

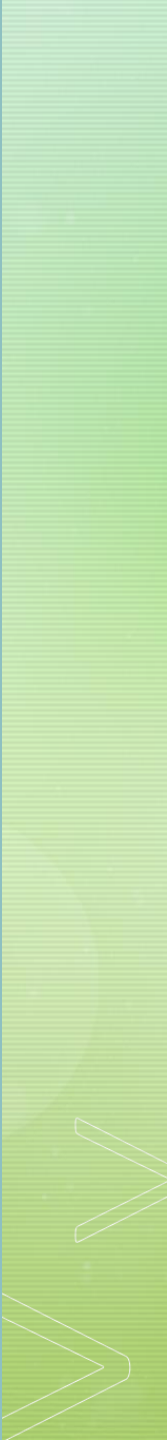
# CARDIOPULMONARY RESUSCITATION (CPR)



by: Dr. Gideon  
(St Crost)



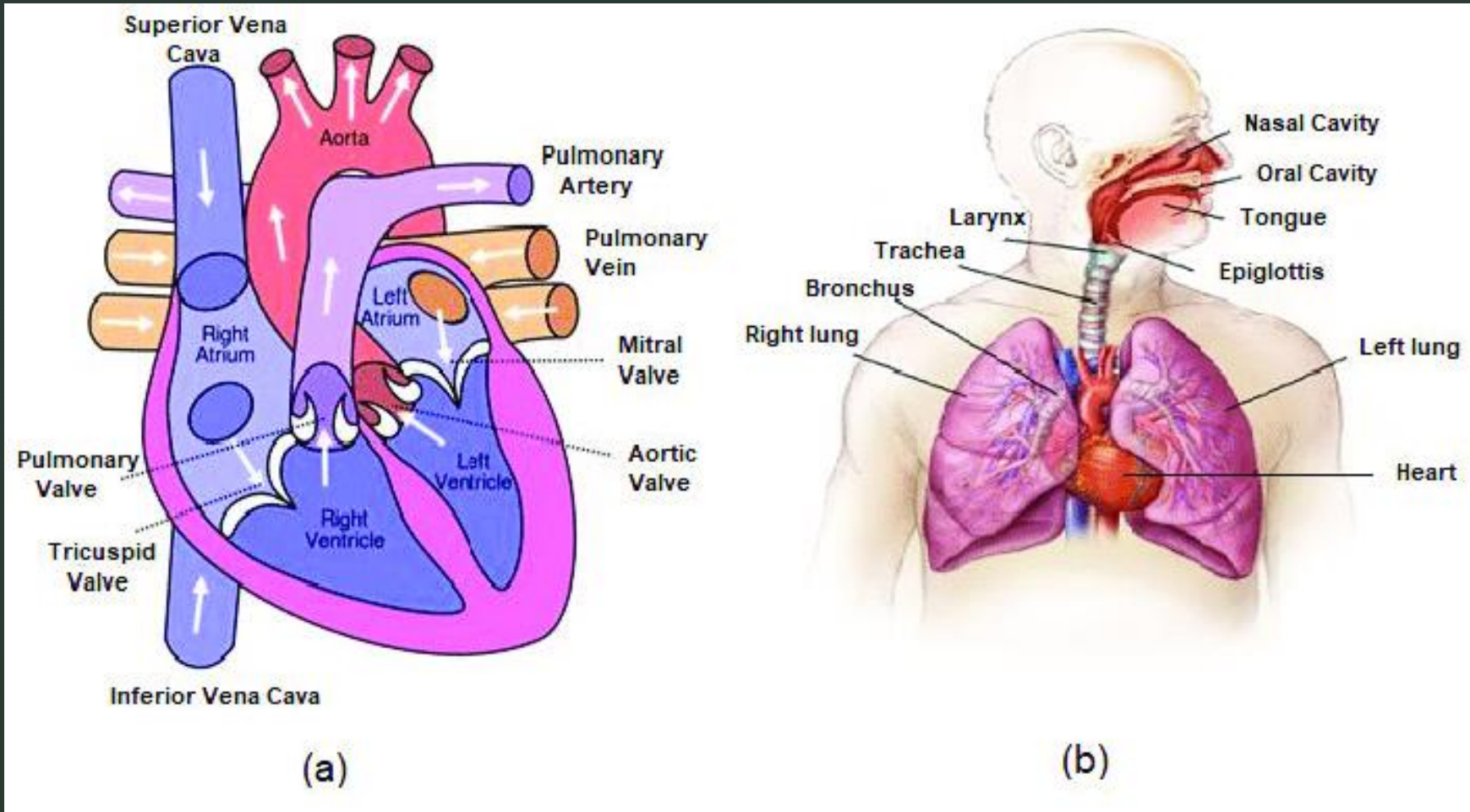
# Outline

- Introduction
  - History: Evolution to modern approach
  - The Chain of survival
  - Technique
  - Reversible causes
  - What next
  - Q and A
- 

# Learning Objectives

- Understand CardioPulmonary Resuscitation
- Adapt the historical shift to Compression-Airway-Breatihng C-A-B
- Master the metrics of High-Quality CPR
- Adapt the technique based on age group of patient
- Integrate CPR into the chain of survival
- Appreciate the critical role of Post-Arrest-Care

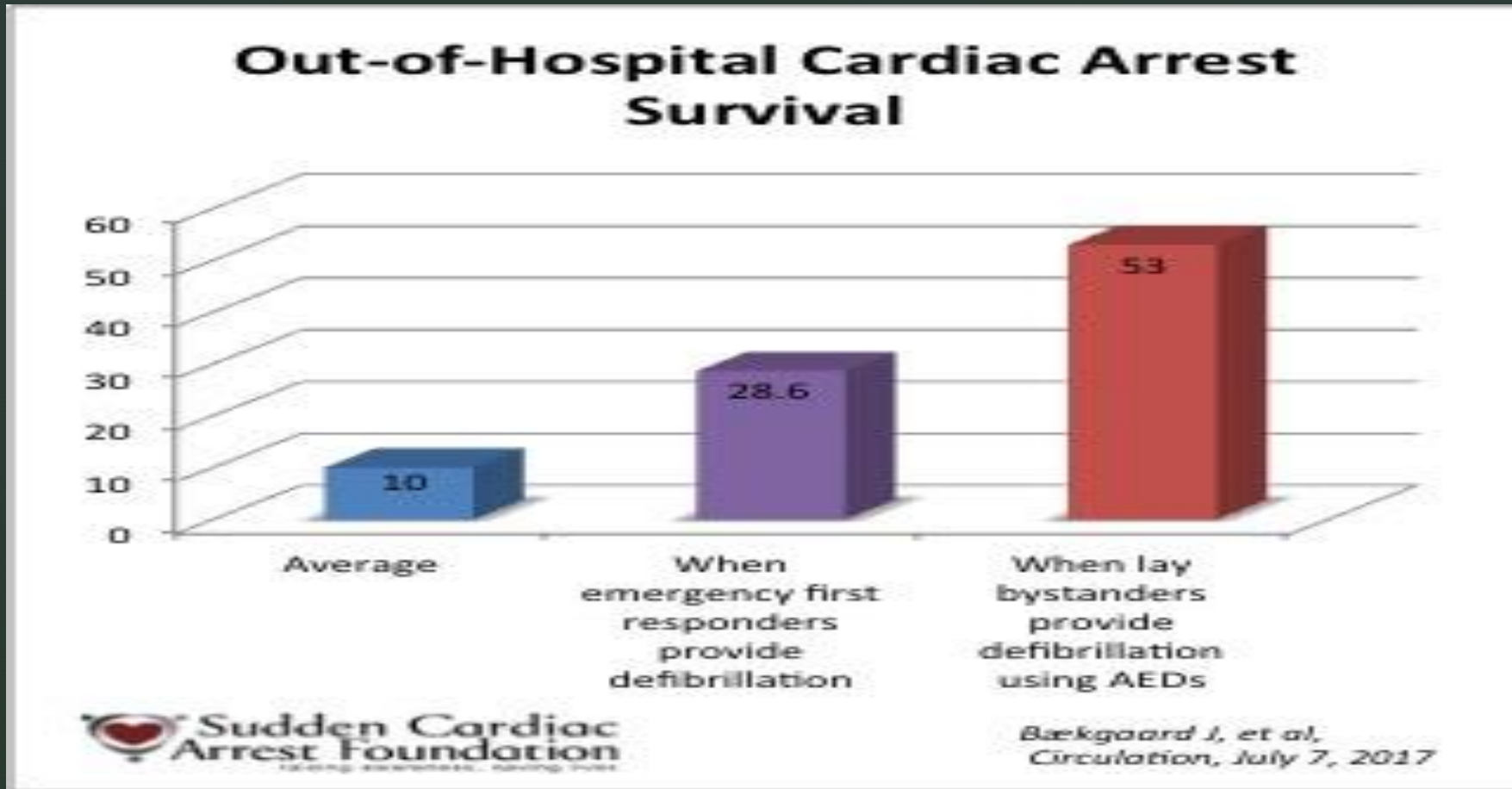
# INTRODUCTION



# INTRODUCTION

- The cardiovascular (heart) and pulmonary (lungs) systems work in tandem to sustain life. Their function is reflected in our vital signs:
  - Heart — Blood Pressure (BP), Pulse
  - Lungs — Respiratory Rate (RR), Oxygen Saturation (SpO<sub>2</sub>)
- These indicators guide emergency interventions like CPR, which supports both circulation and oxygenation when the body's natural systems fail.
- CPR is a life saving procedure performed when the heart stops beating (cardiac arrest) or when breathing has ceased with the aim of maintaining circulation of oxygen-rich blood to the brain and vital organs of the body until advanced help arrives or the heart can be restarted.

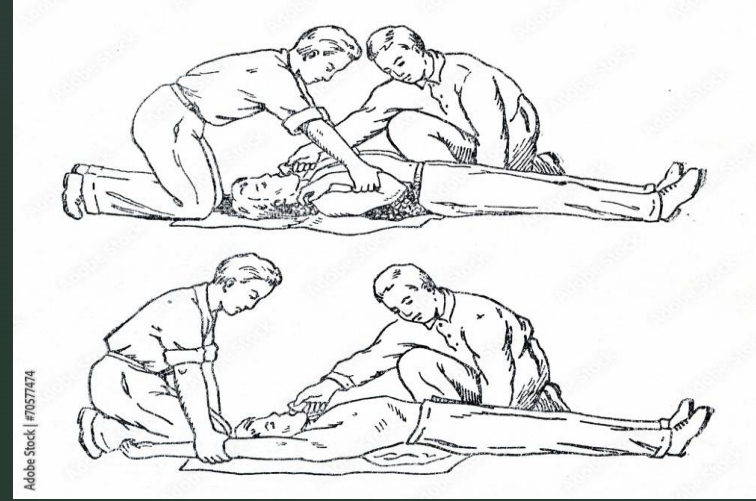
# Problems: A Race Against Time



Every second counts. Your actions in the first few minutes are the single greatest determinant of survival."

# History

- Pre 20th century: Bellows :Barotrauma
- Mouth to Mouth
- Silvester Method
- CPR (AHA, 1966)
- We've come a long way from guesswork to evidence-based medicine. The key lesson was realizing circulation was the immediate priority."




# Why C-A-B? (not A-B-C) ...the Science of Priming the Pump

- 2010, AHA guideline shifted from A-B-C to C-A-B based on data
- Key Question: Why compressions first?
  - Oxygen is already in the blood. The limiting factor is FLOW. Use the "Bridge to Survival" diagram here.
- Prime the pump to get whatever oxygen left circulate

# The Chain of Survival



- Recognition/Activation -> Early CPR -> Rapid Defibrillation -> ACLS, Post-Arrest Care -> Recovery).
- CPR is a vital link, but it's part of a system. You are the first and most important part of that system."



# Recognition: cardiac arrest?

- The Triad:
  - Unresponsive?
  - No Normal Breathing?
  - No Pulse (<10s)?

# Goals

- YOU ARE NOT TRYING TO RESTART THE HEART (Defibrillation) but...
- immediate:
  - Artificial heart and lungs
  - Bridge to definitive treatment
    - Defibrillation, ACLS drugs, securing advanced airway.
- Ultimate:
  - Survival with good neurological outcome



- NB: landmark, body positioning, technique
  - hands, elbow, shoulders

# High-Quality CPR: 5 pillars

- Rate: 100-120/min
- Depth: 5-6 cm (not too deep, not too shallow)
- Recoil: Full
- Ratio: 30:2
- Minimize Interruptions! (CCF >80%).

"These are not suggestions; they are evidence-based targets.  
Quality trumps speed."

## CPR for different age groups

Age group	Head tilt	Type of breath	Hand positioning for compression
Baby	No head tilt	A small puff	2 fingers only to a depth of 2 cm
Child (1–8 years)	Half head tilt	Half a breath from the lungs	2 hands (1 used only for support) to a depth of 3 cm
Adult	Full head tilt	Full breath from the lungs	2 hands to a depth of one third of the chest

# Technique: compression



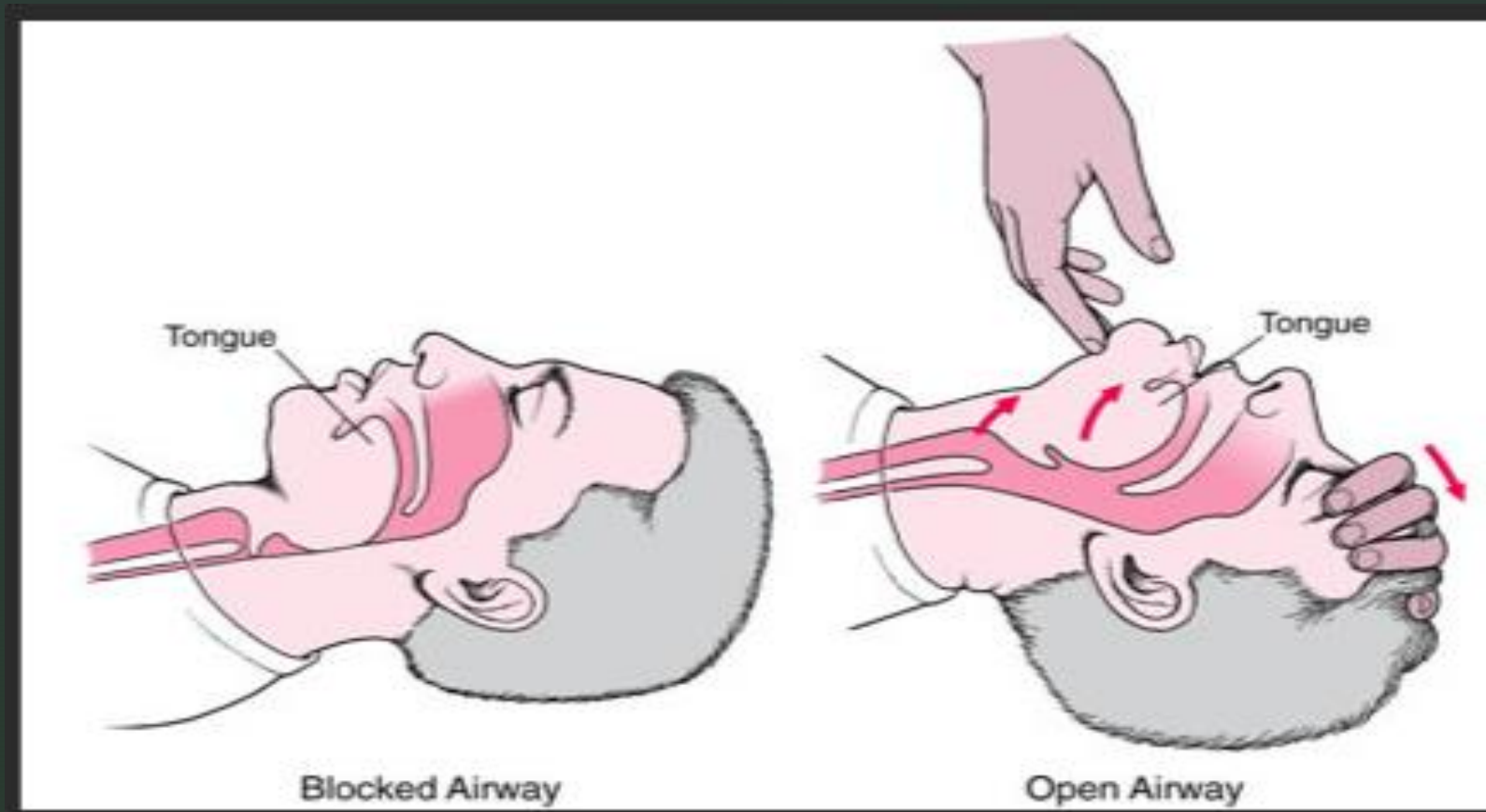
# compression



compression



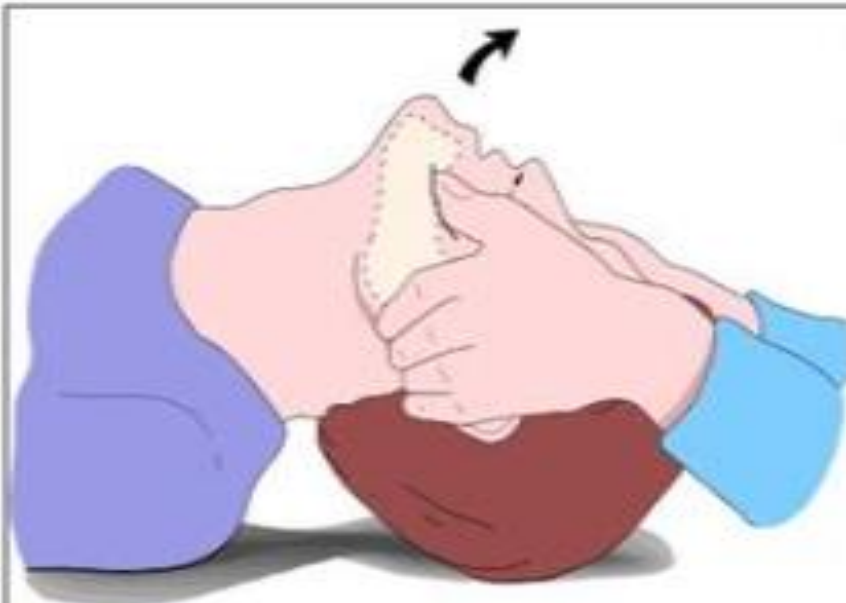
## Technique: Airway & Breathing



Head tilt and Chin lift

# Technique: Airway & Breathing

## Jaw Thrust



- An alternative to head tilt - chin lift
- Technique of choice where there is a strong suspicion of cervical spine injury (e.g. RTA, falls, drowning or diving accidents)
- Place fingers posterior to the mandibul of jaw and apply upward and forward pressure
- Hold mouth slightly open using thumbs to displace chin inferiorly

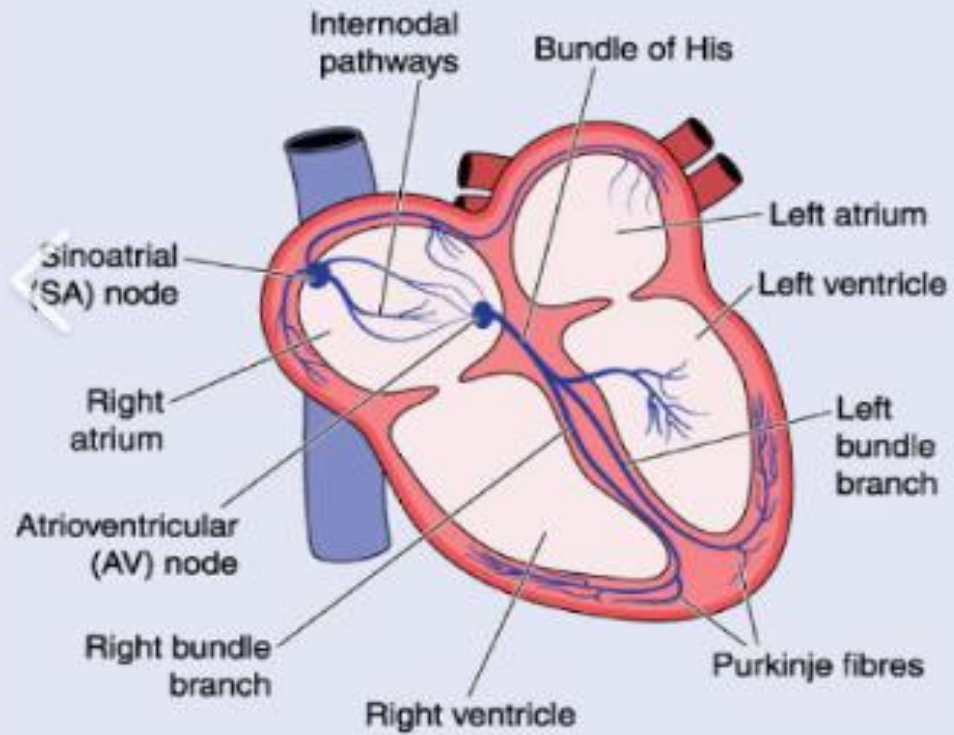


**Normal Heart Rhythm**

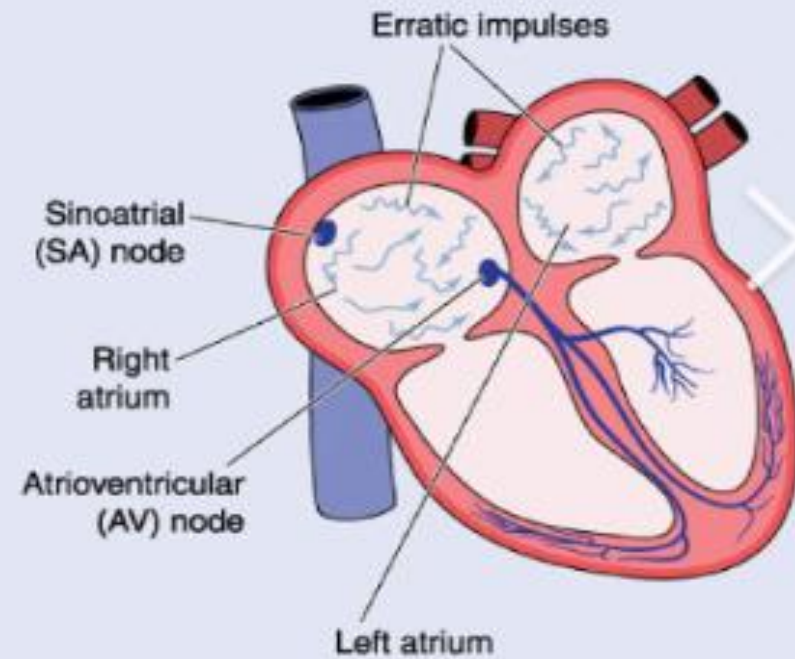
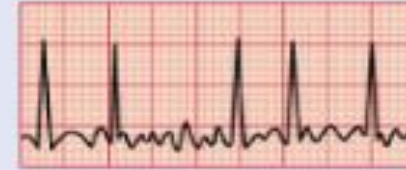


**Atrial Fibrillation Heart Rhythm**

Normal ECG



Atrial fibrillation



# Defibrillation: A Hard Reset



- Shock stops chaos, it doesn't "restart" a flatline. Presenter Note: "The mantra is: Shock, then immediately resume compressions. Don't delay."

# The Reversible Causes: H's and T's

- Hypovolemia
- Hypoxia
- Hydrogen ion (acidosis)
- Hypo/Hyperkalemia
- Hypothermia
- Tension Pneumothorax
- Tamponade
- Toxins
- Thrombosis (Coronary/Pulmonary)

While you're doing BLS, your mind should be running through this checklist for when ACLS arrives.

# When to Stop

- Review TOR criteria (ROSC)
  - Transfer of Care
  - DNR
  - Futility
- This is a team decision, guided by protocols and clinical judgment. It's one of the hardest parts of our job.

# Basic TOR Rule (for Medical Cardiac Arrest)

- Unwitnessed arrest by EMS or bystanders
- No shockable rhythm detected (e.g., asystole or PEA)
- No return of spontaneous circulation (ROSC) after full resuscitative efforts
- CPR duration exceeds 20 minutes without improvement
- Secure airway confirmed (e.g., via waveform capnography)
- End-tidal CO<sub>2</sub> (ETCO<sub>2</sub>) < 10 mmHg despite effective CPR
- Patient is ≥18 years old

# ROSC achieved: what next?

- Post-Cardiac Arrest Care (P-CAC).
- Getting a pulse back is just halftime. The next 72 hours determine neurological outcome.

# P-CAC: Preserving Brain function

- Focus on 3 pillars
  - Optimize Hemodynamics/Ventilation. MAP > 65mmHg
  - Targeted Temperature Management (TTM).
  - Early Coronary Reperfusion



## Case Study:

- 55-year-old male collapses in the clinic waiting room. You are the first to arrive. He is unresponsive. You see him take a loud, gurgling gasp. What are your next 5 steps, in order?"



# Answer

- Ensure scene safety
- Check for response/breathing
- Call for help/AED
- Check carotid pulse <10s
- Begin high-quality chest compressions

# Take-Home-Message

- 1. C-A-B! Compressions are king.
- 2. QUALITY matters: Push hard, push fast, allow full recoil, and minimize interruptions.
- 3. CPR is a bridge to definitive care and neurological recovery.
- 4. Don't forget the patient after you get a pulse back.



# Abbreviations

- ACLS: Advanced Cardiac Life Support
- CCF : Chest Compression Fraction
- ROSC: Return Of Spontaneous Circulation
- AED: Automated External Defibrillation
- BLS: Basic Life Support
- DNR: Do Not Resuscitate
- TOR: Termination of Resuscitation
- P-CAC: Post-Cardiac Arrest Care

# References

- American Heart Association (AHA). Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. Latest version (e.g., 2020 Guidelines).
- International Liaison Committee on Resuscitation (ILCOR) Consensus on Science with Treatment Recommendations (CoSTR).
- Kleinman, M. E., Perkins, G. D., Youngquist, S. T., et al. (2022). Part 3: Adult Basic and Advanced Life Support: 2020 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. *Circulation*, 142(16\_suppl\_2), S416-S468.
- Kouwenhoven, W. B., Jude, J. R., & Knickerbocker, G. G. (1960). Closed-Chest Cardiac Massage. *Journal of the American Medical Association (JAMA)*, 173(10), 1064-1067.
- Safar, P. (1957). Ventilatory efficacy of mouth-to-mouth resuscitation. *JAMA*, 165(7), 819-821.