Arrhythmia ToolBox Resources

Registered Nurse

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RN Initial Arrhythmia Curriculum

The online or blended curriculum is designed to provide easily accessible, just-in-time, standardized educational content to support electrocardiogram (ECG) interpretation for a diverse audience. ECG interpretation has become a valuable and necessary skill for a wide audience. The audience may consist of registered nurses working in telemetry units, emergency departments, critical care units, postanesthesia care units, and any monitored area who wish to master the skill of basic ECG recognition. Anyone working in an adult environment that provides cardiac monitoring technology to patients will benefit form this course.

The curriculum is composed of 5 courses. The first one is the **Arrhythmia Pretest and ToolBox Resources**. Next, you will take the three content courses: AACN – Basic ECG Interpretation, Arrhythmia Case Studies with Rhythm Assessment, and Cardiac Pharmacological Therapies and Management Assessment. The last and fifth course, Arrhythmia Post-Test and Course Evaluation, includes a post-test and an evaluation.

Content Course I: **AACN - Basic ECG Interpretation** by American Association of Critical-Care Nurses (ACCN) is designed to provide knowledge and enhance skills in adult ECG interpretation basics including rhythm categories of sinus, atrial, junctional, ventricular, and heart blocks, cardiac anatomy and physiology. A total of 6.5 contact hours for nurses will be provided through AACN, upon successful completion of two modules (ten lessons) that cover foundation and application. You will complete this section by successfully taking two assessments, one consisting of 50 multiple-choice questions on concepts, measurements, application and 29 questions on rate calculation and rhythm recognition. A score of 80% or better is required on each section and you will have the opportunity to retest. It is recommended you print a copy of the continuing education certificate for your records. You will need to **apply for contact hours** through the **AACN link** that will be accessible at the end of the topic and is required for completion.

Content Course II: **Arrhythmia Case Studies with Rhythm Assessment** by Clinical Learning, provides you with a variety of six-second rhythm strips, the majority of them recorded in Lead II. ECG rhythm strips are provided for you to practice and review, prompting you to identify a missing measurement, accompanied with the answers. A total of 4.5 contact hours for nurses will be provided through CE Broker, upon successful completion of the tutorial and one assessment, consisting of 20 multiple-choice questions. A score of 80% or better is required and you will have the opportunity to retest.

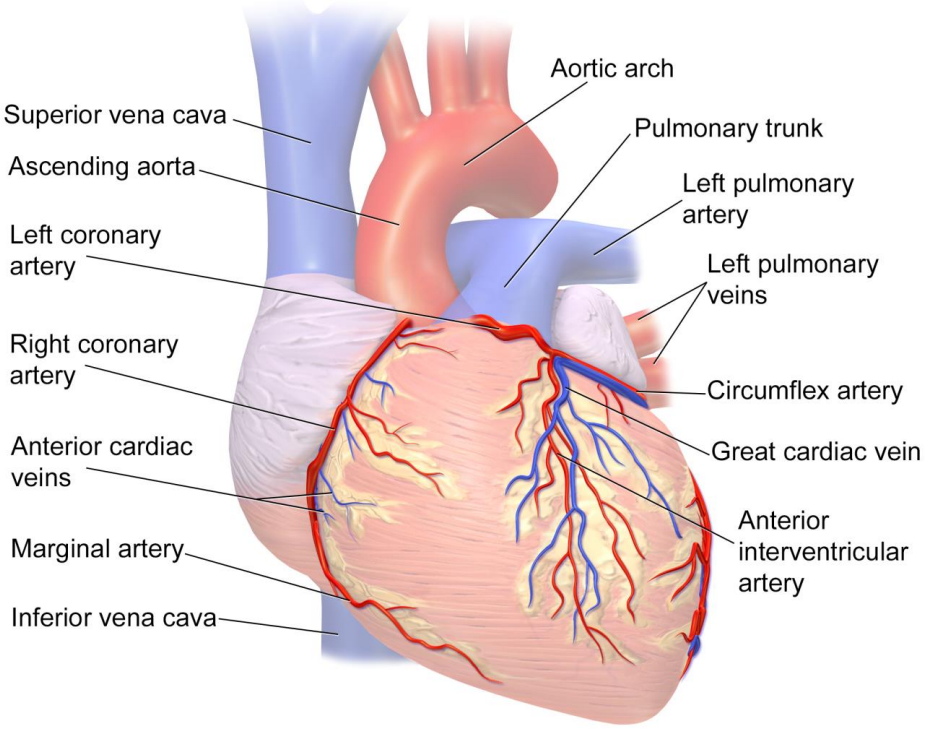
Content Course III: **Cardiac Pharmacological Therapies and Management Assessment** by Clinical Learning, is required only for the registered nurse and covers cardiac medications, but not all inclusive, that are currently used for dysrhythmia management. The author has made every attempt to check the content, especially drug dosages and management protocols, for accuracy. Guidelines change, new medications and technology are being developed and medical research is ongoing. A total of 2.5 contact hours for nurses will be provided by CE Broker, upon successful completion of the tutorial and one assessment, consisting of 25 multiple-choice questions. A score of 80% or better is required and you will have the opportunity to retest. The credits will be posted in BHU.

Proficiency Standards

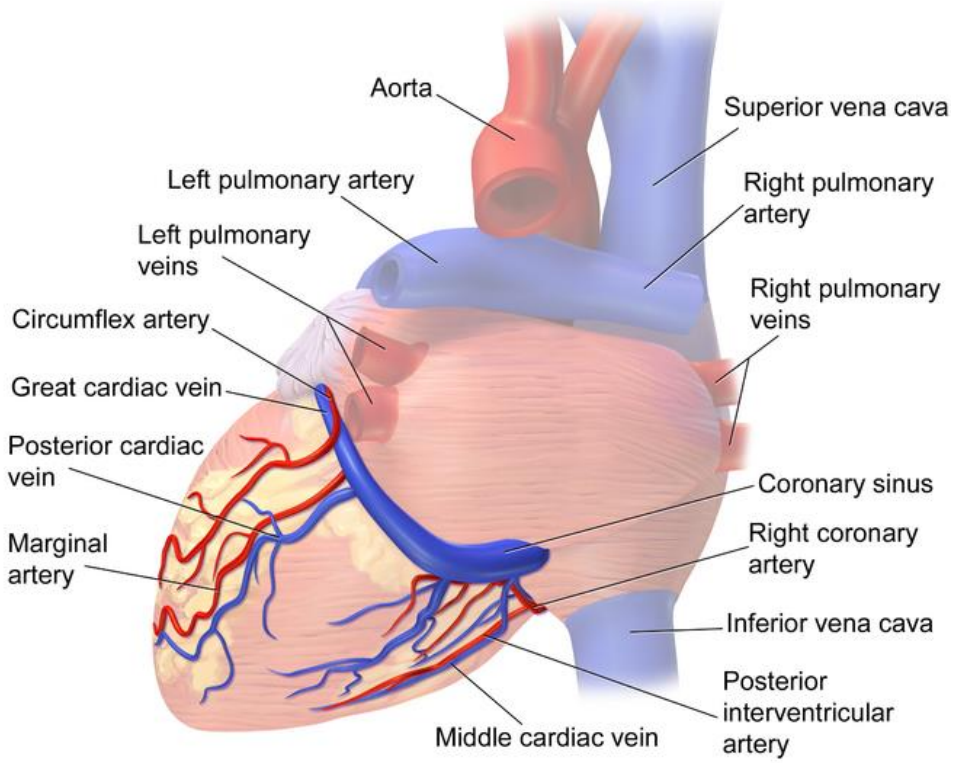
We have developed proficiency standards for all staff involved with ECG monitoring to ensure accurate and effective monitoring. **The program was designed to prepare registered nurses to meet required competencies that are assessed on an annual basis.**

As a professional you have the responsibility to keep informed of changes in emergency care procedures, and learn and follow local protocols as defined by hospital entity and BHSF.

The Heart

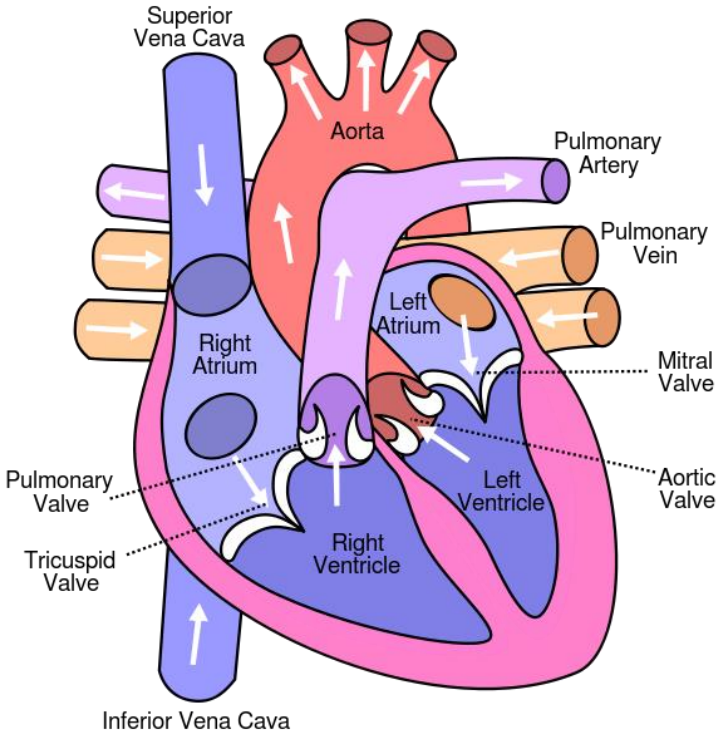


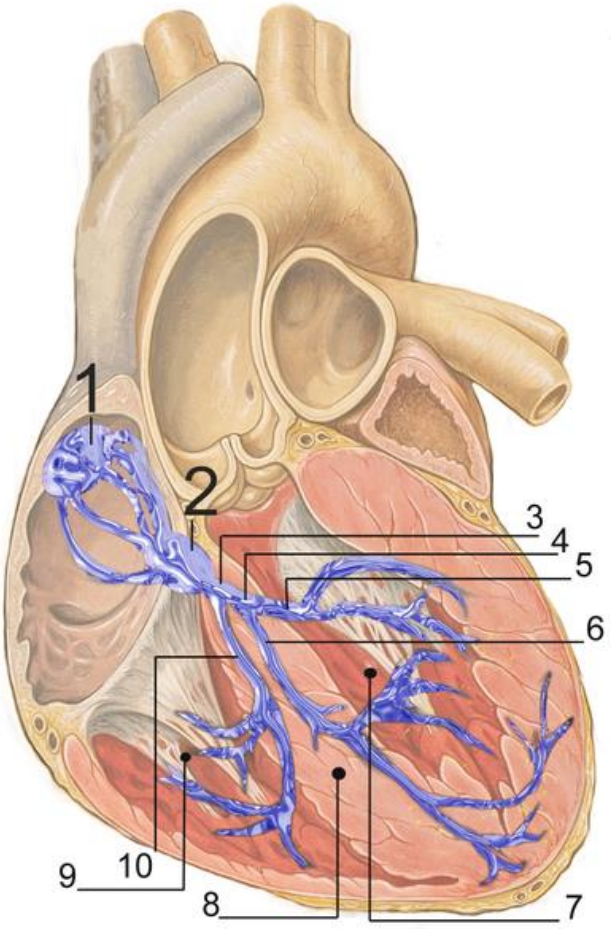
Coronary Circulation (Anterior)



Coronary Circulation (Posterior)

Chambers and Valves

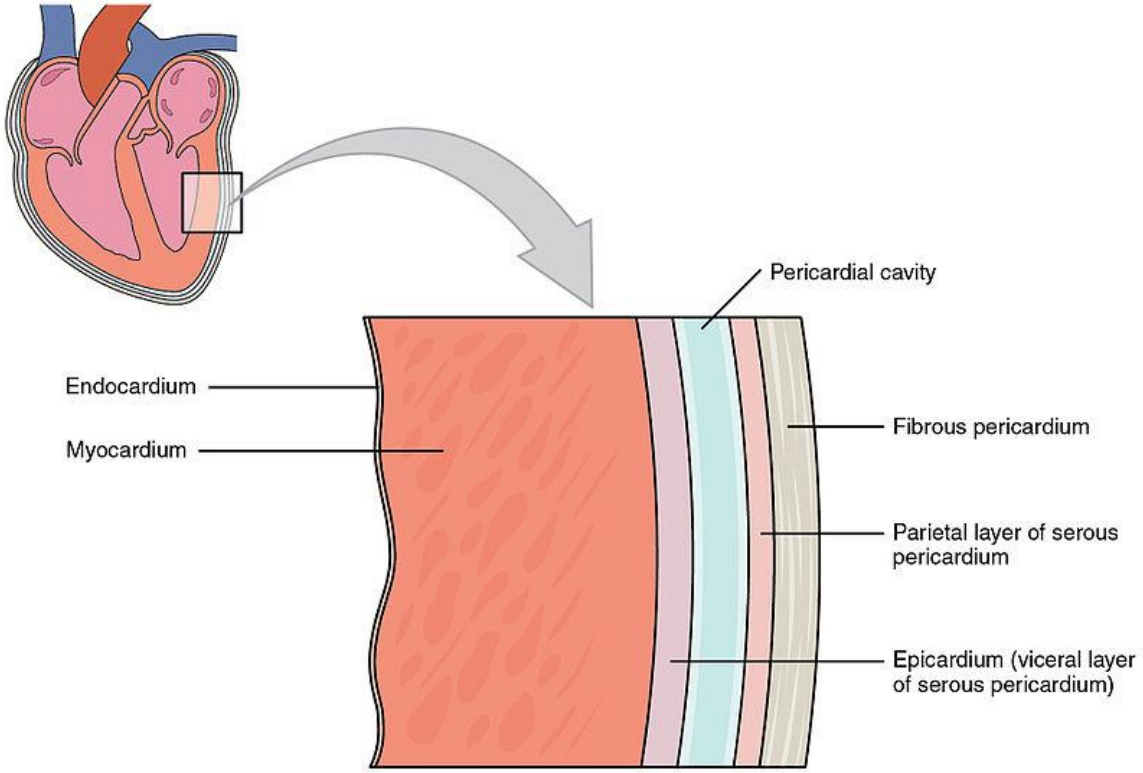


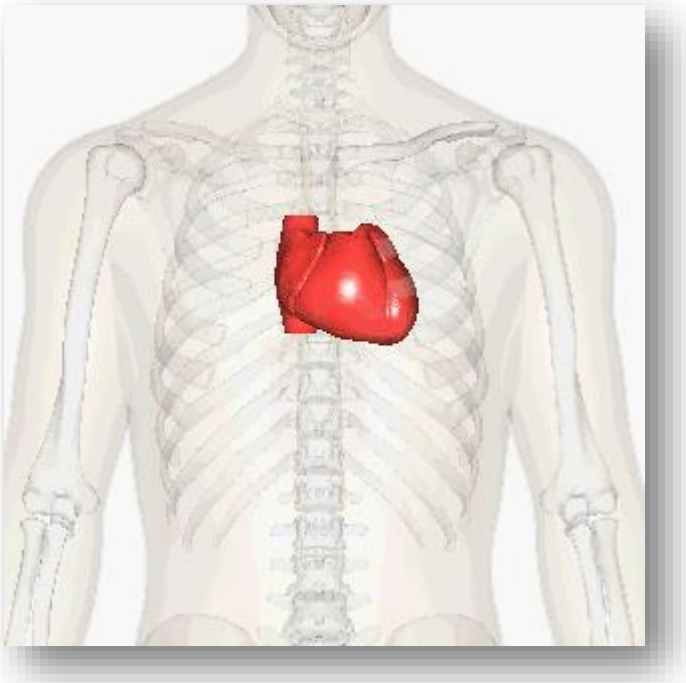


Electrical conduction system of the heart:

1. Sinoatrial node
2. Atrioventricular node
3. Bundle of His
4. Left bundle branch
5. Left posterior fascicle
6. Left-anterior fascicle
7. Left ventricle
8. Ventricular septum
9. Right ventricle
10. Right bundle branch

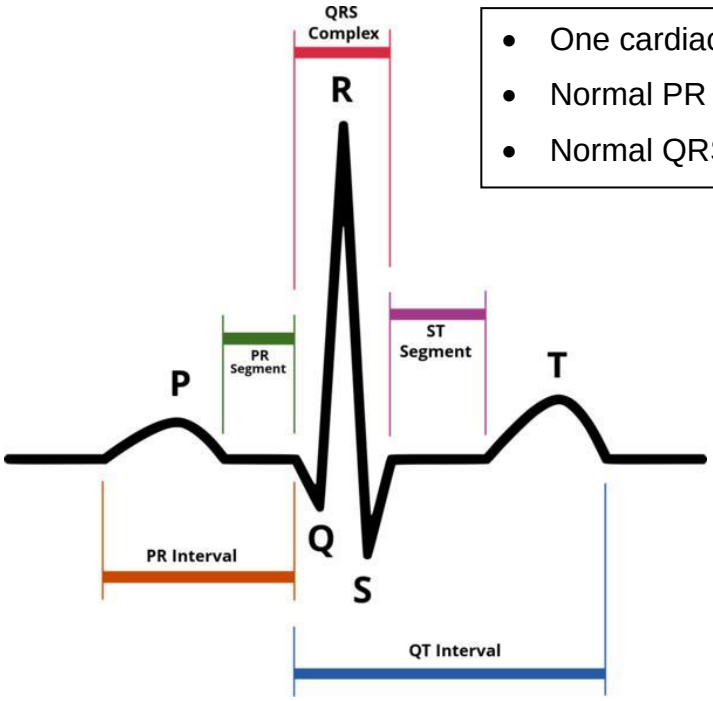
Layers of the Heart



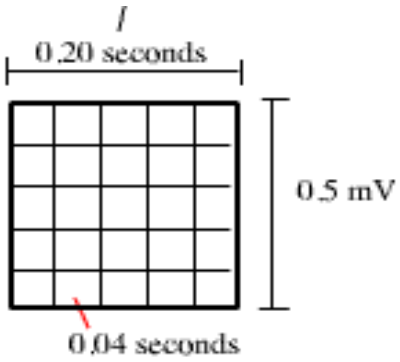


The Heart's Location

EKG Pearls



- One cardiac cycle consists of a P-QRS-T wave
- Normal PR interval is 0.12 to 0.20 seconds (3-5 tiny boxes)
- Normal QRS interval is <0.12 seconds (less than 3 tiny boxes)

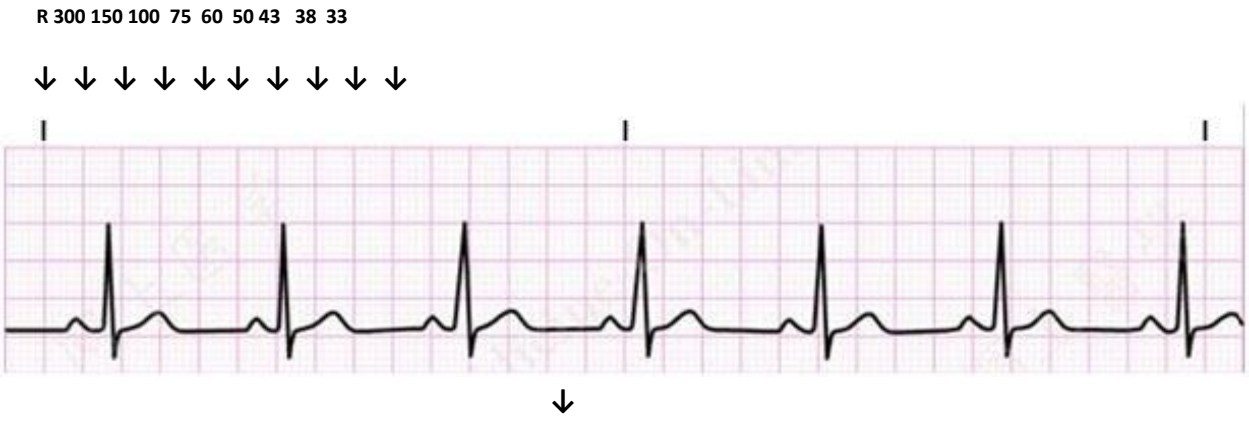


- Each small square (box), from left to right, represents **0.04 seconds in time**
- Each larger square (big box), from left to right, represents **0.20 seconds in time**
- Each small square (box), from top to bottom, represents **1mm (0.1mV) in voltage or amplitude**

Calculating Heart Rate

- Hash marks are typically vertical marks above the ECG-EKG paper
- From one vertical mark to next indicates 3 seconds (15 big boxes)
- Total of 30 big boxes = 6 seconds
- Six second rhythm strip is utilized to calculate the rhythm rate
- Various methods to calculate heart rate other than looking at a heart monitor: six-second, calculation by division, countdown (sequential) method

Start Here at the hash/slash mark



- In order to calculate a **regular** rhythm, the heart rate is 300 divided by the number of large squares between the QRS complexes or 1500 divided by the number of tiny squares (this is an example using the division method)

Example: If there are 4 large squares between regular QRS complexes, the heart rate is 75 (300/4=75).

Example: If there are 20 tiny squares between regular QRS complexes, the heart rate is 75 (1500/4=75).

- To estimate the heart rate for an **irregular rhythm**, count the number of R waves in a 6 second strip and multiply by 10. This method can also be used for a regular rhythm as well

Example: If there are 7 R waves in a 6 second strip, the ventricular heart rate is 70 (7x10=70).

Systematic Method in Interpreting Rhythm Strips

To analyze an electrocardiogram (ECG) tracing, approach it in a logical and systematic manner. The following is a basic **eight-step** method that can be used with any ECG tracing. The key to successfully analyzing ECGs is learning the characteristics or features of each normal and abnormal ECG, and then comparing what one sees on the ECG tracing to those characteristics. Some ECG rhythms may be profoundly slow or fast, in which case one should quickly assess the patient for adequate cardiac output. If cardiac output is compromised, immediate treatment is necessary. If an arrhythmia, dysrhythmia or abnormality is present, this finding should always be compared with a complete assessment of the patient. This will determine the significance of the abnormality and assist in any decision regarding a patient treatment.

1. **Determine the rhythm regularity**: Is it regular or irregular? Is there a pattern? An irregular rhythm is considered abnormal. The distance between the consecutive P waves should be the same, just as the distance between the consecutive QRS complexes should be the same throughout the tracing. We call these distances the P-P interval and the R-R interval. A set of calipers, a tool used to examine heart rate, rhythm, and intervals, is a good tool to utilize since your eyes can trick you.
2. **Determine the rate**: Place it into a group first. Is it normal, fast, or slow? We count the QRS complexes to determine the ventricular rate (VR) and the P waves to determine the atrial rate (AR). Normal rate in the adult is 60-100 beats per minute (bpm). Use the rule of 10 for both regular and irregular rhythms. Count the number of QRS complexes in 6 seconds (30 big boxes on standard graph paper) and multiply by 10 to obtain your ventricular rate. Count the number of P wave complexes in 6 seconds and multiply by 10 to obtain your atrial rate. The most accurate method is the calculation by division method. Use the calculation by division method for regular rhythms only. Ventricular rate (and atrial rate) equals 300 divided by the number of large boxes between one R wave and the next R wave, or one P wave and the next P wave. Each tiny box (5 tiny boxes make one big box) counts for 0.2 of a large box, so 4 large boxes and 1 small box, for example, would be 4.2 large boxes. In this example the rate would be 300 divided by 4.2 or 71 bpm. This method is used for calculation purposes only.
3. **Assess the P waves**: Is there a uniform P wave preceding each QRS complex? Do they appear normal? The P wave is the first waveform at the start of the cardiac cycle. It begins with its movement away from the baseline and ends on its return to the baseline. We look at the location and morphology (configuration and deflection). Is there a P wave preceding each QRS complex? Are there any P waves without a QRS complex? Abnormal P waves are those that look different, are inverted, absent, follow the QRS complex, or when P waves are not followed by a QRS complex. The normal P wave duration is typically 0.06 (60 msec) to 0.10 seconds (100 msec) in duration or width.
4. **Assess & measure the PR intervals**: Are the PR intervals identifiable? Within normal limits? Constant in duration? The PR interval is the distance from the beginning of the P wave to the beginning of the QRS complex (R wave if the Q wave is absent). The PR interval denotes depolarization of the heart from the SA node through the atria, AV node, and His-Purkinje system. A normal PR interval indicates the impulse originated from the SA node (or close to it) and traveled through the atria and AV node in a regular and unobstructed course. The normal PR interval duration is 0.12 to 0.20 seconds and tells us we have a normal conduction pathway.

5. **Assess & measure the QRS complexes**: Are the QRS complexes within normal limits & appear normal? Are they narrow or wide? A supraventricular rhythm is identified by a narrow QRS. The QRS is the waveform immediately following the P wave and the PR segment. The QRS starting point is where the first wave of the complex starts to move away (sharply or gradually) from the baseline. The QRS complex ends at the point where the last wave of the complex starts to flatten (sharply or gradually) at, above or below the baseline. The QRS is much bigger than the P wave because depolarization of the ventricles involves considerably larger muscle mass than depolarization of the atria. The QRS complex characteristically looks thinner than the other parts of the ECG because the ventricles depolarize so fast. Determining where the QRS complex ends can be difficult as you don't always see a clear transition with nice straight lines. In some ECG tracings you have to use your best educated guess and common sense to conclude what is the duration of the QRS complex. The normal QRS duration is typically less than 0.12 seconds (120 msec) in duration (width). You will find variability in the QRS normal parameters, depending on what resource you use.
6. **Assess the QT interval**: Is it in the normal range? In patients with a normal heart rate, the normal range for QT interval is 0.36-0.44 seconds (360-440 msec). Remember that the QT interval is from the beginning of the QRS complex to the end of the T wave. Excessive QT interval prolongation in the right setting can be proarrhythmic and degenerate into a potentially fatal ventricular tachyarrhythmia. Because the actually measured QT interval changes with the heart beat in the absence of any intervention, it is usual to correct the measured interval for changes (RR interval) to derive a rate-corrected (QTc) interval, which is then used when evaluating the effect of an intervention.
7. **Is there anything else unusual about the rhythm**? Visually scan the entire the 6-second rhythm strip.
8. **Name the rhythm or dysrhythmia** by identifying the underlying rhythm first. Here we put it all together to determine whether the rhythm is normal sinus rhythm or something else. Use a systematic approach when analyzing rhythms.

Adult Arrhythmia-Dysrhythmia Summary Tool

NAME	RHYTHM	RATE	QRS	P WAVES	PRI (INTERVAL)
SINUS RHYTHMS					
Normal/Regular Sinus Rhythm (NSR/RSR)	Regular (QRS/P)	60-100 bpm	Narrow < 0.12 sec same shape	Precedes every QRS	QRS for each P constant, 0.12-0.20 sec
Sinus Bradycardia (SB)	Regular (QRS/P)	< 60 bpm	Narrow < 0.12 sec same shape	Precedes every QRS	QRS for each P constant, 0.12-0.20 sec
Sinus Tachycardia (ST)	Regular (QRS/P)	> 100 bpm usually 100-150 Can be higher	Narrow < 0.12 sec same shape	Precedes every QRS	QRS for each P constant, 0.12-0.20 sec
Sinus with Wide QRS possibly (BBB) or Intraventricular Conduction Delay (ICD) =QRS >0.12 seconds in all leads	Regular (QRS/P)	Same as RSR/SB/ST	Wide > 0.12 sec in all leads same shape	Precedes every QRS	QRS for each P constant, 0.12-0.20 sec
Sinus with 1º AVB	Regular (QRS/P)	Variable	Narrow < 0.12 sec same shape	Precedes every QRS	QRS for each P constant, PR interval > 0.20 sec
Sinus Arrhythmia	Irregular (QRS/P) Gradual repeating pattern	Variable but same as NSR/RSR or < 60; gradual increase or decrease	Narrow < 0.12 sec same shape	Precedes every QRS	QRS for each P constant, 0.12-0.20 sec
SINUS BLOCKS					
Sinus Pause (Sinus Delay)	Irregular around pause < 2 cardiac cycles (2 R-R intervals)	Variable	Narrow < 0.12 sec same shape	None (SA node impulse fails to fire)	QRS for each P is constant, 0.12-0.20 sec
Sinus Exist Block (Sinus Delay)	Irregular around pause = 2 cardiac cycles	Variable	Narrow < 0.12 sec same shape	None (SA node impulse fires but not conducted)	QRS for each P is constant, 0.12-0.20 sec
Sinus Arrest (Sinus Delay)	Irregular around pause > 2 cardiac cycles	Variable (usually slow) pause longest of the three	Narrow < 0.12 sec same shape	None (SA node impulse fails to fire)	QRS for each P is constant, 0.12-0.20 sec
ATRIAL RHYTHMS					
Premature Atrial Complex (PAC) normally conducted	Irregular around the PAC	N/A single beats	Narrow < 0.12 sec same shape	Early, looks different from the other p waves	0.12-0.20 sec/may not be consistent
Premature Atrial Complex (PAC) non-conducted or blocked PAC	Irregular around the PAC	N/A single beats	Narrow < 0.12 sec same shape	Early, looks different from the other p waves	None (can't have PRI if no QRS)
Multifocal Atrial Rhythm (MAR): also called wandering atrial pacemaker	Irregular	Variable but < or = 100	Narrow < 0.12 sec same shape	P waves have 3 or > different shapes	0.12-0.20 sec/may not be consistent
Multifocal Atrial Tachycardia (MAT): also called wandering atrial pacemaker	Irregular	Variable but >100	Narrow < 0.12 sec same shape	P waves have 3 or > different shapes	0.12-0.20 sec/may not be consistent
Atrial Tachycardia (AT)	Regular (P/QRS)	typically 150-250	Narrow < 0.12 sec same shape	present and followed by QRS complex	0.12-0.20 sec/may not be consistent
Supraventricular Tachycardia (SVT)	Regular (QRS)	typically 150-250	Narrow < 0.12 sec same shape	p waves cannot be identified	Not identified
Atrial Flutter	Atrial rhythm regular; Ventricular rhythm regular (or) irregular; Depends on degree of block (on conduction rate of atrial impulses)	Atrial rate averages 250-350 and typically not counted due to high rate. Ventricular rate variable	Narrow < 0.12 sec same shape	None. Impulses take a circular course around atria. Same ectopic sites. Typically recognized by saw-toothed or jagged appearance	Not measurable since no p waves are present, only flutter waves
Atrial Fibrillation (A fib or atrial fib)	Atrial baseline is irregular & wavy, fibrillatory or not discernible. Vent rhythm irregularly irregular	Atrial rate over 350 bpm (350-500) and typically not counted since it is so rapid. Ventricular rate variable	Narrow < 0.12 sec same shape	None. Impulses take multiple chaotic random pathways. Isoelectric line appears wavy or can be flat if atrial impulses fast	Not measurable since no p waves are present, only fibrillatory waves

NAME	RHYTHM	RATE	QRS	P WAVES	PRI (INTERVAL)
JUNCTIONAL RHYTHMS					
Premature Junctional Complex (PJC/PNC) Premature Nodal Complex/Contraction	Irregular around the PJC	N/A single beats	Narrow < 0.12 sec same shape	Inverted in Lead II, located before, earlier than expected, but no clear p wave; can be interpreted as no p wave visible	absent or < 0.12 sec if p wave present
Junctional Rhythm or Junctional Escape Rhythm; an escape rhythm	Regular (QRS)	40-60 bpm	Narrow < 0.12 sec same shape	Inverted in Lead II, located before, after or within (buried) QRS	absent or < 0.12 sec if p wave present
Accelerated Junctional Rhythm	Regular (QRS)	60-100 bpm	Narrow < 0.12 sec same shape	Inverted in Lead II, located before, after or within (buried) QRS	absent or < 0.12 sec if p wave present
Junctional Tachycardia	Regular (QRS)	>100 bpm	Narrow < 0.12 sec same shape	Inverted in Lead II, located before, after or within (buried) QRS	absent or < 0.12 sec if p wave present
VENTRICULAR RHYTHMS					
Premature Ventricular Complex (PVC)	QRS (early); Irregular around the PVC	N/A single beats	Wide, usually > 0.12 sec. & early, wide, and bizarre	None	None
Ventricular Escape Beat	QRS (late), Irregular around the ventricular escape beat	N/A single beats	Wide, usually > 0.12 sec (or) shape changes	Typically none (or usually not visible but not associated with QRS)	None
Idioventricular (IVR); an escape rhythm	Regular (QRS)	20-40 bpm (QRS); 3 or more beats in a row	Wide , usually > 0.12 sec (or) shape changes	None	None
Accelerated Idioventricular Rhythm (AIVR); an escape rhythm	Regular (QRS)	41-100 bpm (QRS); 3 or more beats in a row	Wide, usually > 0.12 sec (or) shape changes	None	None
Ventricular Tachycardia (VT) monomorphic (regular) vs polymorphic (irregular)-type of polymorphic VT is Torsades de Pointes (TdP)	QRS rhythm regular or irregular; Can present pulseless or with pulse	>100 bpm	Wide, but usually > 0.12	None (if seen are not associated with QRS)	None
Ventricular Fibrillation (V Fib)	Irregular-pulseless	None	No identifiable form	None	None
Asystole (Ventricular Standstill; Ventricular Asystole; Flat line)	None-pulseless	None	None	Typically none but sometimes p waves seen	None
AV BLOCKS (Atrial Rate > Ventricular Rate for All AV Blocks >1º)					
1st degree AV Block (1ºAVB) typically a delay not a block-all impulses conducted	Regular PP, Regular RR (P/QRS)	Variable; Usually < 100 AR=VR	Narrow < 0.12 sec same shape	Present, look the same and 'all' followed by QRS complex	QRS for each P constant, PR > 0.20 seconds
2ºAVB Type I (Mobitz I or Wenckebach); group beating; usually transient -some impulses conducted-incomplete block	Regular PP, Irregular RR (P/QRS)	Variable AR >VR or VR < AR	Narrow < 0.12 sec same shape	Present, look the same 'not all' followed by QRS complex	Becomes progressively longer until the P wave is not conducted, is blocked so you have a QRS that drops out
2º AV Block Type II (Mobitz II); infranodal block (at bundle of His or bundle branches)-some impulses conducted-incomplete block	Regular PP, Irregular RR (P/QRS)	Variable AR >VR or VR < AR	Narrow < 0.12 sec same shape or wide (usually wide); same shape	Present, look the same 'not all' followed by QRS complex	no QRS for some P's. No change, constant, regular and set; no progressive prolongation before a QRS drops out
2 °AVB 2:1 or 3:1 conduction; can be a 2ºAVB Type I or Type II; need 2 consecutive beats to determine if block Type I or Type II so called untypeable-some impulses conducted: incomplete block	Regular PP Regular RR (P/QRS)	Variable AR >VR or VR< AR	Narrow < 0.12 or wide: same shape	Present, look the same 'not all' followed by QRS complex	No QRS for some P's. No change, constant, regular due to pattern
3º AV Block or complete AV Block; CHB-no impulses conducted; complete block	Regular PP Regular RR (P/QRS)	Variable but typically slow <60 ; AR >VR or VR < AR	Narrow < 0.12 sec same shape or wide (usually wide); same shape	Present but 'no' p waves followed by a QRS; no relationship to QRS; impulses completely blocked at AV node, Bundle of His, or bundle branches	No impulses are conducted from the atria to the ventricles. Relationship (distance) of P to QRS varies & inconsistent & no relationship; there are 2 independent pacemakers firing

Cardiac Medication Summary Review Tool

MEDICATION/INDICATION	ACTION	DOSAGE	SIDE EFFECTS
Adenosine (Adenocard) • Unclassified Antiarrhythmic • Supraventricular Tachyarrhythmias • Drug of choice and preferred drug for stable SVT/PSVT (narrow complex QRS) tachycardia due to reentry involving AV node or SA node • Consider for regular monomorphic wide complex tachycardia (thought to be or previously defined to be reentry SVT) • Record rhythm strip during administration	• Short-acting drug • Slows SA node, slows HR • Slows AV conduction • Interrupts AV node re-entry circuits	• Initially give 6 mg IVP rapidly over 1-3 seconds • Follow with rapid bolus .9% NS flush (20 ml recommended) • Injection technique very important • Draw up Adenosine dose and flush in two separate syringes • May repeat 12 mg in 1-2 min	• Transient, flushing, dyspnea, chest pain, tightness, hypotension, bradycardia, brief asystole; ventricular ectopy • No therapy unless sustained • Not effective in atrial fib/flutter • Not given as drip
Amiodarone (Cordarone) • Antiarrhythmic • Ventricular & supraventricular drug • Ventricular recurrent rhythms such as VF/VT (wide QRS) • Supraventricular Tachycardia (SVT), (narrow QRS) • Cardiac arrest unresponsive to CPR, defibrillation, & vasopressor • Lidocaine can be considered if Amiodarone not available	• Diffuse effect on the cardiac conduction structures • Prolongs refractory period of SA node, AV node, atria accessory bypass tract tissues, ventricular purkinje fibers & myocardium • Acts on repolarization & reentry circuits • Decreases ventricular rate (AV node)	• **Pulseless VT or VF (cardiac arrest)**: 300 mg IVP, undiluted in D5W or NS (may repeat 150 mg IVP in 3 to 5 min) • **Pulse Present**: 150 mg in 100 ml D5W over 10 min (600ml/hr) – may repeat • Maximum dose 2.2 Grams IV/24 hours • Infusion of 1mg/min, x6 hrs, then 0.5 mg/min	• Hypotension, bradycardia, AV block, may prolong QT interval • GI symptoms hypo/hyperthyroidism • Photosensitivity • Abnormal liver function tests (LFT's) • Maintain normal K & Mg levels • Can be given as drip
Atropine Sulfate • Unclassified Antiarrhythmic • Vagolytic or anticholinergic drug • First drug for symptomatic sinus bradycardia • May be beneficial in presence of AV nodal block • Will probably not be effective in infranodal blocks • Increase in the block may occur secondary to increases in atrial rate	• Blocks the effects of the PNS (parasympathetic nervous system) • Acts primarily on the SA node & AV node • Increases sinus rate & AV conduction, thus ↑ ventricular rate (VR) • Produces a positive effect on HR & conduction	• 0.5 mg IV (0.04 mg/kg) q 3-5 min. as needed • Maximum dose of 3 mg • Avoid in 2º AVB Type II or 3º AVB (complete heart block, CHB) with wide QRS	• Caution in myocardial ischemia & hypoxia • Can increase myocardial O2 consumption • Significant tachycardia • Urinary retention • Dryness of mouth • Do not give to pts with glaucoma • Not given as drip

Cardiac Medication Summary Review Tool

MEDICATION/INDICATION	ACTION	DOSAGE	SIDE EFFECTS
Beta Blockers • Antiarrhythmics • Second line-agents (with Calcium Channel Blockers) after Adenosine for stable SVTs • Supraventricular tachycardias (SVT, PSVT, atrial fib, atrial flutter) • Used to control ventricular response in atrial fib & flutter • Some used in the chronic management of both ventricular & supraventricular arrhythmias • Administer to all patients with suspected MI and unstable angina in absence of contraindications • Effective antianginal agents & can reduce incidence – VFib Examples: • Cardiac specific: Metoprolol (Lopressor) & Atenolol (Tenormin) • Noncardiac specific: • Propranolol (Inderal), Sotalol (Betapace), Esmolol (Brevibloc) • Alpha-beta receptor blocker: • Labetalol (Normodyne)	• Block the beta 1 receptors of the sympathetic nervous system (SNS) • All beta blockers reduce SA node automaticity (↓ HR) and ↓ conduction through AV node • Impair calcium release, which reduces the strength of the contraction; ↓ workload of heart • Slows VR, ↓ HR, BP • Converts to NSR • Reduces myocardial ischemia and damage in AMI patients • Can reduce incidence of Ventricular fibrillation (VFib)-antianginal agents – Acute Coronary Syndrome patients	• Refer to drug resources since there are many beta blockers: many end in "olol" • Divided into 3 categories: cardiac specific, non cardiac specific and combination alpha-beta receptor blockers	• Hypotension, bradycardia, fatigue, heart failure • Use with caution in CHF patients • Initially beneficial but can deteriorate as direct effect on contractility • Selective B1 blockers have less bronchospastic side effects • Avoid in COPD or asthma • Drip available for some
Diltiazem (Cardizem) • Antiarrhythmic • Calcium Channel Blocker • Supraventricular Drug • Atrial fibrillation • Cardioactive agent • May terminate reentrant arrhythmias such as paroxysmal supraventricular tachycardia (PSVT/SVT)	• ↓ heart rate and conduction in the SA and AV nodes • ↓ contractility to lesser extent • Decreases ventricular rate in atrial fibrillation/flutter • Conversion or prevention of supraventricular arrhythmia • Control of rapid VR in Afib/flutter • Rapid conversion of SVT to NSR	• Initial average dose of 15 mg (0.25 mg/kg) IVP over 2 min. May repeat with 0.35 mg/kg (20-25 mg) over 2 min. after 15 minutes. • As infusion mix 125 mg/100 ml D5W or NS for total of 125 mg/125ml at 5-15 mg/hr	• Hypotension, bradycardia, AV block • Contraindicated for wide QRS tachycardias • Never give together with beta blockers or pts with known sick sinus disease • Titrate to HR; notify MD for HR<60 bpm • Can be given as drip

Cardiac Medication Summary Review Tool

MEDICATION/INDICATION	ACTION	DOSAGE	SIDE EFFECTS
Dopamine (Intropin) • Inotrope & vasopressor • Adrenergic/Sympathetic Stimulator • Catecholamine • Second-line drug for symptomatic bradycardia • Brady with hypotension • Given as an infusion drip only	• Increases contractility (moderate dosage) • ↑ HR, automaticity, conduction (higher dosage) • May cause tachycardia • Vasoconstriction	• Continuous IV infusion only (400mg/250 ml) • Correct hypovolemia with volume 1-2 L • Usual infusion rate is 2-20 mcg/kg/min • Titrate to pt response • Administer in central line	• Monitor for tachycardia • Ventricular rhythms • Headache • Hypertension
Epinephrine (Adrenalin) • Catecholamine • EPI as IVP bolus (every pulseless individual) will receive this drug: Asystole/VF/pVT/PEA • Can be considered after Atropine as alternative infusion to Dopamine • Sympathetic bradycardia (poor perfusion) when second-line drugs indicated, but in drip format only	• Sympathetic Stimulator • Constricts systemic blood vessels (alpha): ↑ BP ↑coronary/cerebral blood flow • Stimulates heart/lung • Increases heart rate & contraction	• Give 1 mg IVP (10 ml of 1:10:000 solution) every 3-5 min. for pulseless rhythms-no max dose • Consider infusion (1:1:000 solution) for symptomatic bradycardia with poor perfusion while awaiting pacer or if pacer ineffective (2-10 mcg/min) • Drug can be given IVP or in drip format, but for different indications	• Monitor for tachycardia • Ventricular rhythms • Significant tachycardia
Lidocaine (Xylocaine) • Antiarrhythmic • Ventricular drug only • Alternative to Amiodarone in cardiac arrest from VF/pVT • Consider for stable VT (preserved ventricular function) • May be considered if Amiodarone is not available	• Relatively weak sodium channel blocker • Decreases electrical instability in ventricles • Rapid onset of action • Relative lack of toxic effects on the heart	• Consider in Cardiac Arrest for Vfib/pVT: 1 to 1.5 mg/kg IV push, can repeat half dose for refractory VF 0.5-0.75 IV mg every 5-10 min. up to 3 doses or total 3 mg/kg (maximum dose) • Infusion: mix 2 Grams/500 ml D5W or NS at 2 mg/min or 30ml/hr • Range 1 to 4 mg/min (1mg -15ml/hr)	• Hypotension • Monitor BP, sensorium, cardiac • Neuro to include tremors, hot & cold flashes, blurred vision, confusion, dizziness, seizures • Stop infusion if signs of toxicity develop & call MD • Can be given as drip

Cardiac Medication Summary Review Tool

MEDICATION/INDICATION	ACTION	DOSAGE	SIDE EFFECTS
Magnesium Sulfate • Antiarrhythmic • Ventricular arrhythmias-drug of choice for TdP (Torsades de –Pointes), a type of polymorphic VT caused by a prolonged QT interval • Hypomagnesemia • Life-threatening ventricular arrhythmias due to digoxin toxicity	• Effect on Na channels • Reversal of Torsades de Pointes-may stabilize repolarization by restoring intracellular K+ • Also effective in acute MI: decreases arrhythmias, inhibits coronary spasm, & ↓ BP	• Cardiac Arrest: (due to (hypomagnesemia or TdP):1 to 2 grams IV (2- 4 ml of 50% solution diluted in 10ml D5W over 5-20 minutes) • Pulse present(TdP): 1- 2 grams IV in 50 to 100 ml of D5W over 5 to 60 min IV (diluted) • Load with 1-2 grams over 5-60 minutes, then infusion : 0.5 to 1 gram/hr Titrate to control TdP	• Monitor for bradycardia, hypotension, respiratory depression • Anticipate flushing sensation • Monitor deep tendon reflexes during infusion • Can be given as drip
Procainamide (Pronestyl) • Antiarrhythmic • Supraventricular & Ventricular drug: • May use for reentry SVT uncontrolled by adenosine & vagal maneuvers if BP stable • Stable wide-complex tachycardia of unknown origin • Atrial fibrillation with rapid rate in WPW syndrome	• Sodium and potassium channel blocker	• Recurrent VF/pVT • Dosage of 20-50 mg/min IV push • Give 20 mg/minute IV fusion (max dose 17mg/kg) • In urgent situations, up to 50 mg per minute may be administered (total dose 17 mg/kg) • Maintenance infusion: 1-4 mg/min	• Give 20mg/minute IV infusion until one of following occurs: • Arrhythmia suppression • Hypotension • QRS widens by >50% • Avoid in pts with QT prolongation & CHF • May induce hypotension in pts with impaired LV function • Can be given as drip
Vasopressin (Pitressin) • Sympathetic Stimulator • Vasopressor • Peripheral vasoconstrictor • Can be considered for every pulseless individual (EPI) • Asystole/VF/VT/PEA	**REMOVED from Guidelines** • Constricts systemic blood vessels • ↑ BP • ↑ cerebral blood flow	**REMOVED from Guidelines** • Removed from 2015 AHA/ACLS cardiac arrest guidelines • Dose was 40 units IVP x1 • Was used for all pulseless rhythms in previous guidelines • Was alternative to 1st or 2nd dose of Epinephrine for refractory VF/pVT	**REMOVED from Guidelines** • Monitor for tachycardia &ventricular rhythms • Significant tachycardia • Not to be repeated • Not given as drip in cardiac arrest
Verapamil (Calan) • Antiarrhythmic • Calcium-channel blocker • Supraventricular drug • Alternative drug (after adenosine) to terminate PSVT- adequate BP & preserved left ventricular function	• ↓ HR and conduction in the SA and AV nodes • ↓ contractility to lesser extent • ↓ ventricular rate in atrial fibrillation/flutter • Conversion or prevention of supraventricular arrhythmias	• Give 2.5 to 5 mg IV over 2 min to 3 min (elderly) • Then 5 to 10 mg every 15 to 30 minutes up to a total of 20 mg • Alternative dose is 5 mg IV bolus every 15 minutes to total dose of 30 mg	• See Cardizem-same precautions- since this is another Ca-channel blocker • Greater ↓ in BP with Verapamil • Contraindicated in wide QRS tachycardias • Not given as drip