

Refractory Ventricular Fibrillation (RVF)

- RVF is a complication of cardiac arrest defined as Ventricular Fibrillation that is unable to obtain a return of spontaneous circulation (ROSC) within 10 minutes despite three defibrillation attempts, 300mg of amiodarone, and 3mg of epinephrine.
- Patients with RVF during their cardiac arrest have a mortality rate of up to 97%.
- Most common causes for VF:
 - Heart disease
 - Heart attack or chest pain
 - Arrhythmias or arrhythmia-causing conditions
 - Certain medications
- Treatment:
 - Double external Defibrillation (DED) involves the use of a second defibrillation providing an additional shock in a sequential or simultaneous manner. The use of DED occurs after standard transthoracic electrical current from a single defibrillation has failed to terminate the lethal rhythm.
 - Power Theory: This approach requires the two electrical currents from both defibrillator devices to be administered at the same time or as close together as possible and is where DED gets one of its more common names of “double simultaneous defibrillation” DSiD
 - Setting Up Theory: This theory suggests that the first transthoracic current lowers the defibrillation threshold, which then increases the second transthoracic current's success at converting any remaining fibrillation myocytes. This theory requires a deliberate pause when administering but not delivered at exactly the same time, the most common name of “double sequential defibrillation” DSD.

<https://rebelem.com/the-dose-vf-pilot-rct-double-sequential-external-defibrillation-for-refractory-ventricular-fibrillation/>

<https://www.ncbi.nlm.nih.gov/books/NBK544231/>

Epinephrine

- The primary drug administered during CPR to reverse cardiac arrest. Epinephrine increases arterial blood pressure and coronary perfusion during CPR. vasoconstrictor properties.
- 1mg administered every 3-5 minutes during resuscitation. Follow each dose with 20mL flush. Elevate arm for 10-20 seconds after dose.

Amiodarone

- Used to treat some atrial and ventricular arrhythmias. Because its use is associated with toxicity, amiodarone is indicated for use in patients with life-threatening arrhythmias when administered with appropriate monitoring.
- First dose: 300mg IV/IO push
- Second dose (if needed): 150mg IV/IO push

Lidocaine

- Alternative to amiodarone in cardiac arrest from VF. antiarrhythmic
- Works in injured or ischemic myocardial cells to limit sodium influx and restore rhythm. Normally, the ventricles contract in response to impulses from the SA node. But when tissue damage occurs in the ventricles, ischemic cells allow a rapid infusion of sodium ions that causes the cells to depolarize much more quickly than normal and then begin firing spontaneously to create an ectopic pacemaker, which can trigger ventricular arrhythmias.
- Initial dose: 1-1.5mg/kg IV/IO
- For Refractory VF, may give additional 0.5-0.75 mg/kg IV push, repeat in 5-10 minutes; maximum 3 doses or total of 3 mg/kg

[https://www.nursingcenter.com/ncblog/july-2022/lidocaine#:~:text=Lidocaine%20may%20be%20administered%20\(off,to%201.5%20mg%2Fkg%20bolus.](https://www.nursingcenter.com/ncblog/july-2022/lidocaine#:~:text=Lidocaine%20may%20be%20administered%20(off,to%201.5%20mg%2Fkg%20bolus.)

Norepinephrine

- Is a naturally occurring potent vasoconstrictor and inotropic agent.
- The initial dose is 0.5-1.0 micrograms/min titrated to effect. Patients with refractory shock may require 8-30 micrograms/min. It should not be administered in the same IV line as alkaline solutions, which may inactivate it.

https://www.ahajournals.org/doi/10.1161/circ.102.suppl_1.1-129

<https://www.ahajournals.org/doi/10.1161/CIRCULATIONAHA.105.166557>

Intraosseous (IO) Cannulation:

- The placement of a specialized hollow bore needle through the cortex of a bone into the medullary space for infusion of medical therapy and laboratory tests.
- Provides access to a non collapsible venous plexus, enabling drug delivery similar to that achieved by central venous access.
- Proximal Tibia: 1-2 cm inferior and medial to the tibial tuberosity in the flat portion of the tibia.
- Distal Tibia: 2 cm proximal to the medial malleolus in the flat portion of the Tibia.

[https://www.ncbi.nlm.nih.gov/books/NBK554373/#:~:text=Intraosseous%20\(IO\)%20vascular%20access%20refers,not%20easily%20obtained%20in%20the](https://www.ncbi.nlm.nih.gov/books/NBK554373/#:~:text=Intraosseous%20(IO)%20vascular%20access%20refers,not%20easily%20obtained%20in%20the)