
بسم الله الرحمن الرحيم

Electrical Therapies

Defibrillation vs. Cardioversion

Defibrillation	■ *Electric shock delivered without synchronization with ECG activity* ■ *Used in VF or pulseless VT*
Synchronized Cardio-version	■ *Electric shock delivered with synchronization with R wave to avoid the R on T phenomenon* ■ *Used in unstable tachyarrhytmias other than VF or pulseless VT*

Indications

- Indications for defibrillation include the following:

- Pulseless ventricular tachycardia (VT)

- Ventricular fibrillation (VF)

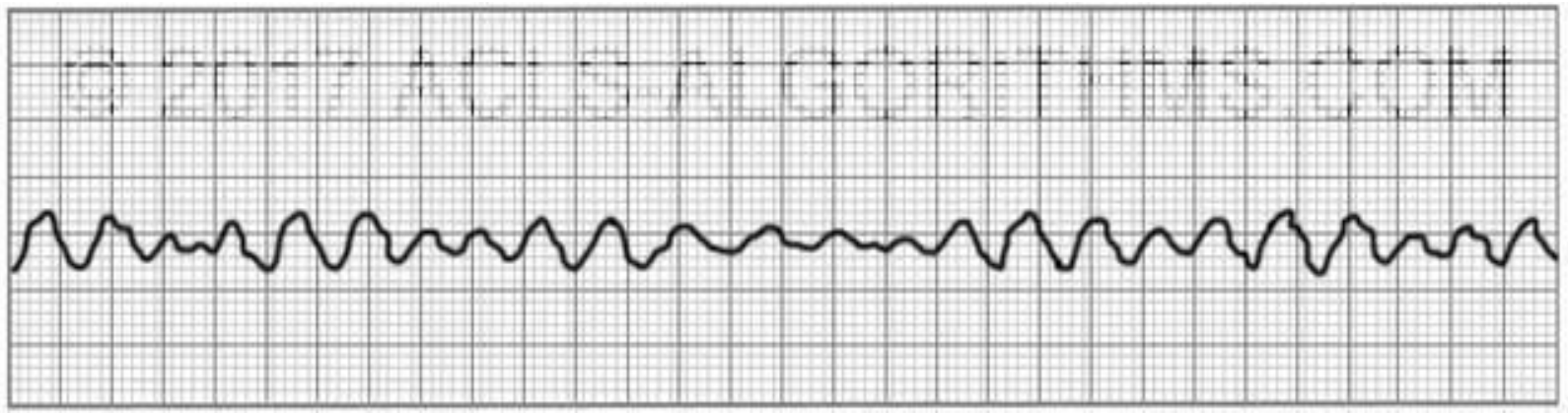
Early Defibrillation

(1) the most frequent initial rhythm in witnessed SCA is VF

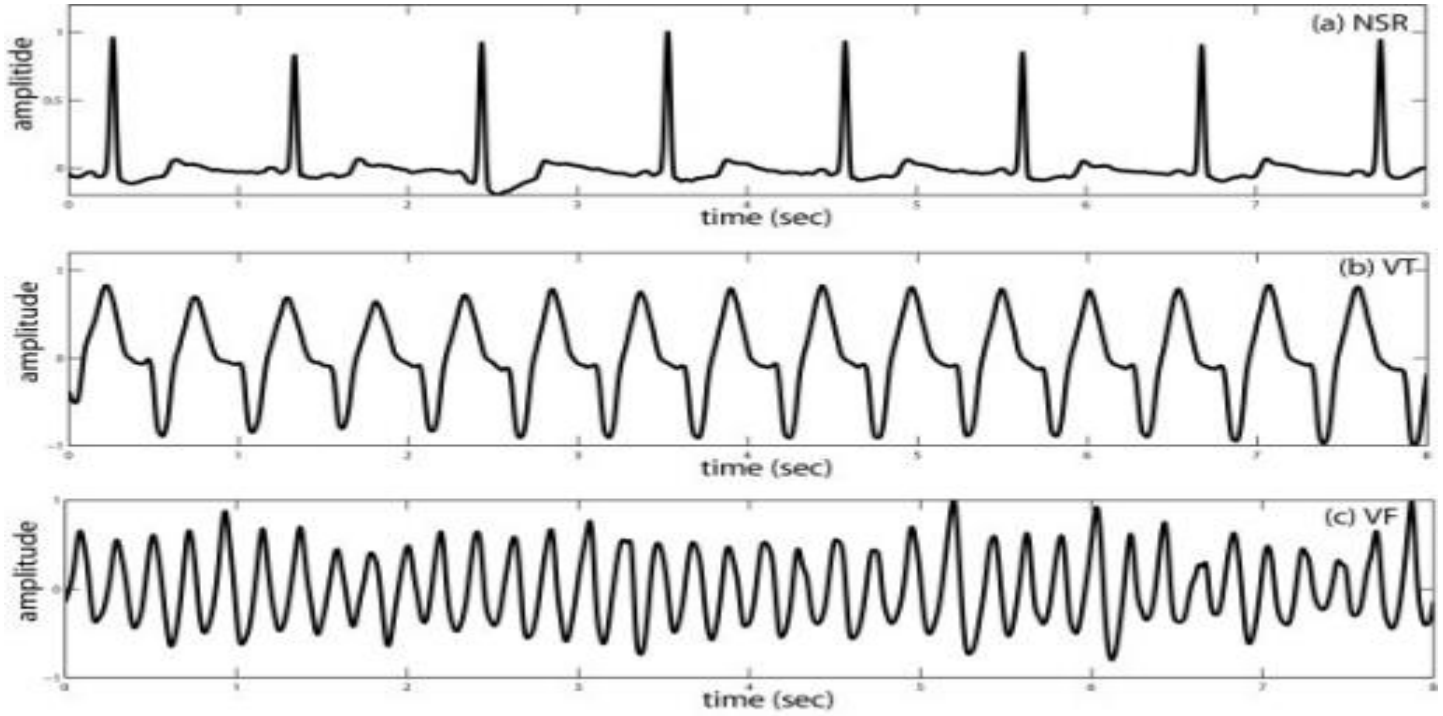
(2) the treatment for VF is electrical defibrillation,

(3) the probability of successful defibrillation diminishes rapidly over time

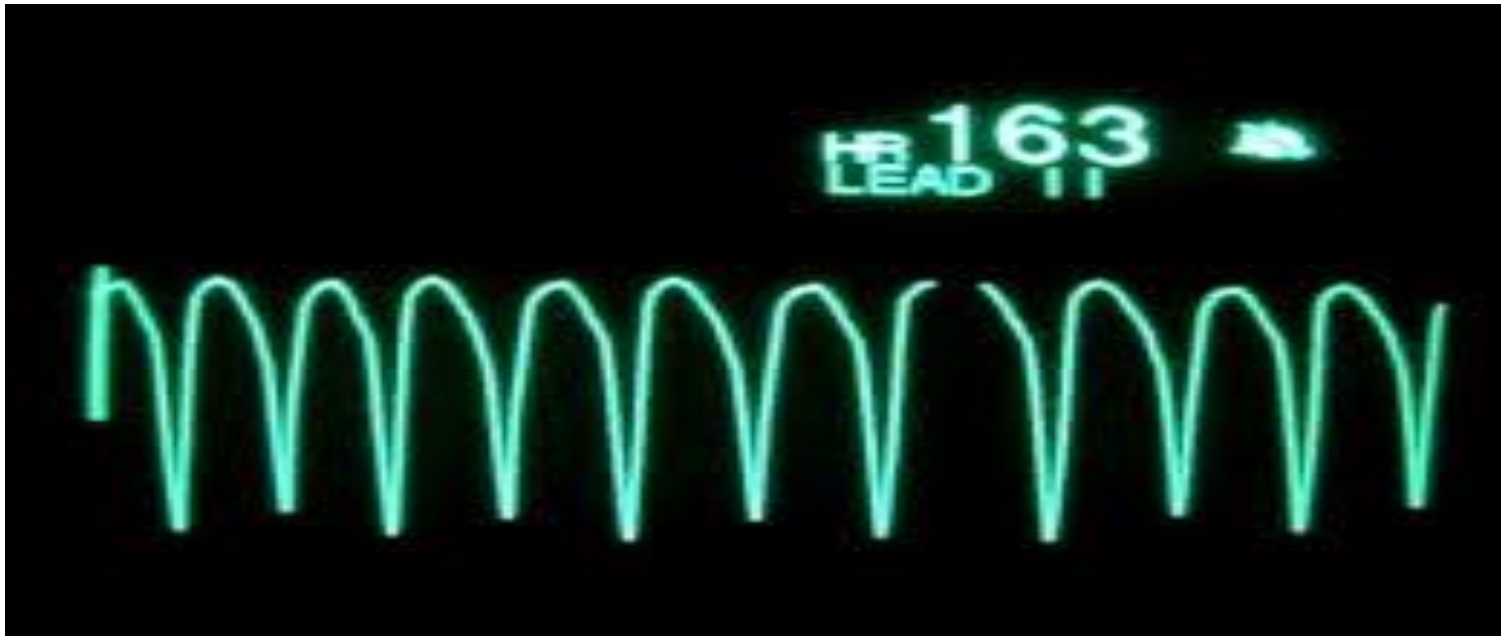
(4) VF tends to deteriorate to asystole within a few minutes.



Ventricular Tachycardia (VT)


(a) NSR
amplitide
time (sec)
(b) VT
amplitude
time (sec)
(c) VF
amplitude
time (sec)
Figure 1

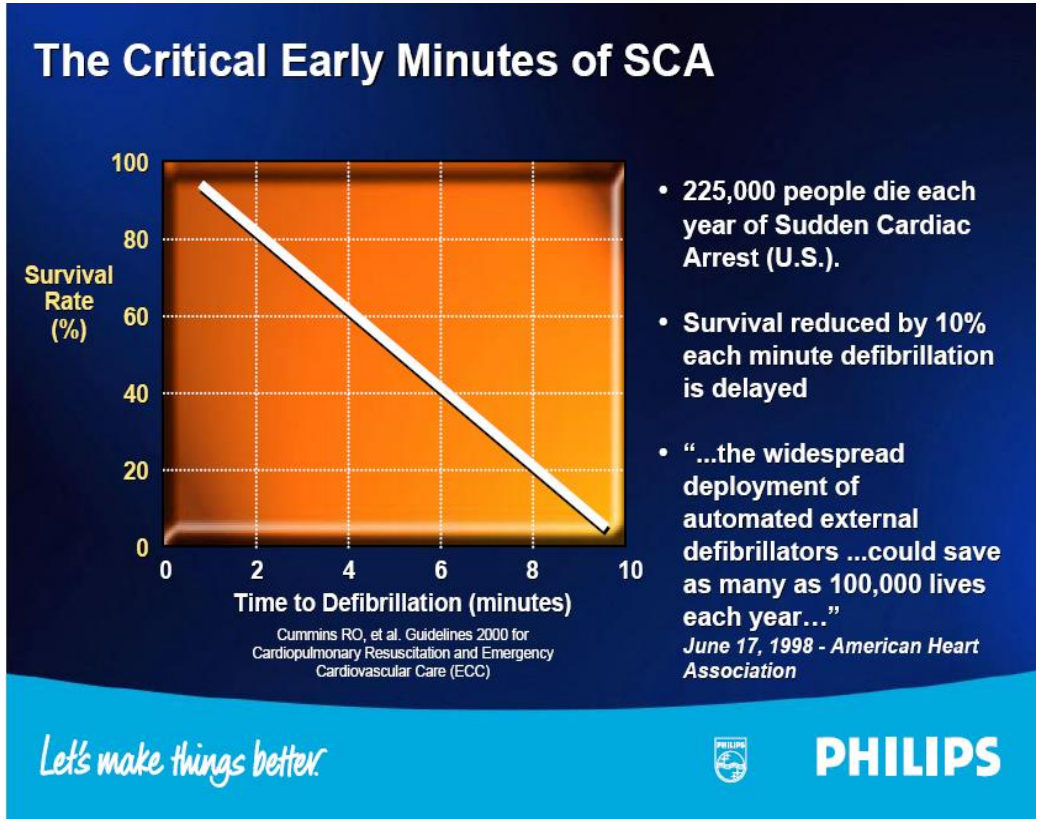

ECG x1.5 48
E PADS
DEFIB 200J SEL
01:01
BIPHASIC


HR
163
LEAD II

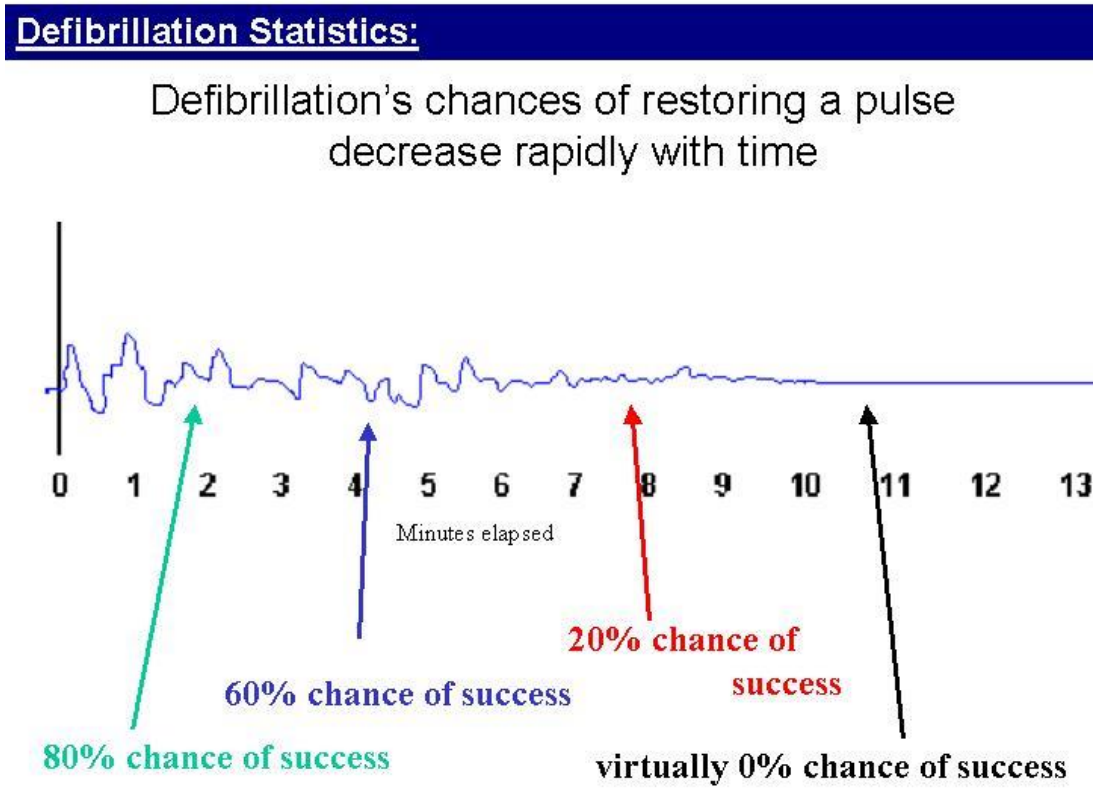
SURVIVAL

- Without CPR :
  - Decrease 7 – 10 % for every minute delay
- With CPR :
  - Decrease 3 – 4 % for every minute delay
  - Double or triple SURVIVAL

SURVIVAL


The Critical Early Minutes of SCA
Survival Rate (%)
100
80
60
40
20
0
0
2
4
6
8
10
Time to Defibrillation (minutes)
Cummins RO, et al. Guidelines 2000 for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care (ECC)
• 225,000 people die each year of Sudden Cardiac Arrest (U.S.).
• Survival reduced by 10% each minute defibrillation is delayed
• "...the widespread deployment of automated external defibrillators ...could save as many as 100,000 lives each year…"
June 17, 1998 - American Heart Association
Let's make things better.
PHILIPS

SURVIVAL


Defibrillation Statistics:
Defibrillation's chances of restoring a pulse decrease rapidly with time
0 1 2 3 4 5 6 7 8 9 10 11 12 13
Minutes elapsed
80% chance of success
60% chance of success
20% chance of success
virtually 0% chance of success

survival

Sudden Cardiac Arrest

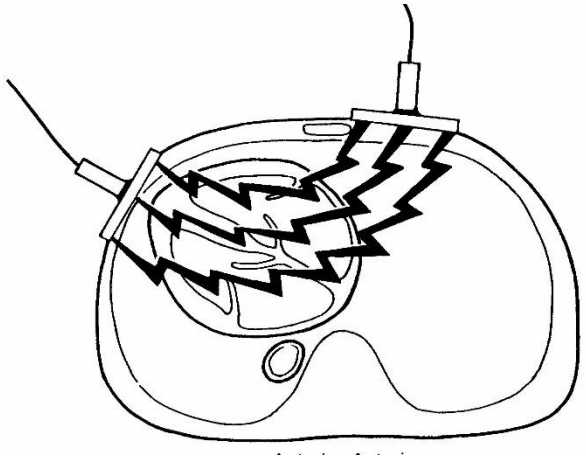
- The survival rate from CPR alone is 0-2%
- CPR will buy you time, it will not stop a VF

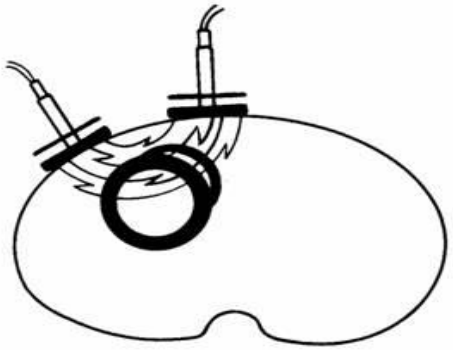
American Heart Association®
Learn and Live℠

The time from collapse to defibrillation is the single greatest determinant of survival.

Sternal-apical

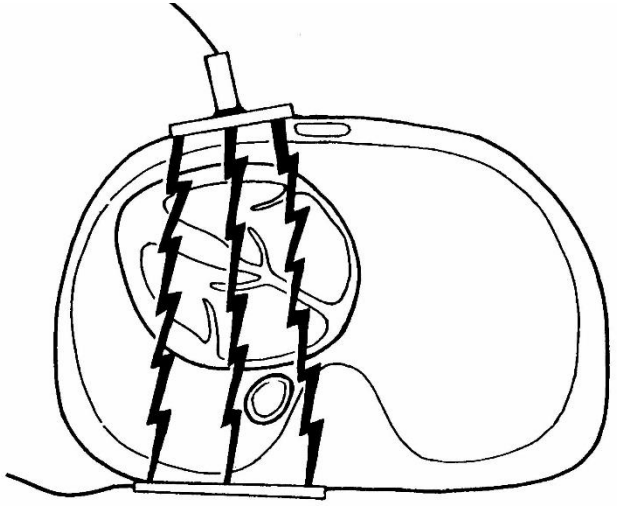
- Below the outer right clavicle
- Cardiac apex





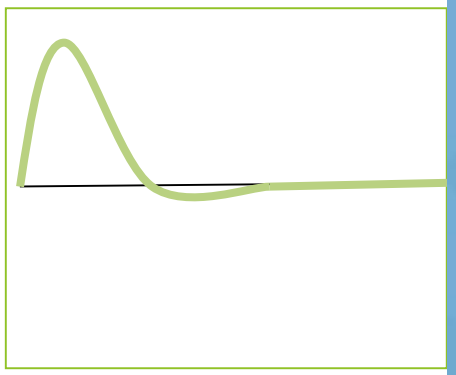
Left-anterior-posterior

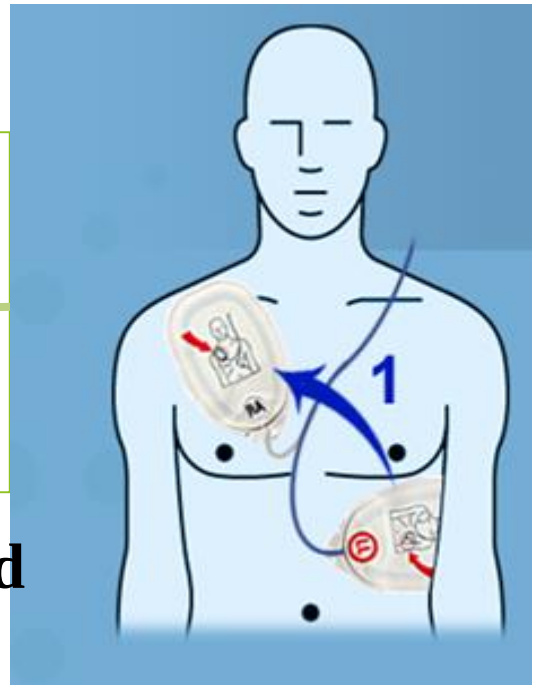
- Anterior apex just left of palpable cardiac apex
- Back inferior to the left scapula



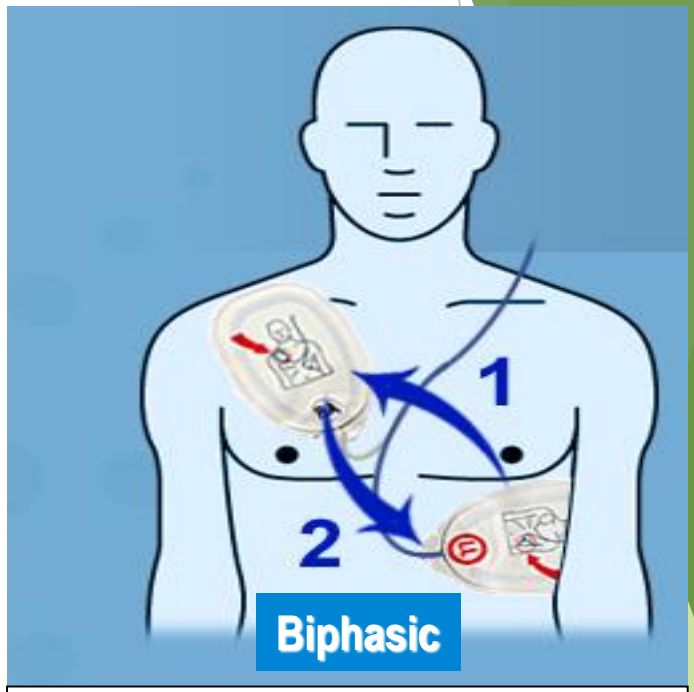
Defibrillation Waveform

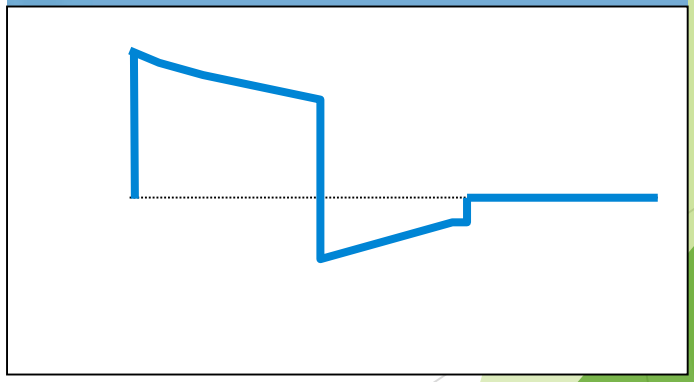
Monophasic



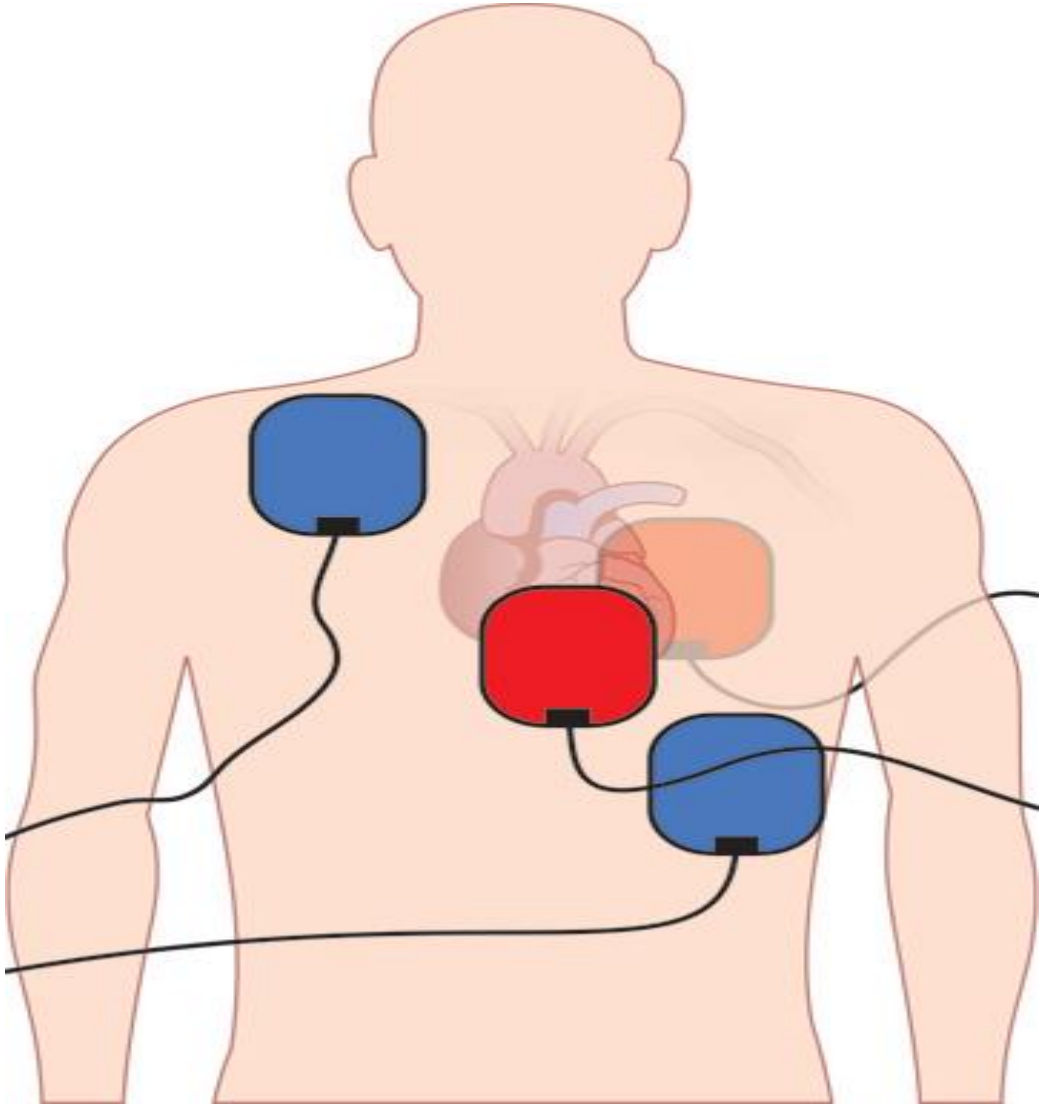


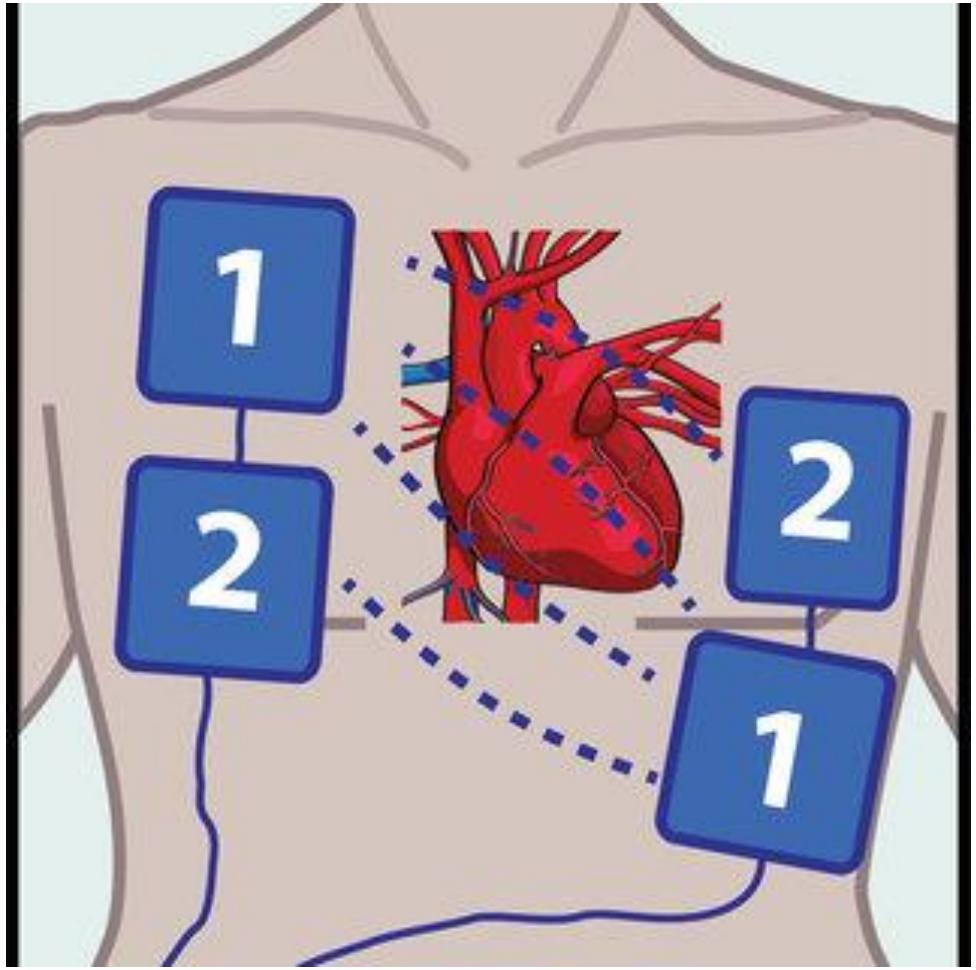
Current delivered in one direction





Current delivered in two directions




1
2
2
1

Defibrillators using biphasic waveforms are preferred to monophasic defibrillators for treatment of both atrial and ventricular arrhythmias.

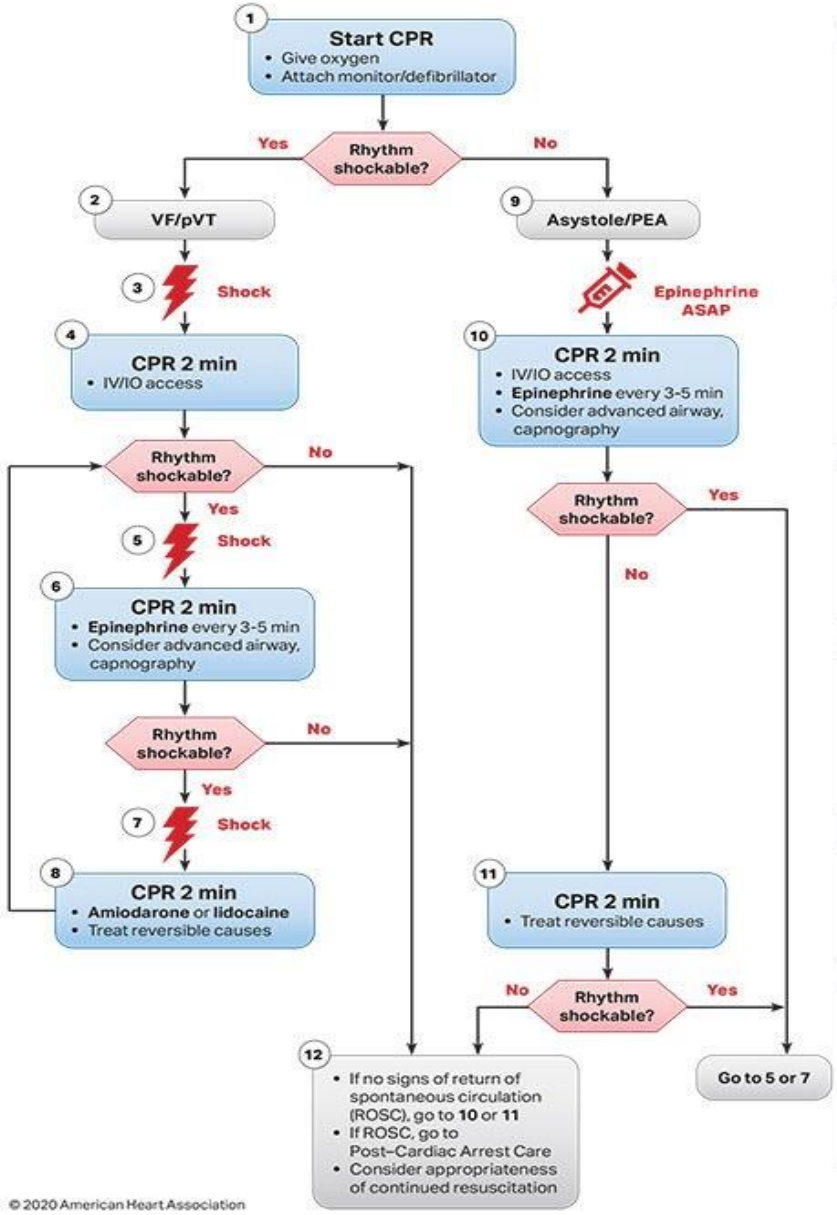
It is reasonable to use the manufacturer's recommended energy dose for the first shock. If this is not known, defibrillation at the maximal dose may be considered

If using a manual defibrillator capable of escalating energies, higher energy for second and subsequent shocks may be considered

- Single Shocks Versus Stacked Shock?

A single-shock strategy (as opposed to stacked shocks) is reasonable for defibrillation

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



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 P_{ETCO_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 P_{ETCO_2} (typically ≥40 mm Hg)
- Spontaneous arterial pressure waves with intra-arterial monitoring

Reversible Causes

- **H**ypovolemia
- **H**ypoxia
- **H**ydrogen ion (acidosis)
- **H**ypo-/hyperkalemia
- **H**ypothermia
- **T**ension pneumothorax
- **T**amponade, cardiac
- **T**oxins
- **T**hrombosis, pulmonary
- **T**hrombosis, coronary

Thank you