complex	Normal

delayed impulse from AV node

Second Degree AV Block, Type I



AKA: Mobitz I or Wenckebach

1. Look for P wave. Is there one or more than one before each QRS?
2. Measure regularity
3. Measure PR interval
4. Look at the QRS complex

Mobitz I Identifying Features

usually temporary & resolves on its own

(rarely)

↑ MII hyperkalemia
↑ can be normal & asymptomatic
in people who are very athletic

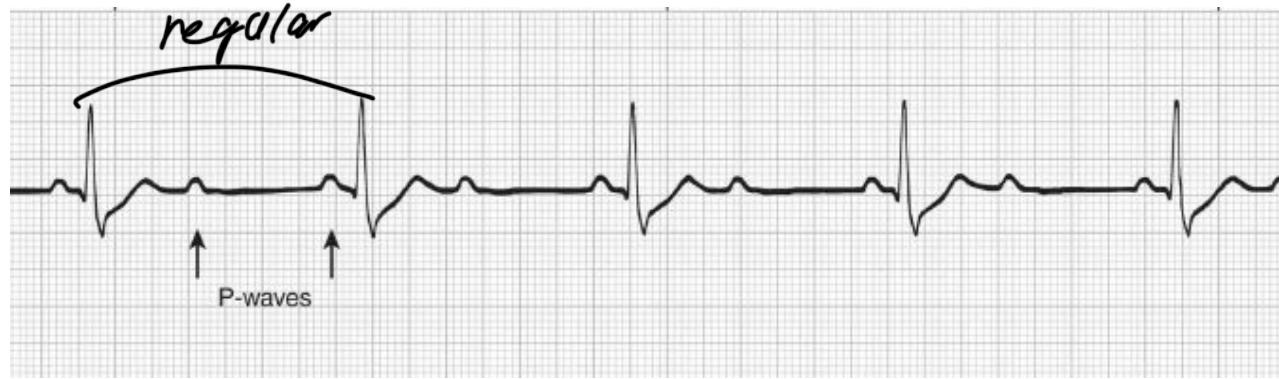
Rhythm	Regular atrial rhythm, irregular ventricular rhythm
Rate	Atrial: rate of underlying rhythm, ventricular: depends (will be less than atrial rate)
P waves	Sinus
PR interval	Varies, progressively lengthens until a P wave isn't conducted
QRS complex	Normal - so where is location of this block?

above the AV node



"Longer, longer, drop! Now you've got a Wenckebach!"

Second Degree AV Block, Type II



AKA: Mobitz II

1. Look for P wave. Is there one or more than one before each QRS?
2. Measure regularity
3. Measure PR interval — *can be normal*
4. Look at the QRS complex
normal

Mobitz II Identifying Features

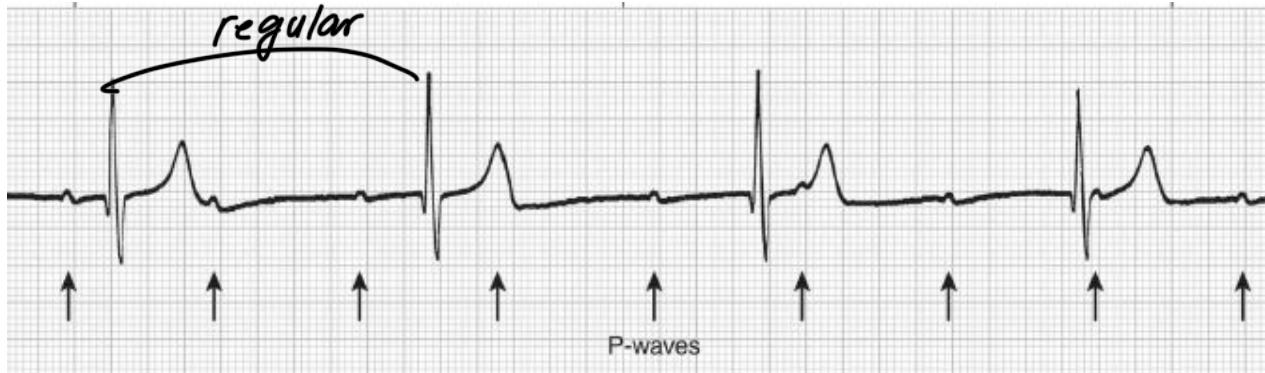
TX depends on HR & symptoms
Tx permanent pacemaker!!!
can progress to asystole
if they have hiccups,
they need to get it
pedal. It is
touching the
vagus nerve.
lol!!!
settings
can be other
A-paced
or
V-paced
or
both

Rhythm	Regular atrial rhythm, ventricular rhythm can be regular or irregular
Rate	Atrial: rate of underlying rhythm, ventricular: depends (will be less than atrial rate)
P waves	Sinus; 2-3 (or more!) before each QRS complex
PR interval	Consistent; can be normal or prolonged
QRS complex	Normal or wide - if wide, where is the location of the block?

2 below
AV node

aka complete heart block

Third Degree AV Block



AKA: Complete heart block

1. Look for P wave. Is there one or more than one before each QRS?
2. Measure regularity
3. Measure PR interval — *inconsistent*
4. Look at the QRS complex

*atria & ventricles are
not communicating*

Third Degree AV Block Identifying Features

causes - Lyme disease
massive heart attack

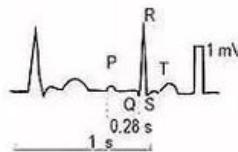
can be asymptomatic
↳ bc IT is gradual onset

(Tx) pacemaker!!!

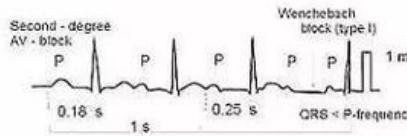
Rhythm	Regular (atria and ventricles)
Rate	Atrial: rate of underlying rhythm, ventricular: SLOW and always less than atrial rate
P waves	Sinus with no constant relationship to QRS complex
PR interval	Not consistent/variable
QRS complex	Normal or wide - if wide, where is the location of the block?

"THE HEART BLOCK POEM"

If the R is far from P,
then you have a FIRST DEGREE.



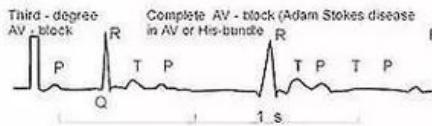
Longer, longer, longer, drop!
Then you have a WENCKEBACH.



If some Ps don't get through,
then you have MOBITZ II.

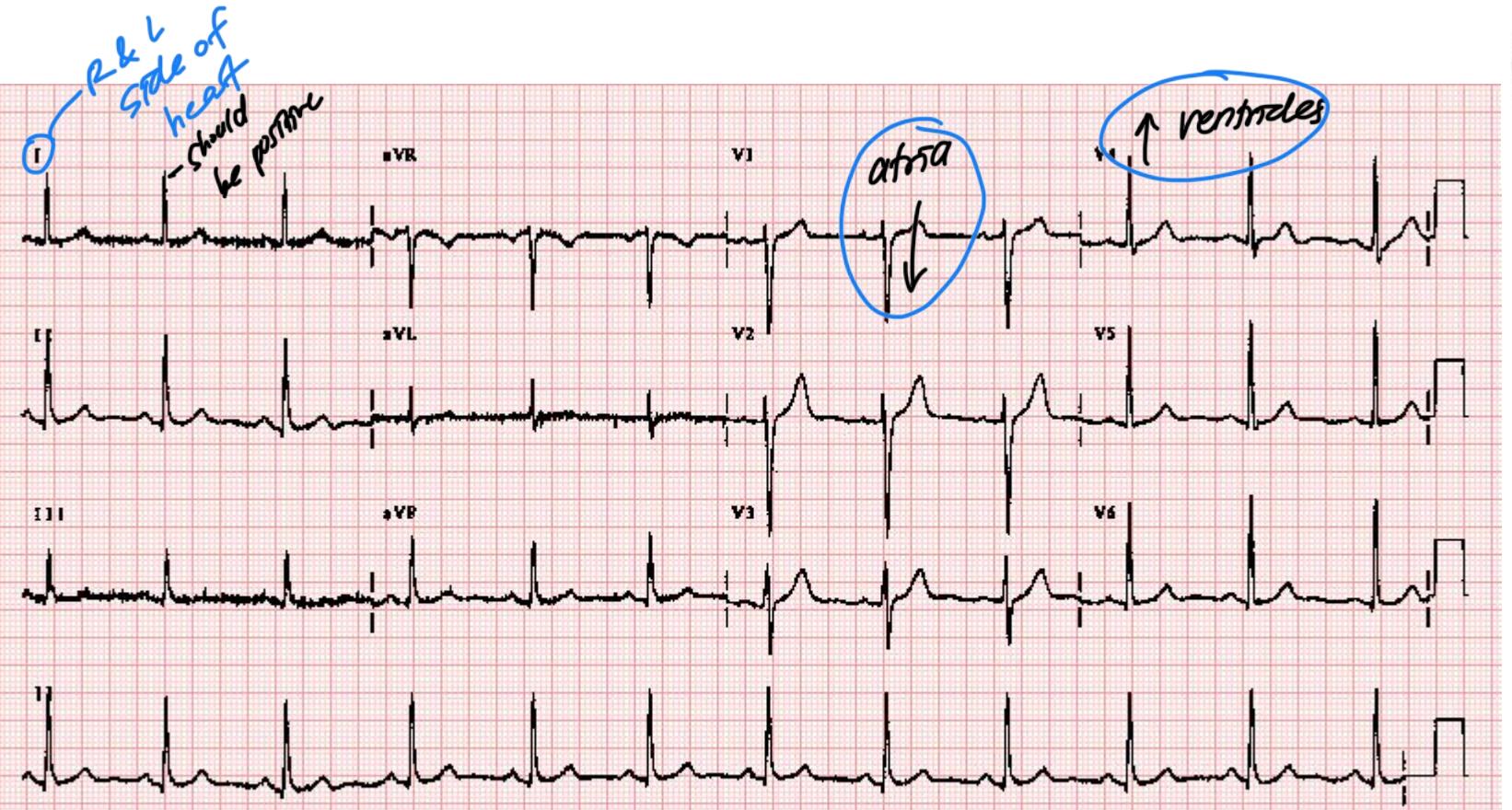


If Ps and Qs don't agree,
then you have a THIRD DEGREE.



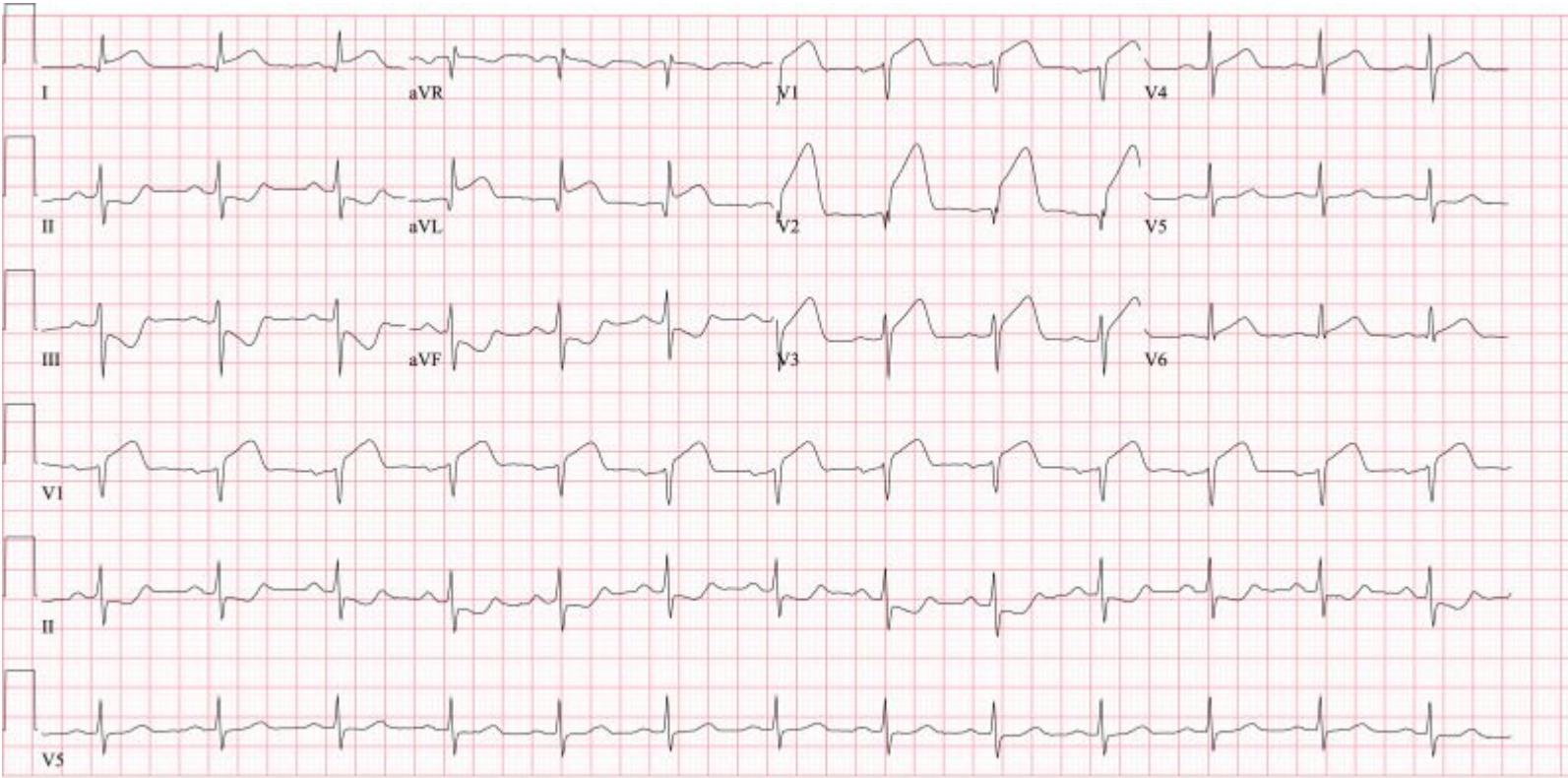


12 Lead EKG



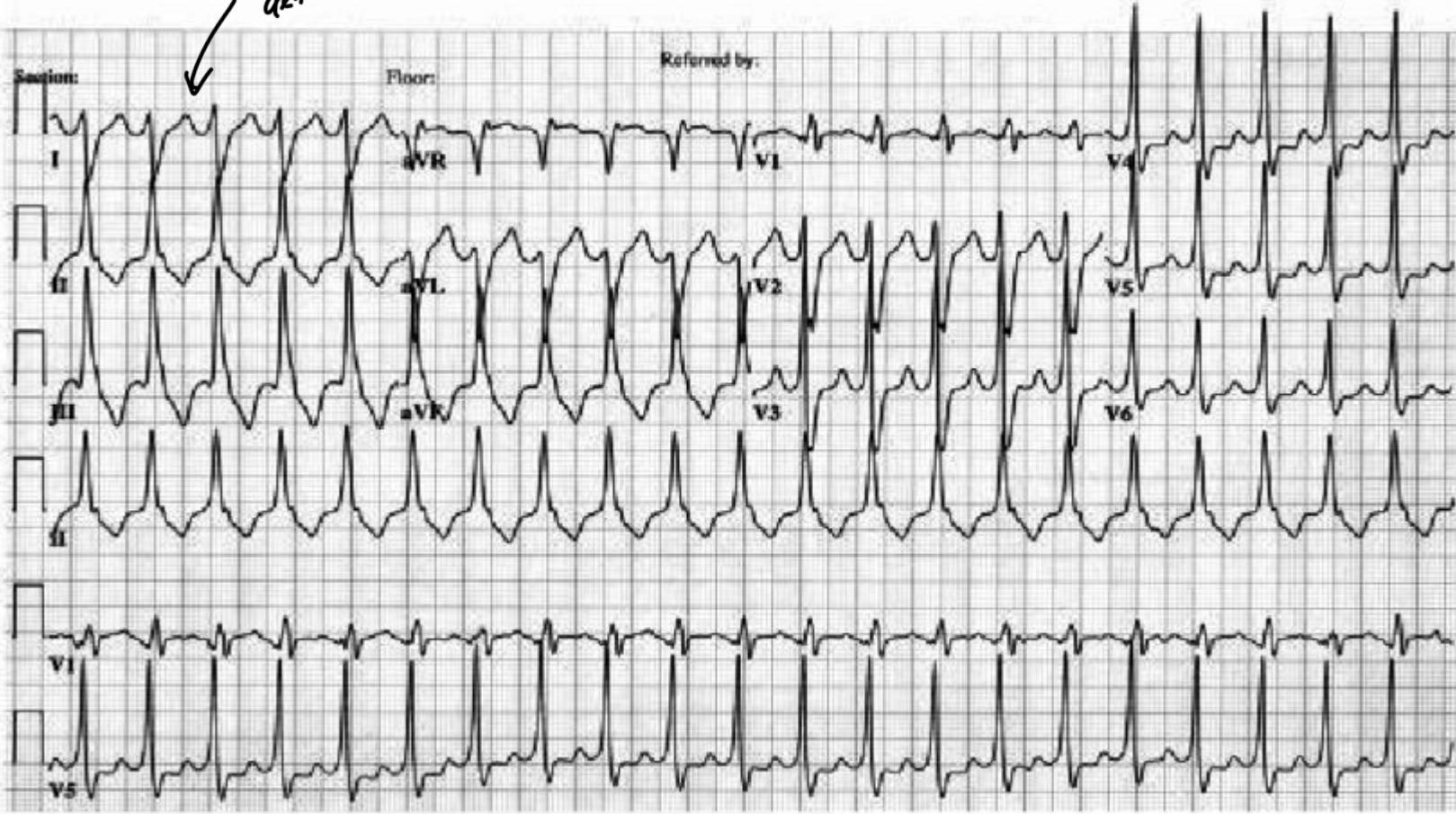


I Lateral	aVR	V1 Septal	V4 Anterior
II Inferior	aVL Lateral	V2 Septal	V5 Lateral
III Inferior	aVF Inferior	V3 Anterior	V6 Lateral



25mm/s 10mm/mV 40Hz

*negative
deflections*



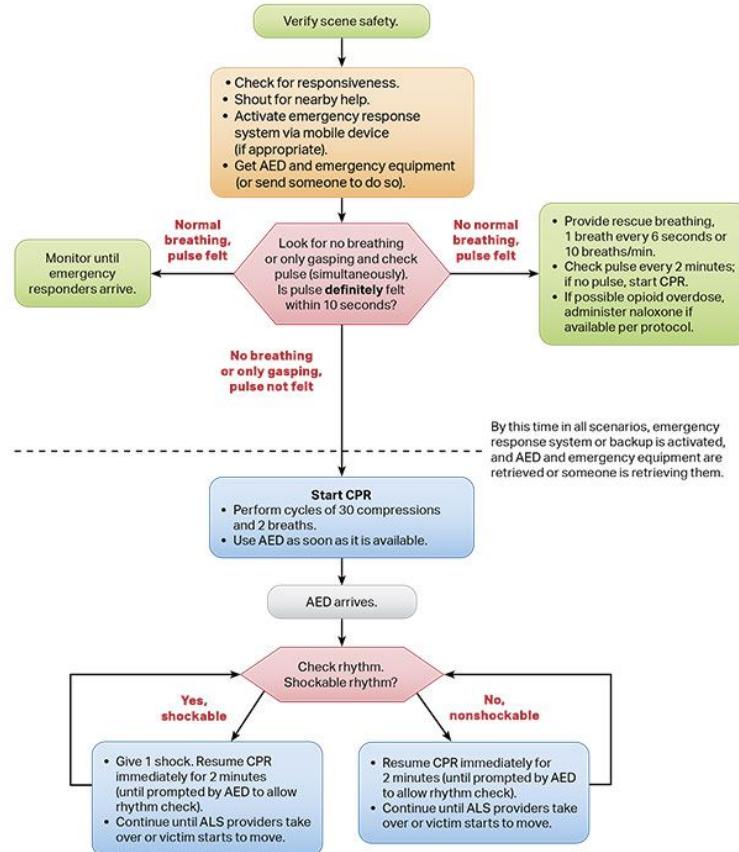
Code Blue

Roles in a code blue

- Compression team
- Recorder
- Medication RN
- Respiratory therapist/airway manager
- Defibrillator operator
- Physician/APP
- Family liaison

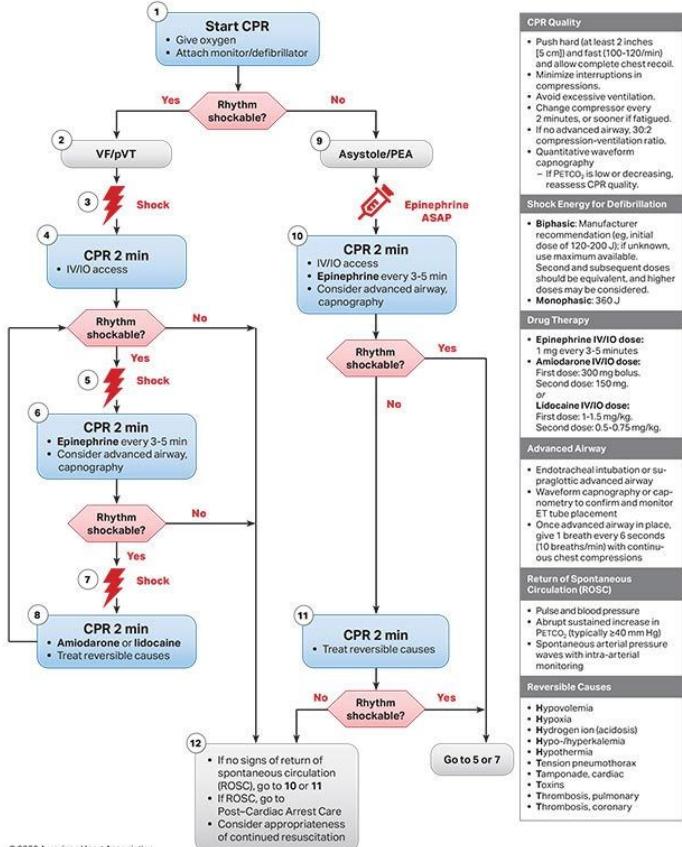
Basic Steps

1. Identify arrest and call code blue
2. Begin compressions
3. Code cart and defibrillator pulled into room
4. Backboard under patient
5. Attach electrodes and defibrillator pads on patient
6. Ensure IV access - if none, start PIV, central line, or intraosseous access

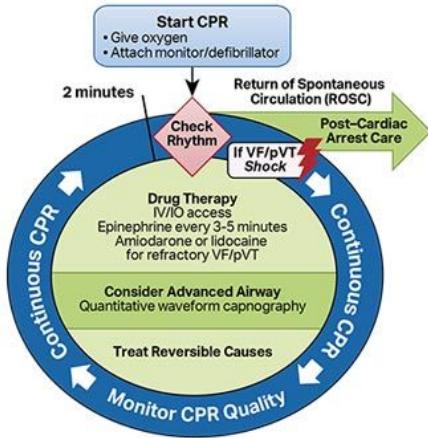


Advanced Steps

Adult Cardiac Arrest Algorithm (VF/pVT/Asystole/PEA)



Adult Cardiac Arrest Circular Algorithm



CPR Quality

- Push hard (at least 2 inches [5 cm]) and fast (100-120/min) and allow complete chest recoil.
- Minimize interruptions in compressions.
- Avoid excessive ventilation.
- Change compressor every 2 minutes, or sooner if fatigued.
- Quantitative waveform capnography
 - If PETCO₂ is low or decreasing, reassess CPR quality.

Shock Energy for Defibrillation

- Biphasic:** Manufacturer recommendation (eg, initial dose of 120-200 J; if unknown, use maximum available. Second and subsequent doses should be equivalent, and higher doses may be considered.)
- Monophasic:** 360 J

Drug Therapy

- Epinephrine IV/IO dose:** 1 mg every 3-5 minutes
- Amiodarone IV/IO dose:** First dose: 300 mg bolus. Second dose: 150 mg. or
- Lidocaine IV/IO dose:** First dose: 1-1.5 mg/kg. Second dose: 0.5-0.75 mg/kg.

Advanced Airway

- Endotracheal intubation or supraglottic advanced airway
- Waveform capnography or capnometry to confirm and monitor ET tube placement
- Once advanced airway in place, give 1 breath every 6 seconds (10 breaths/min) with continuous chest compressions

Return of Spontaneous Circulation (ROSC)

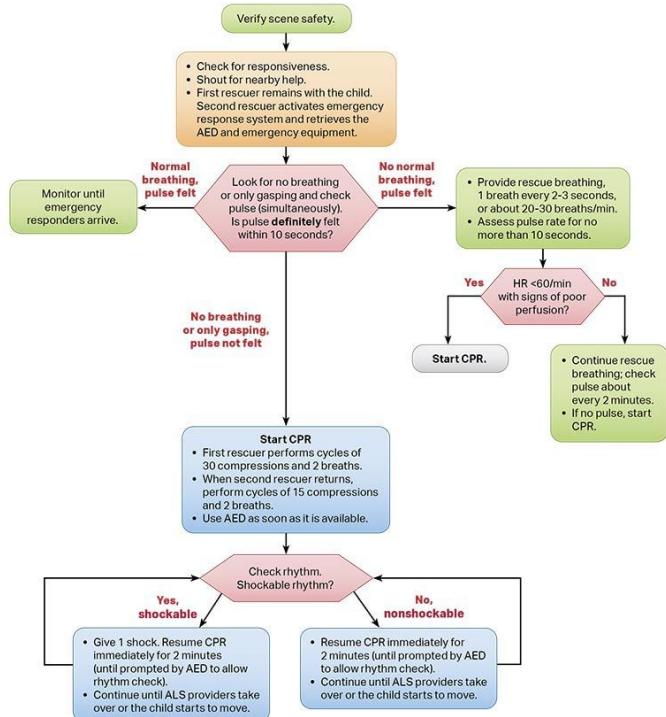
- Pulse and blood pressure
- Abrupt sustained increase in PETCO₂ (typically ≥40 mm Hg)
- Spontaneous arterial pressure waves with intra-arterial monitoring

Reversible Causes

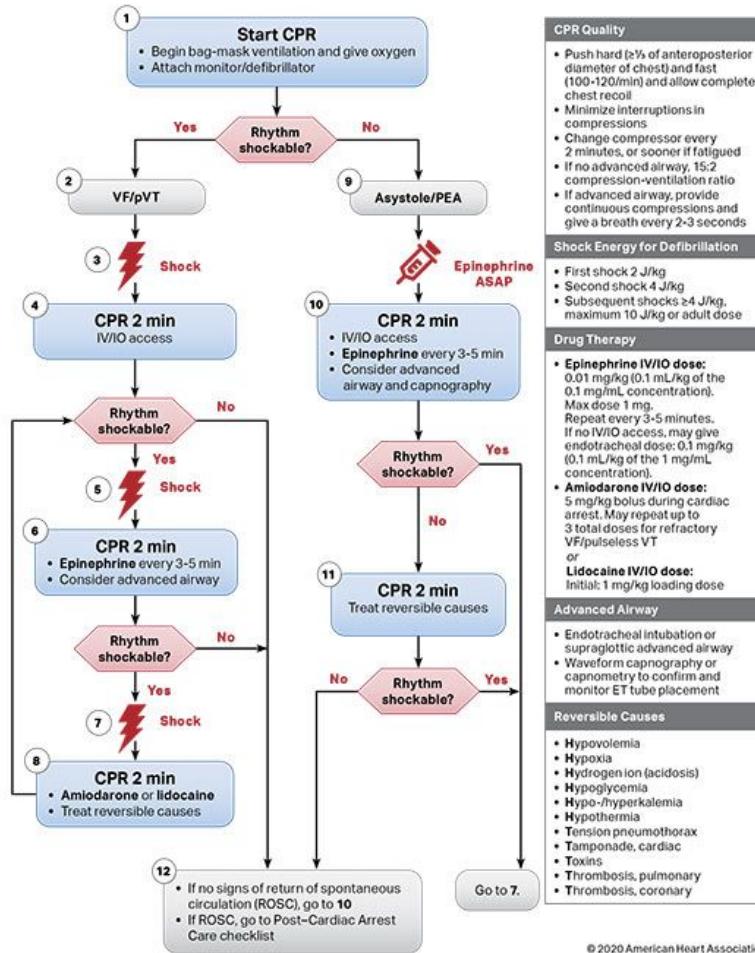
- | | |
|---|---|
| <ul style="list-style-type: none"> Hypovolemia Hypoxia Hydrogen ion (acidosis) Hypo-/hyperkalemia Hypothermia Tension pneumothorax Tamponade, cardiac Toxins Thrombosis, pulmonary Thrombosis, coronary | <ul style="list-style-type: none"> Tension pneumothorax Tamponade, cardiac Toxins Thrombosis, pulmonary Thrombosis, coronary |
|---|---|

Advanced Steps

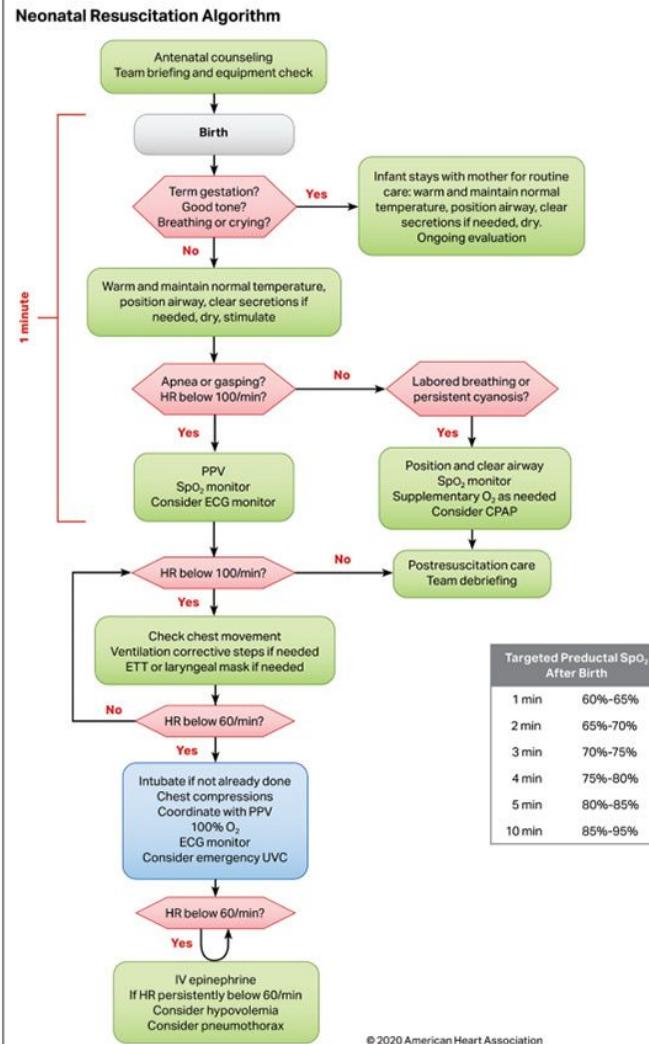
Pediatric Basic Life Support Algorithm for Healthcare Providers—2 or More Rescuers



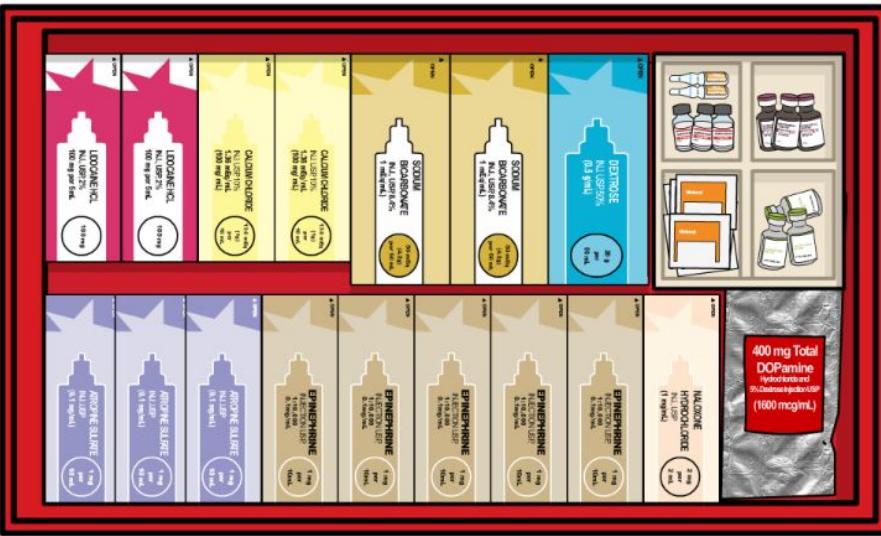
Pediatric Cardiac Arrest Algorithm



Advanced Steps



Commonly Used Medications in Code Blue



- Epinephrine *vfil*
 - 1 mg for adults
 - 0.1 mg/kg for children (max dose is 1mg)
 - 0.01 - 0.03 mg/kg for neonates (to prevent dosing errors, usually given via ETT (0.05-0.1 mg/kg))

- Atropine *brady*
 - 1 mg for adults (max is 3mg)
 - 0.02 mg/kg for children (max single dose is 0.5 mg)
 - 0.1 mg for neonates (not commonly used)

- Amiodarone *fachy*
 - 300 mg then 150 mg for adults
 - 5 mg/kg (x3 doses if refractory) for children
 - Not typically used in neonates



Commonly Used Medications in Code Blue

- Sodium bicarbonate
 - Typical dose is 50mEq dose (pre-filled syringe) for adults
 - 1 mEq/kg of 8.4% solution for children
 - 1 mEq/kg of 4.2% solution for neonates
- Naloxone
 - 0.04 mg - 2mg for adults
 - 0.1 mg/kg IV for children < 20kg
 - 2 mg/kg IV for children >5 years and >20 kg
- Adenosine SVT & PAT treatment can give 3 times max
 - 6 mg, then 12 mg x2 doses for adults
 - 0.1 mg/kg, then 0.2 mg/kg, then 0.3 mg/kg for children < 50kg
- Shock Energy for Defibrillation
 - 150 - 200 joules initially; can increase to max of 360J
 - 2J/kg then 4J/kg in children

check for
good IV access!!!

1/2 or 3 min
or continuous IV
infusion

correct
severe met. acid.
(cannot hypotension px)

push it as close to
the patient as you can.
~~don't~~ direct push
& fast hard

flush
afterwards



push to the heart
central line preferred

Post Code Blue Care

Patient & Family

- Depends on outcome
- Family liaison
- Family debrief
- Clarifying goals of therapy/plan of care
- Post mortem care
- Notifications
 - LifeBanc, family

Nurse/Healthcare Team

- Debrief
- Acknowledge patient if poor outcome
- Take a moment
- Feel your feelings
- Strategies for preventing compassion fatigue

Advice/Alleviating Worries

- Know your patient's code status
- Know the signs of a code blue
- Know the H's and T's
 - Hypovolemia
 - Hypoxia
 - Hydrogen Ion (Acidosis)
 - Hyper/Hypokalemia
 - Hypothermia
 - Toxins
 - Tamponade
 - Tension Pneumothorax
 - Thrombosis
- Know where the supplies are:
 - Suction
 - Oxygen/ambu bag
 - Code cart
 - CPR lever on bed
 - Code blue button
- Nursing care
 - Bolus
 - Blood bank runner
 - Get an EKG
 - Get labs
- Get out of the way
- Get experience

