

## ACLS Review

### BLS CPR

BLS CPR changed in 2010. The primary change is from the “ABC” format to “CAB.” After establishing unresponsiveness and calling for a code, check for a pulse less than 10 seconds then begin compressions immediately, within 10 seconds of arriving at the patient’s side. After thirty compressions, give your first two breaths. The 30:2 ratio then will continue. “Look, listen and feel” for breathing has been removed from the new guidelines. One other significant change in 2010, the use of an AED is now indicated for infants.

#### Here are the basic steps in BLS:

1. Check for responsiveness
2. Call for help and an AED
3. Check for pulse and simultaneously scan the chest for breathing.
4. Begin the thirty compressions (within 10 seconds of arriving at the patient)
5. Give two breaths—continue 30:2 ratio.

#### High Quality CPR includes:

1. Effective compressions at least 100/min
2. Minimal interruptions (<10secs)
3. Allow for recoil, monitoring via capnography \*less than 10 is ineffective
4. At least 2 inch compression depth
5. Rotate q2mins/5cycles

#### Defibrillate early (use AED)

### Airway

***Pulse Oximetry to be between 94 – 99% to avoid hyperoxia (high oxygen tension can lead to tissue death)***

Waveform Capnography (pETCO<sub>2</sub>)

Best way to evaluate advanced airway placement

Can assist in measuring cardiac output during CPR

ETCO<sub>2</sub> reading must be greater than 10 during CPR (>10) or patient will not survive

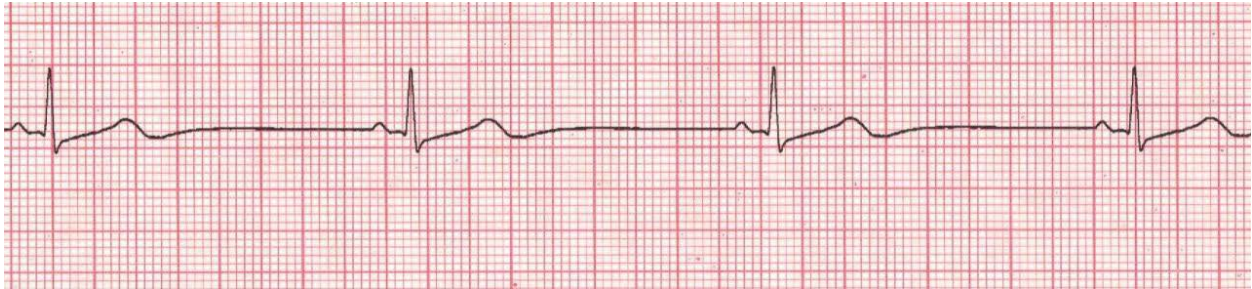
Normal readings for pETCO<sub>2</sub> for patients should be **35-40**

Ventilations with Bag Valve Mask (BVM) – breaths every 5-6 sec (10-12 breaths per minute)

Ventilations with Advanced Airway – breaths every 6-8 sec (8-10 breaths per minute)

## Sinus Bradycardia

*(Sinus rhythm with a rate less than 50)*



Is your patient stable or unstable?

Stable- monitor closely

Unstable/ Symptomatic – this patient is showing signs of poor perfusion (their heart rate is not fast enough to deliver an adequate volume of blood to the body and requires treatment/ intervention) for example: hypotensive feels faint, decreased or altered mental status, cool or clammy/diaphoretic.

Administer **0.5mg Atropine**. If **Atropine** is ineffective you now have four options:

1. **Repeat Atropine 0.5 mg** (dosing 0.5mg – 1 mg, max total dose 3mg)
2. administer **Dopamine 2-10 mcg/kg/minute OR**
3. Administer **Epinephrine infusion: 2 – 10 mcg per minute**
4. Prepare and provide external **transcutaneous pacing**.

## Heart Blocks



Is your patient stable or unstable?

Stable- monitor closely, seek expert consultation

Unstable/ Symptomatic – this patient is showing signs of poor perfusion (their heart rate is not fast enough to deliver an adequate volume of blood to the body and requires treatment/ intervention) for example: low B/P, feels faint, decreased or altered mental status, cool or clammy/diaphoretic

Administer **0.5mg Atropine**. But don't rely on atropine in Mobitz type II, second-degree block or third-degree block with a new wide QRS complex.

For an unstable Mobitz type II second-degree or third-degree heart block patient be prepared for transcutaneous pacing

## Supraventricular Tachycardia

- SVT (SUSTAINED rapid narrow complex tachycardia with a rate greater than 150)



Is your patient stable or unstable?

Stable- Attempt vagal maneuvers like bearing down or a good hard cough.

If vagal maneuvers aren't successful in slowing their heart rate, administer 6 mg. of **Adenosine**. What is unique about administering Adenosine is that it is a fast-push and fast-acting drug. It may cause a second or two of asystole. Patient also must be monitored.

If the first dose of 6 mg isn't successful, ACLS allow you to repeat the Adenosine providing 12 mg the second time if needed.

Unstable/ Symptomatic – this patient is showing signs of poor perfusion (low B/P, feels faint, decreased or altered mental status, cool or clammy/diaphoretic) it may be due to their heart rate is too fast to deliver an adequate volume of blood to the body and requires rapid treatment/ intervention. Provide synchronized cardioversion of 50 – 100 joules.

## Monomorphic Ventricular Tachycardia- VT

VT (SUSTAINED) >30 seconds rapid wide complex tachycardia)



First and important question: Does your patient have a pulse with this rhythm?

If yes, he/she does have a pulse, then is your patient stable?

With a PULSE and UNSTABLE (low B/P, ischemic chest pain, weak, clammy, cold, ashen, unresponsive or lethargic)

Deliver immediate synchronized cardioversion at 100J (or higher).

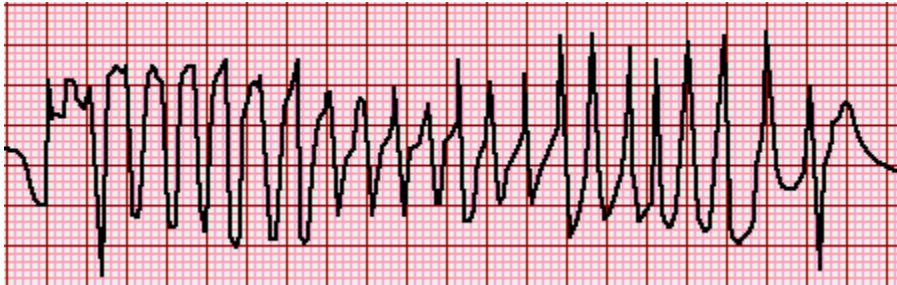
Evaluate the rhythm post cardioversion and consider a second attempt at a higher energy level if needed.

With a PULSE and STABLE, treat with adenosine only if regular and monomorphic.

Consider antiarrhythmic infusion i.e. Procainamide or Amiodarone IV drip.

## **Polymorphic Ventricular Tachycardia- VT**

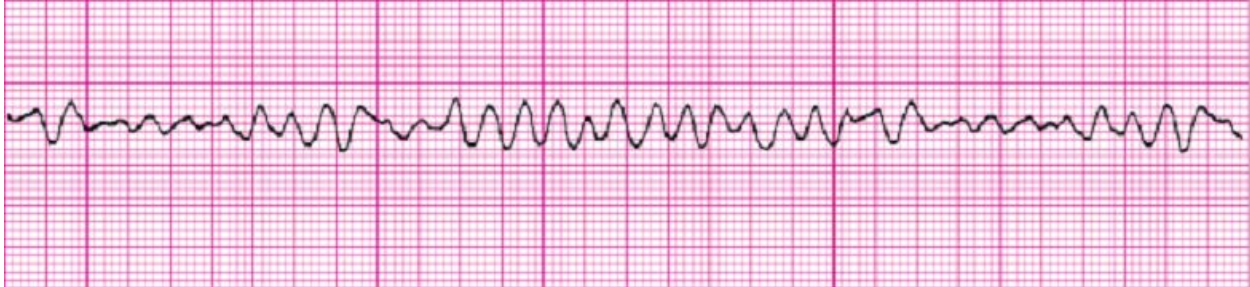
Torsades de Pointes



Arrhythmias with a polymorphic QRS appearance, torsades de pointes for example, will usually not permit synchronization. The patient will have to be treated as V-fib: defibrillate at 200 joules.

If there is doubt about whether an unstable patient has monomorphic or polymorphic VT, do not delay treatment for further rhythm interpretation. Provide defibrillation (not synchronized cardioversion) at 200 joules.

## VENTRICULAR FIBRILLATION-



VFib is a chaotic and disorganized rhythm that generates absolutely no perfusion! The heart is quivering as it is dying and requires IMMEDIATE defibrillation...do not delay! The sooner the heart in VF can be defibrillated, the higher the chances of successfully converting to an organized rhythm.

Quickly...

1. Rapidly assemble your team
2. Begin chest compressions
3. Apply defibrillator (hands-free) pads to patient, clear your co-workers from touching the patient or the bed and deliver 200J shock as quickly as you can. Hands free defibrillation allows for rapid defibrillation. Ensure oxygen sources are

Immediately after the shock is delivered, resume compressions and bag mask ventilations. (CPR should not stop for more than 10 seconds.)

You will continue CPR for 2 minutes (make sure your timer/recorder is tracking this for you) and prepare your first drug – your first medication will be **Epinephrine 1mg**, but do not administer it yet. This is also a good time to get IV or IO access if not already established.

At 2 minutes clear to reevaluate your rhythm- if VF persists charge and defibrillate a second time at 200J, clear the patient and deliver the shock. Immediately resume compressions (**make sure to rotate compressor and person bagging every 2 minutes for optimal compressions- you will get tired quickly**)

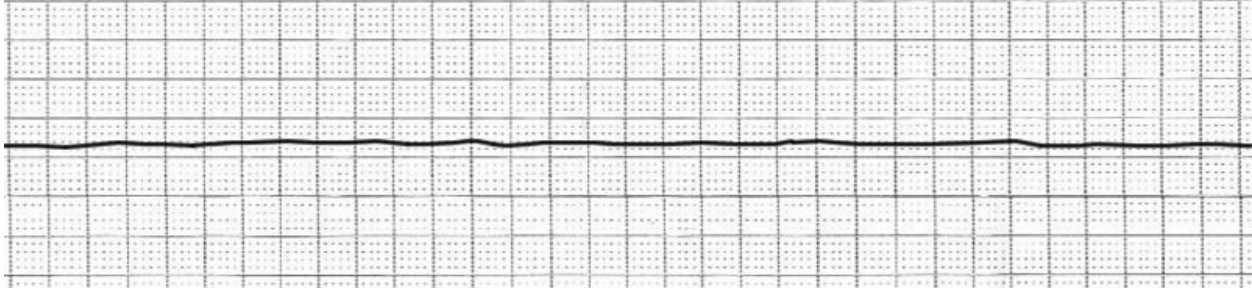
During this 2 minute cycle administer the **Epinephrine** and prepare the second medication- **Amiodarone 300mg**.

Again at the 2 minute mark clear to reevaluate your rhythm- if VF persists, charge and defibrillate at 200J, again resume compressions immediately after the shock is delivered.

During this 2 minute cycle administer the **Amiodarone 300mg** and prepare your next dose of **Epinephrine, 1 mg**.

These 2 minute cycles of **rhythm check- shock if indicated- CPR- administer med** will continue as long as VF or pulseless VT persists.

## Asystole



Asystole requires immediate intervention

1. Begin compressions and airway management, good CPR.
2. Administer **Epinephrine 1mg** IVP as soon as it's available. (Vasopressin 40 units may replace Epinephrine in the first or send dose of Epinephrine)
3. 1 mg of Epinephrine (1:10,000 used in cardiac arrest) is given every 3-5 minutes and there is no maximum dose.

***A critical step to restoring a perfusing rhythm is to quickly identify one of the underlying/reversible causes that most frequently lead to asystole. The most common are known as the H's & T's! As a team leader you should run through the list for consideration.***

### H's & T's

Hypoxia	Toxins
Hypovolemia	Tension Pneumothorax
Hypo/Hyperkalemia	Tamponade
Hydrogen Ion (Acidosis)	Thrombus Cardiac
Hypothermia	Thrombus Pulmonary

## Pulseless Electrical Activity (PEA)

– Electrical Activity without mechanical contractility – rhythm without a pulse



NO PULSE

What do you do if you are in a code and you find an organized rhythm on the monitor?

1. CHECK FOR A PULSE! If you have a rhythm and no pulse you are in PEA
2. Begin compressions and airway management / good CPR at a ratio of 30:2.
3. Administer Epinephrine 1:10,000 1mg IVP (Vasopressin 40 units may replace Epinephrine in the first or second dose of Epinephrine)

***A critical step to restoring a perfusing rhythm is to quickly identify one of the underlying/reversible causes that most frequently lead to PEA. The most common are known as the H's & T's! As a team leader you should run through the list for consideration.***

H's & T's are as follows: Hypoxia, Hypothermia, Hypo/Hyperkalemia, Hydrogen Ion (acidosis), Hypovolemia, Toxins, Tension Pneumothorax, Tamponade, and Thrombus (coronary or pulmonary)

Remember- PEA is not always a Sinus Rhythm and it is not always a slow PEA. It can look like any organized rhythm.

## **Immediate Post Cardiac Arrest Care**

Start with Airway – Breathing – Circulation

**Airway – Breathing** Optimize Ventilation and Oxygenation

Unconscious/Unresponsive patient will require advanced airway

Continuous Waveform Capnography – **Optimize pCO<sub>2</sub> at 35-40**

Pulse Oximetry titrated 94-99%. Avoid oxygen toxicity

Ventilate 8-10 breaths per minute

**Circulation**

Treat Hypotension (Systolic BP < 90)

IV Bolus 1-2 L Normal Saline

Vasopressors (Epinephrine, Dopamine, Norepinephrine)

**Therapeutic Hypothermia** – Consider for patients unable to follow verbal commands

**Early 12 Lead EKG – STEMI? PCI?**

**Continue to look for causes (Hs & Ts)**

**Early Advanced Care**



## ACLS Pharmacology

### Drugs for Pulseless Arrest VF/VT

Epinephrine 1:10,000: 1mg IV/IO followed by 20 ml flush; repeat throughout code every 3-5 minutes.  
There is no maximum dose.

*When is Epi administered? Asystole, PEA, VF, Pulseless VT....in other words....when there isn't a pulse, this is the first drug given. .*

Vasopressin: 40 units can replace the first or second dose of Epinephrine.

Amiodarone: 300mg IV/IO push. Second dose (if needed) 150 mg IV/IO push.

*-Antiarrhythmic medication that has been shown to increase chance of return of pulse after defibrillation of a shockable rhythm, VF or pulseless VT.*

### Drugs for Pulseless Arrest PEA or Asystole

Epinephrine: 1mg IV/IO followed by 20ml flush; repeat throughout code every 3-5 minutes. There is no maximum dose.

TRUE TREATMENT FOR PEA/ASYSTOLE IS TO FIND AND CORRECT THE CAUSE (H & Ts)

### Drugs for Bradycardia

**Atropine:** 0.5mg IV/IO followed by 20ml flush; repeat every 3-5 minutes to a maximum total dose of 3mg.

*-Increases heart rate*

**Dopamine** drip: second line drug for Bradycardia, 2-10mcg/kg/min as an IV Infusion on an infusion pump **only**. Titrate to patient response.

**- NEVER GIVE IV PUSH**

*-Increases heart rate at lower doses, and increases B/P at higher doses*

**Epinephrine** drip: Dilute 1mg Epinephrine in 500ml NS and run as an IV Infusion on an infusion pump at a rate of 2-10mcg/min.

*-Titrate to patient response.*

*-Increases heart rate and B/P*

## Drugs for Supraventricular Tachycardia and Stable Wide Complex VT

**Adenosine:** 6mg rapid IV push followed by an immediate 2 ml flush; may repeat with a 12mg dose (if unsuccessful contact expert consultation)

1. *-fast push and fast acting drug that may cause a short period of asystole.*
2. *-Allows heart to return to a normal rhythm*

## Drugs for ACS (Acute Coronary Syndromes)

### MONA

**M = Morphine**

**O = Oxygen (for oxygen saturation less than 94%)**

**N = Nitrates**

**A = Aspirin**

**It is preferable to do a 12 Lead ECG**, if available, prior to the administration of nitroglycerin to verify your patient's cardiac rhythm status. Right ventricular infarct? High degree of suspicion with inferior wall MI.

**Morphine:** Initial dose is 2 to 4 mg IV over 1 to 5 minutes, administer slowly and only titrate to effect

1. *-May administer to patients with suspected ischemic pain unresponsive to oxygen and nitrates*
2. *Before administering morphine, be sure that the patient's systolic blood pressure is >90 mm Hg and they are not hypovolemic*
3. *-Remember to reassess and repeat vital signs between doses*

**Nitroglycerin:** 1 spray sublingually every 3-5 minutes up to a total of 3 sprays

1. *-Indications — Standard therapy for all patients with new pain/discomfort suggestive of ACS*
2. *-Give within minutes of arrival*
3. *-Nitroglycerin decreases pain in ischemia and is a vasodilator.*
4. *-Before administering nitroglycerin, be sure that the patient's systolic blood pressure is >90 mm Hg and they should not have bradycardia or tachycardia.*
5. *-Do not give nitroglycerin if the patient has had an erectile dysfunction drug (phosphodiesterase inhibitor) within the past 72 hours*

**Aspirin:** 160 to 325 mg given as soon as possible, non-coated baby or adult aspirin may be used

1. *-Indications — Standard therapy for all patients with new pain/discomfort suggestive of ACS*
2. *-Give within minutes of arrival*
3. *-Aspirin irreversibly binds to platelets and partially inhibits platelet function.*
4. *-Before administering aspirin, make sure patient does not have an aspirin allergy, or recent or active GI bleeding.*