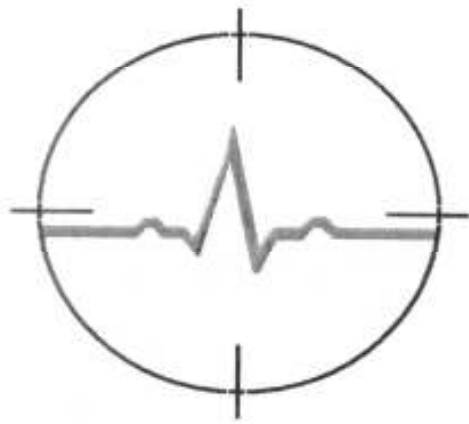


# ACLS



## Study Guide

Trinity Training Consultants Inc.

## AHA ACLS/BLS Regional Faculty

### ALGORITHM REVIEW

*Always start with the ABCD survey!*

#### VENTRICULAR FIBRILLATION / PULSELESS VENTRICULAR TACHYCARDIA

Remember: Good ACLS starts with good BLS

Algorithm: Pulseless Arrest

- CPR
- Shock
- CPR
- Epi 1 mg q 3-5 min OR 1 dose of Vasopressin 40 U IV/IO to replace 1<sup>st</sup> or 2<sup>nd</sup> dose of Epi
- CPR
- Shock
- Antiarrhythmic—Amlodarone 300 mg IV/IO once or Lidocaine 1-1.5 mg/kg up to 3mg/kg
- CPR
- Shock Note: We initiate CPR as soon as possible; after each shock we resume CPR immediately for 5 cycles prior to evaluating the rhythm and minimize interruptions to chest compressions. Pulse checks are done when an organized rhythm returns.

#### PULSELESS ELECTRICAL ACTIVITY

Remember: PEA

Algorithm: Pulseless Arrest

- **P** = Possible causes (6 H's, 5 T's)
- **E** = Epi, 1mg q 3-5 min OR 1 dose of Vasopressin 40 U IV/IO to replace 1<sup>st</sup> or 2<sup>nd</sup> dose of Epi
- **A** = Atropine, 1mg IV/IO q 3-5 min to max 3mg (only if electrical rate is < 60)

Note: use the 6 H's and the 5 T's to remember the most common reversible causes of PEA

Hypovolemia	Toxins
Hypoxia	Tamponade, cardiac
Hydrogen Ion (acidosis)	Tension Pneumothorax
Hypo-/Hyperkalemia	Thrombosis (coronary or pulmonary)
Hypoglycemia	Trauma
Hypothermia	

Note: PEA is a problem with the pump, pipes, or volume, not an electrical problem. The electrical system of the heart is still functioning, but the mechanical part of the system is not working.

#### ASYSTOLE

Remember: DEAD

Algorithm: Pulseless Arrest

- **D** = Determine whether to initiate resuscitative efforts
- **E** = 1mg Epinephrine IV/IO q 3-5 minutes or 1 dose of Vasopressin 40 U IV/IO to replace 1st or 2nd dose of EPI
- **A** = 1mg Atropine IV/IO (max 3 mg)
- **D** = Are they still dead? Consider reversible causes or ceasing efforts; check blood glucose; check core temperature; and consider Naloxone

## ACUTE CORONARY SYNDROMES

Remember: Consider MONA for patients with suspected ACS

Algorithm: Acute Coronary Syndromes

- Morphine
- Oxygen
- Nitroglycerine
- Aspirin ...but in the order **Oxygen, Aspirin, Nitro, Morphine**

## BRADYCARDIA

Remember: All Trained Dogs Eat

Algorithm: Bradycardia

- **A** = Atropine .5mg-1mg IVP for SB & 1st, 2nd #1 AV Block
- **T** = Transcutaneous pacing (preferred for 2nd#2 & 3rd)
- **D** = Dopamine 5-10 mcg/kg/min
- **E** = Epinephrine drip 2 to 10mcg/min

Note: Atropine is not indicated, and may actually be harmful, for 2nd #2 & 3rd degree heart blocks. Proceed directly to pacing instead.

## TACHYCARDIA - Stable

Remember: **If the patient is unstable, go directly to Cardioversion – 100 joules**

Algorithm: Tachycardia **With** Pulses

- For **Regular** Narrow Complex Tachycardia
  1. Vagal maneuvers
  2. Adenosine 6 mg rapid IV push. If no conversion, give 12 mg, then another 12, mg
  3. Consider expert consultation
- For **Irregular** Narrow Complex Tachycardia
  1. Consider expert consultation
  2. Control rate with Diltiazem or  $\beta$ -blockers
- For **Regular** Wide Complex Tachycardia
  1. Consider expert consultation
  2. Amiodarone 150 mg over 10 minutes or Lidocaine 1.0 mg / kg
  3. Elective Cardioversion
- For **Irregular** Wide Complex Tachycardia
  1. Consider expert consultation
  2. Consider antiarrhythmics
  3. If Torsades, give magnesium 1-2 g over 5-60 minutes
  4. **Note: If unstable** – Irregular / multi-focal wide V-Tach – Defibrillation not Cardioversion

## Weight Conversion:

Formula 1:

- >Pounds to kilograms / divide the weight (in lbs.) by 2.2.
- >Kilograms to pounds / multiply the weight (in kgs) X 2.2.

Example 1.

A patient weighs 150 pounds.

150 divided by 2.2: The answer is: 68.1 or 68 kgs. (Rounded off)

*If you don't have a calculator handy*

Formula 2:

**Take half off the weight in pounds then take 10% off that answer.**

Example 1. 150 pounds / Half off is 75 / then minus 7 = 68 kgs

Example 2. 240 pounds / Half off is 120 / then minus 12 = 108 kgs

Example 3. 120 pounds / Half off is 60 / then minus 6 = 54 kgs

## Lidocaine

Drug ordered: 2 mg/min IVPB

Drug on hand: 2 Grams Lidocaine 20% in 5 ml (the 5 ml is irrelevant in our calculations)

IV Solution: 500 ml of Normal Saline

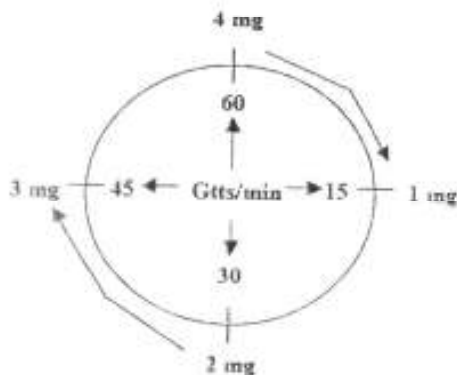
Lidocaine drip dose 1 to 4 mg per minute

Using the "Rule of Fours" or Clock Method

Using the information above for our problem we can conclude that there is 4 mg of lidocaine for each milliliter of IV solution (That is by putting 2 grams or 2000 mg of lidocaine into 500 ml of NS and dividing 2000 mg by 500 ml = 4 mg/ml)

This means that there is 4 mg = 1 ml which means we will have 4mg for every 60 drops of solution because the drip set is a 60 gtts/ml IV set.

The Rule of Fours Method (Lidocaine Clock Method)



Look at the drug order and compare to the clock in the circle. 2 mg = 30 gtts/min is observed and is the answer to the problem.

## Dopamine:

800 mg of dopamine mixed in 500 ml of NS.

Solution yield 1600 mcg per cc of fluid

Starting Dose: 5 mcg / kg - Titrated to B/P

Method 1:

Drug Dose x kg x drip set (60 gtts) divided by Solution yield

### Example 1:

Pt weight is 220 pound

Half of 220 = 110 then 10% from 110 (110-11) or about = 100 kg

5 mcg x 100 kg = 500

500 x 60 = 30,000

30,000 divided by 1600 = 18.75 / Round up to 19 drops per minute

### Example 2:

Pt's weight 160 pounds

Half of 180 = 80 then 10% from 80 (80-8) or about 72 kg

5 mcg x 72 = 360

360 x 60 = 21,600

21,600 divided by 1600 = 13.5 / Round up to about 14 drops per minute

Don't have a calculator handy and easiest method

Method 2:

You must mix the dopamine, 800 mg in 500 ml of NS.

Solution yield 1600 mcg per cc of fluid

Drug dose is 5 mcg / kg

Patients weight in pounds / take the first 2 number then minus 2 = drip rate

### Example 1:

Patients weight 220 pounds / 22 - 2 = 20 gtts / min

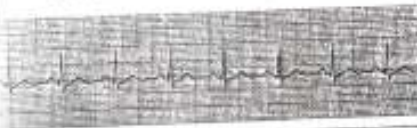
### Example 2:

Patients weight 160 pounds / 16 - 2 = 14 gtts/min

## OXYGEN CONCENTRATIONS

Nasal Cannula	24 to 44% at 1 to 6L
Simple Face Mask	40 to 60% at 8 to 10L
Venturi Mask	24 to 28% at 4L
Non-rebreather mask	60% at 6L Near 100% @ 10L
Bag Valve Mask (Ambu bag)	21% at room air 40% at 12L 90% @ 12L with reservoir

### Normal Sinus Rhythm




**ECG Mode**

(Also known as NSR or NSR)	
Rhythm	Regular
Rate	60 - 100
P waves	Normal in configuration and direction and P wave precedes each QRS complex
PR	Normal (0.12 - 0.20 seconds)
QRS	Normal (0.10 seconds or less)

### Sinus Tachycardia

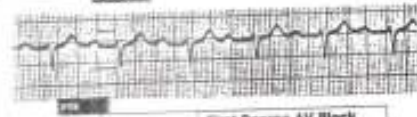
(Can occur for a second up to 100 bpm)



**ECG Mode**

Rhythm	Regular
Rate	100 - 160
P waves	Normal in configuration and direction and P wave precedes each QRS complex
PR	Normal (0.12 - 0.20 seconds)
QRS	Normal (0.10 seconds or less)

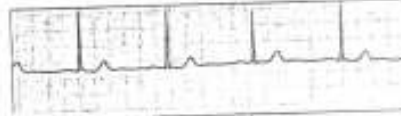
### First-Degree AV Block



**ECG Mode**

Rhythm	Regular
Rate	Heart rate is that of underlying rhythm (usually sinus) and atrial and ventricular rates will be the same
P waves	Normal and P wave precedes each QRS complex
PR	Prolonged (> 0.20 seconds) constant
QRS	Normal (0.10 seconds or less)

### Sinus Bradycardia



**ECG Mode**

Rhythm	Regular
Rate	40 - 60
P waves	Normal in configuration and direction and P wave precedes each QRS
PR	Normal (0.12 - 0.20 seconds)
QRS	Normal (0.10 seconds or less)


### Junctional Escape Rhythm



**ECG Mode**

Rhythm	Regular
Rate	44-60
P waves	Inverted in Lead II and will occur immediately before the QRS, immediately after the QRS, or between other QRS
PR	Short (0.10 seconds or less)
QRS	Normal (0.10 seconds or less)

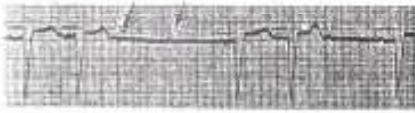
### Sinus Arrhythmia



**ECG Mode**


Rhythm	(Regular) Irregular
Rate	Variable (40-100) or slow (less than 60)
P waves	Normal in configuration and direction and P wave precedes each QRS
PR	Normal (0.12 - 0.20 seconds)
QRS	Normal (0.10 seconds or less)

### Second-Degree AV Block Type II




Rhythm	Atrial Regular Ventricular IRB or regular atrial AV conduction variable
Rate	Normal Rate of underlying rhythm Ventricular Rate will depend on AV conduction. Look for the atrial rate.
P waves	Block one or more P waves (sometimes many) before next QRS
PR	Not to occur or prolonged variable constant
QRS	Normal (if block located in bundle branches) Abnormal (if block located in bundle branches)

### Second-Degree AV Block Type I (Mobitz I or Wenckebach)




Rhythm	Atrial Regular Ventricular Irregular
Rate	Heart rate is that of underlying rhythm (usually slows) both atrial and ventricular rates will be the same.
P waves	Block one P wave progressive each QRS complex
PR	PR varies, PR progressively lengthens until a P wave occurs without a QRS. A pause follows the dropped QRS.
QRS	Normal (0.10 seconds or less)

### Premature Atrial Contraction (PAC)



Rhythm	Underlying rhythm usually regular, irregular with PACs
Rate	Rate of the underlying rhythm
P waves	P wave is premature and abnormal in size, shape or direction. Abnormal P wave is often found in the T wave obscuring its contour.
PR	Normal or prolonged (0.10 seconds usually shorter than underlying rhythm)
QRS	Normal (0.10 seconds or less)

### Premature Junctional Contraction



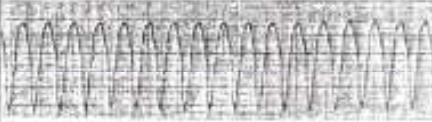
Rhythm	Underlying rhythm usually regular, irregular with PJC
Rate	Rate of the underlying rhythm
P waves	P wave associated with PJC will be inverted in Lead II and will occur immediately before the QRS, occasionally after the QRS, or occur within the QRS.
PR	Short (0.10 seconds or less)
QRS	Normal (0.10 seconds or less)

### Supraventricular Tachycardia



Rhythm	Regular
Rate	100-250
P waves	Visible a, preceding P wave
PR	Not measurable
QRS	Normal (0.10 seconds or less)

### Ventricular Tachycardia



Rhythm	Usually regular
Rate	140 (usually 140 to 220)
P waves	NA, wide double not seen, P wave is rarely visible in the QRS
PR	Not measurable
QRS	Wide (0.12 second or greater)

## ASYSTOLE



## Paroxysmal Supraventricular Tachycardia (PSVT)



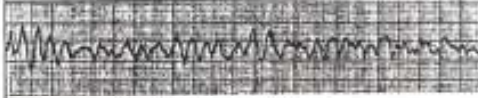
Rhythm	Regular
Rate	150 - 200
P waves	Absent (often present), usually hidden in preceding T wave
PR	Not measurable
QRS	Normal (0.10 seconds or less)

## Junctional Tachycardia



Rhythm	Regular
Rate	> 100 bpm
P waves	Inverted in Lead II and will occur immediately before, after, or hidden within the QRS
PR	Short (0.12 seconds or less)
QRS	Normal (0.10 seconds or less)

## Ventricular Fibrillation



Rhythm	Irregular. The rhythm is nearly chaotic.
Rate	Cannot be determined since there are no discernible waves or complexes
P Waves	There are no discernible P Waves
PR	There is no PR
QRS	There are no discernible QRS complexes



Normal beat not related to QRS	None	N/A	No relationship between P&RS
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## Introducing the Funny Looking Bear ("Is that a PVC?")

The 2 types and several flavors of Premature Ventricular Contraction

