Heart Stopping Emergencies- CPR
How to Bring Back the Dead

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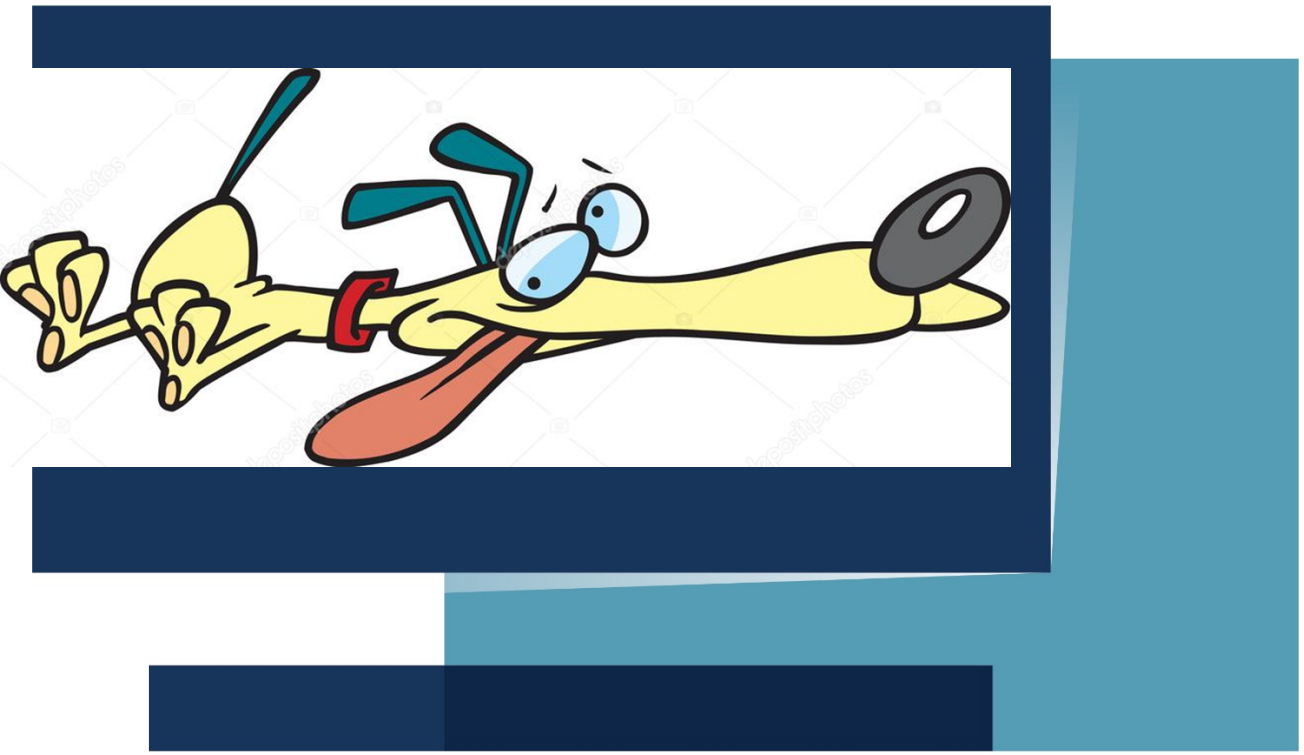
TECHNICIAN BOOT CAMP MEDVET

What is CPR?



Cardiopulmonary Resuscitation

Emergency procedure for reviving heart and lung function, involving special physical techniques and often the use of electrical and mechanical equipment (dictionary.com)

History of CPR

Humans:

1740 – Mouth-to-mouth resuscitation was officially recommended for drowning victims by The French Academy of Sciences in Paris.

1767 – The Society for the Recovery of Drowned Persons became the first organized effort to deal with sudden and unexpected death..

1904 – The first American case of closed-chest cardiac massage was performed

1956 --mouth-to-mouth resuscitation invented

1960 – Cardiopulmonary resuscitation (CPR) was developed

1966 –American Health Association establish standardized training and performance standards for CPR.

1972 – World's first mass citizen training in CPR in Seattle, Washington He helped train over 100,000 people the first two years of the programs.

2008 – Hands-Only CPR (or Compression Only CPR) is introduced as a way to get bystanders to provide compressions if they have witnessed an arrest. The goal here is to get people involved.

Pets:

1961- First Published Article of CPR in Animals

2012- The American College of Veterinary Emergency and Critical Care Developed the first set of guidelines called RECOVER

What are the chances?

-CPR (in humans), especially if administered immediately after cardiac arrest, can double or triple a person's chance of survival (cpr.heart.org)

-CPR (in animals) if performed correctly is effective and the patient will be discharged from the hospital ONLY 6-7% of the time.

-If arrest happens during anesthesia it is a 50% chance of discharge

-Seconds count though!

Risks associated with CPR

Rib Fracture 1.6%
Muscle Damage 1.4%
Chest Pain 11.7%

Kinds of CPR

Red – Do not Resituate

Yellow- CPR

Green- Open Chest CPR
(**rarely** done)

Do Not Resituate

Doesn’t mean we aren’t going to do everything up to the point of coding

CPR

-Also known as Basic Life support

-Compressions and Ventilation

-This is the step that most owners understand, and that any practice can do

-Goes hand in hand with ALS

Open Chest CPR

- Advanced Life Support (ALS)

- Drug administration, ECG, Defibrillation and Open chest CPR

- Some parts of ALS can be done in Regular practice

- It is best if ALS and BLS are done simultaneously and promptly

- Open chest CPR works best with giant breeds, pericardial disease, Plural Disease, and patients already in surgery

Circulatory System

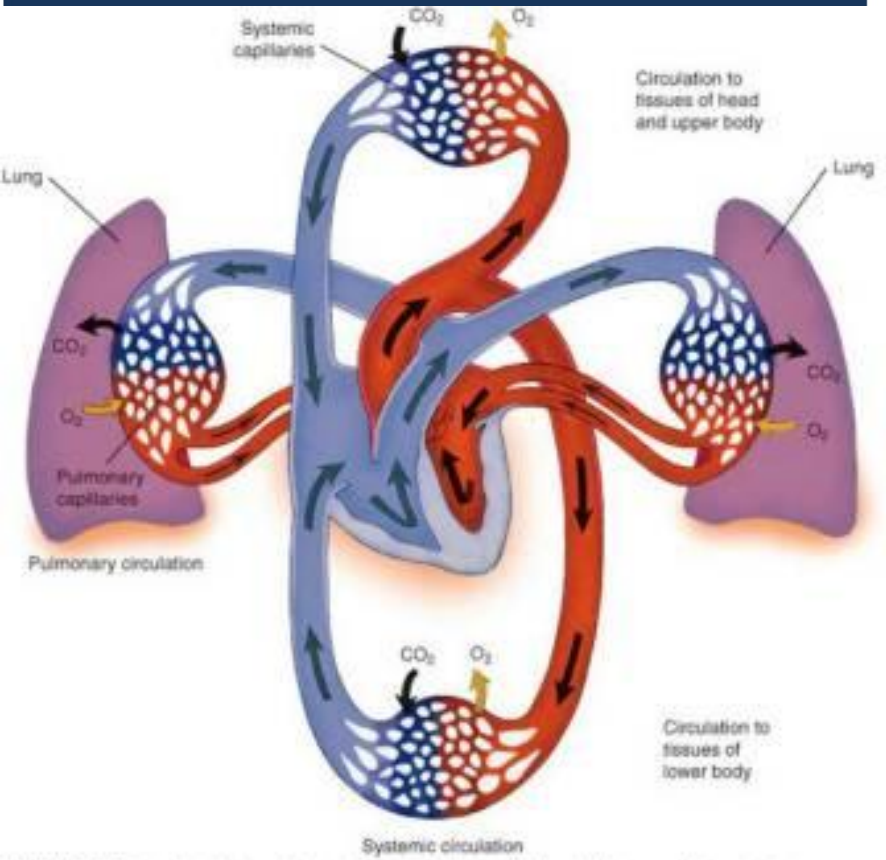
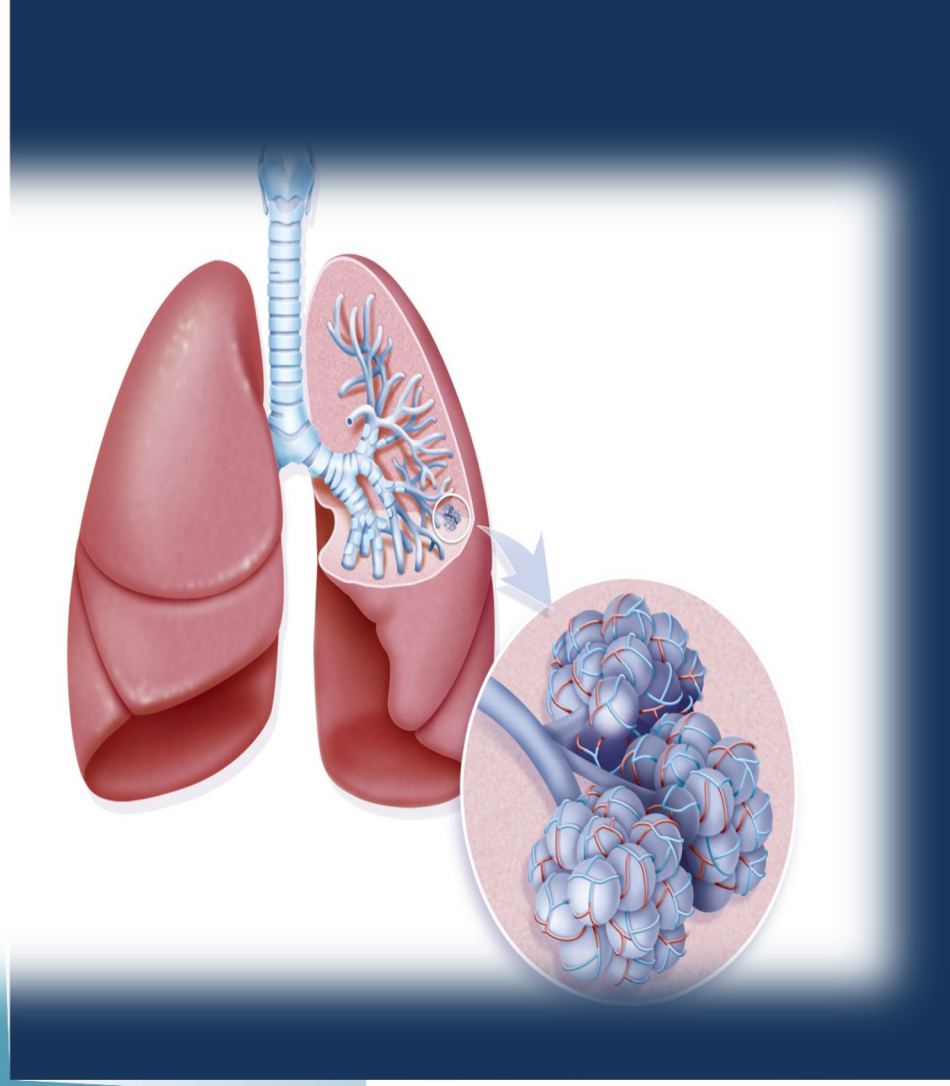


FIGURE 9-6 Generalized circulatory pathways between the heart, lung, and extremities.

~ Deoxygenated blood from body comes back to right side of the heart
~ Deoxygenated blood goes to Lungs in the Pulmonary artery
~ Oxygen and Carbon Dioxide transferred
~ Oxygen rich blood returns to the Left side of the heart through the Pulmonary Vein
~ Oxygen rich blood goes through the left side of the heart to the Aorta
~The Aorta takes oxygen rich blood to the body tissues
~The Caudal Vena Cava, Coronary veins, and Cranial Vena Cava return Deoxygenated blood to the heart

Respiratory System

~Diaphragm and muscles contract (inhale)-which causes the chest cavity volume to increase and cause negative pressure to generate
~The negative pressure then pulls the lungs outward increasing negative pressure in the Aveoli
~Aveoli then pull oxygen in because of the negative pressure generated (marshmallow in a vacuum)
~Diaphragm and muscles relax (exhale)- causes positive pressure to generate
~Positive pressure then compresses the Aveloi
~This then forces the CO2 out of the blood and into the lungs to be evicted from the body



What Happens During Arrest?

Cardiopulmonary arrest happens when the heart stops.

Immediately the transfer of Oxygen and CO2 stalls and blood starts to build up in periphery

-This decreases the blood flow to the vital areas
-Because oxygen is not getting transferred vasodilation due to apnea can increase intracranial pressure

Addressing the Client

Worst most stressful part of their day/life

Why is this happening?

What caused it?

What is CPR?

What are the chances?

Ask for a VERY brief history of what lead up to event
10-15 seconds for responses/questions
-On any medications/ingest anything?
-Recent health problems?
-How long have we been like this?

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Checking for Arrest

Needs to be a quick 10 seconds or less

Pulses are not easily identified - studies have shown 2% can correctly identify pluses in 10 seconds or less

ECG can show artifacts – PEA, pulseless VT

ETCO2- unless already intubated, not fast enough

Doppler- unless already on patient, can take too long

Trust your own eyes and ears

Checking for Arrest

ABC's

AIRWAY - Make sure there is nothing blocking the airway

BREATHING - Is the chest moving (Agonal breathing, isn't breathing)

CIRCULATION - auscultate the heart, feel for beats

If in doubt start CPR

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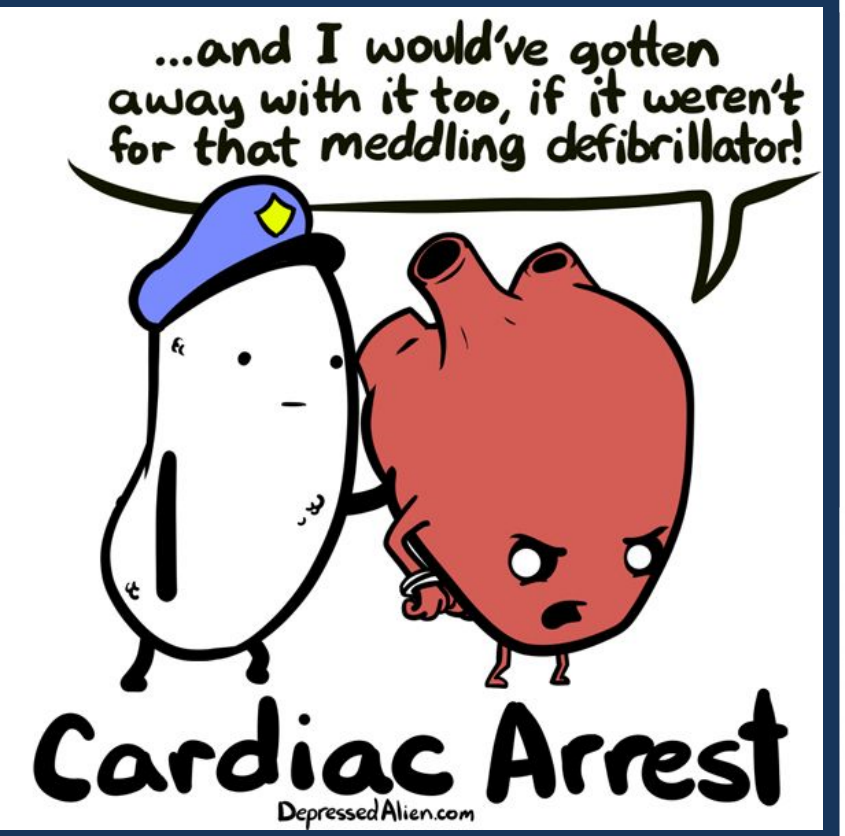
Calling a Code!

Get attention!
Yell, scream, let people know.
Everyone should come running
This is a team event, let them know.

Then move the pet where people can get to it.



Starting CPR

CAB

- Compressions
- Airway
- Breathing

Start Compressions

Start compressions first and right away!

Don’t stop!

Switch out people every 2 minutes with a 10 second break for evaluation

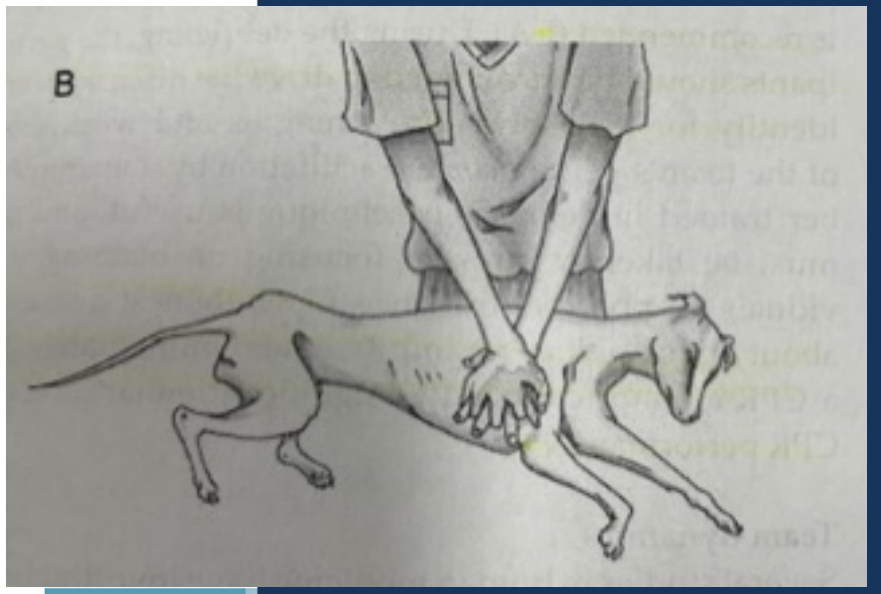
How to do: Compressions

- 100-120 / minute (think of a song)
- 1/3 rd to ½ width of chest
- Make sure not to lean on the chest
- Keep your hands and patient chest under your shoulders

Compressions

Lateral recumbency

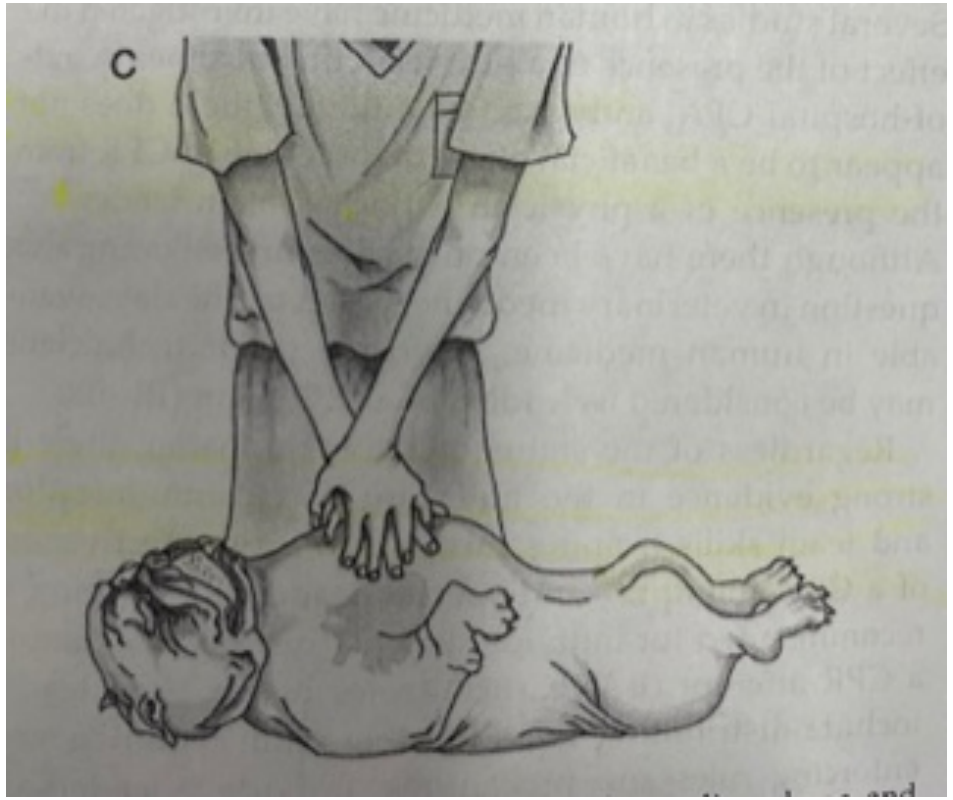
Over heart on: cat, keel chested dogs



Widest part of chest: med, large, barrel chested, or obese dogs

Compressions cont.

Dorsal if bulldog



Songs to do Compression to

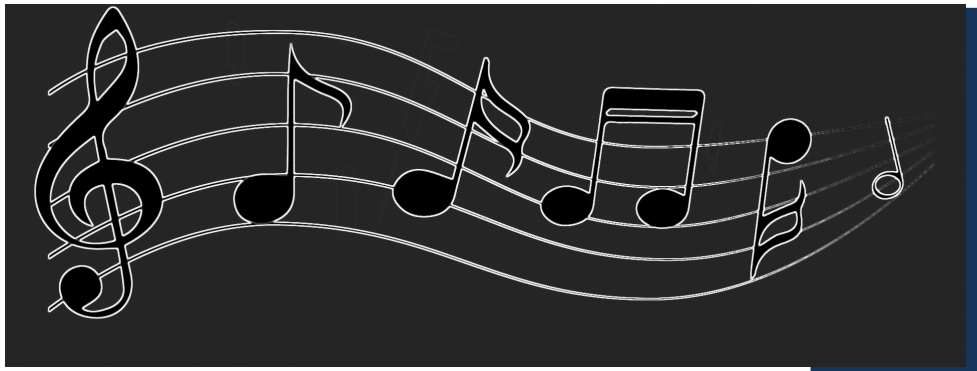
"Stayin Alive" by the BeeGee's

Third Eye Blind - Semi-Charmed Life
All American Rejects - Gives You Hell
Michael Jackson - Man In The Mirror
Missy Elliott - Work It
Shakira - Hips Don't Lie [Featuring Wyclef Jean]

"Another one Bites the Dust" by Queen are popular

Tom Cochrane / Rascal Flatts – Life is a Highway
Backstreet Boys - Quit Playing Games (With My Heart)
Fall Out Boy - This Ain't A Scene, It's An Arms Race
Guns N' Roses - Paradise City
Ricky Martin - Shake Your Bon Bon

And of course "Baby Shark"



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How to do: Breathing

- Intubate
- Inflate cuff to prevent aspiration
- Tie tube in to limit tracheal trauma
- 10 breaths / minute with inspiration of 1 second
  - (1breath/6 seconds)
- If you are the only person Compressions only!
- Mouth to snout can be done by owners
  - 2 breaths/30 compressions

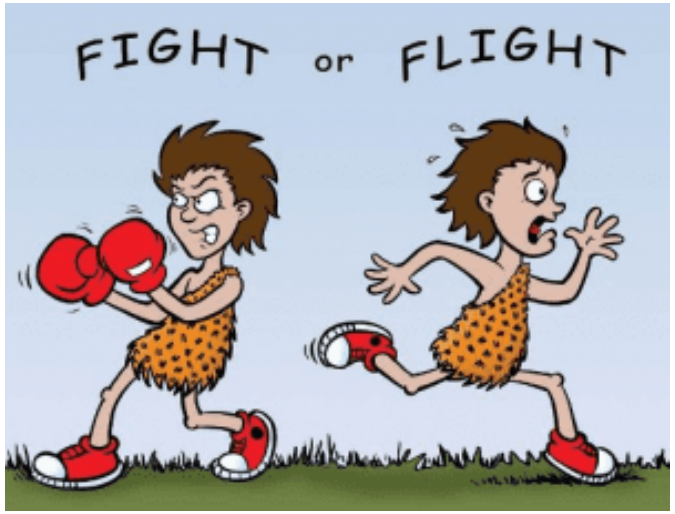
Obtain Intravenous Access

- Cephalic
- Jugular
- Lingual
- Interosseous-best in Neonates
- Saphenous

Can happen while compressions and intubating happen but don't interrupt either to get it to happen

If IV is unobtainable drugs can go Intratracheal

Drugs to be Given



~Epinephrine (adrenergic agonist)

- Increases blood glucose levels and provides energy to the cells
- Increases peripheral vasoconstriction (alpha) and increased cardiac output (beta)
- Vasopressin can also be used in place of Epi but it is expensive

- ~Atropine (parasympatholytic anticholinergic)
- Increases heart rate, decreases mucous and saliva, causes pupil dilation
- Increases vagal tone (increased success in these cases

Reversals

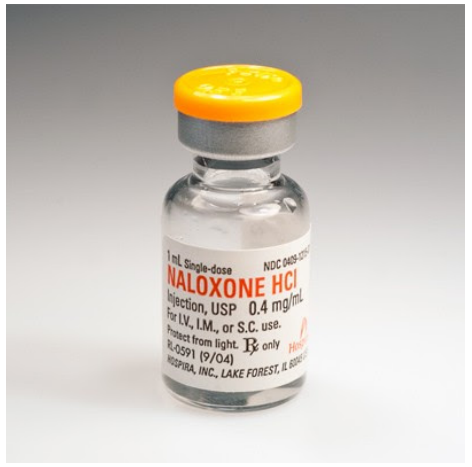
Dexmedetomidine

Atipamezole

Benzodiazepines

Flumazenil

Opioids



Naloxone

Xylazine

Yohimbine

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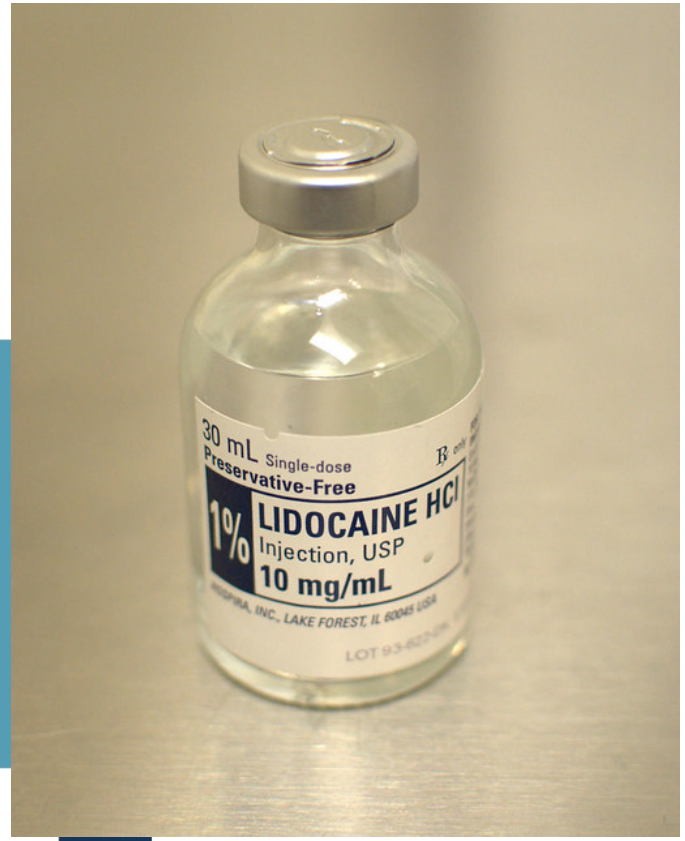
Additional Drugs

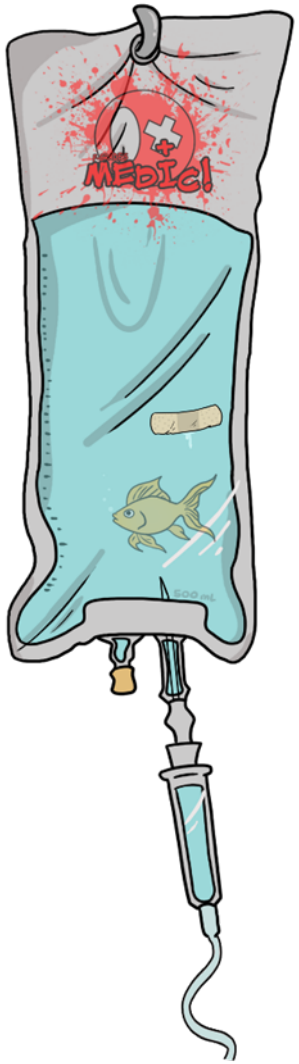
Lidocaine



Furosemide

Other Support

- Fluids
- Calcium
- Steroids



CPR Emergency Drugs and Doses

RECOVER Initiative

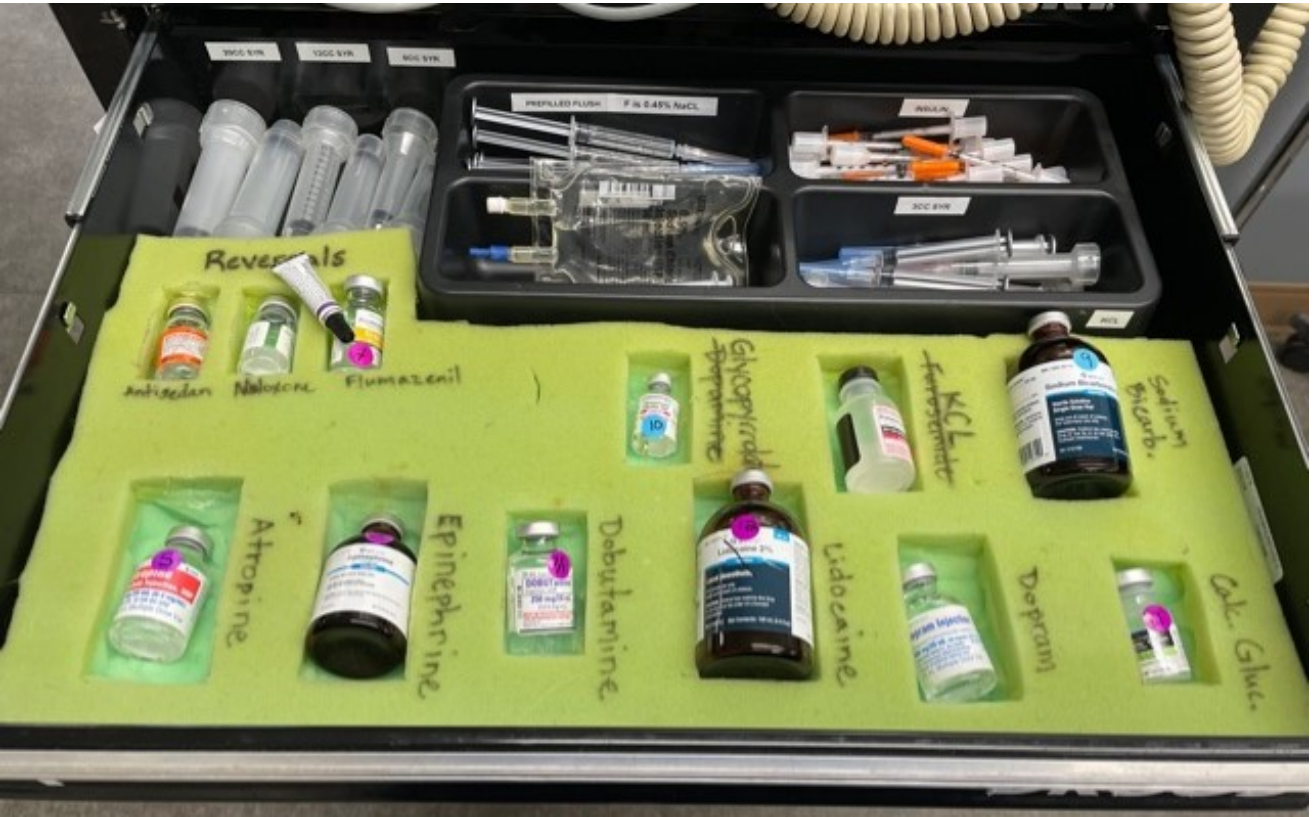
		Weight (kg)	2.5	5	10	15	20	25	30	35	40	45	50
		Weight (lb)	5	10	20	30	40	50	60	70	80	90	100
	DRUG	DOSE	ml	ml	ml	ml	ml	ml	ml	ml	ml	ml	ml
Arrest	**Epi Low** (1:1000; 1mg/ml) every other BLS cycle x3	0.01 mg/kg	0.03	0.05	0.1	0.15	0.2	0.25	0.3	0.35	0.4	0.45	0.5
	Epi High (1:1000; 1 mg/ml) for prolonged CPR	0.1 mg/kg	0.25	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5
	Vasopressin (20 U/ml)	0.8 U/kg	0.1	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2
	Atropine (0.54 mg/ml)	0.04 mg/kg	0.2	0.4	0.8	1.1	1.5	1.9	2.2	2.6	3	3.3	3.7
Anti-Arrhyth	**Amiodarone** (50 mg/ml)	5 mg/kg	0.25	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5
	Lidocaine (20 mg/ml)	2 mg/kg	0.25	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5
Reversal	**Naloxone** (0.4 mg/ml)	0.04 mg/kg	0.25	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5
	Flumazenil (0.1 mg/ml)	0.01 mg/kg	0.25	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5
	Atipamezole (5 mg/ml)	100 цg/kg	0.06	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
Defib Monophasic	**External Defib** (J)	4-6 J/kg	10	20	40	60	80	100	120	140	160	180	200
	Internal Defib (J)	0.5-1 J/kg	2	3	5	8	10	15	15	20	20	20	25

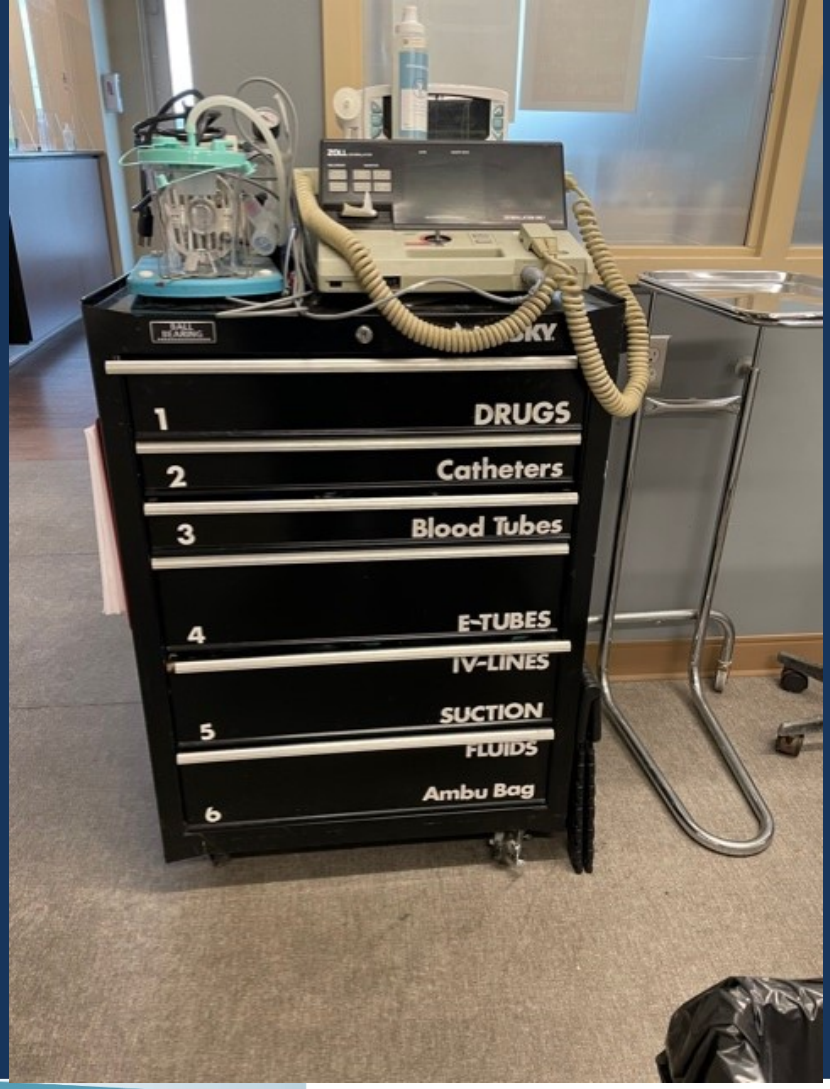
Things to do to Make CPR More Effective

- Crash Carts
- Have a team leader to organize chaos
- Have someone recording and time keeping
- Keep reference sheets nearby for ease
- Closed loop communication
- Debrief afterwards

Crash Cart

Keep it ready
Keep it organized
Restock asap





Crash Cart

Recorder

- To record and keep time
- Dedicated time keeper and recorder
- If it isn't written down it didn't happen

Great Job for the Newbies!

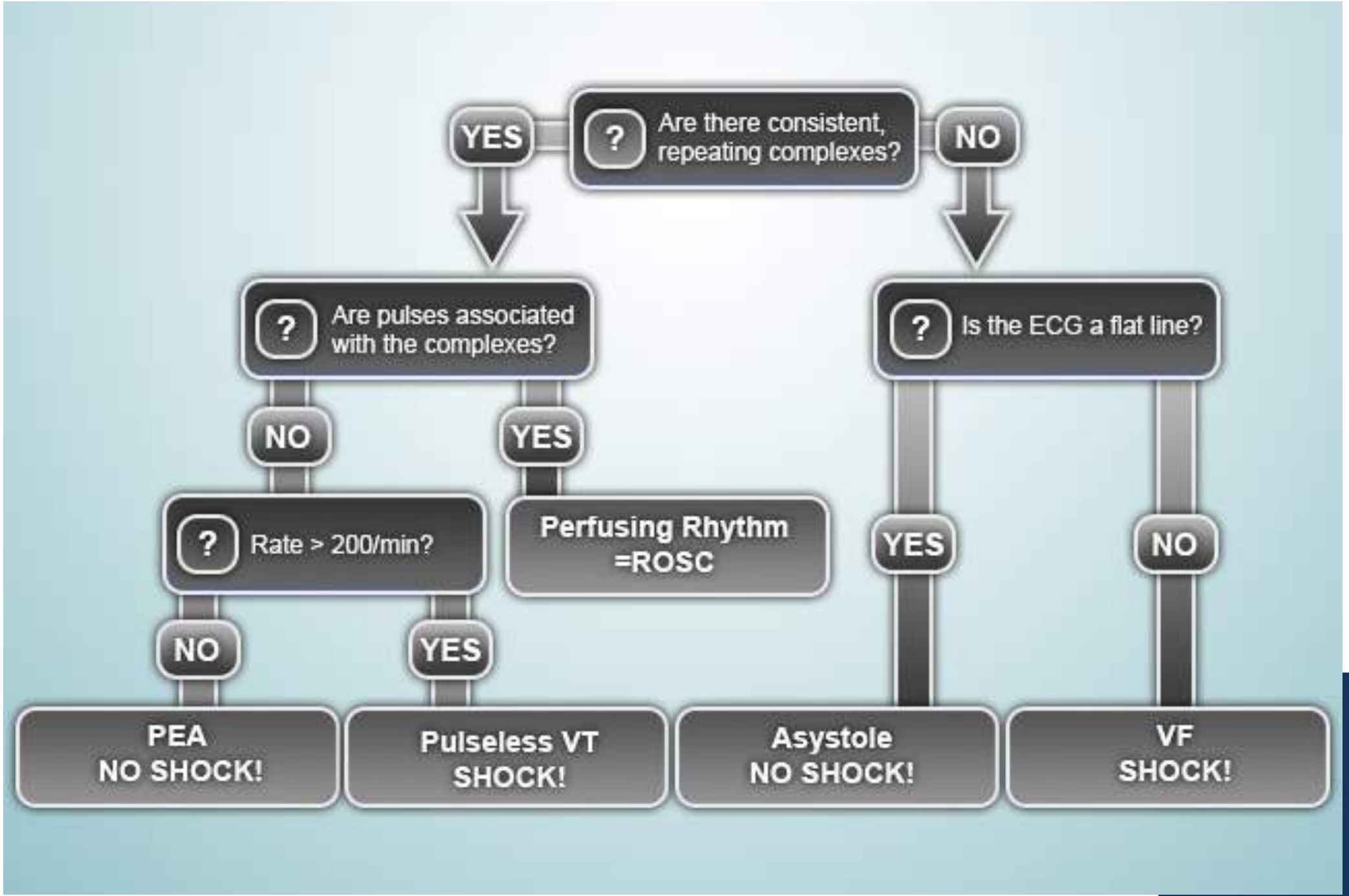
Monitor Equipment

- EKG
- End Title CO2 monitor
- Blood Pressure

ECG Rhythms

Is the complex repeating?
Is a pulse felt?

Shockable Rhythms are less common in cats and dogs than humans



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Defibrillation

The goal of electrical defibrillation is to stop all electrical and mechanical activity in the ventricles

1. Electrical
2. Mechanical
3. Chemical

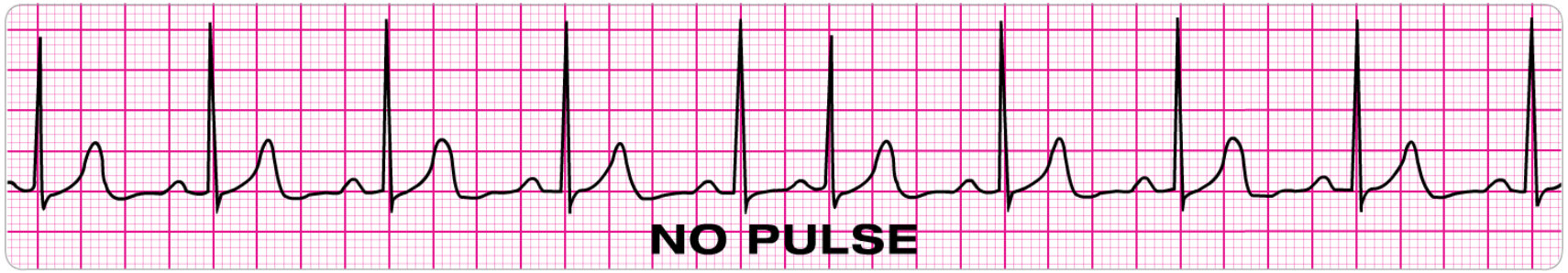
Defibrillation

Lube up defibrillation pads
Yell **Clear!**
Compressions stop everyone steps back from the patient/ table
Paddles on patient and shock
Immediately start compressions again
<u>Do not use alcohol on ECG clips!</u>

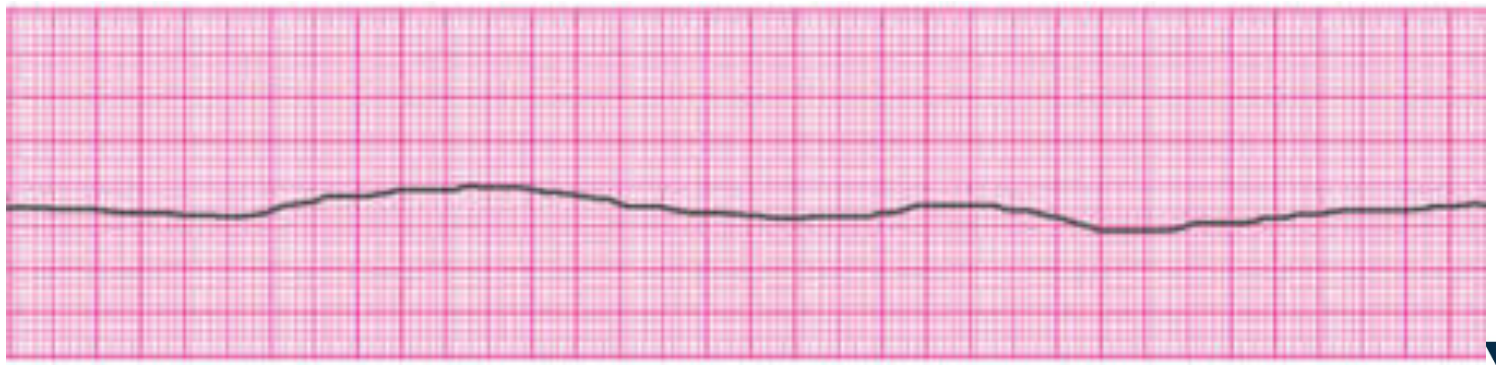
Make sure the person doing the shocking isn't leaning on the table or inadvertently touching the patients leg or body in any way

Non Shockable Rhythms

Pulseless Electrical Activity (PEA)



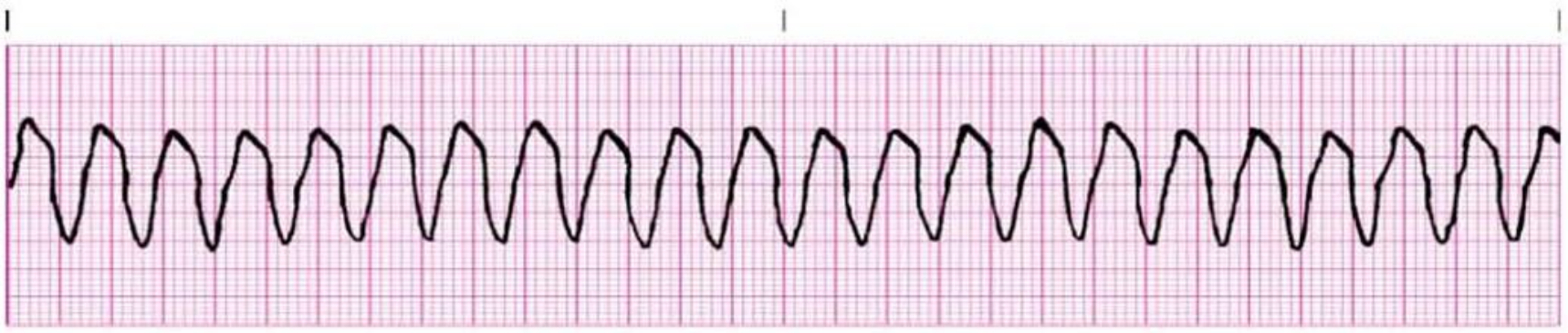
Asystole



Shockable Rhythms

Ventricular Fibrillation

Pulseless Ventricular Tachycardia (VT)



Open Chest CPR

Most effective form of CPR

-Best for some conditions: Pericardial Effusion, Pleural effusion

-Clients have to commit a lot: trauma, recovery, and price

This is best used when patient is already in surgery

Abnormal Cases

Congestive Heart Failure
What to do?

Dump out the patient on way to table

Pericardial Effusion
What to do?

Do a pericardial tap pre-arrest, or if returns

Post Resuscitation Care

Fix what made them arrest the first time

Most likely to re-arrest in 30min - 4 hours

References

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Questions?

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