Advance Cardiovascular Life Support

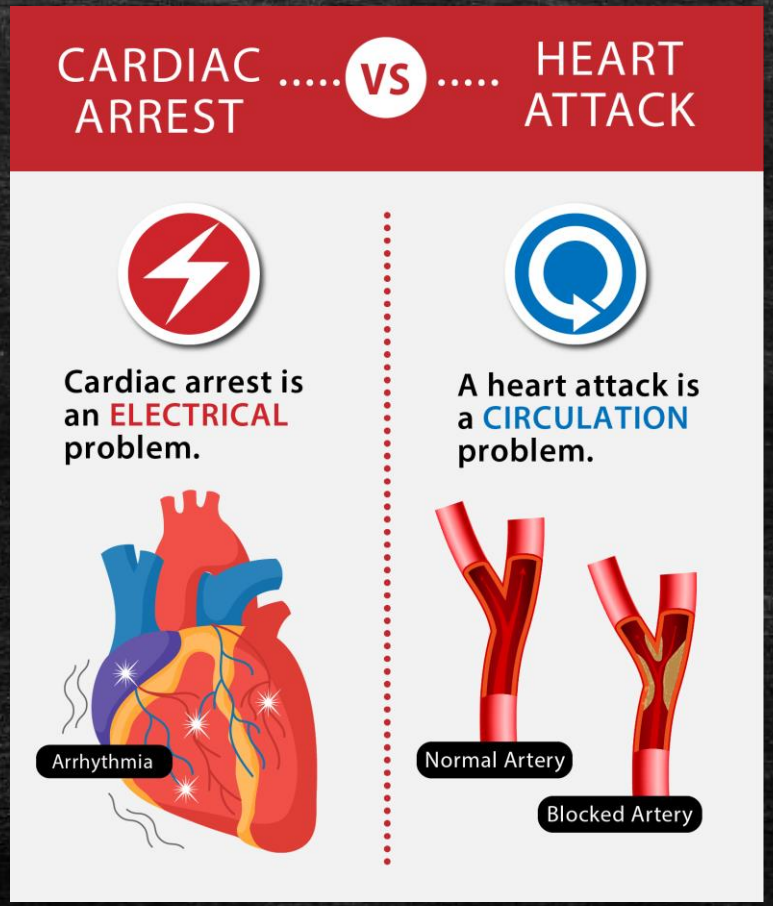
Chanikarn Kanaderm, MD

Outline

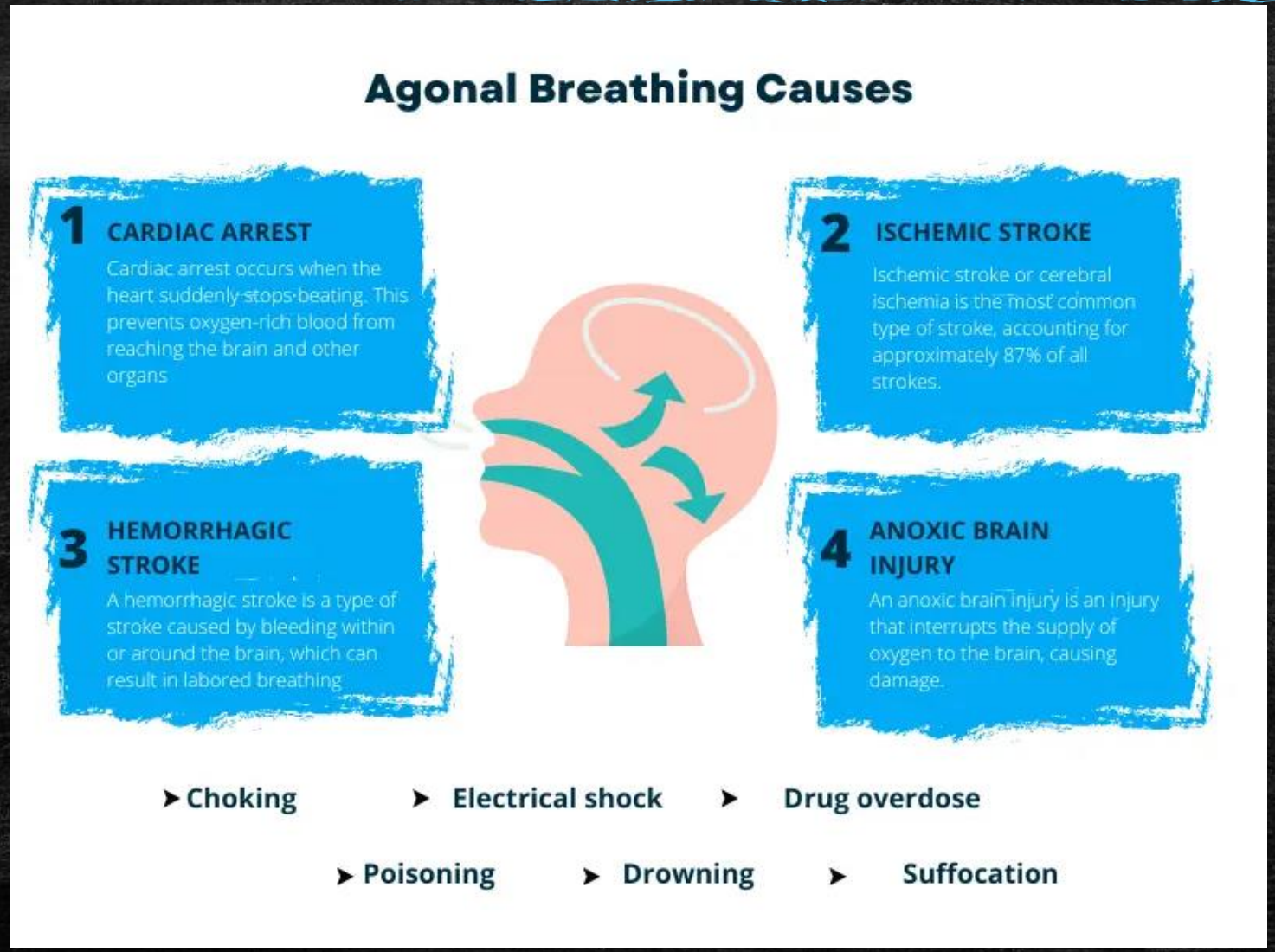
- Collapse & Agonal gasping
- Station
- Guideline

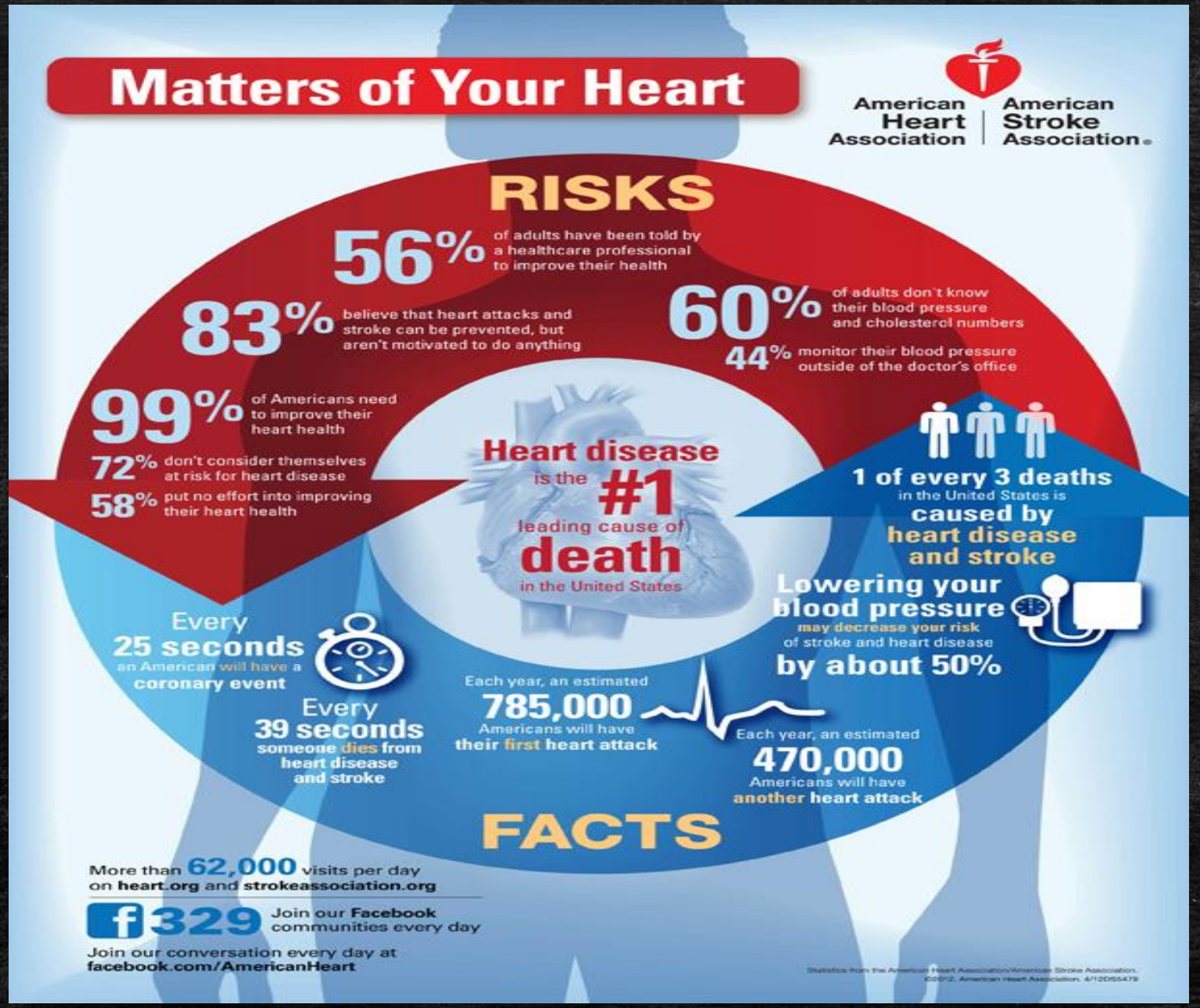
Collapse & Agonal gasping

Collapse


CARDIAC ARREST
VS
HEART ATTACK
Cardiac arrest is an ELECTRICAL problem.
A heart attack is a CIRCULATION problem.
Arrhythmia
Normal Artery
Blocked Artery

Agonal gasping




Matters of Your Heart
American Heart Association
American Stroke Association
RISKS
56% of adults have been told by a healthcare professional to improve their health
83% believe that heart attacks and stroke can be prevented, but aren't motivated to do anything
60% of adults don't know their blood pressure and cholesterol numbers
44% monitor their blood pressure outside of the doctor's office
99% of Americans need to improve their heart health
72% don't consider themselves at risk for heart disease
58% put no effort into improving their heart health
Heart disease is the #1 leading cause of death in the United States
1 of every 3 deaths in the United States is caused by heart disease and stroke
Lowering your blood pressure may decrease your risk of stroke and heart disease by about 50%
Every 25 seconds an American will have a coronary event
Every 39 seconds someone dies from heart disease and stroke
Each year, an estimated 785,000 Americans will have their first heart attack
Each year, an estimated 470,000 Americans will have another heart attack
FACTS
More than 62,000 visits per day on heart.org and strokeassociation.org
329 Join our Facebook communities every day
Join our conversation every day at facebook.com/AmericanHeart

2023 American Heart Association Focused Update on Adult Advanced Cardiovascular Life Support: An Update to the American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care

Sarah M. Perman, Jonathan Elmer, Carolina B. Maciel, Anezi Uzendu, Teresa May, Bryn E. Mumma, Jason A. Bartos, Amber J. Rodriguez, Michael C. Kurz, Ashish R. Panchal, … See all authors

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Chain of survival 2020

OHCA

New link in the chain
Recovery

Circulation 142, Issue 16_Suppl_2, 20 October 2020, Pages S337-S357
https://doi.org/10.1161/CIR.0000000000000918

Scene safe

IHCA

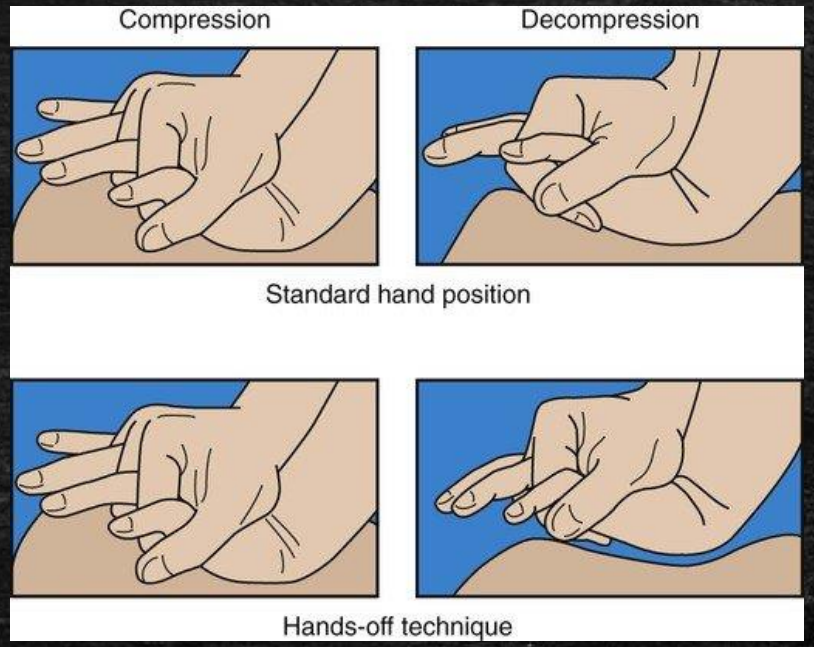
Circulation 142, Issue 16_Suppl_2, 20 October 2020, Pages S337-S357
https://doi.org/10.1161/CIR.0000000000000918

Station 1 :High quality BLS

- Effective Chest Compression
- Airway Management
- AED

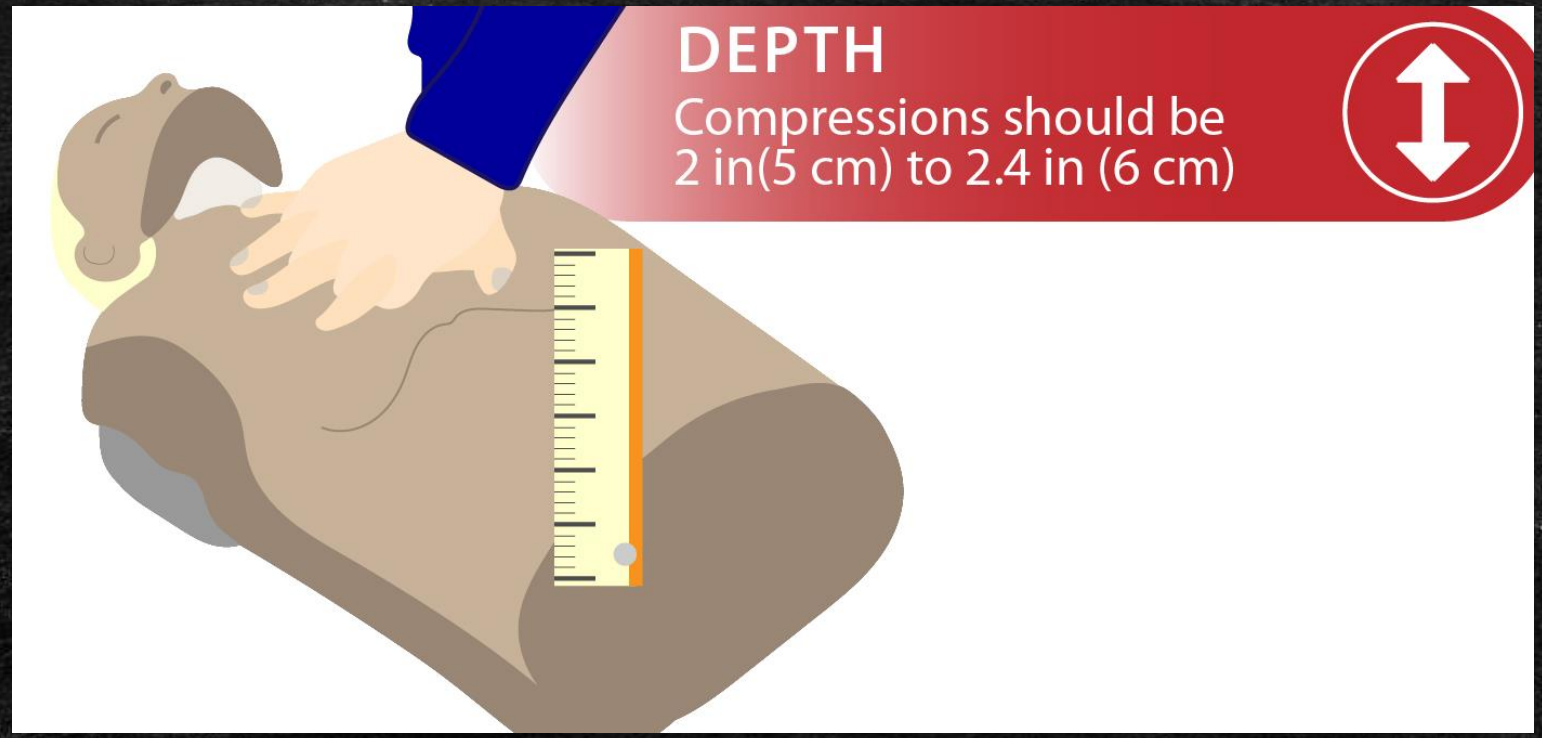
Chest Compression

- Push Hard deep 5-6 cm
- Push FAST 100-120 /min
- Fully recoil
- Minimize interruption



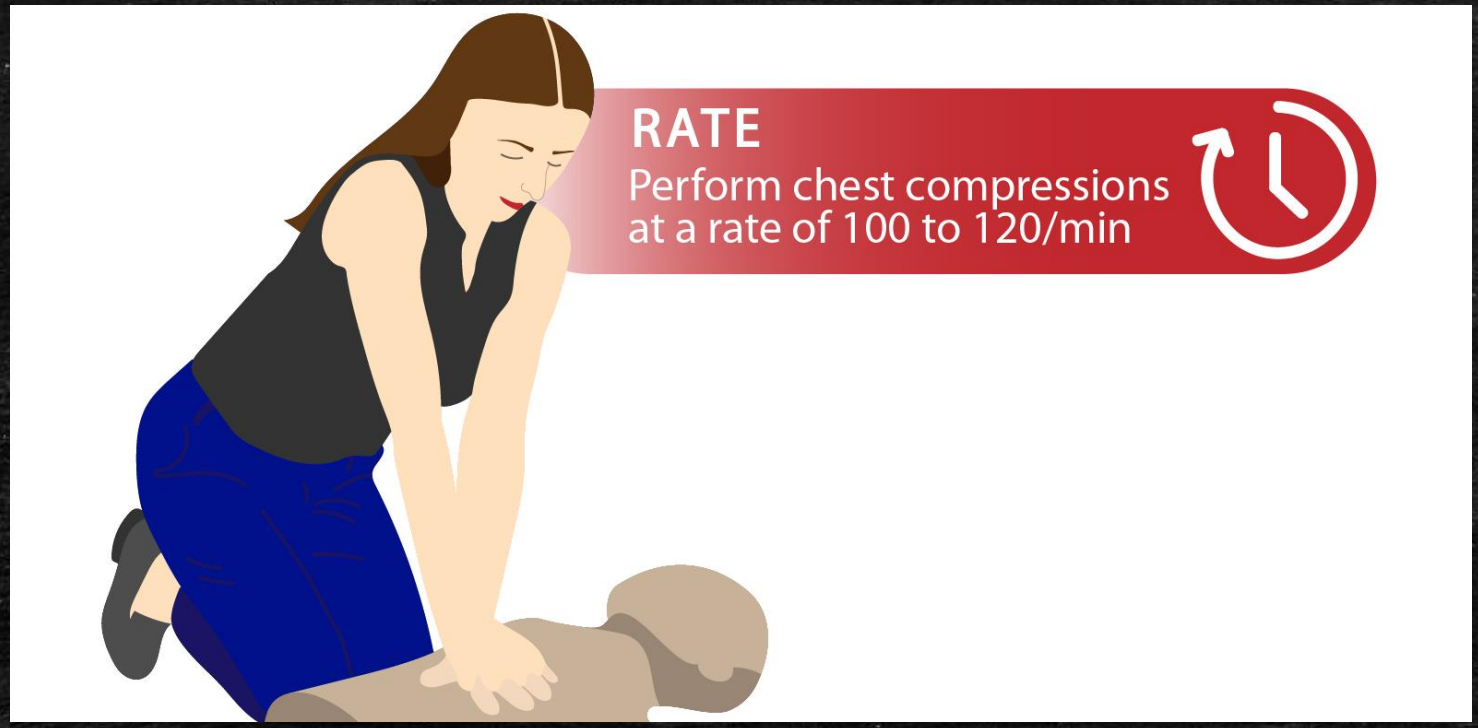
Chest Compression

- Push Hard deep 5-6 cm



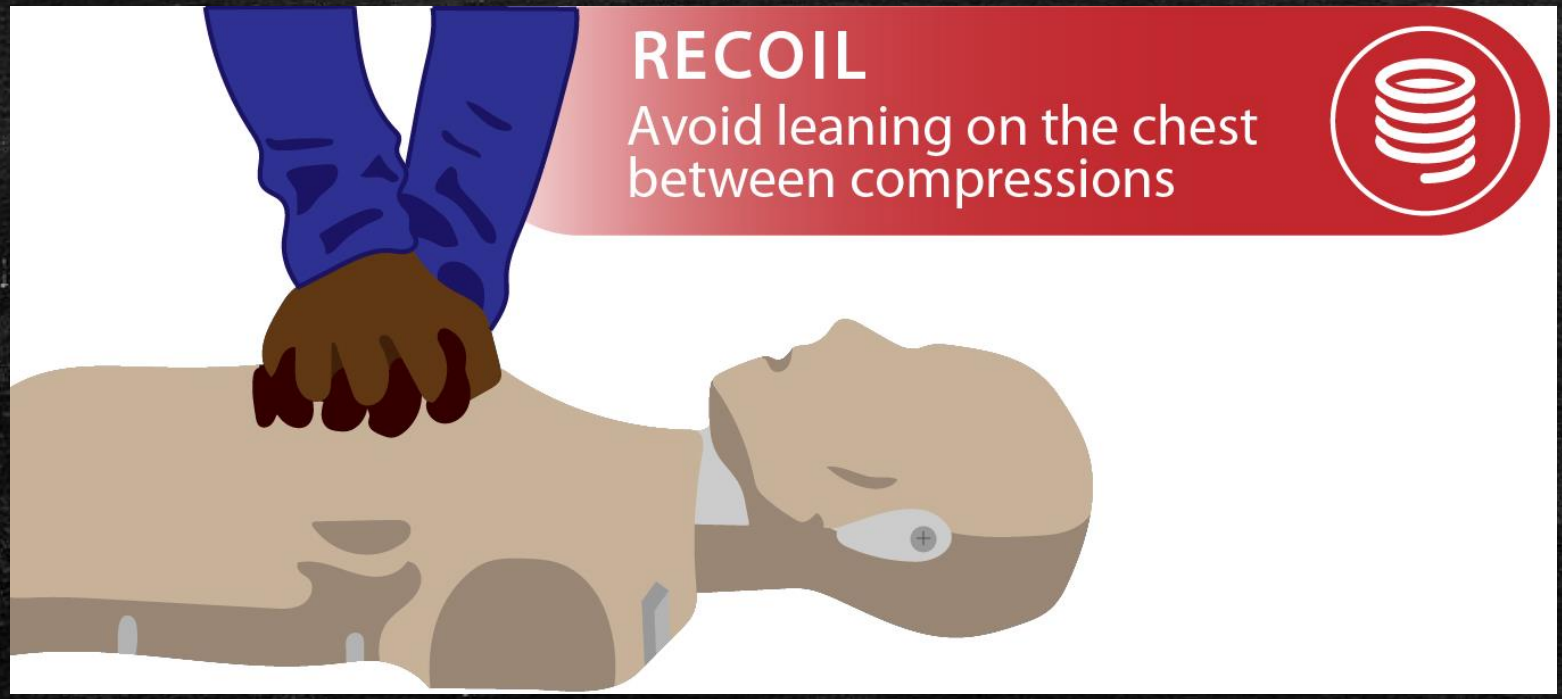
Chest Compression

- Push FAST 100-120 /min



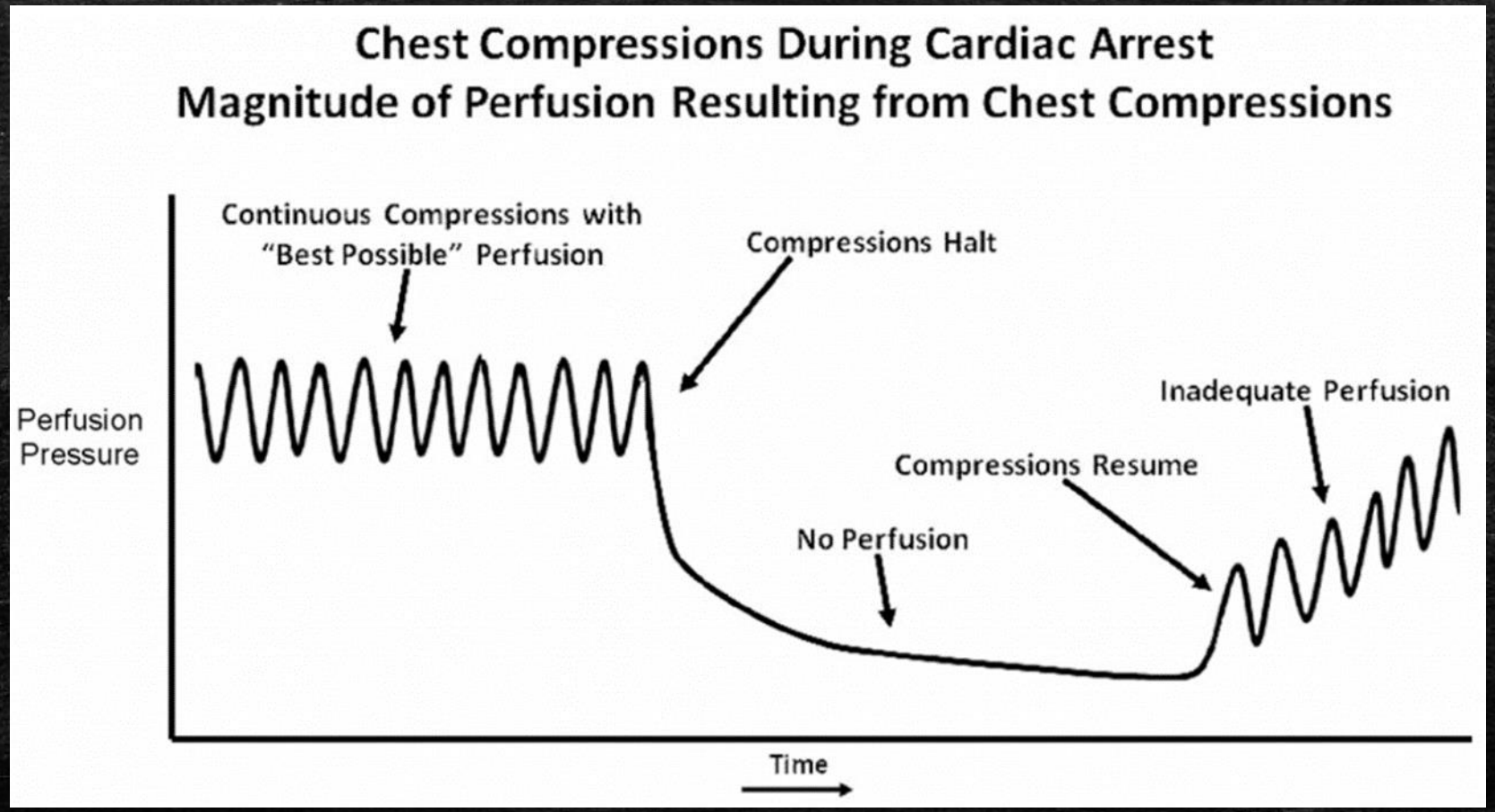
Chest Compression

- Fully recoil

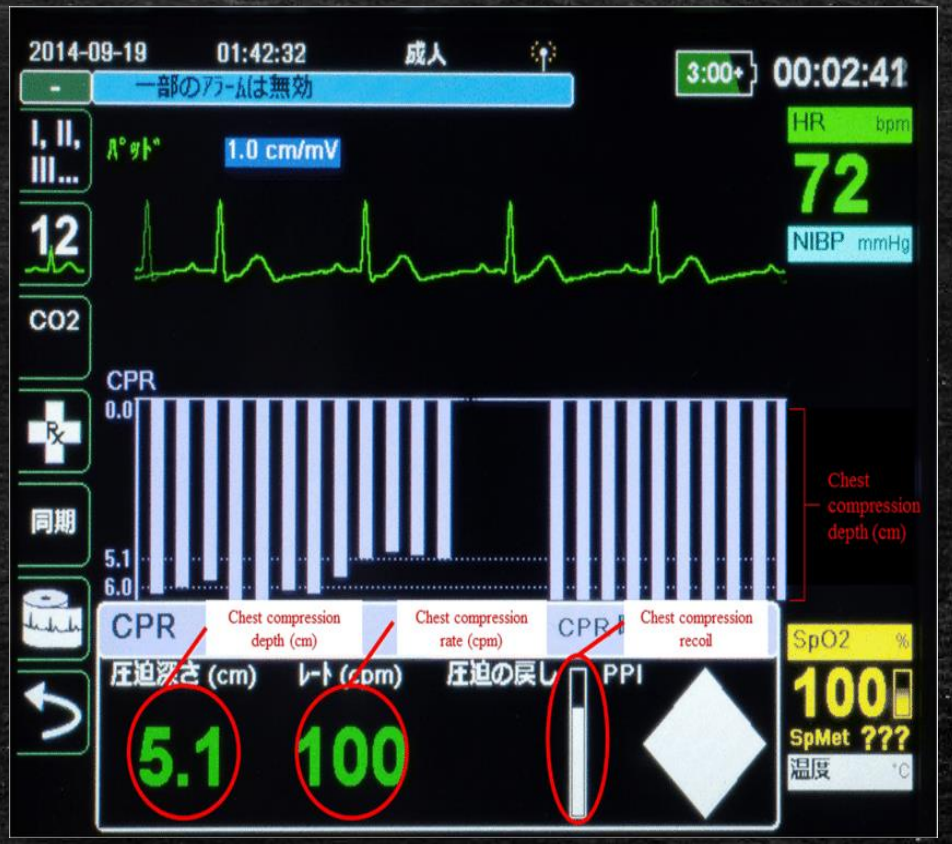


Chest Compression

- Avoid interruption

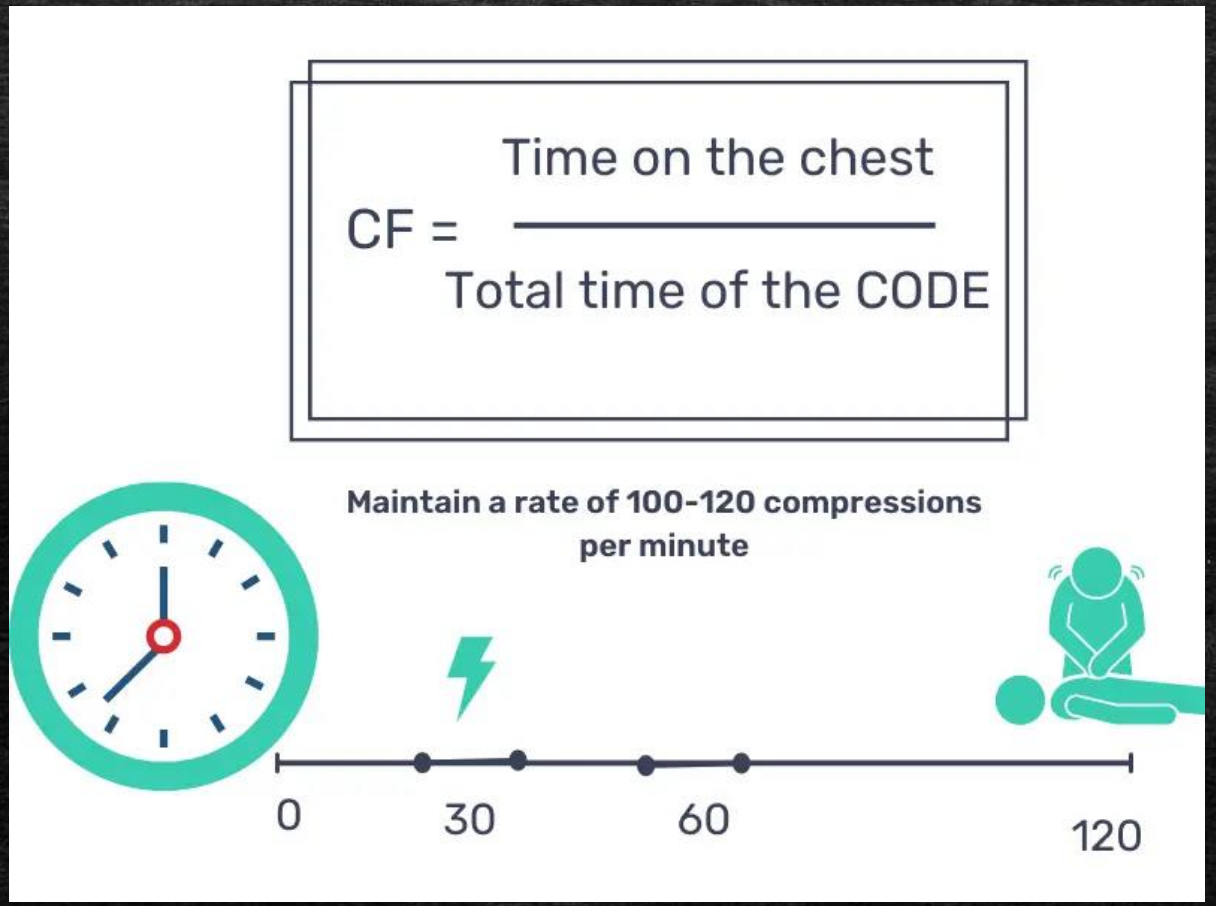


Chest Compression



Chest Compression

Chest Compression Fraction



Open airway

Mouth to mouth resuscitation

HANDS-ONLY CPR

American Heart Association®
life is why®

Take a Minute to Save a Life!

It's easy to learn this lifesaving skill.

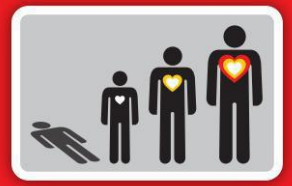
Watch the 60-second demonstration video on Hands-Only CPR at **heart.org/handsonlycpr** and share it with the important people in your life. For resources in Spanish, go to **heart.org/rcp**.

#CPRSAVESLIVES

2 STEPS TO SAVE A LIFE

If you are called on to give CPR in an emergency, you will most likely be trying to **save the life of someone you love**: a child, a spouse, a parent or a friend.

When a person has a cardiac arrest, **survival depends** on getting **immediate CPR from someone nearby.**



CPR CAN: DOUBLE or even TRIPLE a victim's chance of survival.

WHY?: Chest compressions push oxygen-rich blood through the body to **keep vital organs alive**. **Hands-Only CPR buys time until EMS arrives.**

The American Heart Association's Hands-Only CPR campaign is supported by an educational grant from the Anthem Foundation.

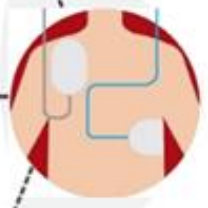
The AHA still recommends CPR with compressions and breaths for infants and children and victims of drowning, drug overdose, or people who collapse due to breathing problems. Hands-Only CPR training does not result in an AHA Course Completion Card.

AED

- Pull
- Place
- Press

Steps in using AED

Step 1: Turn on the AED



Step 2: Attach electrodes

Attach defibrillation pads to the chest

1. Wipe the chest dry
2. Right side upper chest and left side lower chest

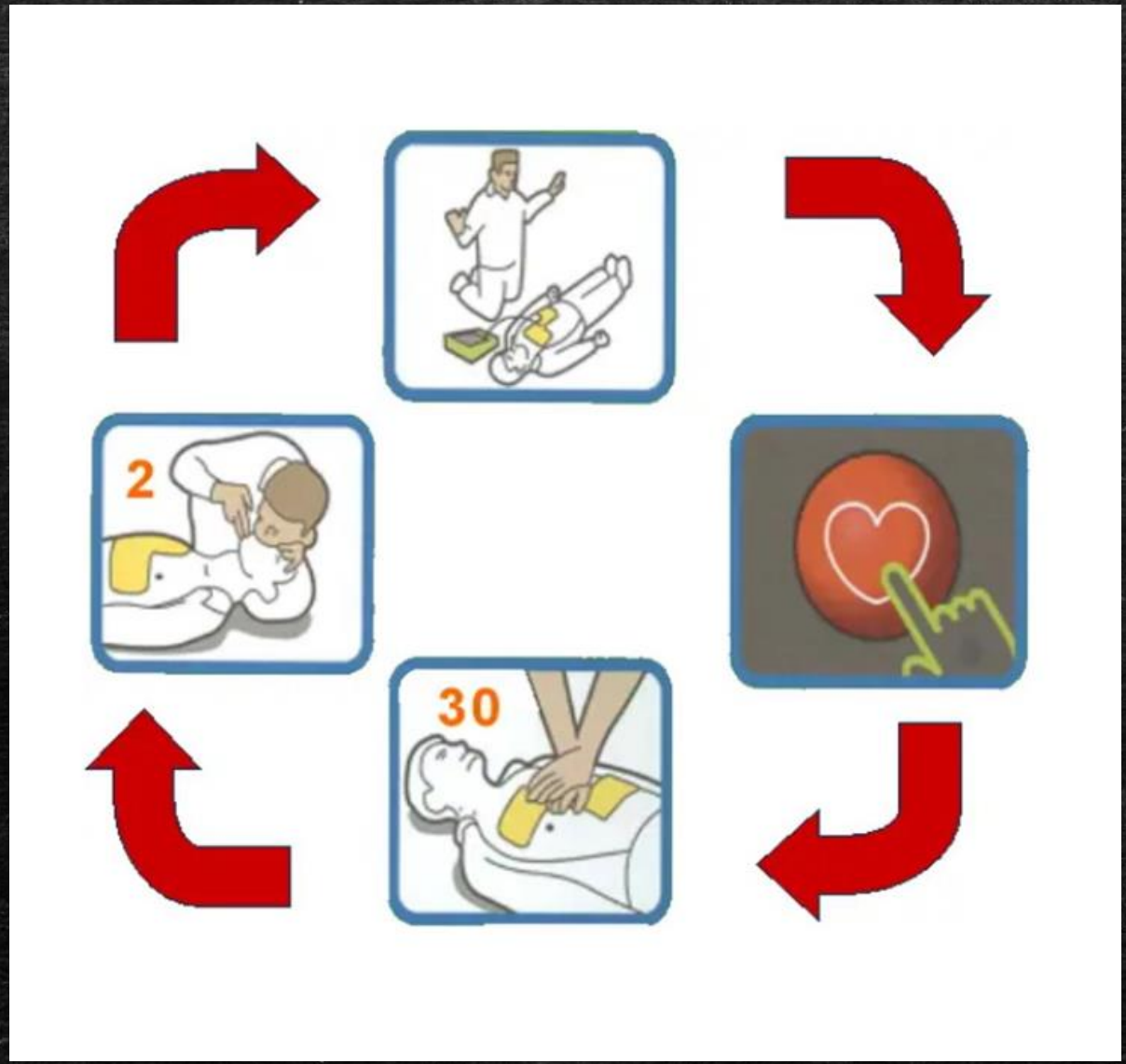
Step 3: Analyse rhythm

Push the analyse button

Step 4: Deliver the shock

If AED advises you to shock the person:

1. Make sure no one is touching the person
2. Tell everyone to stand clear
3. Push the 'shock' button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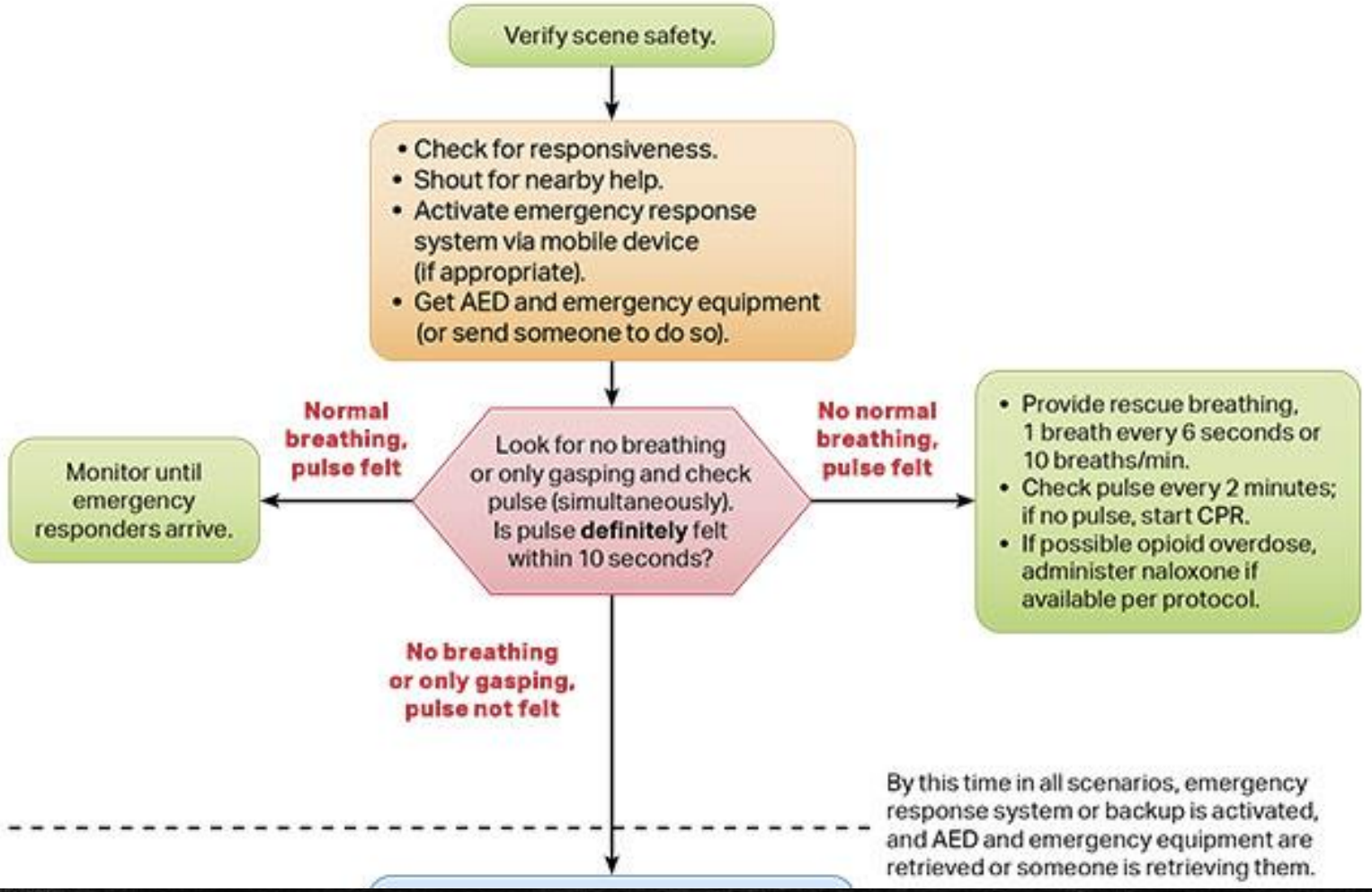
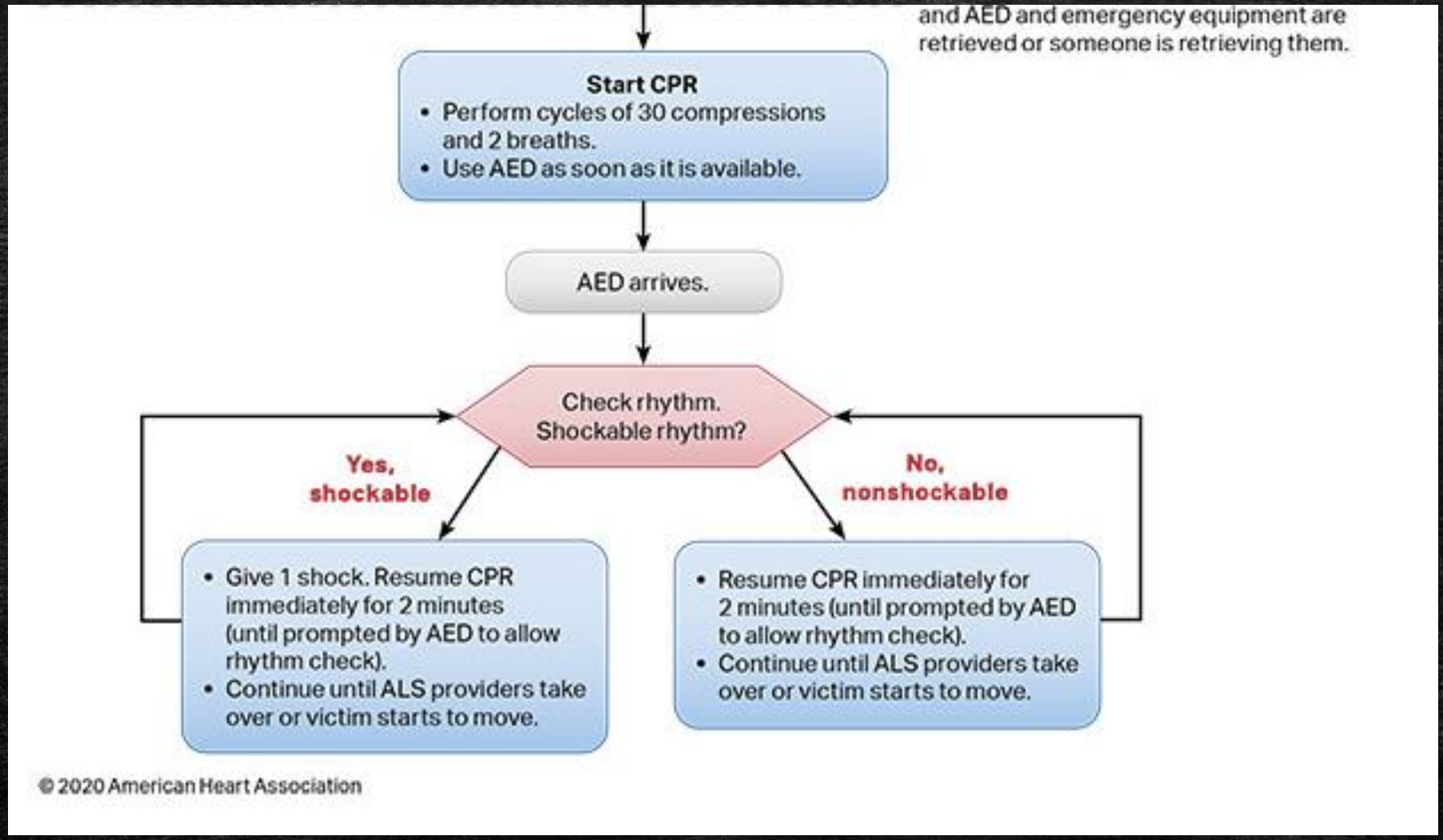
30

Adult Basic Life Support Algorithm for Healthcare Providers




and AED and emergency equipment are retrieved or someone is retrieving them.
Start CPR
• Perform cycles of 30 compressions and 2 breaths.
• Use AED as soon as it is available.
AED arrives.
Check rhythm. Shockable rhythm?
Yes, shockable
No, nonshockable
• Give 1 shock. Resume CPR immediately for 2 minutes (until prompted by AED to allow rhythm check).
• Continue until ALS providers take over or victim starts to move.
• Resume CPR immediately for 2 minutes (until prompted by AED to allow rhythm check).
• Continue until ALS providers take over or victim starts to move.
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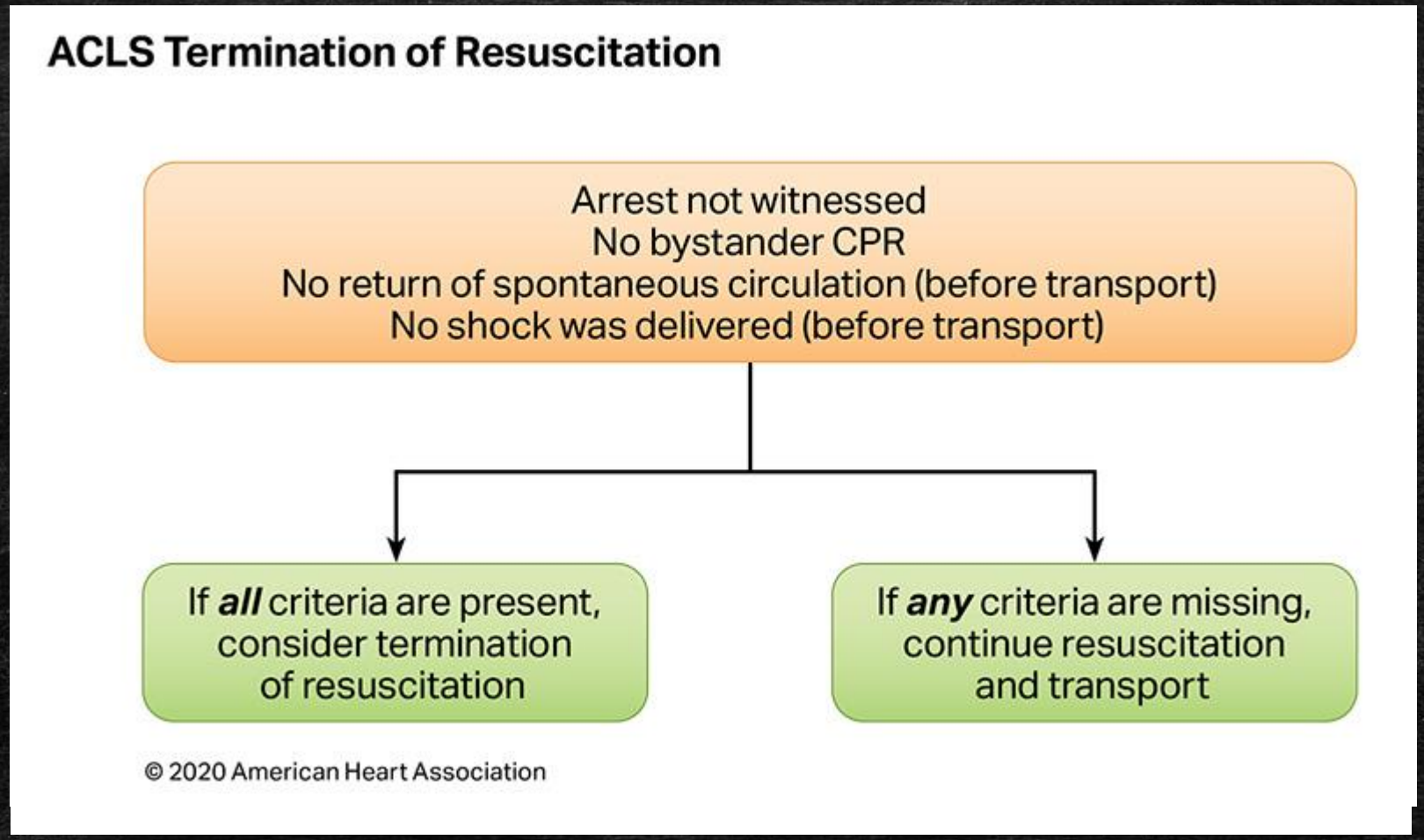
Stop If


ACLS Termination of Resuscitation
Arrest not witnessed
No bystander CPR
No return of spontaneous circulation (before transport)
No shock was delivered (before transport)
If all criteria are present, consider termination of resuscitation
If any criteria are missing, continue resuscitation and transport
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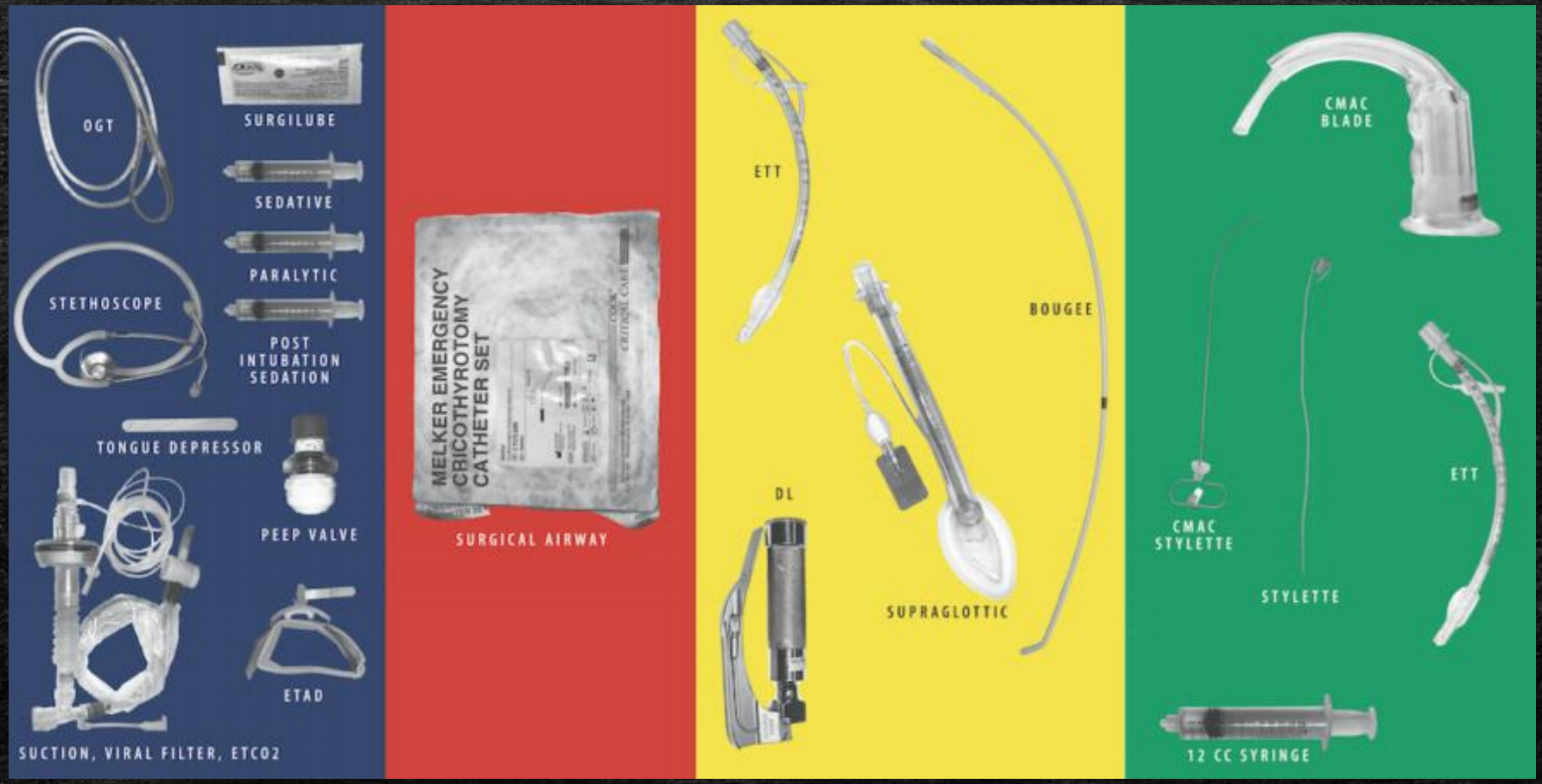
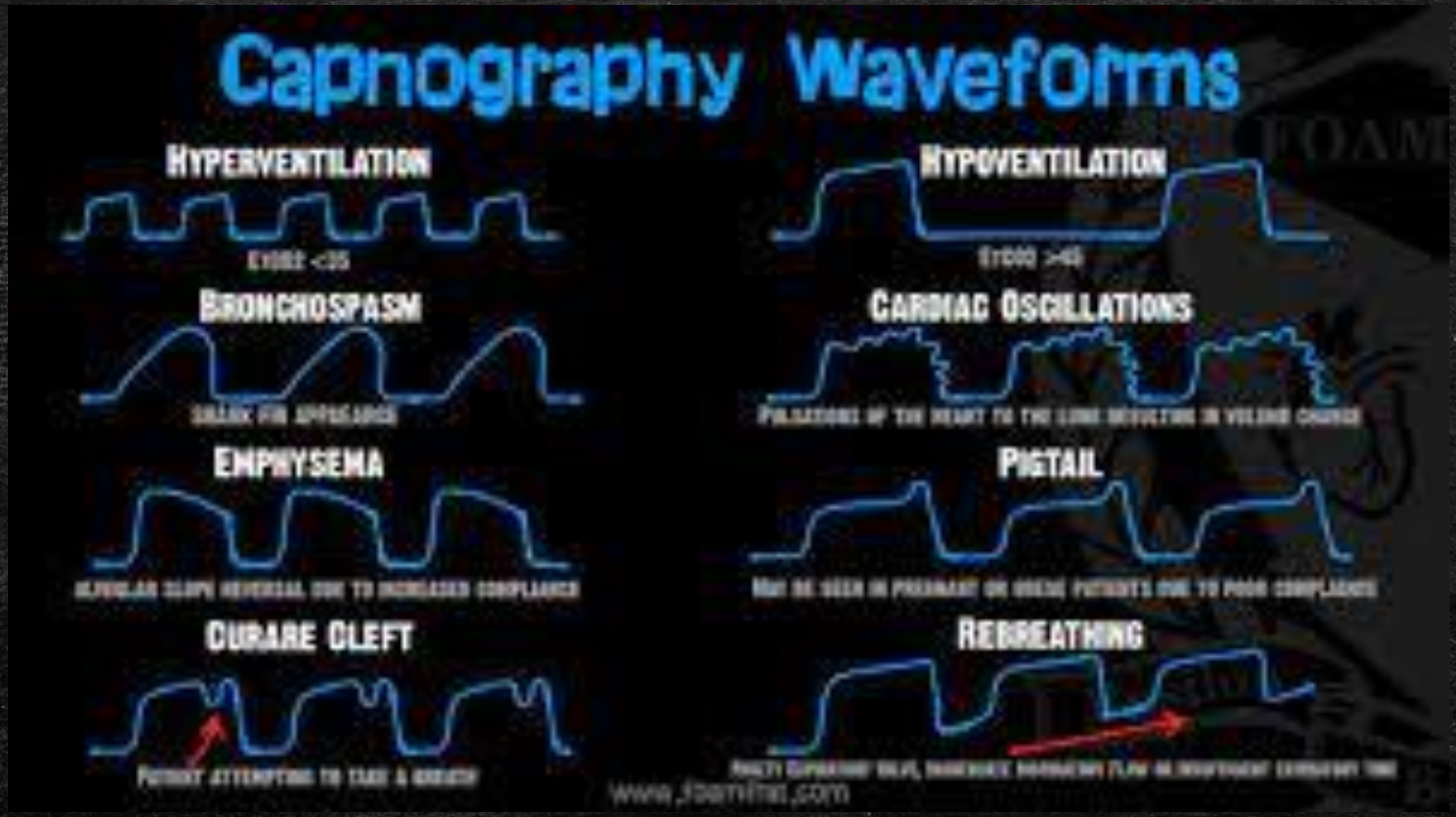
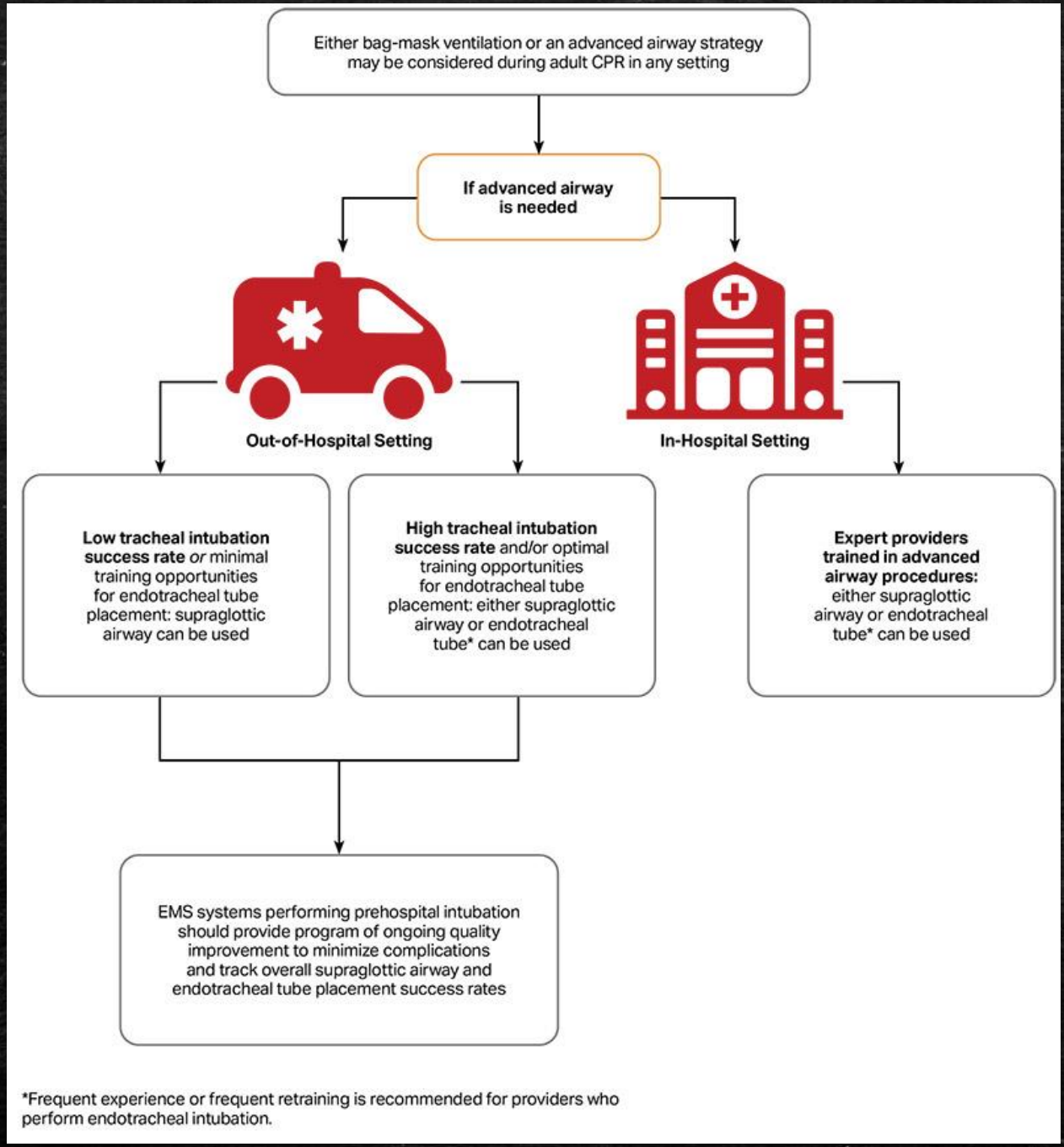
Recovery position

Station 2 :Airway Management



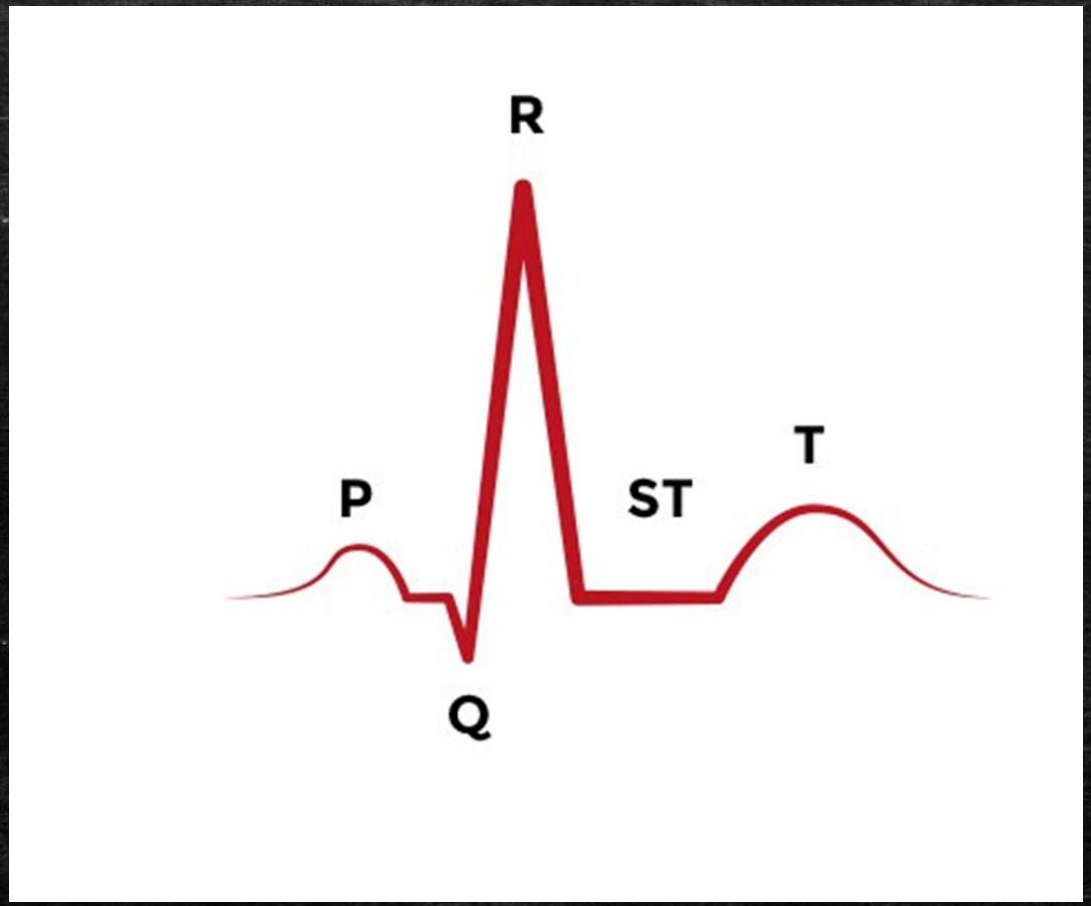
Capnography Waveforms



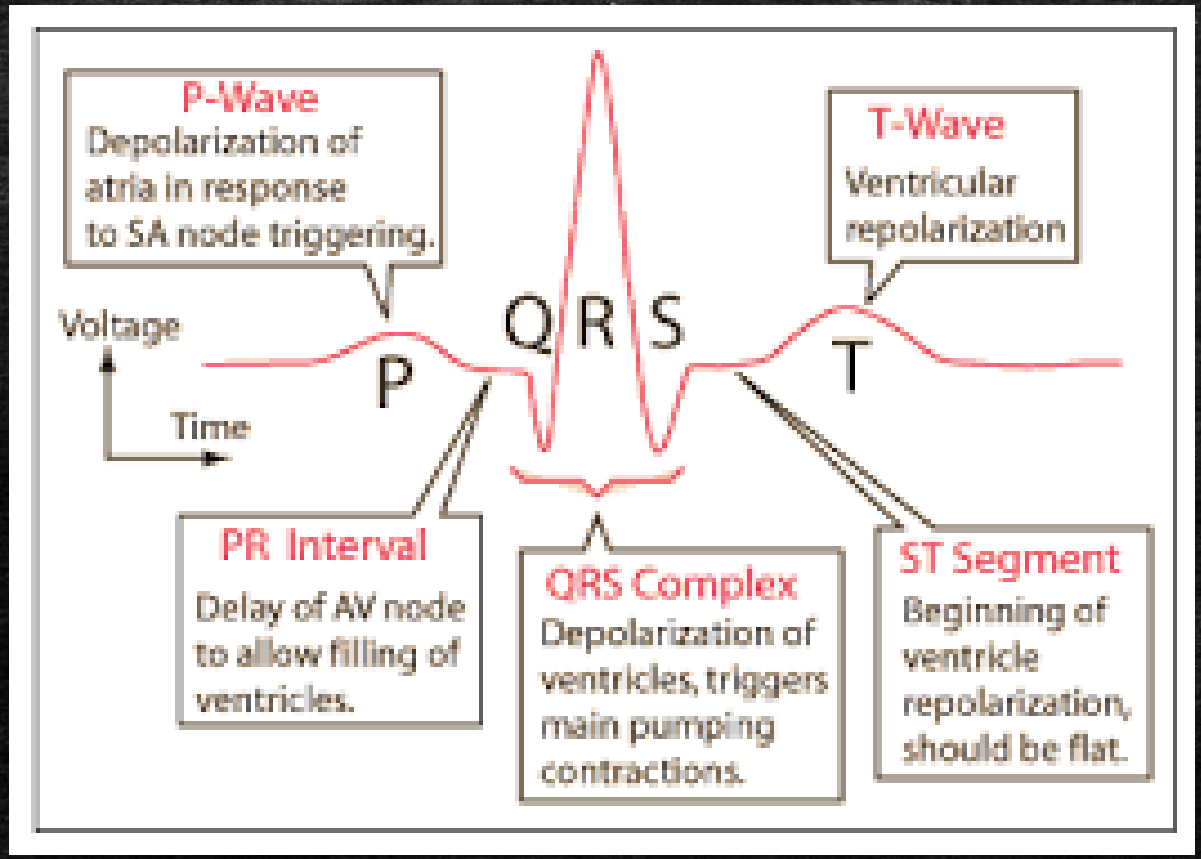

Either bag-mask ventilation or an advanced airway strategy may be considered during adult CPR in any setting
If advanced airway is needed
Out-of-Hospital Setting
In-Hospital Setting
Low tracheal intubation success rate or minimal training opportunities for endotracheal tube placement: supraglottic airway can be used
High tracheal intubation success rate and/or optimal training opportunities for endotracheal tube placement: either supraglottic airway or endotracheal tube* can be used
Expert providers trained in advanced airway procedures: either supraglottic airway or endotracheal tube* can be used
EMS systems performing prehospital intubation should provide program of ongoing quality improvement to minimize complications and track overall supraglottic airway and endotracheal tube placement success rates
*Frequent experience or frequent retraining is recommended for providers who perform endotracheal intubation.

VDO Laryngoscope

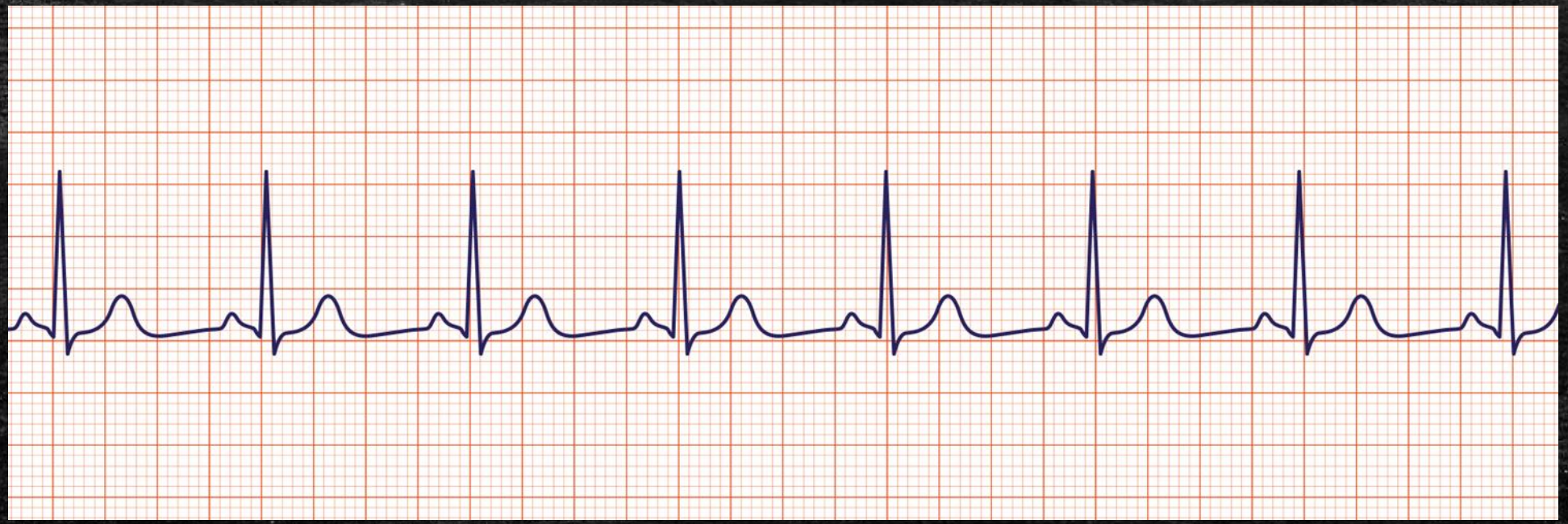
Station 3 : ECG Rhythm Recognition



Rhythm Recognition



Rhythm Recognition

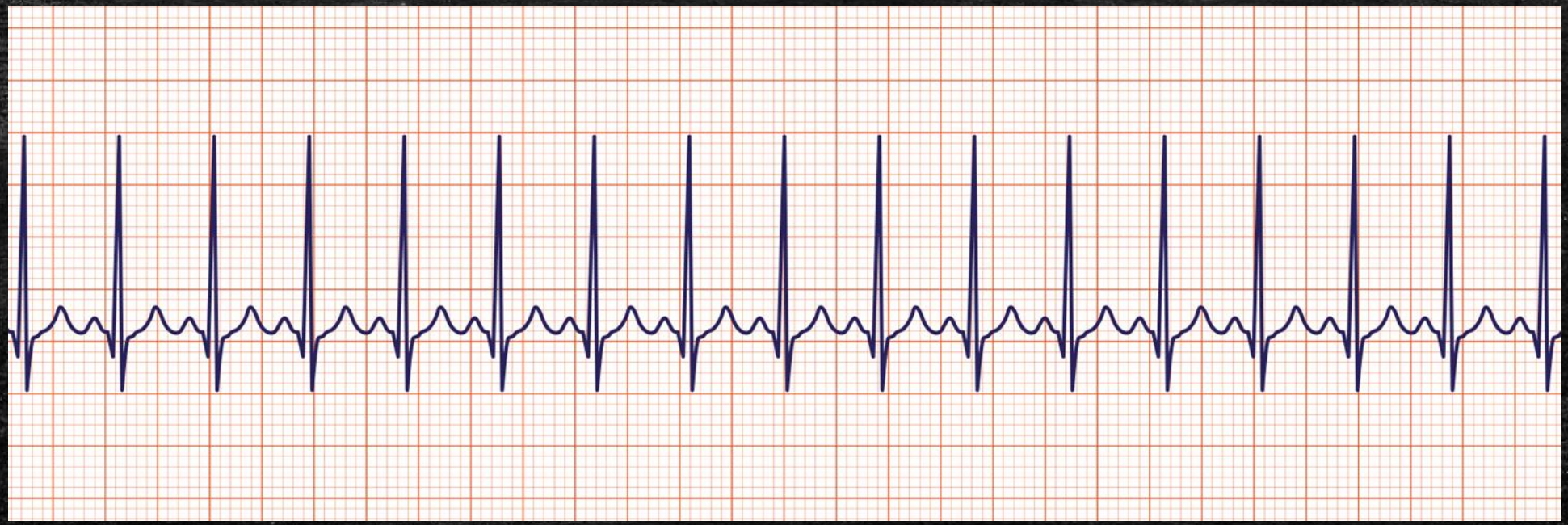


Normal Sinus Rhythm

Rhythm Recognition

Sinus Bradycardia

Rhythm Recognition

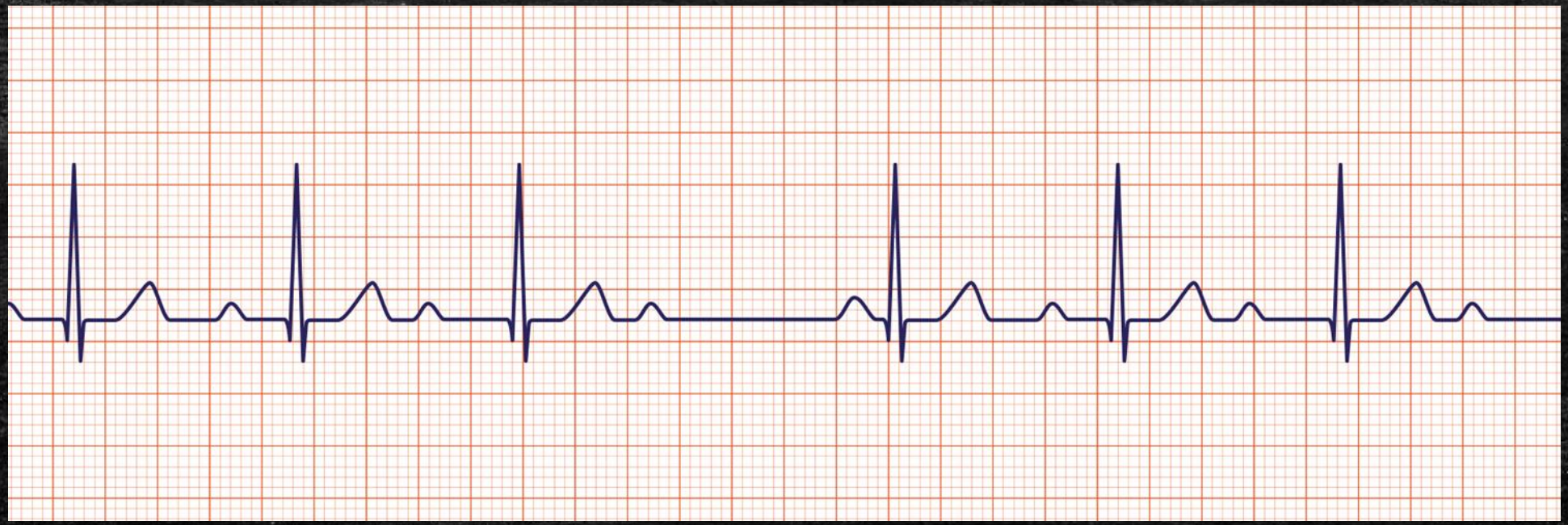


Sinus Tachycardia

Rhythm Recognition

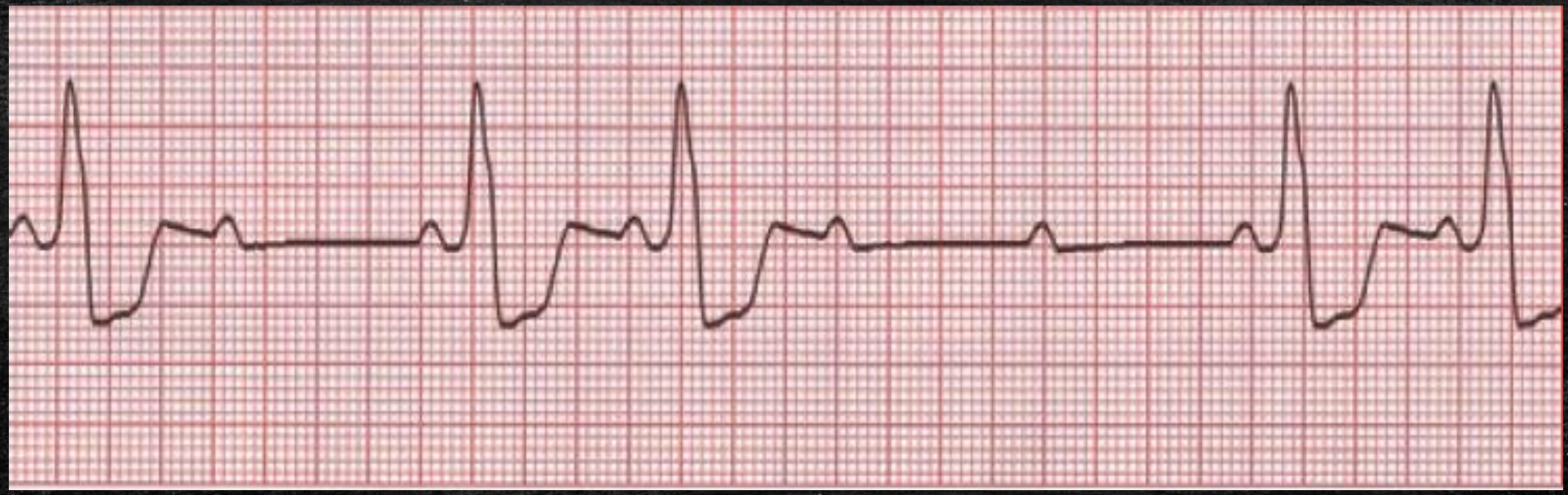
First Degree AV Block

Rhythm Recognition



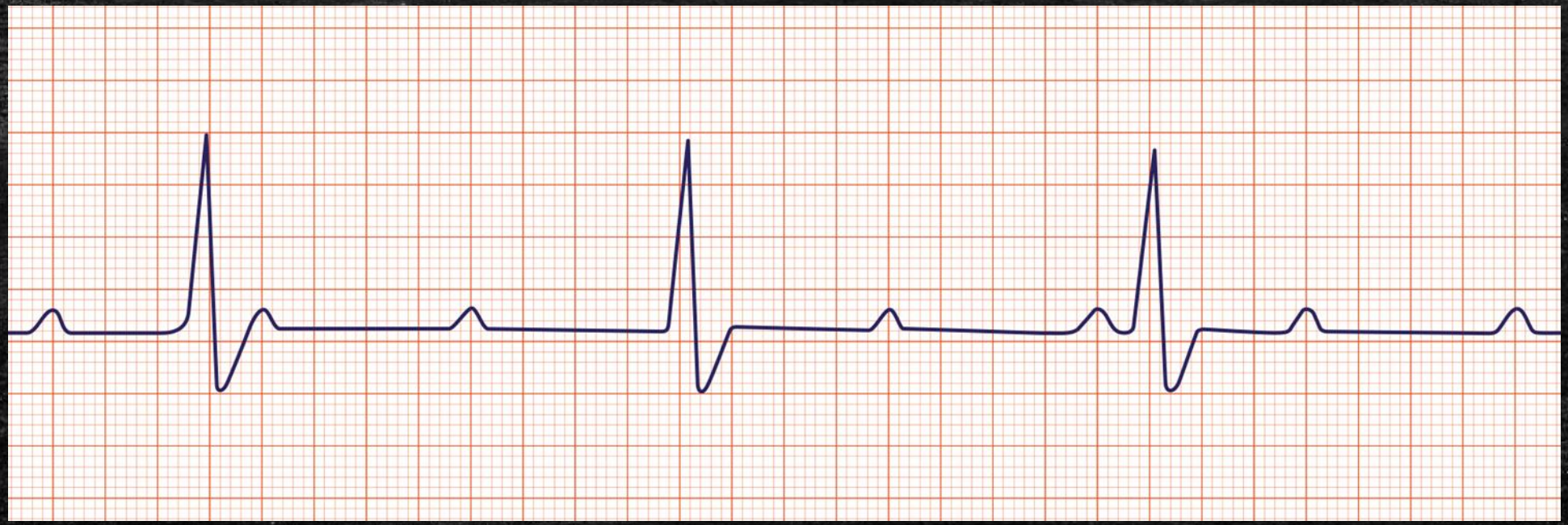
Second Degree AV block Mobitz 1

Rhythm Recognition



Second Degree AV block Mobitz 2

Rhythm Recognition

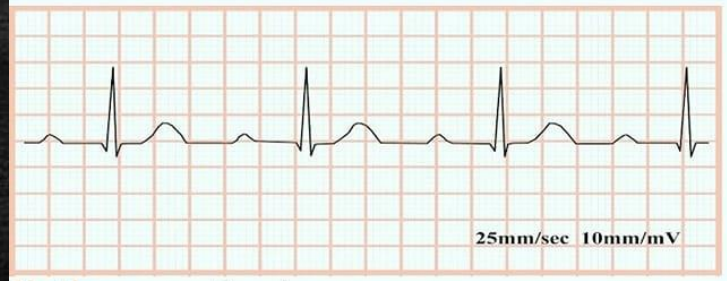


Third Degree AV Block

Rhythm Recognition

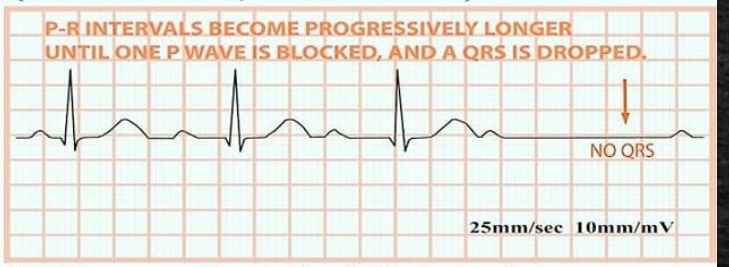
ECG Basics - Heart Blocks

First Degree AV Block



Rhythm:	Regular
PR interval:	Prolonged >0.20 sec
P Wave:	Normal
QRS:	<0.11 sec

Second Degree AV Block - Type 1 (aka Mobitz 1, Wenckebach):

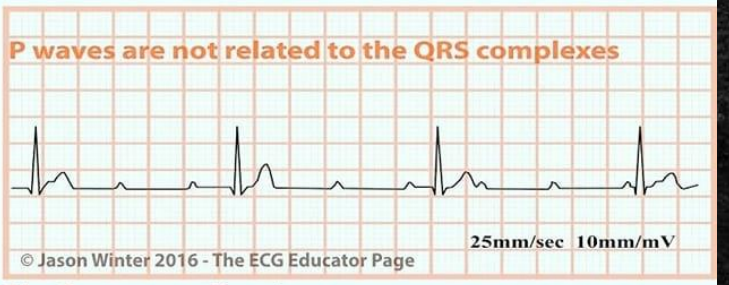


Rhythm:	Increasingly Prolonged
PR interval:	Irregular
P Wave:	Normal
QRS:	<0.11

Second Degree AV Block - Mobitz Type 2

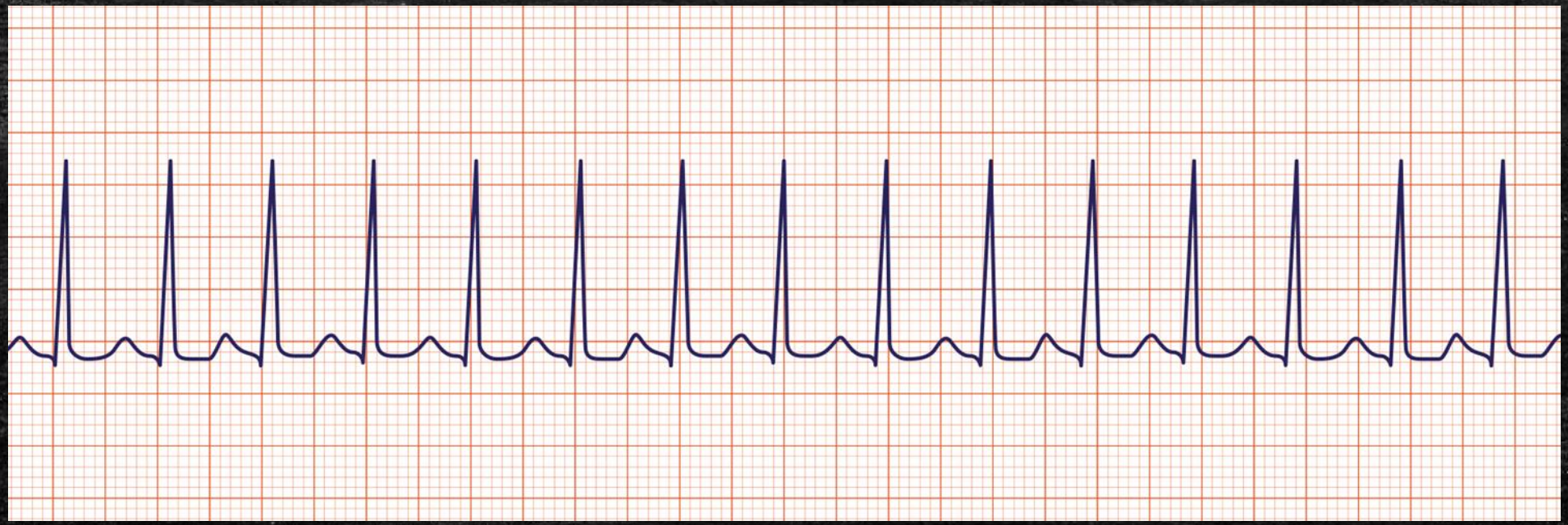
Rhythm:	Irregular
PR interval:	Normal (more P waves then QRS)
P Wave:	Normal
QRS:	Usually wide >0.10

3rd Degree AV Block



Rhythm:	Regular
PR interval:	None
P Wave:	Normal does not relate to QRS
QRS:	Normal or wide

Rhythm Recognition

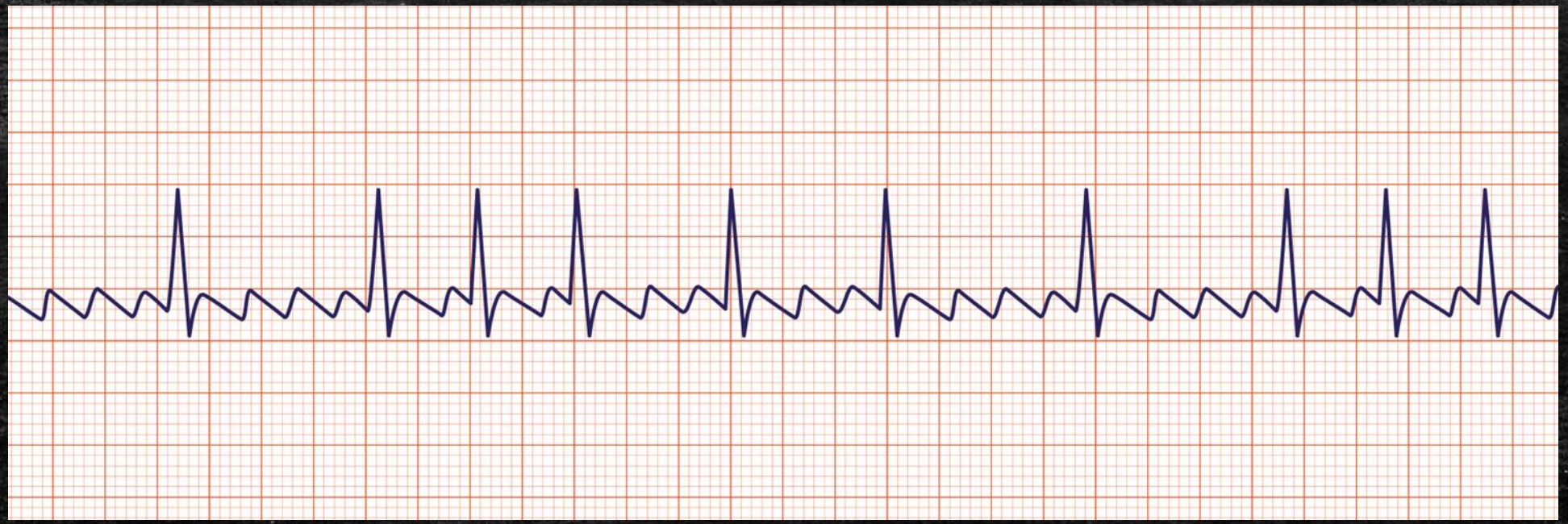


SVT

Rhythm Recognition

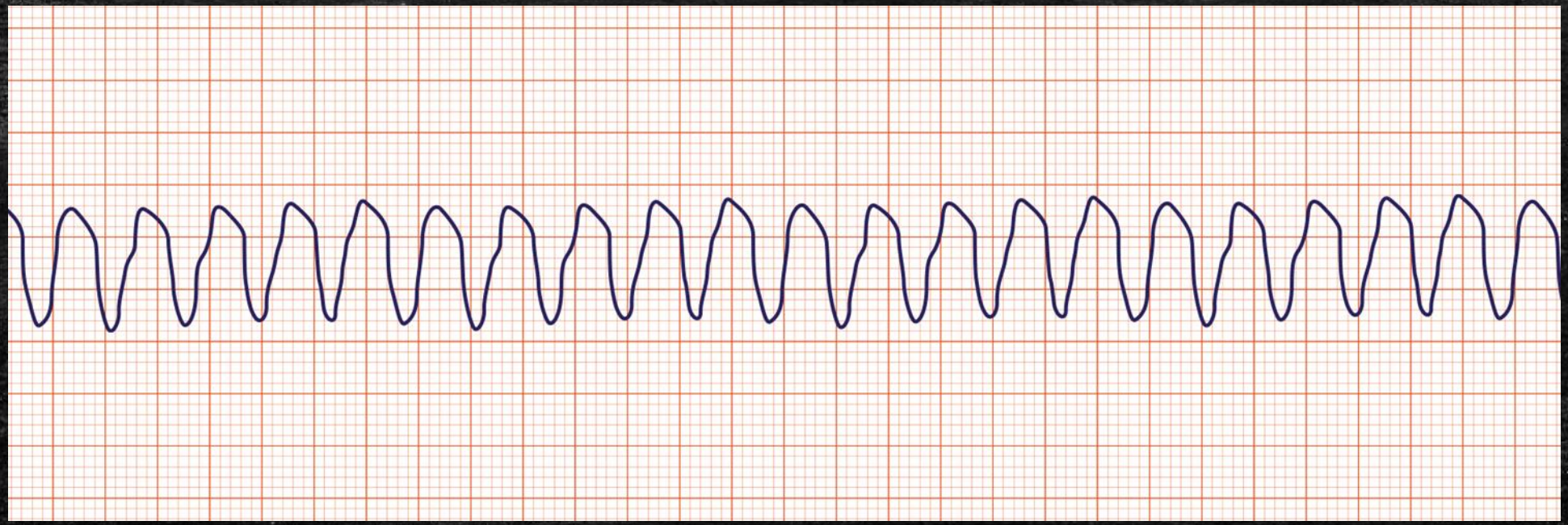
AF

Rhythm Recognition



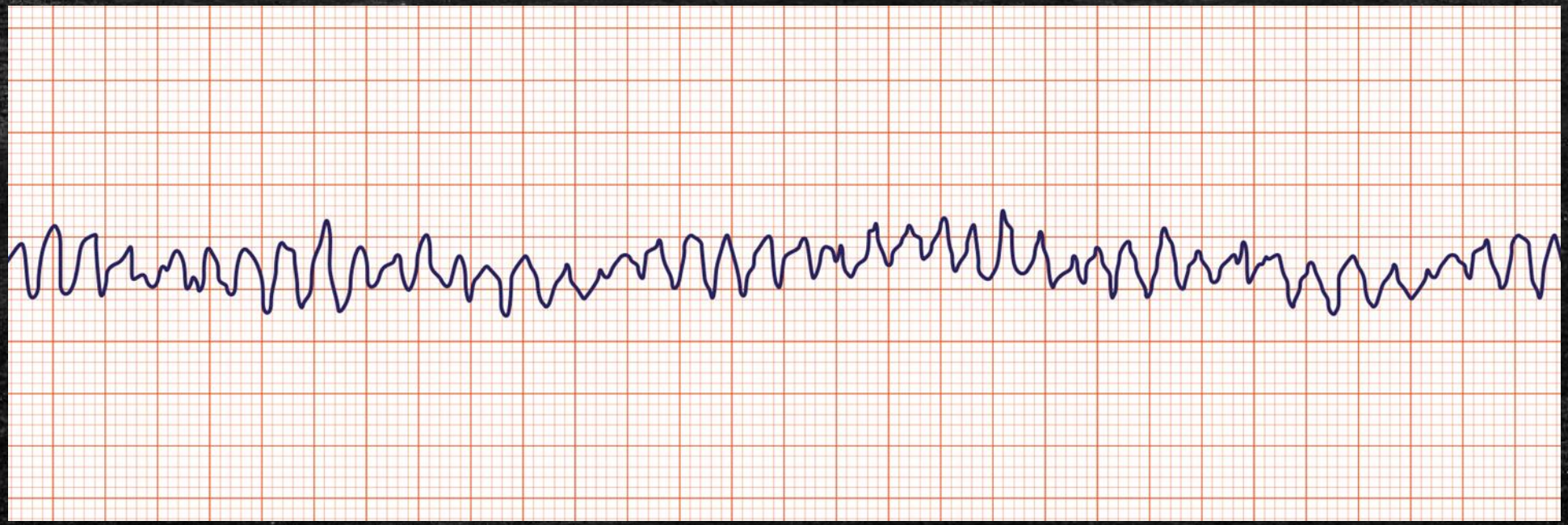
A Flutter

Rhythm Recognition



VT

Rhythm Recognition

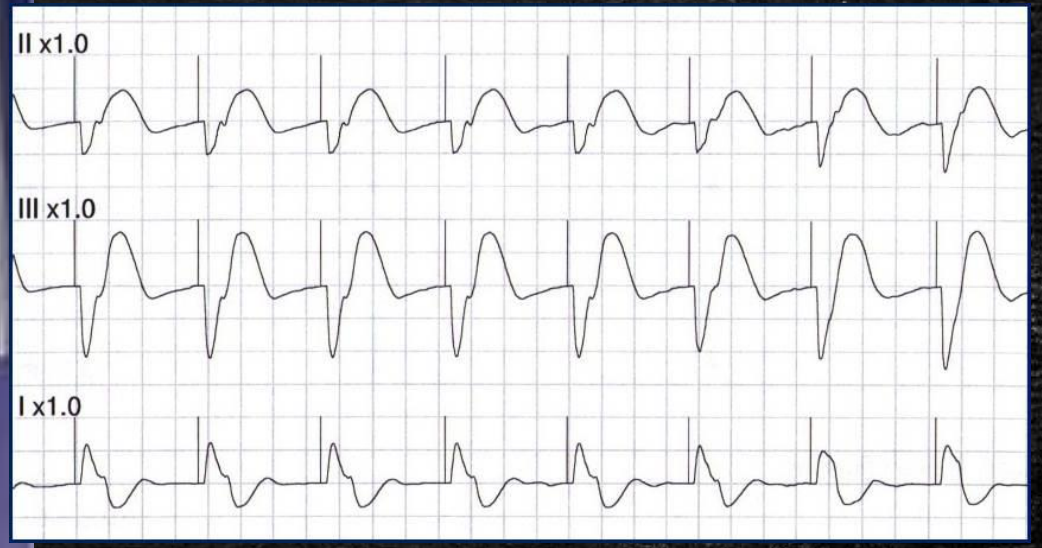


VF

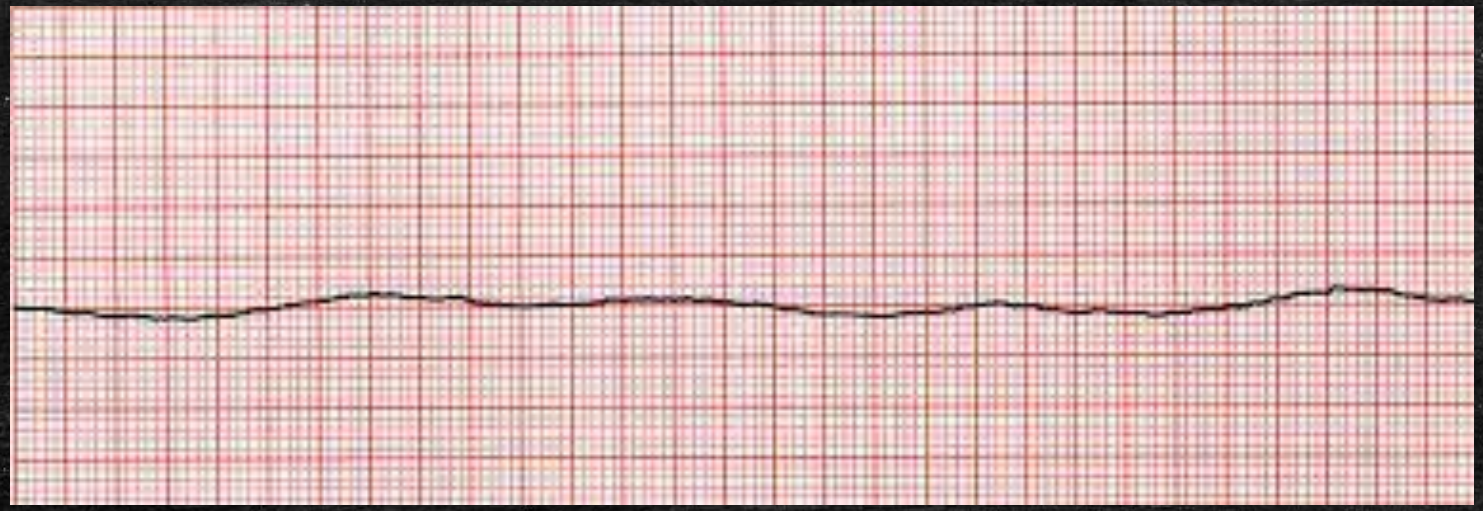
Station 4 : Electrical Therapy

Synchonize cardioversion

Transcutaneous pacing



Station 5: Cardiac arrest (Asystole/PEA)



Early Administration of Epinephrine

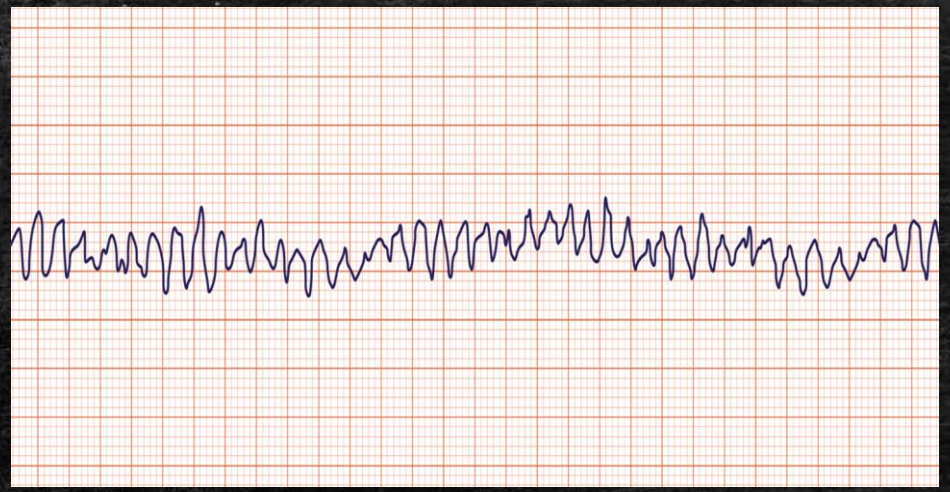
With respect to timing, for cardiac arrest with a nonshockable rhythm, it is reasonable to administer epinephrine as soon as feasible.

(Unchanged/Reaffirmed): With respect to timing, for cardiac arrest with a shockable rhythm, it may be reasonable to administer epinephrine after initial defibrillation attempts have failed.

Circulation 142, Issue 16_Suppl_2, 20 October 2020, Pages S337-S357
https://doi.org/10.1161/CIR.0000000000000918

Station 6: Cardiac arrest (VF/pulseless VT)

VF



pulseless VT

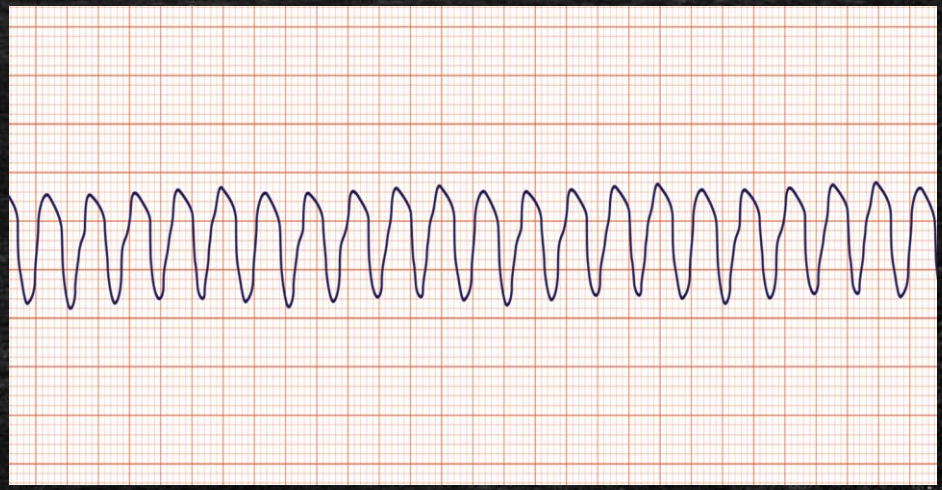
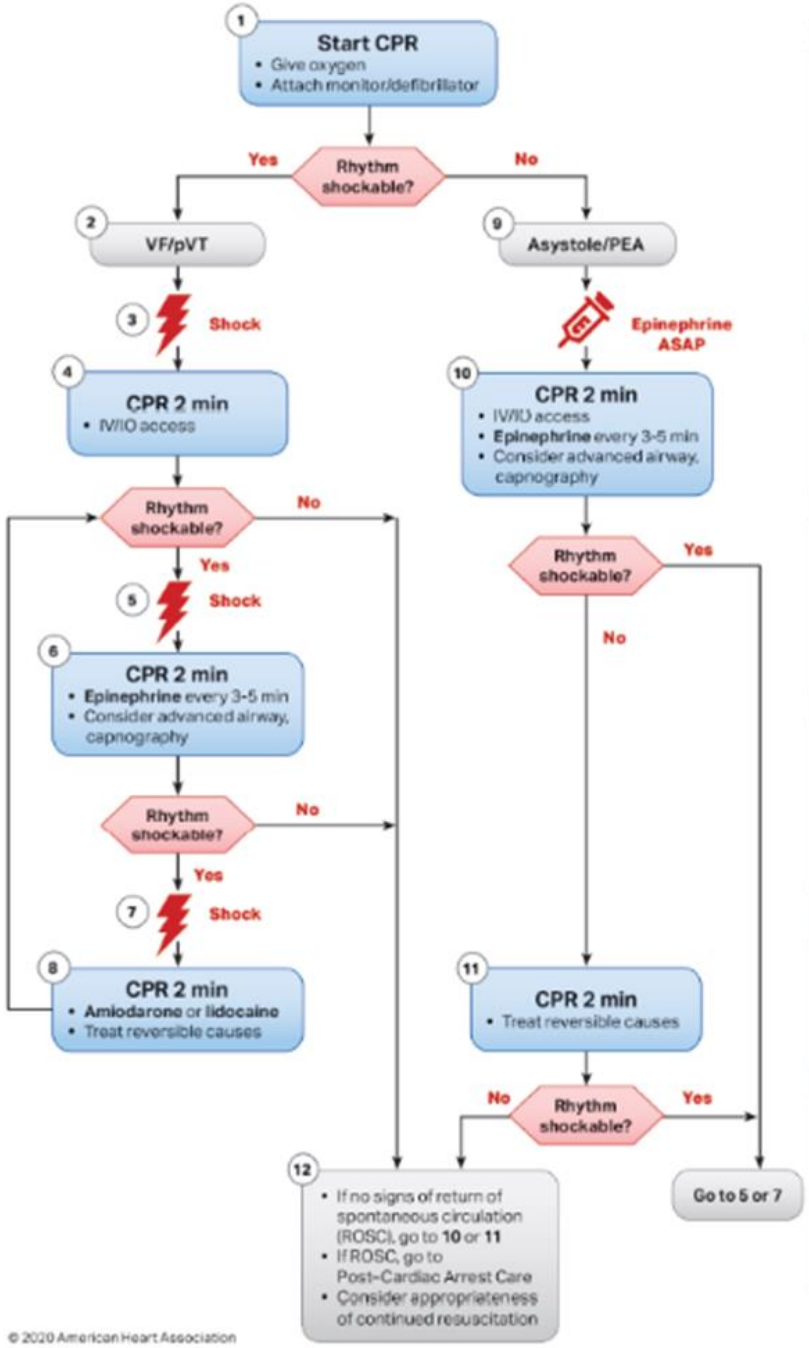


Figure 4. Adult Cardiac Arrest Algorithm.



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.
- If no advanced airway, 30:2 compression-ventilation ratio.
- Quantitative waveform capnography
  - If $PETCO_2$ 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

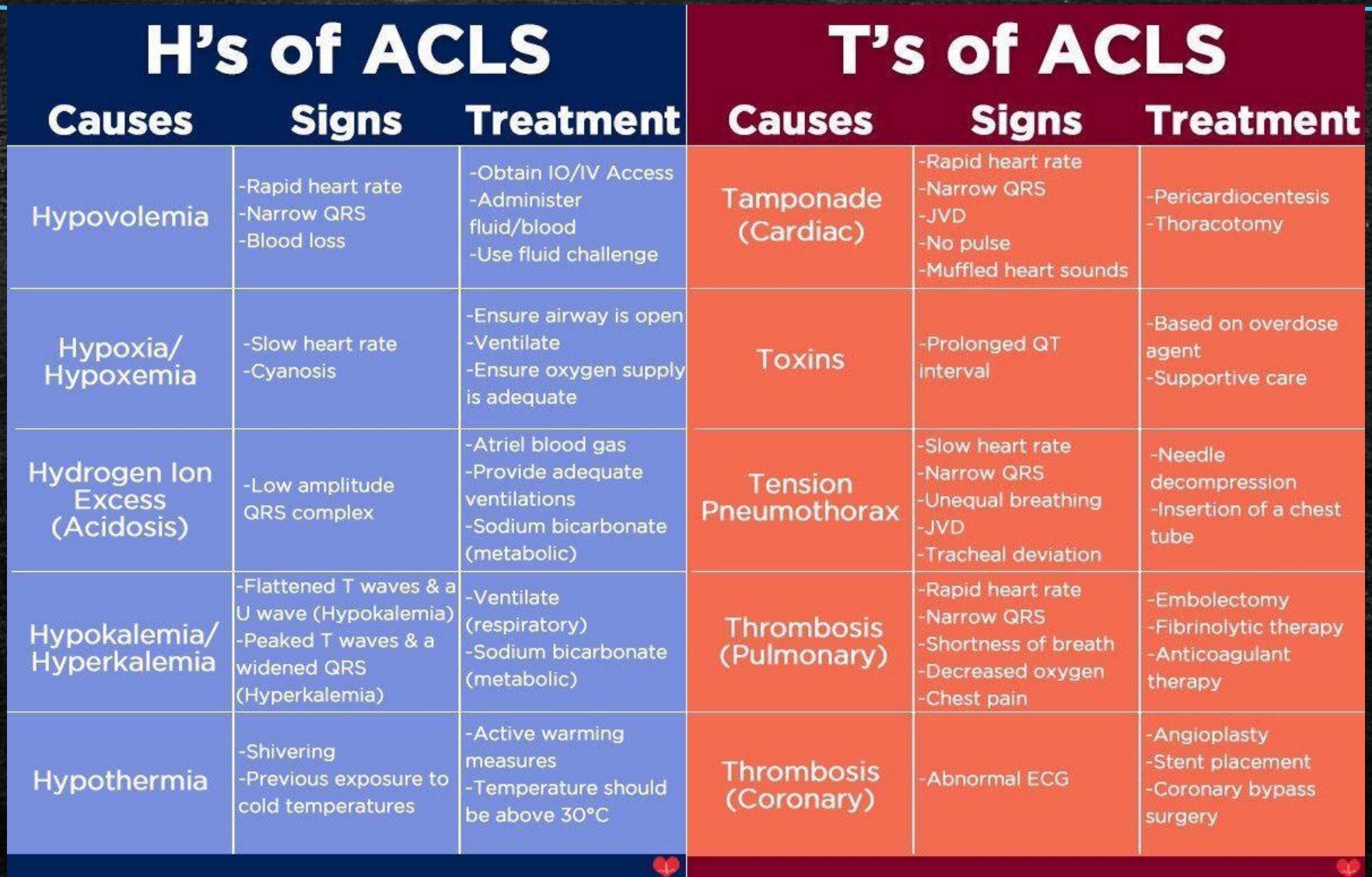
Return of Spontaneous Circulation (ROSC)

- Pulse and blood pressure
- Abrupt sustained increase in $PETCO_2$ (typically ≥40 mm Hg)
- Spontaneous arterial pressure waves with intra-arterial monitoring

Reversible Causes

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

Reversible cause



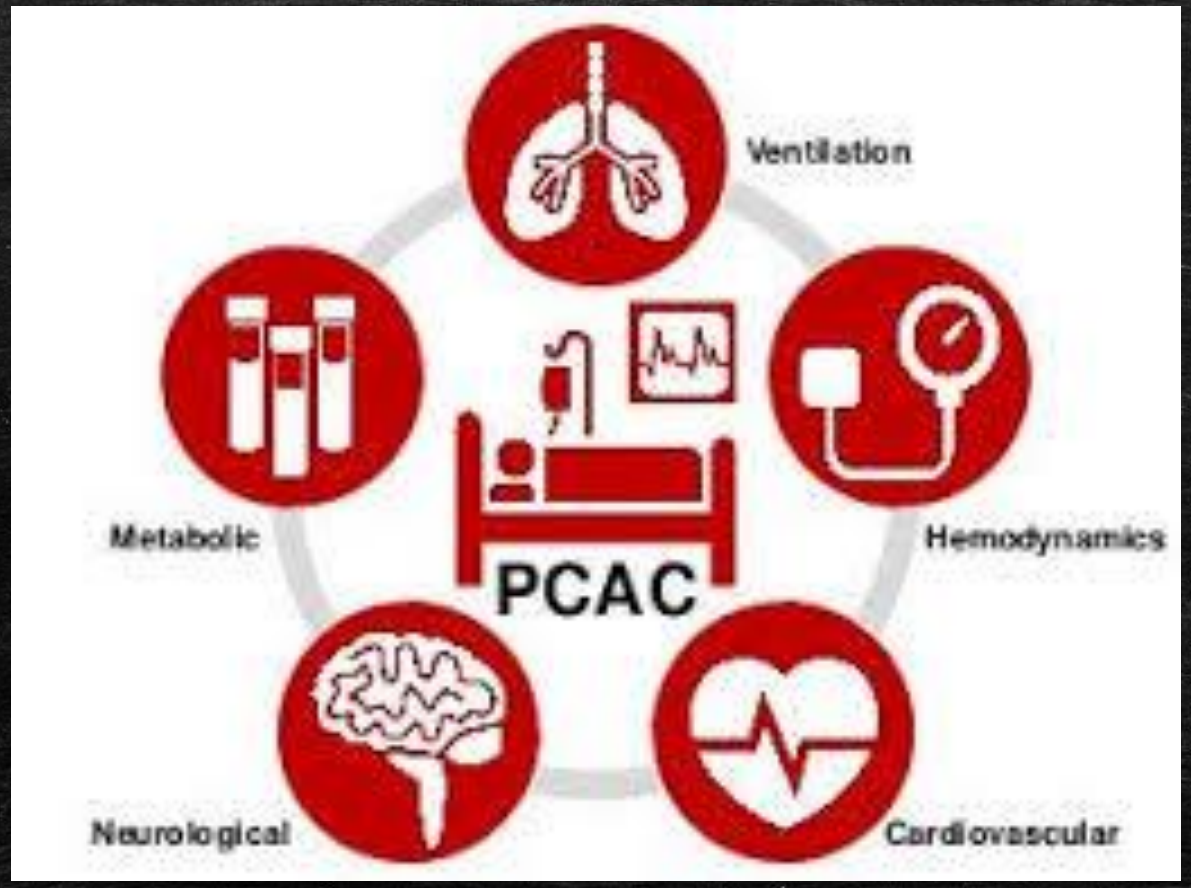
H's of ACLS

Causes	Signs	Treatment
Hypovolemia	-Rapid heart rate -Narrow QRS -Blood loss	-Obtain IO/IV Access -Administer fluid/blood -Use fluid challenge
Hypoxia/ Hypoxemia	-Slow heart rate -Cyanosis	-Ensure airway is open -Ventilate -Ensure oxygen supply is adequate
Hydrogen Ion Excess (Acidosis)	-Low amplitude QRS complex	-Atriel blood gas -Provide adequate ventilations -Sodium bicarbonate (metabolic)
Hypokalemia/ Hyperkalemia	-Flattened T waves & a U wave (Hypokalemia) -Peaked T waves & a widened QRS (Hyperkalemia)	-Ventilate (respiratory) -Sodium bicarbonate (metabolic)
Hypothermia	-Shivering -Previous exposure to cold temperatures	-Active warming measures -Temperature should be above 30°C

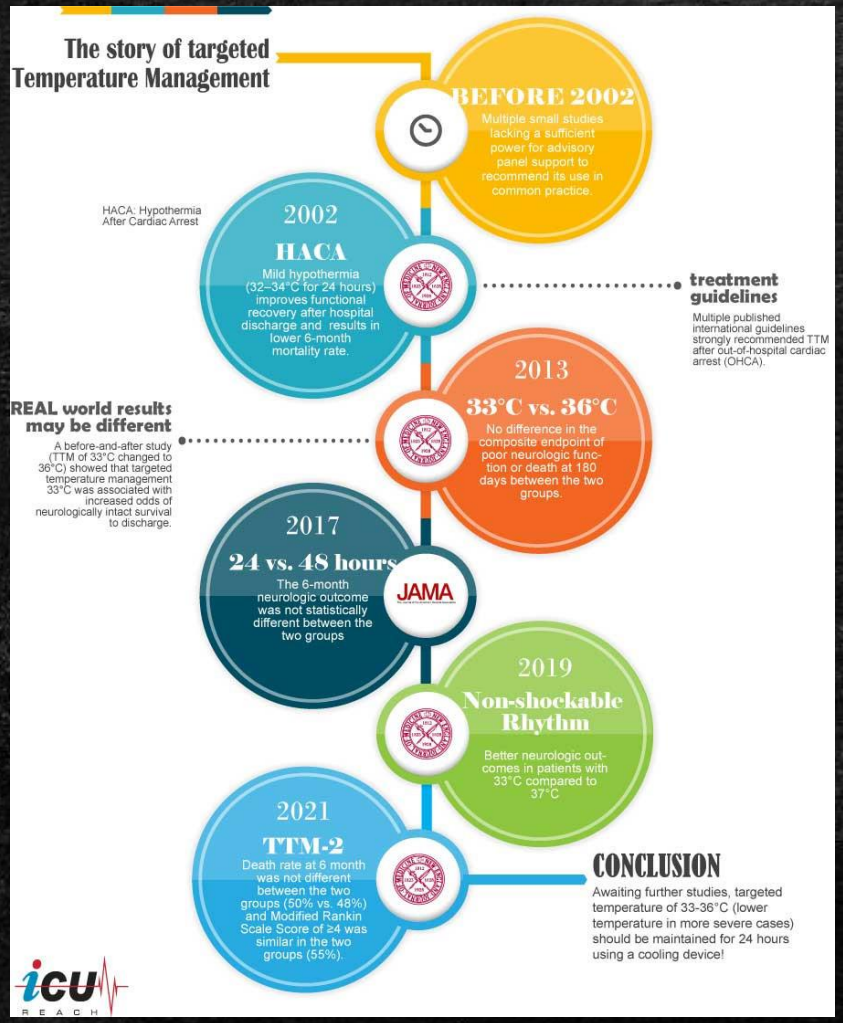
T's of ACLS

Causes	Signs	Treatment
Tamponade (Cardiac)	-Rapid heart rate -Narrow QRS -JVD -No pulse -Muffled heart sounds	-Pericardiocentesis -Thoracotomy
Toxins	-Prolonged QT interval	-Based on overdose agent -Supportive care
Tension Pneumothorax	-Slow heart rate -Narrow QRS -Unequal breathing -JVD -Tracheal deviation	-Needle decompression -Insertion of a chest tube
Thrombosis (Pulmonary)	-Rapid heart rate -Narrow QRS -Shortness of breath -Decreased oxygen -Chest pain	-Embolectomy -Fibrinolytic therapy -Anticoagulant therapy
Thrombosis (Coronary)	-Abnormal ECG	-Angioplasty -Stent placement -Coronary bypass surgery

Adult Post Cardiac Arrest Care



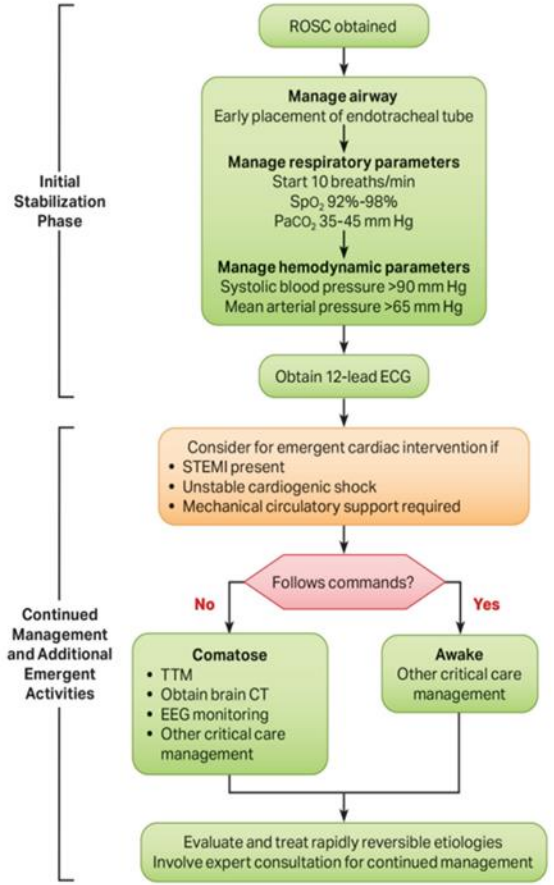
TTM(32-36C)->Temperature Control



Performance of Temperature Control

COR	LOE	Recommendations
1	B-R	1. We recommend selecting and maintaining a constant temperature between 32°C and 37.5°C during postarrest temperature control.
1	B-NR	2. We recommend hospitals develop protocols for postarrest temperature control.
2a	B-NR	3. It is reasonable that temperature control be maintained for at least 24 h after achieving target temperature.
2b	B-NR	4. There is insufficient evidence to recommend a specific therapeutic temperature for different subgroups of cardiac arrest patients.

Figure 7. Adult Post–Cardiac Arrest Care Algorithm.



Initial Stabilization Phase

Resuscitation is ongoing during the post-ROSC phase, and many of these activities can occur concurrently. However, if prioritization is necessary, follow these steps:

- Airway management: Waveform capnography or capnometry to confirm and monitor endotracheal tube placement
- Manage respiratory parameters: Titrate FIO_2 for SpO_2 92%-98%; start at 10 breaths/min; titrate to $PaCO_2$ of 35-45 mm Hg
- Manage hemodynamic parameters: Administer crystalloid and/or vasopressor or inotrope for goal systolic blood pressure >90 mm Hg or mean arterial pressure >65 mm Hg

Continued Management and Additional Emergent Activities

These evaluations should be done concurrently so that decisions on targeted temperature management (TTM) receive high priority as cardiac interventions.

- Emergent cardiac intervention: Early evaluation of 12-lead electrocardiogram (ECG); consider hemodynamics for decision on cardiac intervention
- TTM: If patient is not following commands, start TTM as soon as possible; begin at 32-36°C for 24 hours by using a cooling device with feedback loop
- Other critical care management
  - Continuously monitor core temperature (esophageal, rectal, bladder)
  - Maintain normoxia, normocapnia, euglycemia
  - Provide continuous or intermittent electroencephalogram (EEG) monitoring
  - Provide lung-protective ventilation

H's and T's

Hypovolemia
Hypoxia
Hydrogen ion (acidosis)
Hypokalemia/**h**yperkalemia
Hypothermia
Tension pneumothorax
Tamponade, cardiac
Toxins
Thrombosis, pulmonary
Thrombosis, coronary

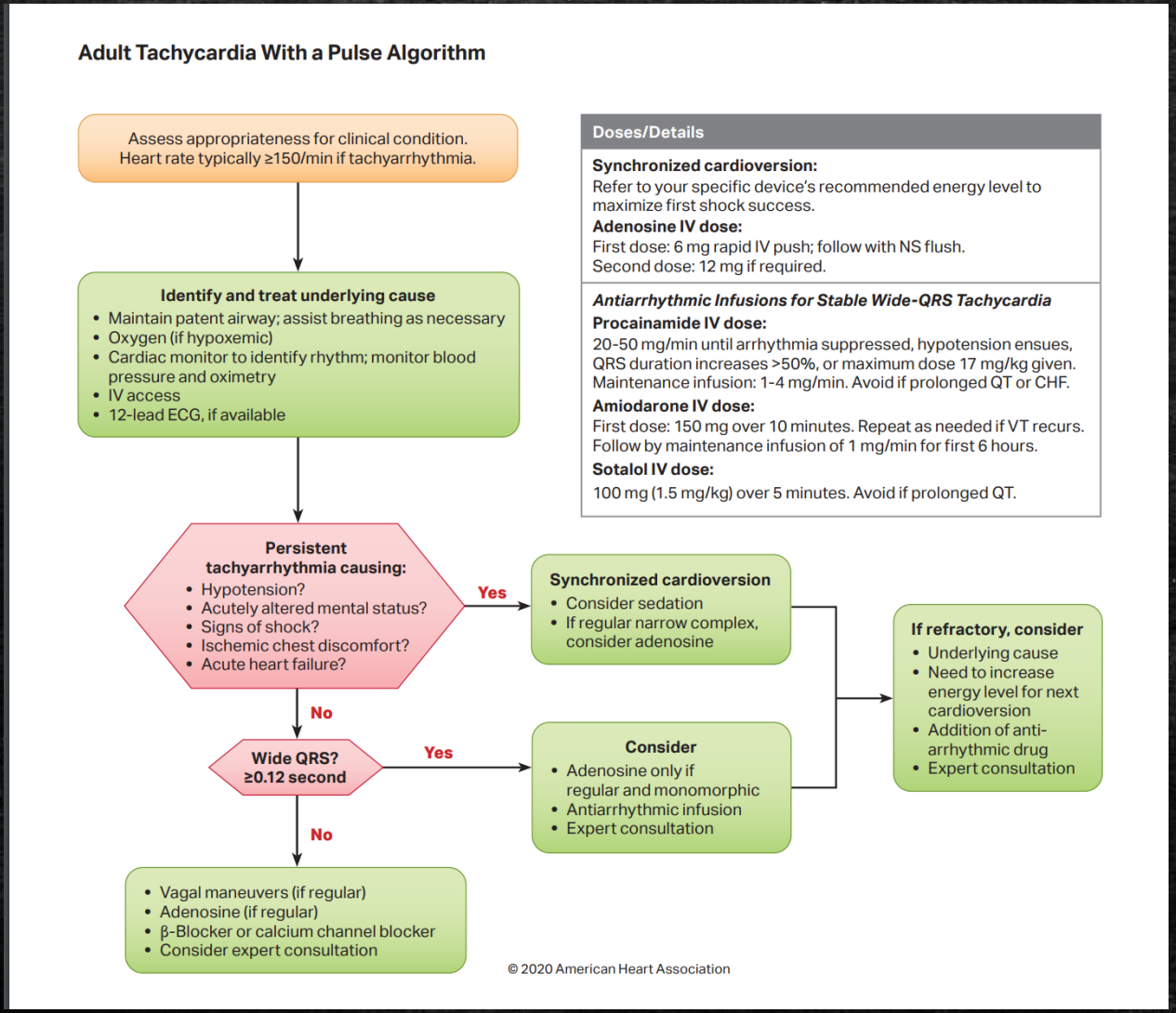
Post–Cardiac Arrest Care and Neuroprognostication

The 2020 Guidelines contain significant new clinical data about optimal care in the days after cardiac arrest. Recommendations from the 2015 AHA Guidelines Update for CPR and ECC about treatment of hypotension, titrating oxygen to avoid both hypoxia and hyperoxia, detection and treatment of seizures, and targeted temperature management were reaffirmed with new supporting evidence.

In some cases, the LOE was upgraded to reflect the availability of new data from RCTs and high-quality observational studies, and the post–cardiac arrest care algorithm has been updated to emphasize these important components of care. To be reliable, **neuroprognostication** should be performed **no sooner than 72 hours** after return to normothermia, and prognostic decisions should be based on multiple modes of patient assessment.

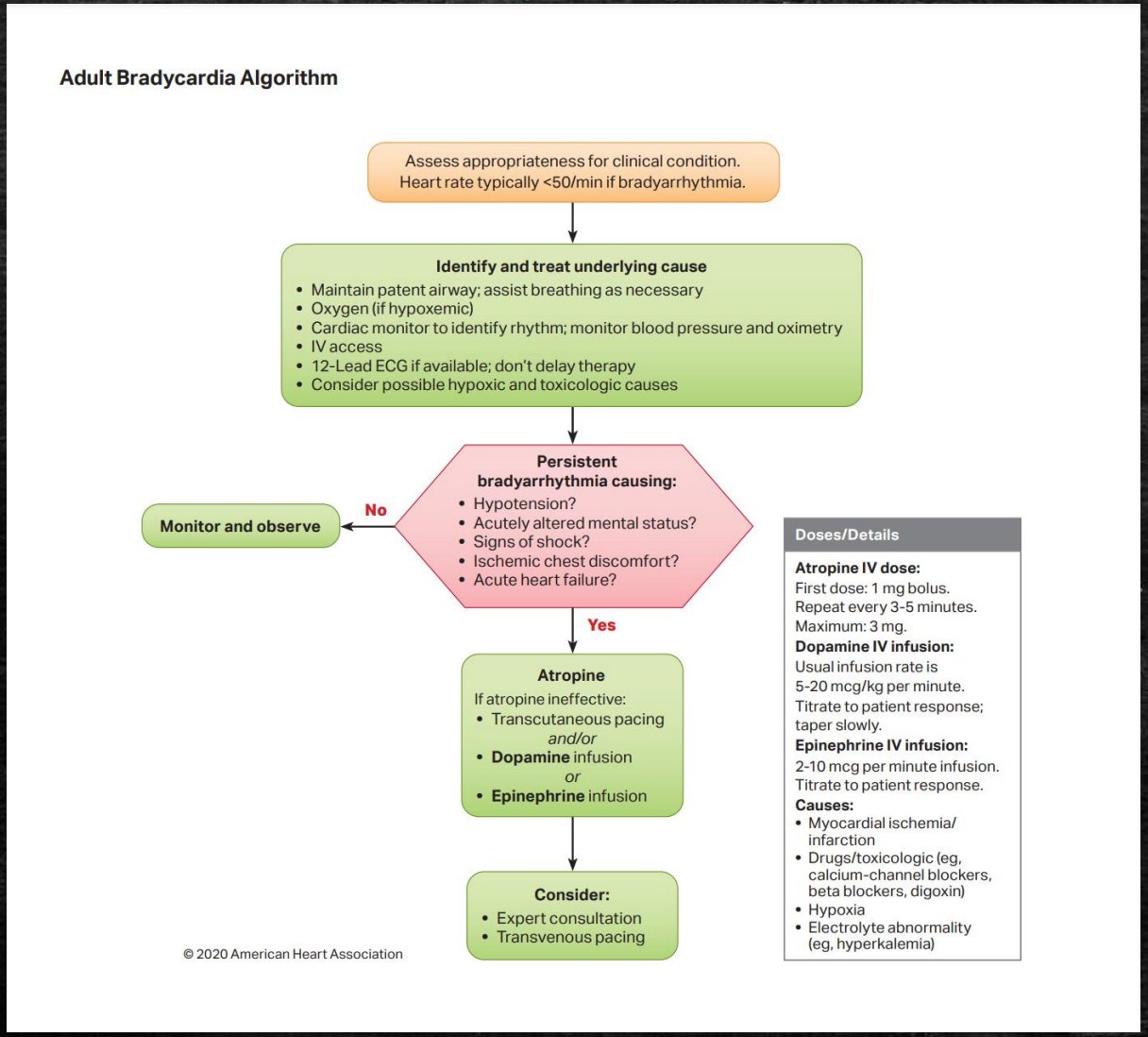
Circulation 142, Issue 16_Suppl_2, 20 October 2020, Pages S337-S357
https://doi.org/10.1161/CIR.0000000000000918

Station 7: Adult Tachycardia

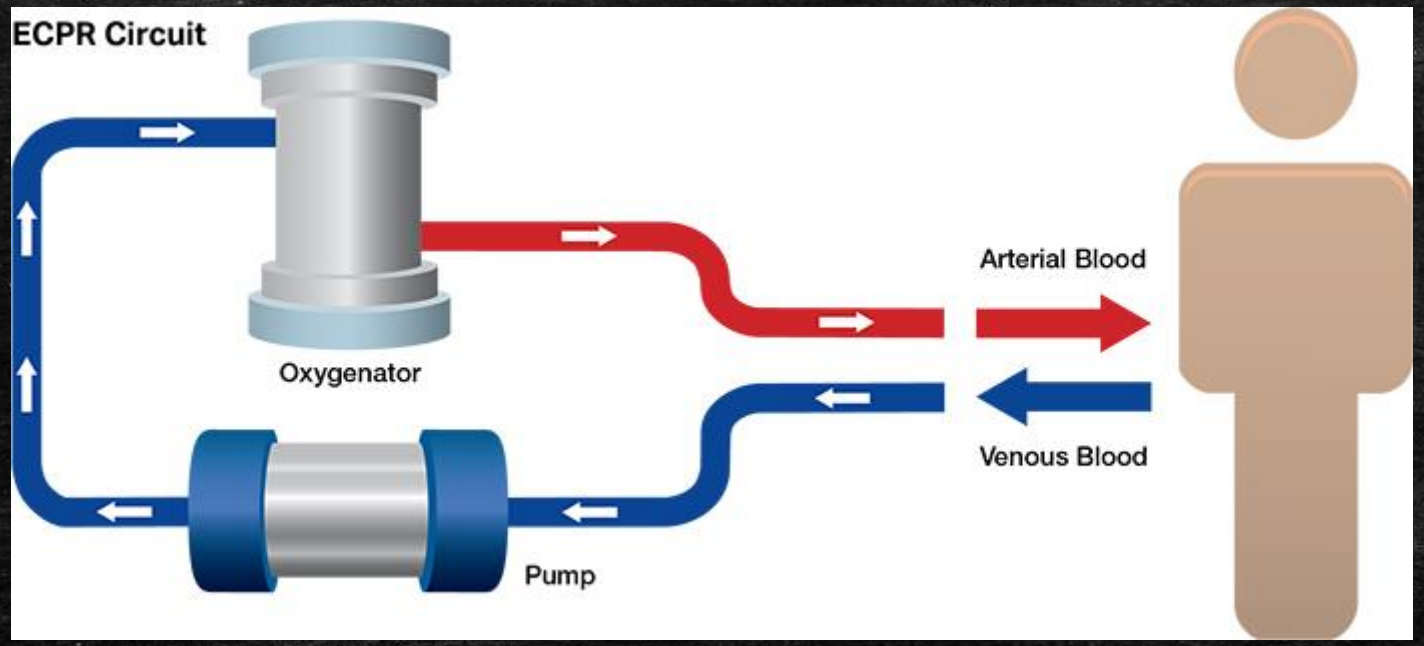


Adenosine double syringe technique

Station 8 : Adult Bradycardia



Extracorporeal membrane oxygenator circuit as used for ECPR.



ECPR

- Witnessed collapse & bystander CPR (no-flow time <5 minutes)
- Age <75 years
- Initially shockable rhythm
- No sustained ROSC within 15 minutes of ACLS (short low-flow time <60 minutes)
- Presumed correctable causes, especially cardiac etiology
- High-quality CPR ($ETCO_2$ ≥10 mm Hg)

Debriefings for Rescuers

Debriefings and referral for follow up for emotional support for lay rescuers, EMS providers, and hospital-based healthcare workers after a cardiac arrest event may be beneficial.

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Data Registries to Improve System Performance

It is reasonable for organizations that treat cardiac arrest patients to collect processes-of-care data and outcomes.

<u>Out-of-hospital cardiac arrest:</u>

- Cardiac Arrest Registry to Enhance Survival (CARES) registry

A ILCOR systematic review found **improvement in** cardiac arrest **survival** in organizations and **communities that participated in** cardiac arrest **registries**.

Circulation 142, Issue 16_Suppl_2, 20 October 2020, Pages S337-S357
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Care and Support During Recovery

We recommend that cardiac arrest survivors have multimodal rehabilitation assessment and treatment for physical, neurologic, cardiopulmonary, and cognitive impairments before discharge from the hospital.

We recommend that cardiac arrest survivors and their caregivers receive comprehensive, multidisciplinary discharge planning, to include medical and rehabilitative treatment recommendations and return to activity/work expectations.

We recommend structured assessment for anxiety, depression, posttraumatic stress, and fatigue for cardiac arrest survivors and their caregivers.

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https://doi.org/10.1161/CIR.0000000000000918

2023 American Heart Association Focused Update on Adult Advanced Cardiovascular Life Support: An Update to the American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care

Sarah M. Perman, Jonathan Elmer, Carolina B. Maciel, Anezi Uzendu, Teresa May, Bryn E. Mumma, Jason A. Bartos, Amber J. Rodriguez, Michael C. Kurz, Ashish R. Panchal, … See all authors

Originally published 18 Dec 2023 | https://doi.org/10.1161/CIR.0000000000001194 | Circulation. 2024;149:e254–e273

Vasopressor Management in Cardiac Arrest

COR	LOE	Recommendations
1	B-R	1. We recommend that epinephrine be administered for patients in cardiac arrest.
2a	B-R	2. It is reasonable to administer epinephrine 1 mg every 3 to 5 minutes for cardiac arrest.
2a	C-LD	3. With respect to timing, for cardiac arrest with a nonshockable rhythm, it is reasonable to administer epinephrine as soon as feasible.
2b	B-R	4. Vasopressin alone or vasopressin+ methylprednisolone in combination with epinephrine may be considered in cardiac arrest but offers no advantage as a substitute for epinephrine.
2b	C-LD	5. With respect to timing, for cardiac arrest with a shockable rhythm, it may be reasonable to administer epinephrine after initial defibrillation attempts have failed.
3: No Benefit	B-R	6. High-dose epinephrine is not recommended for routine use in cardiac arrest.

Nonvasopressor Medications		
COR	**LOE**	**Recommendations**
2b	**B-R**	1. Amiodarone or lidocaine may be considered for ventricular fibrillation/pulseless ventricular tachycardia that is unresponsive to defibrillation.
2b	**C-LD**	2. For patients with OHCA, use of steroids during CPR is of uncertain benefit.
3: No Benefit	**B-R**	3. Routine administration of calcium for treatment of cardiac arrest is not recommended.
3: No Benefit	**B-R**	4. Routine use of sodium bicarbonate is not recommended for patients in cardiac arrest.
3: No Benefit	**B-R**	5. Routine use of magnesium for cardiac arrest is not recommended.

ECPR		
COR	**LOE**	**Recommendation**
2a	**B-R**	1. Use of ECPR for patients with cardiac arrest refractory to standard ACLS is reasonable in select patients when provided within an appropriately trained and equipped system of care.

Percutaneous Coronary Intervention After Cardiac Arrest

COR	LOE	Recommendation
1	B-NR	1. Coronary angiography should be performed emergently for all cardiac arrest patients with suspected cardiac cause of arrest and ST-segment elevation on electrocardiogram.
2a	B-NR	2. Emergent coronary angiography is reasonable for selected adult patients without ST-elevation on electrocardiogram but with elevated risk of significant coronary artery disease where revascularization may provide benefit, such as those with shock, electrical instability, signs of significant ongoing myocardial damage, or ongoing ischemia.
2a	C-LD	3. Independent of a patient's neurologic status, coronary angiography is reasonable in all post–cardiac arrest patients for whom coronary angiography is otherwise indicated.
3: No Benefit	B-R	4. Emergent coronary angiography is not recommended over a delayed or selective strategy in patients with ROSC after cardiac arrest in the absence of ST-segment elevation, shock, electrical instability, signs of significant myocardial damage, and ongoing ischemia.

Indications for Temperature Control		
COR	**LOE**	**Recommendation**
1	**B-R**	1. We recommend all adults who do not follow commands after ROSC, irrespective of arrest location or presenting rhythm, receive treatment that includes a deliberate strategy for temperature control.

Performance of Temperature Control		
COR	**LOE**	**Recommendations**
1	**B-R**	1. We recommend selecting and maintaining a constant temperature between 32°C and 37.5°C during postarrest temperature control.
1	**B-NR**	2. We recommend hospitals develop protocols for postarrest temperature control.
2a	**B-NR**	3. It is reasonable that temperature control be maintained for at least 24 h after achieving target temperature.
2b	**B-NR**	4. There is insufficient evidence to recommend a specific therapeutic temperature for different subgroups of cardiac arrest patients.
2b	**C-LD**	5. It may be reasonable to actively prevent fever in patients unresponsive to verbal commands after initial temperature control.
2b	**C-EO**	6. Patients with spontaneous hypothermia after ROSC unresponsive to verbal commands should not routinely be actively or passively rewarmed faster than 0.5°C per hour.
2b	**B-R**	7. The benefit of strategies other than rapid infusion of cold intravenous fluids for prehospital cooling is unclear.
3: No Benefit	**B-R**	8. We do not recommend the routine use of rapid infusion of cold intravenous fluids for prehospital cooling of patients after ROSC.

Organ Donation After Cardiac Arrest		
COR	**LOE**	**Recommendations**
1	**B-NR**	1. Organ donation should be considered in all patients resuscitated from cardiac arrest who meet neurological criteria for death.
1	**B-NR**	2. Organ donation should be considered in all patients resuscitated from cardiac arrest before planned withdrawal of life-sustaining therapies.
1	**C-EO**	3. Decisions about organ donation should follow local legal and regulatory requirements.
1	**C-EO**	4. Organ donation is an important outcome that should be considered in the development and evaluation of systems of care.

Top 10 Take-Home Messages

- It is important for researchers to develop and implement methods to improve representation of participants from diverse backgrounds and to improve the accuracy of reporting study subject demographics.

- Routine administration of calcium for treatment of cardiac arrest is not recommended.

- Use of extracorporeal cardiopulmonary resuscitation for patients with cardiac arrest refractory to standard advanced cardiovascular life support is reasonable in select patients when provided within an appropriately trained and equipped system of care.

Top 10 Take-Home Messages

- Emergency coronary angiography is not recommended over a delayed or selective strategy in patients with return of spontaneous circulation after cardiac arrest unless they exhibit ST-segment–elevation myocardial infarction, shock, electrical instability, signs of significant myocardial damage, or ongoing ischemia.

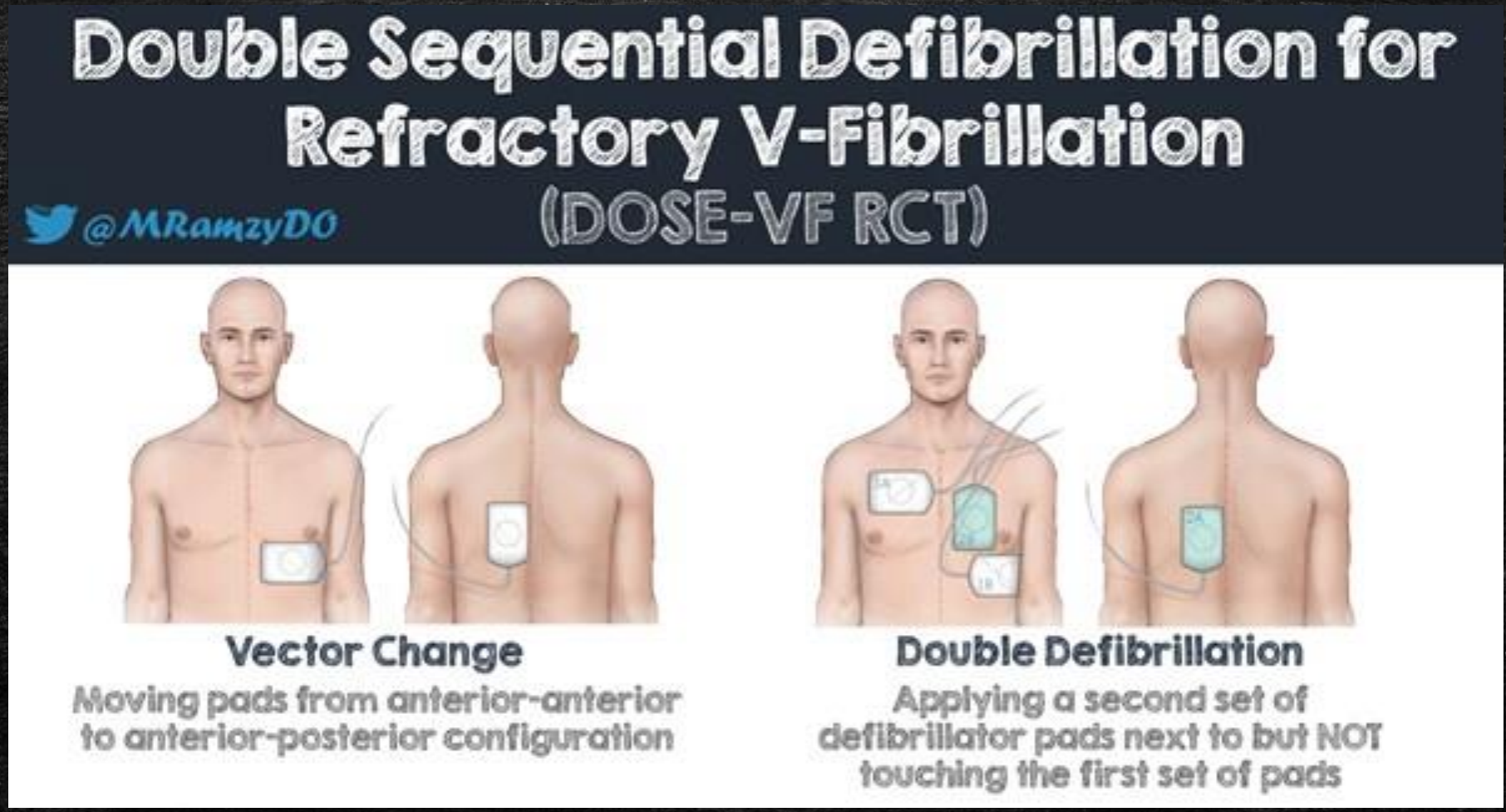
- We recommend that all adults who do not follow commands after return of spontaneous circulation, regardless of arrest location or presenting rhythm, receive treatment that includes a deliberate strategy for temperature control.

- We recommend selecting and maintaining a constant temperature between 32° C and 37.5° C during postarrest temperature control.

Top 10 Take-Home Messages

- There is insufficient evidence to recommend a specific therapeutic temperature for different subgroups of patients with cardiac arrest.
- Patients with spontaneous hypothermia after return of spontaneous circulation who do not follow commands should not be routinely actively or passively rewarmed faster than 0.5° C per hour.
- A therapeutic trial of a nonsedating antiseizure medication may be reasonable in adult survivors of cardiac arrest with electroencephalography patterns on the ictal-interictal continuum.
- Organ donation is an important outcome that should be considered in the development and evaluation of systems of care.

Double Sequential Defibrillation

- 

Double Sequential Defibrillation for Refractory V-Fibrillation

@MRamzyDO

(DOSE-VF RCT)

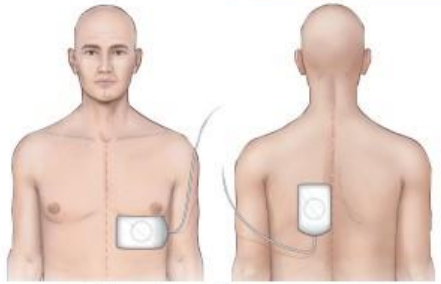
Clinical Question: How does Double Defibrillation & Vector Change compare to standard therapy for OHCA patients in Refractory V-Fibrillation?

Study Design: Three-arm, cluster RCT with crossover among six Canadian paramedic services

Enrollment: Adult cardiac arrest patients > 18 years in V-Fib after THREE consecutive shocks were enrolled in following strategies:

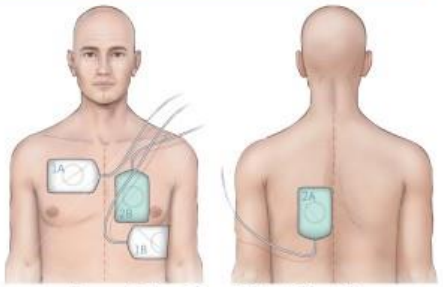
- **Strategy 1**: Standard Single Defibrillation Therapy
- **Strategy 2**: Vector Change: Anterior-Posterior Pad Placement
- **Strategy 3**: Double Sequential External Defibrillation (DSED)

Exclusion: Cardiac arrest due to trauma, drowning, hypothermia, hanging or suspected overdose



Vector Change

Moving pads from anterior-anterior to anterior-posterior configuration



Double Defibrillation

Applying a second set of defibrillator pads next to but NOT touching the first set of pads

touching the first set of pads

Outcomes

Primary Survival to Hospital Discharge

Secondary
- Termination of Ventricular Fibrillation
- Return of Spontaneous Circulation (ROSC)
- Good Neurologic Outcome (mRS ≤ 2)

Results

Outcomes	Single (n = 136)	Vector (n = 144)	DSED (n = 125)	Adj RR DSED vs Single (95% CI)	Adj RR VC vs Single (95% CI)
Survival to Hospital Discharge (%)	18 (13.3)	31 (21.7)	38 (30.4)	2.21 (1.33 - 3.67)	1.71 (1.01 - 2.88)
Termination of V-Fibrillation (%)	92 (67.6)	115 (79.9)	105 (84.0)	1.25 (1.09 - 1.44)	1.18 (1.03 - 1.36)
ROSC (%)	36 (26.5)	51 (35.4)	58 (46.4)	1.72 (1.22 - 2.42)	1.39 (0.97 - 1.99)
mRS ≤ 2 (%)	15 (11.2)	23 (16.2)	34 (27.4)	2.21 (1.26 - 3.88)	1.48 (0.81 - 2.71)

- 450 patients were enrolled and a total of 405 underwent randomization
- 67.9% of OHCAs were witnessed and 58% received bystander CPR
- Additional patient characteristics can be found in the full paper using QR code

Author's Conclusion

Among patients w/RVF, survival to discharge occurred more frequently among those who received DSED or vector change defibrillation than those who received standard defibrillation

Clinical Bottom Line

In addition to early high-quality CPR, DSED and VC defibrillation should be strongly considered in cardiac arrest patients with refractory ventricular fibrillation

⚠ There was not a single reported case of defibrillator damage or malfunction when DSED was performed

Full Article Scan Me

Thank you for attention