Cardiac Arrhythmias in the ER setting

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Introduction

Cardiac arrhythmias are deviations from the normal electrical activity of the heart, leading to irregular heart rhythms. They can arise from abnormalities in impulse generation or conduction within the heart's electrical system. Arrhythmias are categorized based on their origin (atrial, ventricular, or supraventricular), rate (tachyarrhythmias for fast rate, bradyarrhythmias for slow rate), rhythms (regular and irregular). Diagnosing arrhythmias involves electrocardiography (ECG). Management strategies include medications, cardioversion or defibrillation.

Understanding the pathophysiology and classification of arrhythmias is fundamental for clinicians to provide effective patient care.

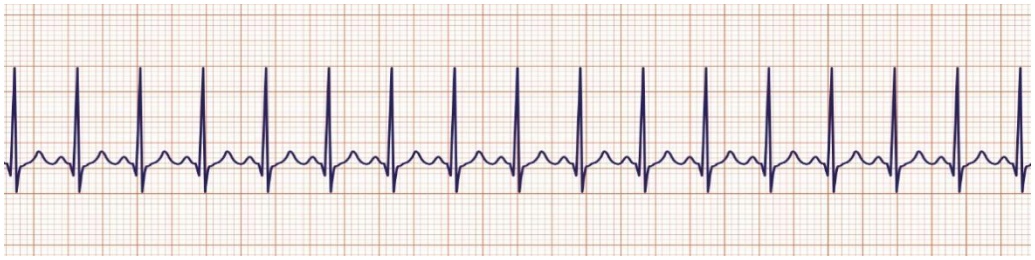
Rate and Rhythm Background

The Rate - 300/big boxes between RR or 1500/small boxes between RR.

Rate - Brady/Normal/Tachy

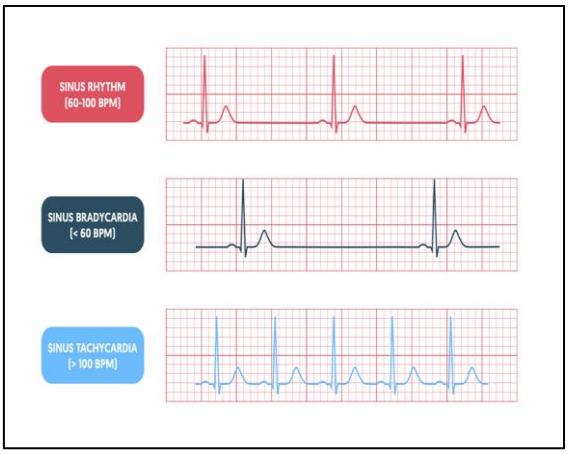
Rhythm - Regular vs Irregular (RR Interval regularity)

Rate and Rhythm

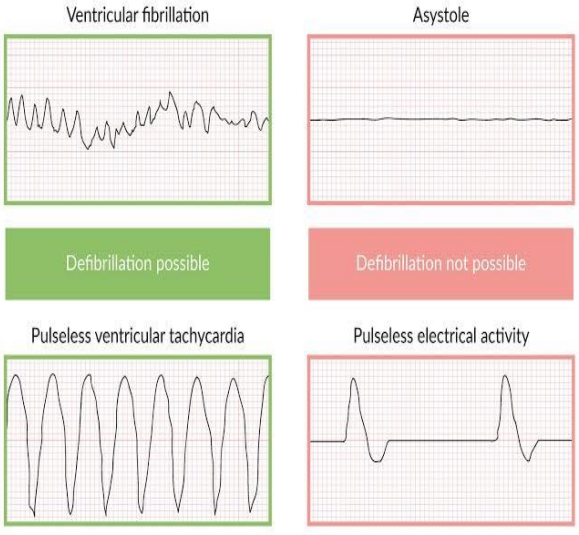


Cardiac arrest rhythms

- Asystole
- Pulseless Electrical Activity(PEA)
- Ventricular Fibrillation
- Pulseless Ventricular Tachycardia.



Shockable vs Non Shockable



5H	5T
Hypoxia	Toxins
Hypovolemia	Tamponade (cardiac)
Hydrogen ion (acidosis)	Tension pneumothorax
Hypo-/hyperkalemia	Thrombosis, pulmonary
Hypothermia	Thrombosis, coronary

Cardiac Arrhythmias in the ER setting

Brady Arrhythmias

- Sinus bradycardia
- 1st degree heart block
- 2nd degree heart block- Type 1 and 2
- 3rd degree heart block or complete heart block.

Tachy Arrhythmias

- SVT
- Atrial fibrillation
- Atrial flutter
- VT with pulse.

Reversible Causes

Stable vs Unstable

"CHASS"

C Chest pain

H Hypotension

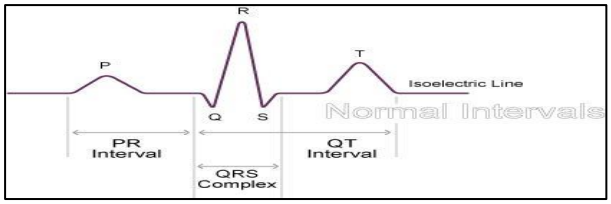
A Altered mental status

S Syncope

S Signs of failure

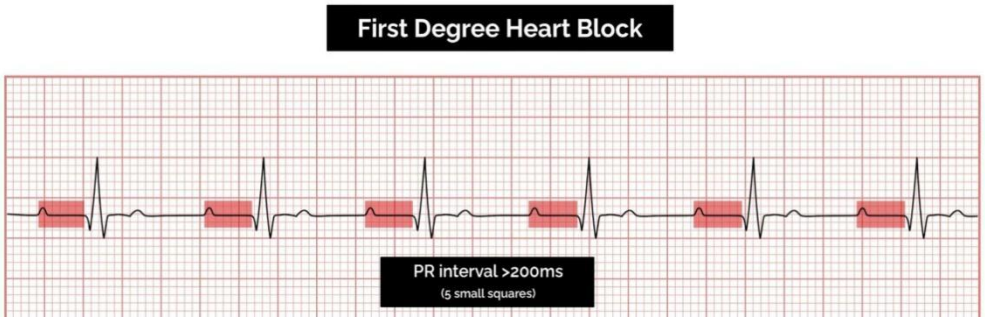
Brady-arrhythmias diagnosis

- PR interval
- Missing QRS

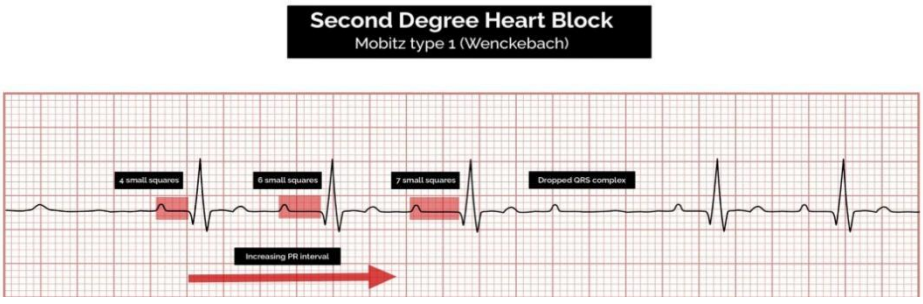


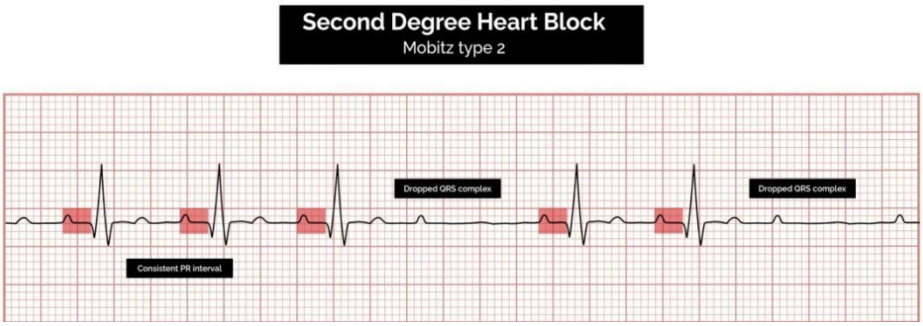
Brady-Arrhythmias (1st degree)

Normal Sinus Rhythm

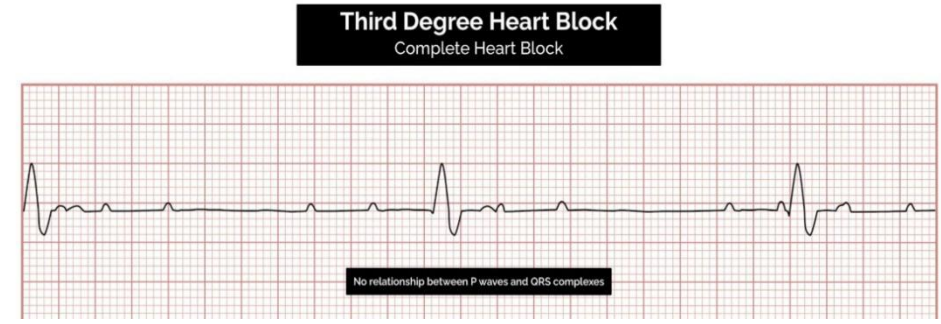


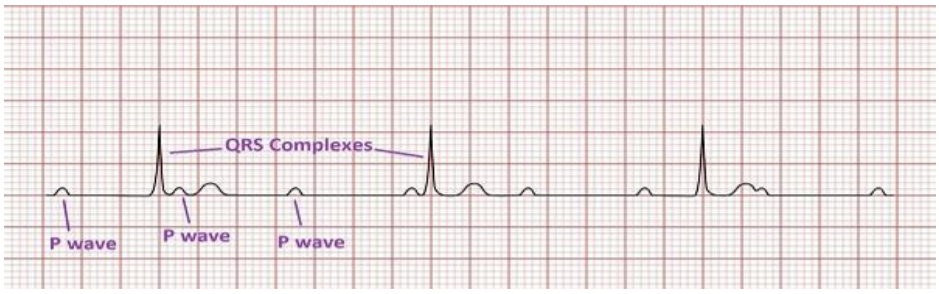
Brady-Arrhythmias (2nd degree)





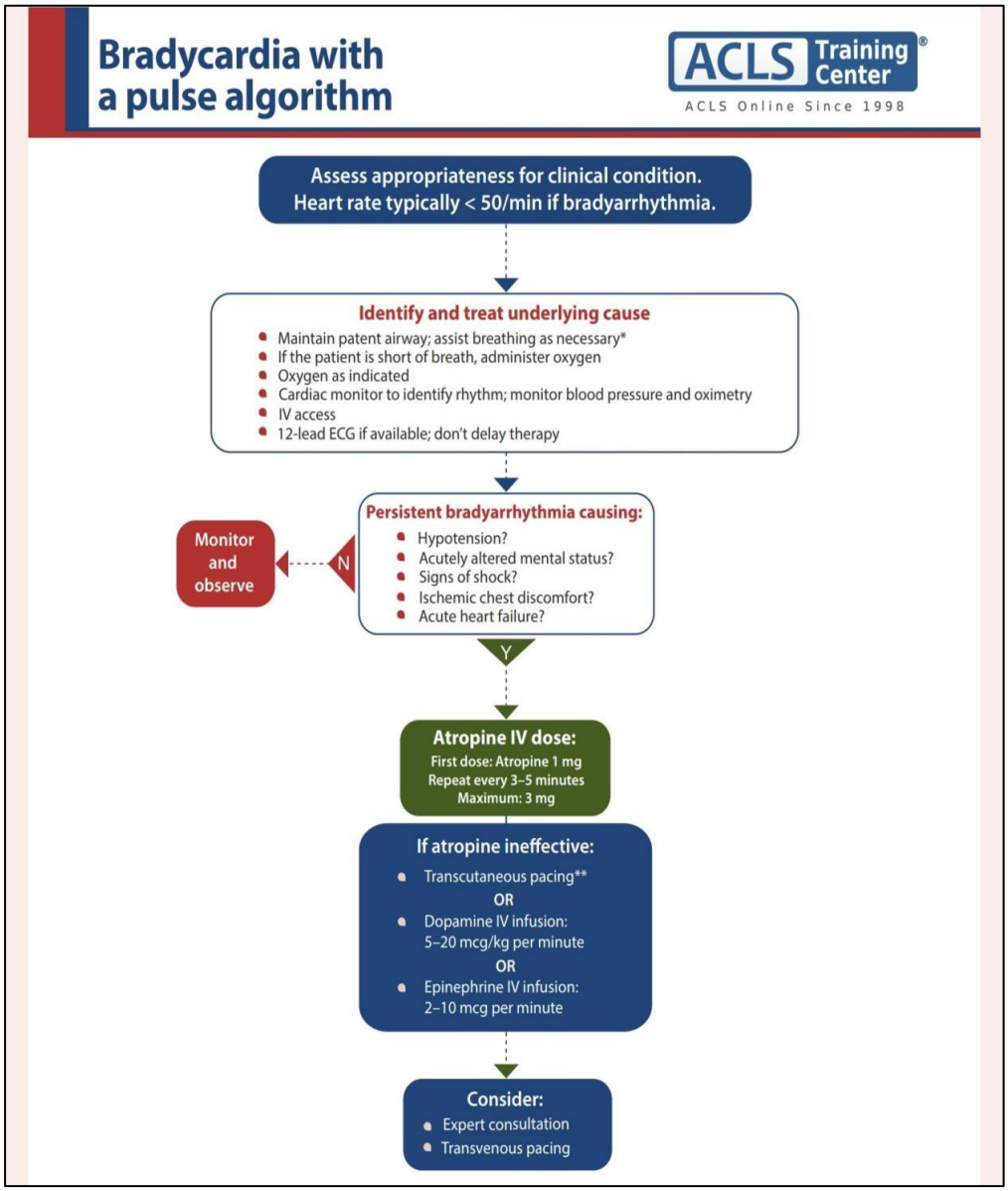
Brady-Arrhythmias (3rd degree)





Summary

- Prolonged PR- 1st degree
- Progressively Prolonged PR + missing QRS - 2nddegree type 1(wenckebach)
- Fixed PR + missing QRS - 2nddegree type 2
- AV dissociation - 3rd degree

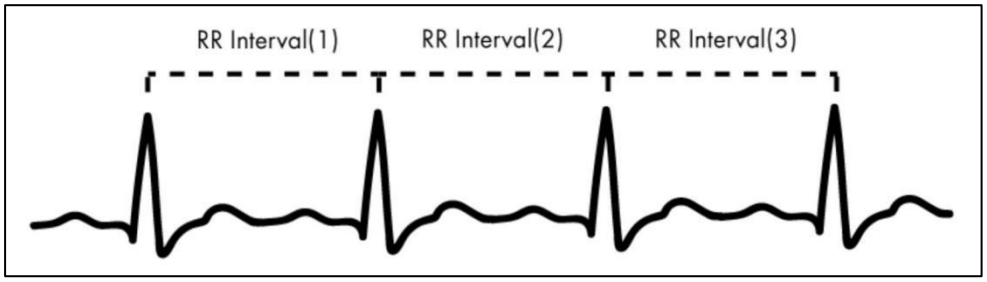


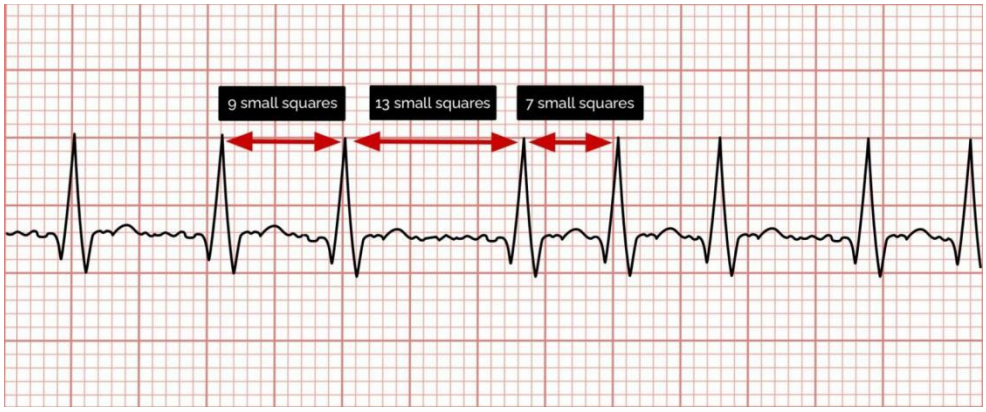
Take home message-Brady arrhythmias

- Do not "waste time" on PR interval.
- Give importance to missing QRS.
- Identify AV dissociation
- CHASS positive - Inj.Atropine
- CHASS negative - 5H 5T correction

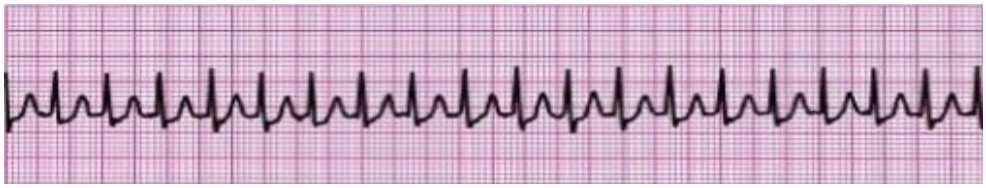
Tachy-arrhythmias diagnosis

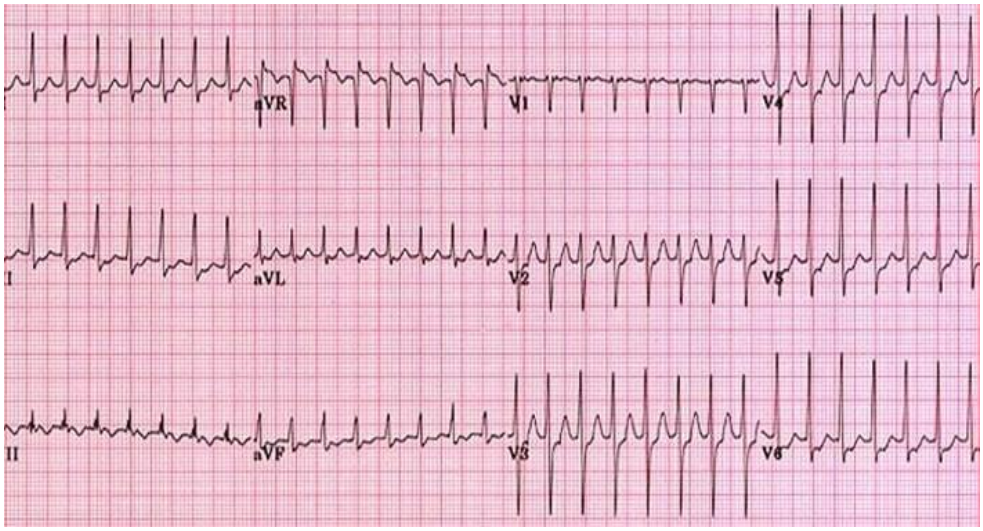
RR interval - Regular vs irregular





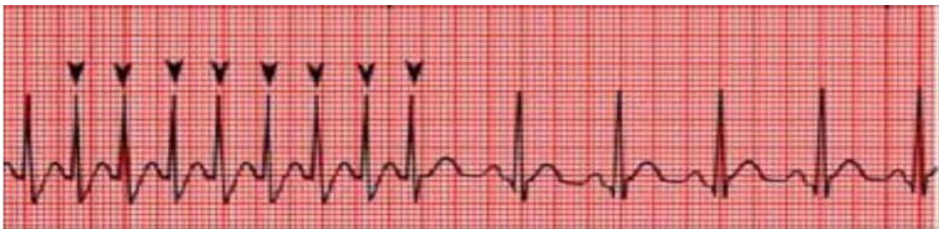
Tachy – arrhythmias (SVT)



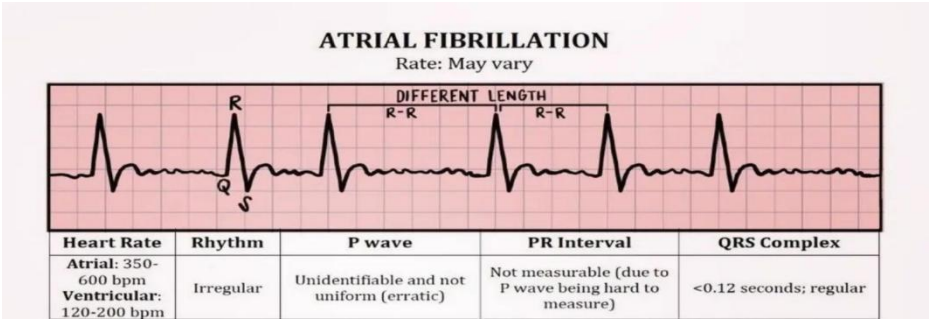


SVT Treatment

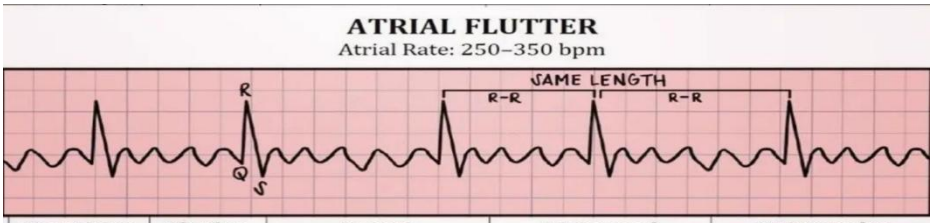
- Stable SVT - Inj. Adenosine 6mg, followed by 12mg.
- Unstable SVT - Cardioversion
- Prophylaxis - Inj Heparin



Tachy-arrhythmias

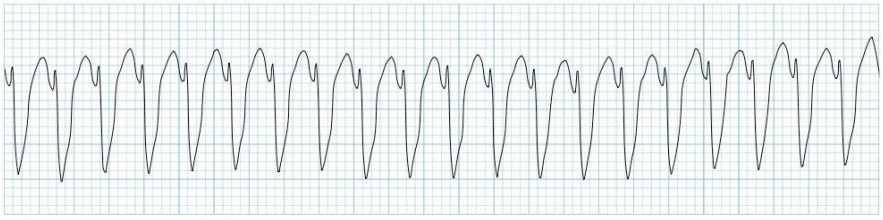


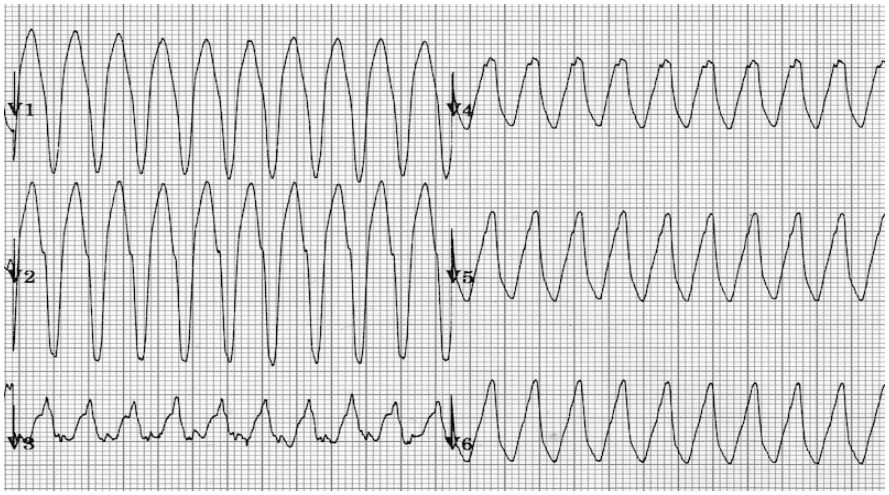
Heart Rate	Rhythm	P wave	PR Interval	QRS Complex
Atrial: 350-600 bpm **Ventricular**: 120-200 bpm	Irregular	Unidentifiable and not uniform (erratic)	Not measurable (due to P wave being hard to measure)	<0.12 seconds; regular



Heart Rate	Rhythm	P wave	PR Interval	QRS Complex
Atrial: 250-350 bpm **Ventricular**: often slower	Irregularly Regular	SAW TOOTH APPEARANCE; flutter (F waves) waves buries in QRS	Not measurable (due to P wave being hard to measure)	<0.12 seconds; regular

Monomorphic VT with Pulse

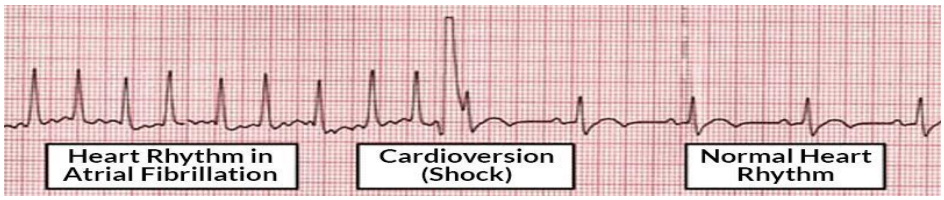


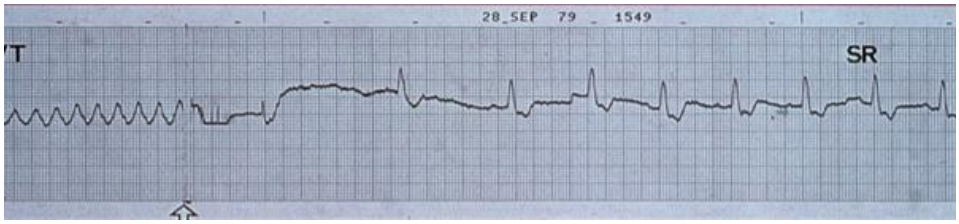


Atrial flutter, Fibrillation and VT with pulse - Treatment

Stable - Inj Amiodarone 300mg stat f/b 900 mg over 24 hr.

Unstable - Cardioversion



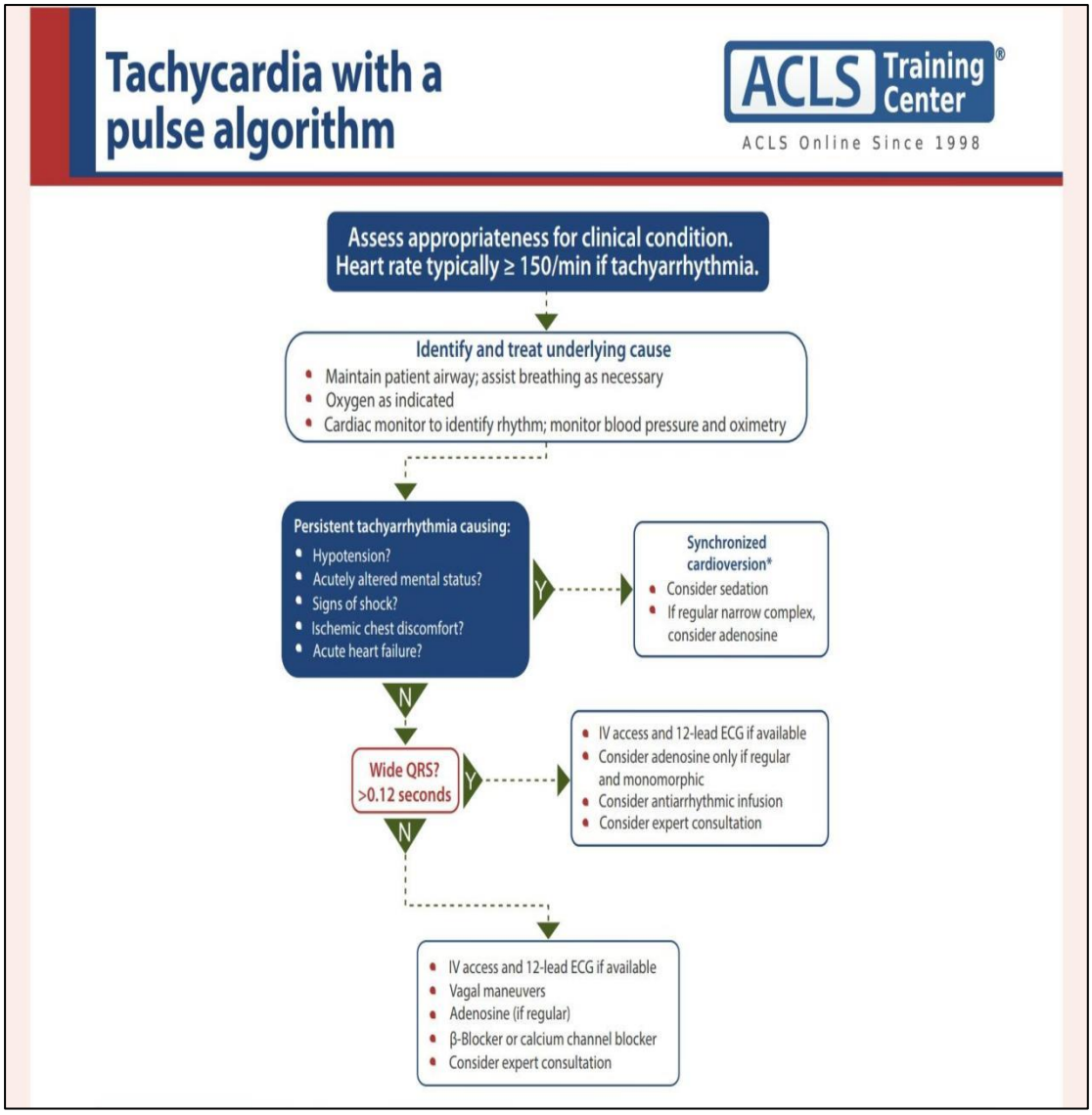


Points to note

Cardioversion - Change of rhythms

Symptoms >72 hr – TEE before anti arrhythmic

Re assess Stable vs Unstable.

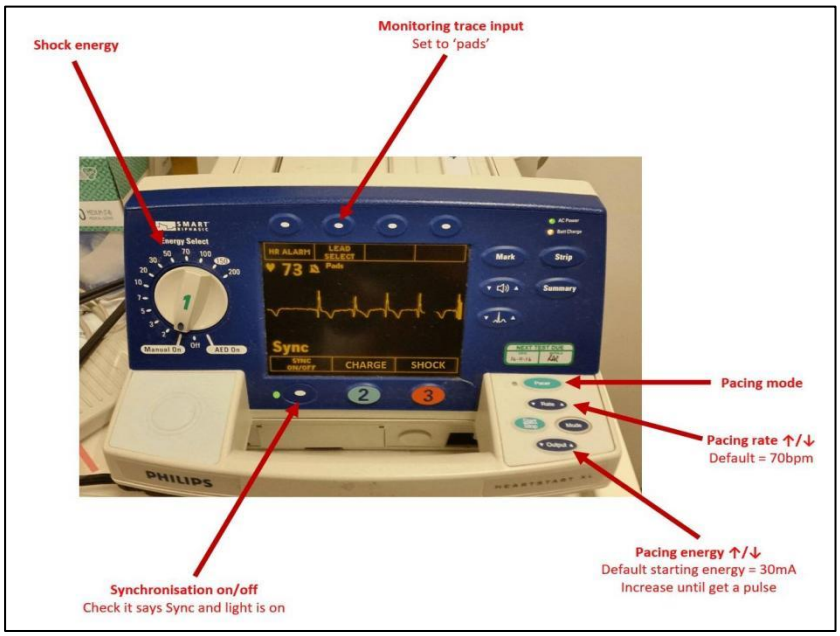


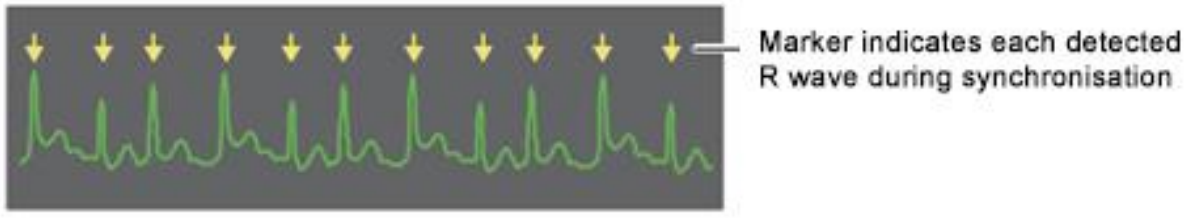
Take home message - Tachy arrhythmias

- Recognise RR- regular (SVT) vs irregular (A. fib, A. flut)
- “Don’t waste time” to differentiate between atrial fibrillation vs atrial flutter
- Check Stable vs Unstable
- Before shocking VT - Check, pulse.

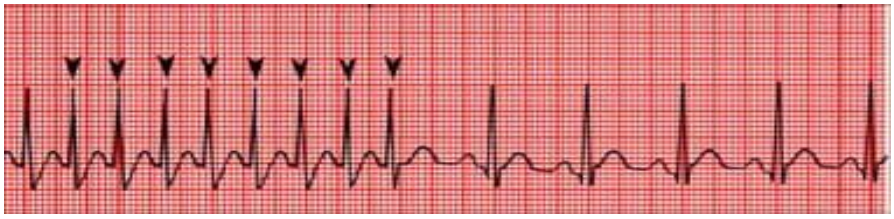
Defibrillation vs synchronize Cardioversion

Defibrillation	Cardioversion
Not synchronised	Synchronised on the R wave
For cardiac arrest	For periarrest tachyarrhythmias (unstable)
Higher energy joules	Lower energy joules
No escalating energy for next shock	Escalate for next shock (100 - 200 - 300 - 360J)





Sync cardioversion vs Defibrillation



Conclusion

Managing tachyarrhythmias and bradyarrhythmias involves a multidisciplinary approach aimed at controlling symptoms, reducing the risk of complications, and improving overall quality of life for patients. Treatment strategies may include medications, cardioversion or implantation of pacemakers, defibrillators.

For tachyarrhythmias, antiarrhythmic drugs are commonly used to control heart rate and rhythm in stable cases but cardioversion is preferred for unstable ones. Catheter ablation can target specific areas of abnormal electrical activity to restore normal heart rhythm as an elective and definitive therapy.

Bradyarrhythmias are often managed with atropine in unstable cases and pacemakers which deliver electrical impulses to the heart to regulate its rate and ensure adequate heart rate.

Lifestyle modifications such as maintaining a healthy weight, regular exercise, avoiding triggers like excessive alcohol or caffeine, and managing stress can also help in the management of both tachyarrhythmias and bradyarrhythmias. Close monitoring and regular follow-up with healthcare providers are essential to assess treatment effectiveness, adjust medications or device settings as needed, and address any new

developments or concerns. **Overall, individualized care tailored to each patient's specific condition and needs is key to effectively managing tachyarrhythmias and bradyarrhythmias on the long run.**