



Pulseless Arrest Algorithm ACLS

MOCK CODE PRACTICE

SAMPLE



Format of the Case & Instructions

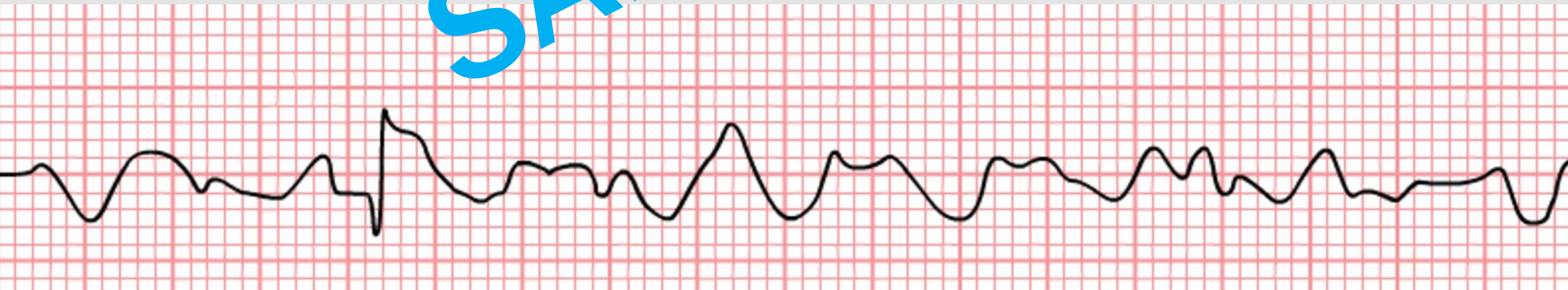
- Open the presentation on a laptop in the room where the code practice will take place.
- The person in charge of presenting the code (not the people running the code) should be familiar with the content of these slides to guide the case along via prompts.
- Data will be presented and the team running the code will then be asked to produce actions and act out the code as they would with a real patient.
- Subsequent slides will present additional data to guide the case along
- The slide show should not be the focus of the case (code team should be focused on the patient). Slides are used as supplement to the case.
- HAs: Please print a copy of the ACLS Pulseless Arrest algorithm for the participants to use in the room

Patient Presentation

- 67 y/o Female presents via private vehicle accompanied by her husband.
- She is here because her husband thinks she had “a seizure.”
- She has been feeling light-headed for a few days and complaining of left wrist pain intermittently. Feeling shortness of breath with exertion for several days.
- Was having a glass of wine with friends when she had a syncopal episode 1 hour ago. Became clammy and diaphoretic. She has no recollection or warning that she was about to faint.
- Has no pain other than her wrist.

Patient Presentation (continued)

- While getting the patient hooked up the monitor, she rolls her eyes back and becomes unresponsive.
- She is breathing loudly (as if snoring) and does not respond to command.
- You look up and see the following rhythm on the monitor:



What do you do next?

- The first person seeing the patient is the Emergency Nurse. Doctor is not in the room yet.
- You have an ER Tech available
- Person initially running the code directs next steps. **Take time to run through what initial steps team would take next and then click on the next slide for additional data.**

First Steps (ABC's)

- Did you check for a pulse?
- Did you have the ER Tech get in crash cart?
- Did you apply defibrillation pads and shock the patient?
- Did you apply jaw thrust maneuver and straightened her airway?
- Did you call for help?
- Click for more data

First Steps (more data)

- Since the patient has no pulse and you think she is in Vfib, you rapidly give 1 shock of (UNSYNCHRONIZED) defibrillation at 200 Joules.
- You resume CPR immediately for 5 cycles and re-check the rhythm and check for a pulse. Each CPR cycle is 30 chest compressions and 2 ventilations. Position need to change every 2 minutes using the word “change” as the signal.
- No pulse is found, and you see this rhythm on the monitor:



- The Emergency Physician is now in the room. Give report.

What do you do next?

- After shocking the VTach, patient still has no pulse and is back on VTach.
- Look at the PULSELESS ARREST ACLS algorithm and mention the steps you would take next.
- We will compare your answers with the recommended guidelines on the next slide.
- Think of the following:
 - Will you give a shock SYNCHRONIZED or UNSYNCHRONIZED
 - Do you give additional immediate CPR or stop after a shock?
 - How do you obtain quick access to give ACLS meds?
 - What meds can you give if patient still pulseless while giving CPR?

What do you do next? (Answers)

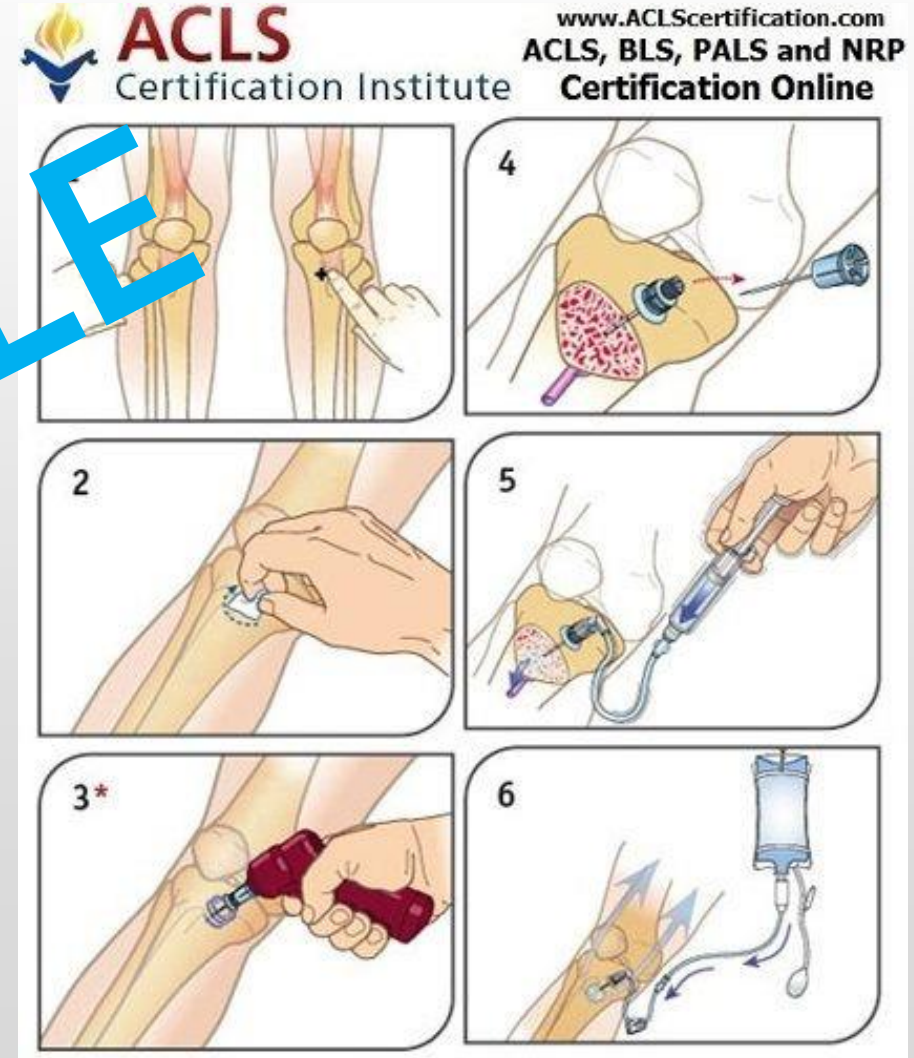
- We need to give a **SYNCRONIZED** shock
 - For cases where electrical shock is needed, **if the patient is unstable**, and you can see a QRS-t complex use **synchronized cardioversion**. If the patient is pulseless, or if the patient is unstable and the defibrillator will not **synchronize**, use **unsynchronized cardioversion** (defibrillation).
- Do you give additional immediate CPR or stop after a shock?
 - Yes, we continued CPR! Stopping CPR will empty the heart and we will lose intravascular pressure we built up with previous CPR. Only stop CPR as briefly as possible (2-3 seconds).
- How do you obtain quick access to give ACLS meds? **IO or IV**
- What meds can you give if patient still pulseless while giving CPR?
 - Epinephrine 1 mg IV/IO (repeat every 3-5 minutes)
 - Vasopressin 40 U IV/IO to replace first or second dose of epinephrine
 - Amiodarone 300 mg IVP (1st dose) and 150 mg (second dose)

SAMPLE

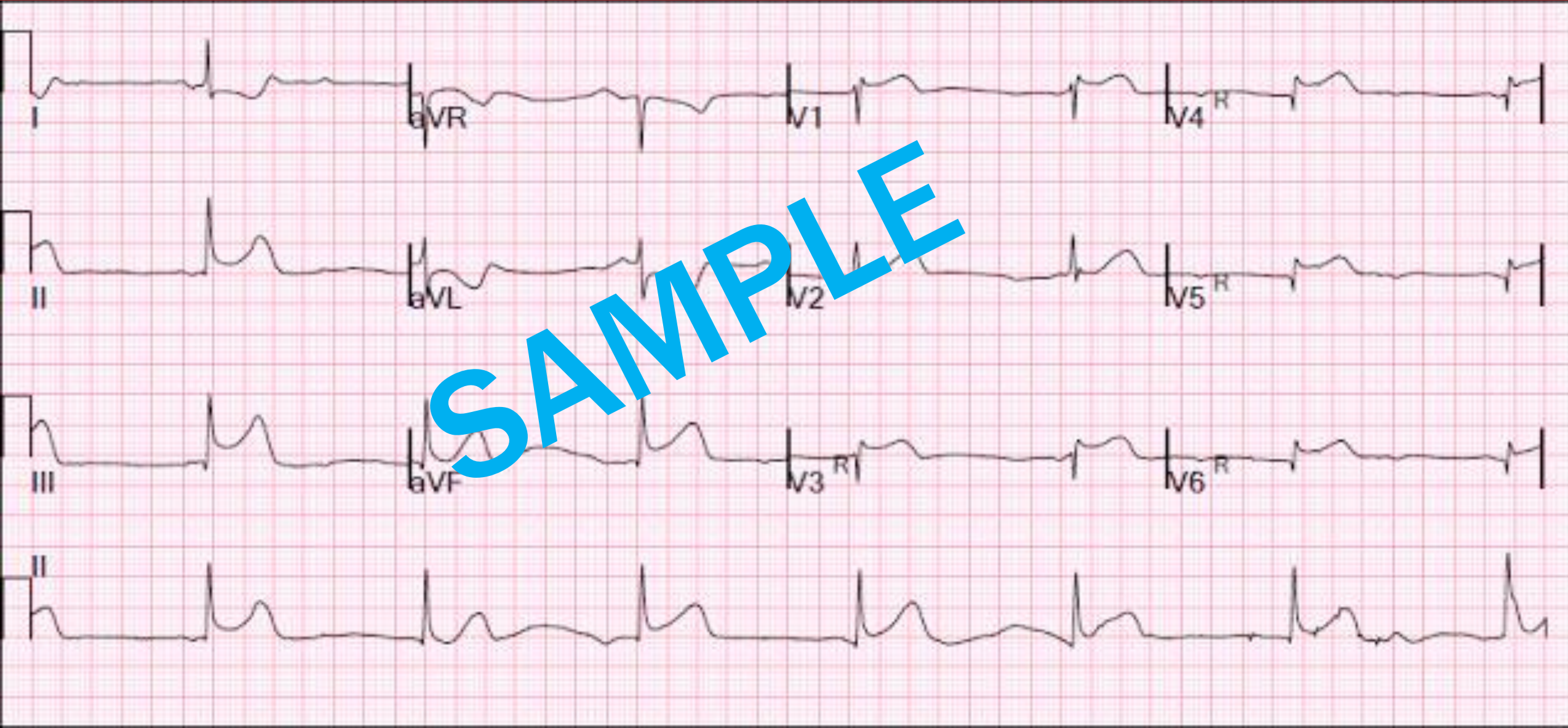
Practice 10 Placement

You are Successful at Obtaining IO Access!

- Best place is proximal or distal Tibia
- Second choice is proximal Humerus (but can be difficult if CPR is ongoing)



ECG After Third Shock: Pulse is Restored



Second Steps (ABC's)

- With VF/VT, the top priority is RAPID defibrillation
- For every minute that passes without CPR and defibrillation, the chances of survival decrease by 7-10%
- Did you activate a STEMI protocol?
- The patient is conscious and protecting her airway, but she is hypotensive (82/41) with a HR of 45
 - What are the top choices for pressors with cardiogenic shock?
- Practice obtaining IO. Know where the kit is located and locations for IO access (next slide)

Additional Data & Possible Actions

- You gave Aspirin (chewed). What dose do you give?
- You gave 500 cc fluid bolus (or fluids wide open initially)
- You identified that the patient is having an acute inferior MI
- Ticagrelor or Clopidogrel (what dose do you give and what do you have available?)
- Heparin bolus. What dose do you give?
It's ok to give heparin after CPR.
- Did you try Atropine (Patient was bradycardic). If so, what dose?
- Cardiac ultrasound performed (optional).

IF ER DOC did bedside US, this is what is shows...

- If no US is wanted or done, ignore this slide and go to next one.
- If US bedside was done by ER doc, click on the link below to see it.

<https://vimeo.com/151409141>

Additional Data

- You identify patient is in **cardiogenic shock**
- ***The ECG showed QRST: The QRS is narrow, so any ST-T abnormalities are primary: there is significant ST elevation in leads II, III, and AVF, with reciprocal ST depression in leads I and AVL, all suggestive of an inferior STEMI. There is ST elevation in lead V2, the furthest right pre-cordial lead, which lies directly over the RV free wall and highly suggests a Right Ventricular MI.***
- While preparing for EMS to arrive, the patient's BP drops to 54/25, with Sats of 69%. Fluids are continued. 1 mg of atropine was given without effect. Then there was an acute change in mental status with BP 66/53 (indicative of inadequate perfusion).
- What do you do next? Discuss and act out potential next steps and then click next slide.

Pt is Crashing (ABC's)

- Did you choose to intubate the patient or use CPAP? Remember pt is now with altered mental status...
- Did you pre-oxygenate and if so how?
- What was your first choice of airway? What was your back up plan?
- Did you do transcutaneous pacing?
- What meds did you give? Doses?
- Pt is intubated (CPAP not appropriate for confused hypotensive patients that have been vomiting).

SAMPLE

Practice Intubation

Additional Data

- Due to **cardiogenic shock, hypotension and AMS**, pt required **intubation** for airway protection.
- **Transient vasopressors** (push dose epinephrine or gtt)
- Sedation with **ketamine** (to avoid hypotension and bradycardia),
- **Paralysis** with atropium (or vecuronium)
- Atropine improved HR to 60 BPM
- **Transcutaneous cardiac pacing** is an option if no response to **atropine**, which improved her heart rate and perfusion.

Practice Pacing

- Place Chest Pads
- Turn ZOLL to PACER
- Set Pacer Rate (BPM) and choose HR 30 BPM FASTER than the patient's (to know when it captures)
- Set Pacer Output (mA). Start at 20 mA and go up in mA until capture.
- Set capture mA to 10 mA above capture amps.
- Watch for ELECTRICAL CAPTURE. If no capture at 100 mA move pads to a different place.

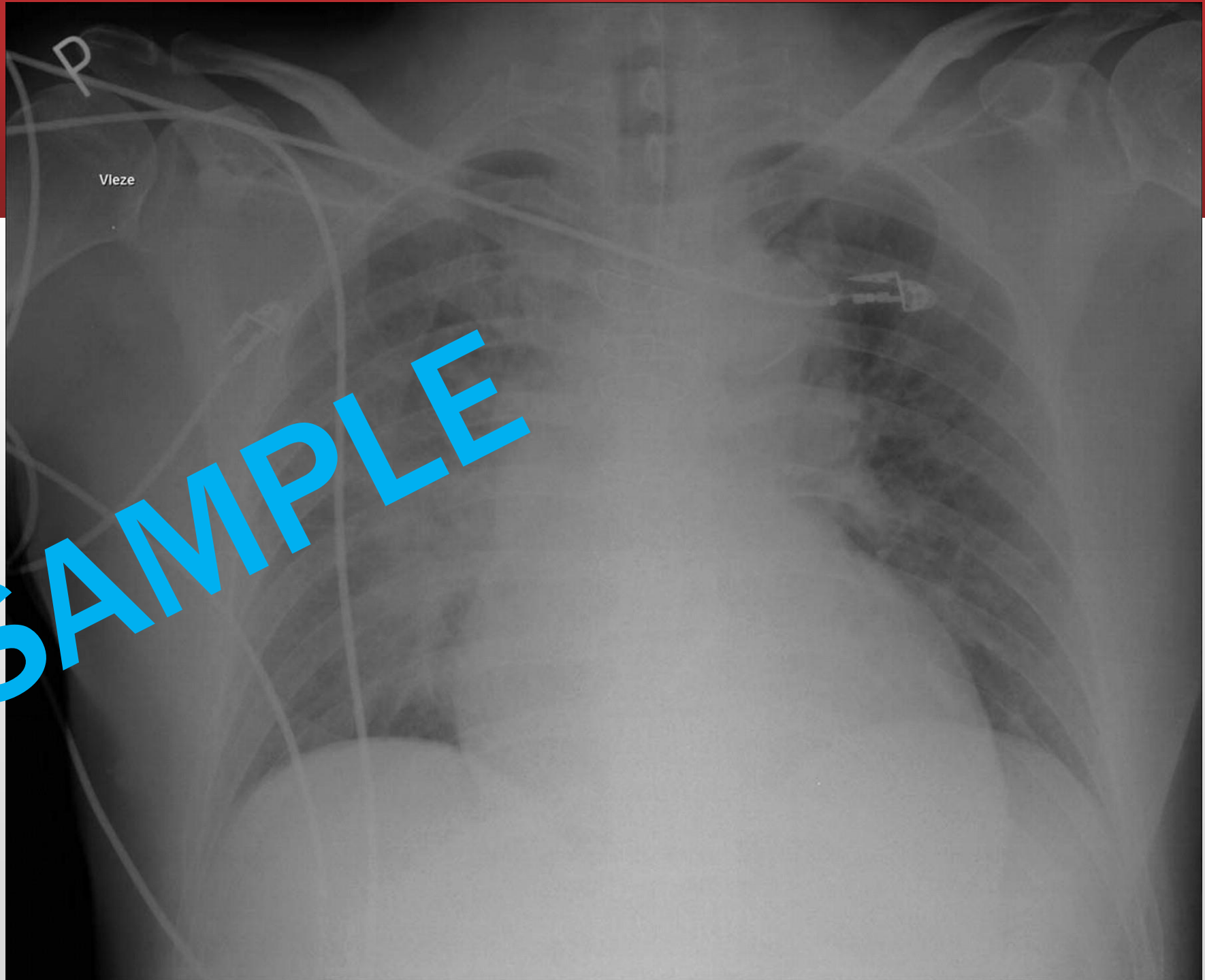


Once the machine is in manual mode, you can perform pacing operations by moving the dial to Pacing.

CXR

- Pulmonary Edema
- ET tube in place

SAMPLE



Let's Talk About Drugs...

- Make sure you know where our STANDARD DRIP TABLES are located
- Epinephrine
- Can be given as “push dose” or drip
- Push dose:
 - Take a 10 ml syringe with 9 ml of normal saline
 - Into that syringe, draw up 1 ml of epinephrine from the cardiac amp (cardiac amp contains Epinephrine 100 mcg/ml or 0.1 mg/ml)
 - Now you have 10 mls of Epinephrine 10mcg/ml
- Onset 1 minute
- Duration: 5-10 minutes
- Dose 0.5 - 2 ml every 2-5 minutes (5-20 mcg)



Epinephrine (continued)

- Epinephrine drip:
- Mix 1 mg in 250 ml NS or D5W = concentration of 0.004mg/ml or 4 mcg/ml
- Initial dose: 0.1 to 0.5 mcg/kg/minute, titrate to desired response
- Practice setting the drip on the pump as ml/hr (see below) and as mcg/kg/hr since some pumps are not programmed as mcg/kg/hr

$$\text{IV Infusion Rate (cc/hr)} = \frac{\text{dose (mcg/kg/min)} \times \text{weight (kg)} \times 60 \text{ min/hr}}{\text{concentration (mg/cc)} \times 1000 \text{ mcg/mg}}$$

Epinephrine Drip (continued)

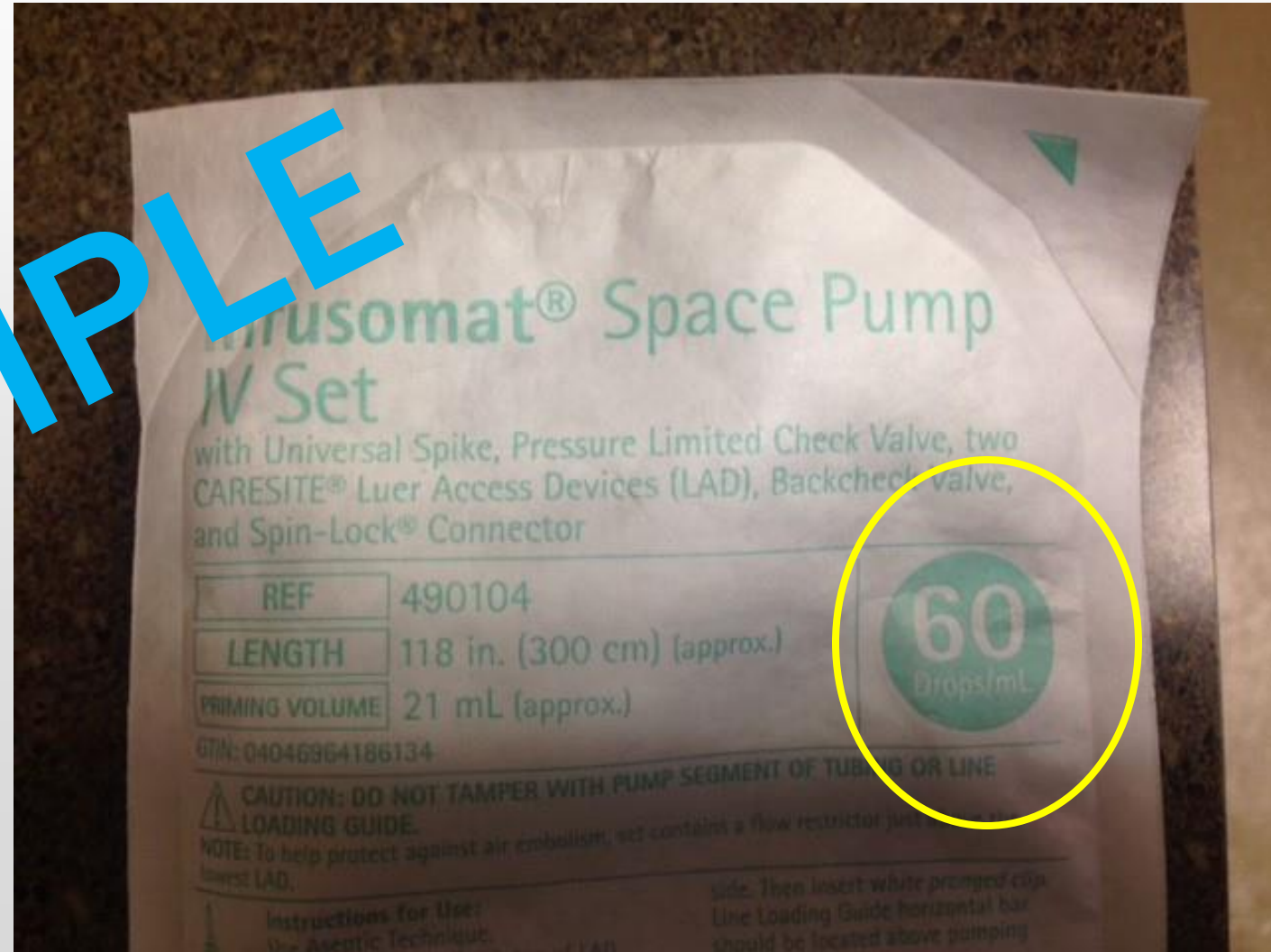
- Epinephrine drip equation using 60 drop/ml IV tubing:
- IV tubing gtt X Desired dose X Kg X Bag volume / Drug amount in mcg
- Example:
- $60 \text{ gtt} \times 0.2 \text{ mcg/kg/min} \times 160 \text{ kg} \times 250 \text{ ml} / 1000 \text{ mcg} = 480 \text{ ml/hr}$ for our 160 kg patient
- Notice you have to use “60 drops/ml” tubing (not 15), 250 ml as the bag volume per our protocol and 1000 mcg as the amount in the bag (See standard drip table of our protocol)

Use This Bag for Drips...

- Practice and become familiar with how to program our pumps for different drip units. It is the safest way.
- You can use MEDCALC online IV rate calculator if you use 60 drop/ml tubing

<http://www.medcalc.com/ivrate.htm>

SAMPLE



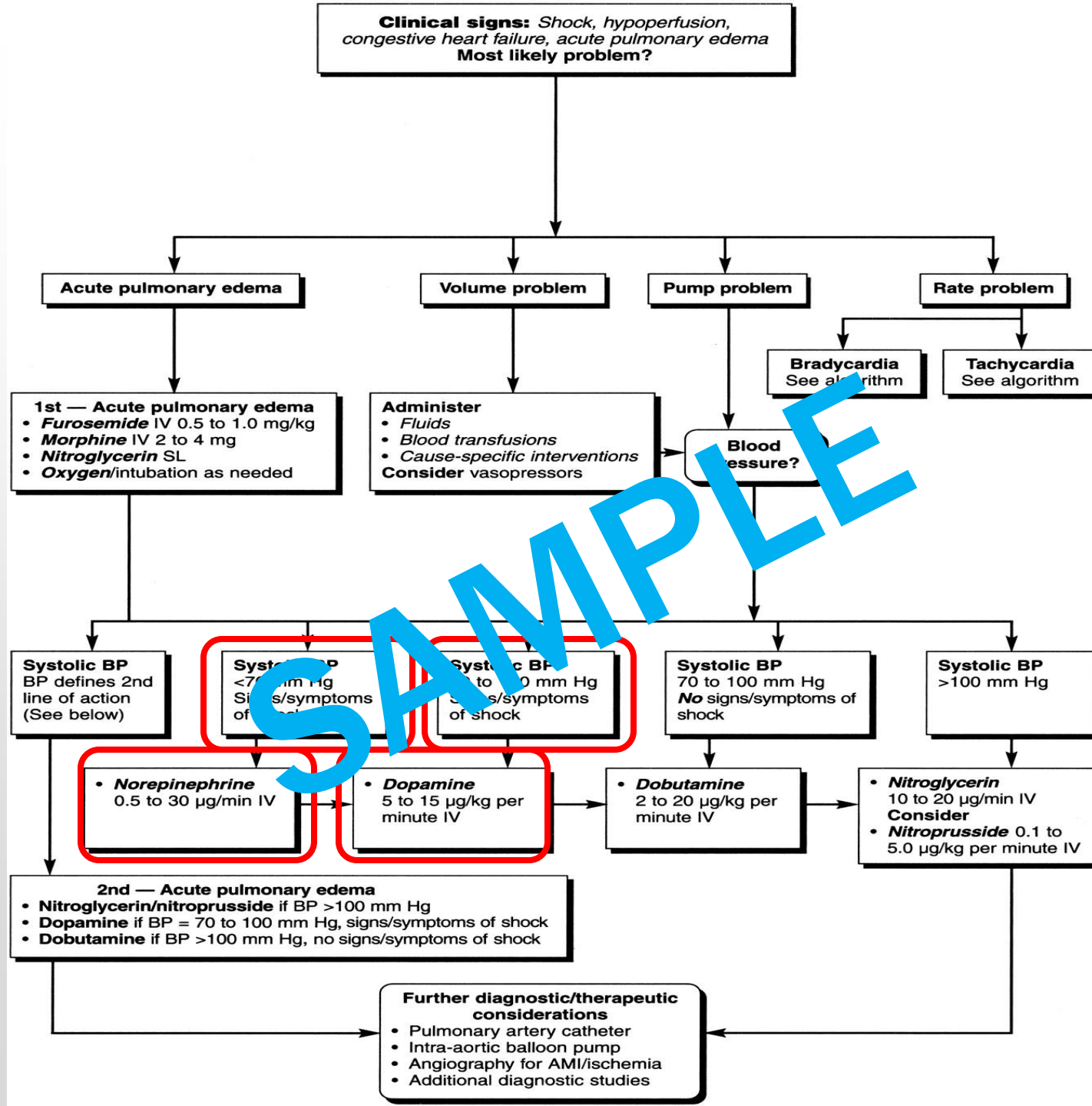
Choice of Pressors

Table 1: Order of antihypotensive medication to administer per type of shock

Type of shock	Agent				
	Norepinephrine	Epinephrine	Phenylephrine	Dobutamine	Vasopressin
Septic	1	2/3	2/3	X	3/4
Cardiogenic	1	2/3	X	2/3	4
Neurogenic	3/4	2	1	X	3/4
Anaphylactic	3/4	1	3/4	X	2

Table 5. Drugs By Adrenergic Receptor Type: Indications, Advantages, And Disadvantages

Pressor	Indications	Advantages	Disadvantages
Dopamine	- Dopamine is FDA indicated for all forms of shock and for treatment of decreased cardiac output - Good cardiac function with poor perfusion - Post arrest hypotension/myocardial stunning	- Effective at multiple receptors - Graded, dose-dependent receptor activity (not all or nothing) - Titrate to patient specific responses and hemodynamic monitoring	"Dopaminergic" doses may improve urine output but do not improve renal function and generally are not helpful in addressing hypotension - May be arrhythmogenic at higher "alpha" doses - High doses may compromise urine output (consider using with dobutamine)
Norepinephrine	- Septic shock due to low SVR - Can be used in anaphylactic shock	Excellent at increasing systemic vascular resistance (SVR)	Increased risk of dysrhythmias and myocardial ischemia; increased oxygen consumption; may decrease intestinal perfusion and increase lactate levels
Phenylephrine	FDA indicated for use in hypotension	Good choice if tachycardia/arrhythmia limiting use	No effect on cardiac output
Dobutamine	- FDA indicated for decreased cardiac output and CHF - Best if used when there are signs/symptoms of shock without severe hypotension (< 90 mmHg)	- Inotropic agent: increases cardiac output - Good for congestive heart failure <i>without</i> hypotension	Can decrease SVR; may provoke hypotension. Potential solution: add dopamine or epinephrine to increase SVR OR consider switching to another class of inotropic agents, such as phosphodiesterase inhibitor (e.g., inamrinone and milrinone)
Epinephrine	- FDA indicated for use in anaphylactic shock - Intravenous form is FDA indicated for cardiac arrest	Does not require volume resuscitation prior to use (for the purely anaphylactic cause of shock)	Increased risk of dysrhythmias and myocardial ischemia
Vasopressin	Consider in septic shock refractory to volume expansion and first line catecholamines	May decrease amount of other vasopressors needed	- Not a first line agent - Delayed onset of action - Its use in septic shock and for cardiac arrest are off-label



More Pressors...

- **Phenylephrine (Neosynephrine):**
 - Mix 10 mg in 250 ml NS or D5W
 - Resulting concentration is 0.04 mg/ml (40 mcg/ml)
 - Can be used to improve blood pressure rapidly while setting up Epinephrine drips or bump BP temporarily. Avoid in bradycardia.
 - For adults, can be used 0.1-0.5 mg dose (0.25 – 1.25 ml of the 0.04mg/ml concentration above) every 10-15 min as needed.
 - Maintenance: 40-60 mcg/min
- **Norepinephrine (Levophed)**
 - Adult dose: Mix 4 mg in 250 ml D5W
 - Initial 4 mcg/min and titrate by 2 mcg q 15 min

Pulseless Arrest: Case Summary

- We identified VFIB and shocked right away
- Gave high quality CPR and shocked again
- Pt was then in Vtach (No pulse)
- ACLS meds given: Epi, Vasopressin and Amiodarone
- Additional CPR was given and pt shocked a third time: Pt back to sinus rhythm in STEMI
- Activated STEMI protocol
- Pt was hypotensive (BP 80's) and pressors started via IO access
- Pt mental status declined due to hypotension from cardiogenic shock (bp 60's)
- Pt Intubated and pressors continued
- Pt prepared for transport
- Ideally:
 - Central line started due to pressors
 - Peripheral IV if possible
 - Transport after stabilizing to the best of our ability

