

# Cardiopulmonary Resuscitation

By: Jade Edwards

# Be Prepared

Crash cart containing:

- Laryngoscope

- Endotracheal tubes (Whole sizes only)

  - Tie-in

- Catheter Supplies (Various size catheters, primed t-set, cleaning supplies, tape)

- CPR Drugs (Epinephrine, Atropine, Reversal agents)

- Syringes/needles



# Identify

The ICU/Critical patient  
The Anesthetized patient  
The "Walk In"

Do not wait for  
confirmation of  
asystole!



# Alert Your Team

- Alert your team, don't be shy! Everyone has a role.
- Communicate with the owners: Part one
  - Code Status
    - Red: Do not resuscitate
    - Yellow: Basic Cardiac Life Support and Advanced Cardiac Life Support
    - Green: Permission to perform surgical CPR (if indicated)
  - DVM discretion
- Communicate with the owners: Part two
  - Relevant history
  - Any known trauma? (HBC, GSW, Animal attack, etc)
- Move patient to "workable" area

# First Things First...

- Try to relax .... .....the patient is already dead
- Since #1 is impossible, give your teammates and yourself the benefit of the doubt



**BASIC CARDIAC LIFE  
SUPPORT (BCLS)**

# #1 Compressions

- Technique and positioning based on patient size and anatomy
- 2-minute intervals at most, shorter if fatiguing
- Use a stool to obtain appropriate height for adequate compression and recoil

# Compressions

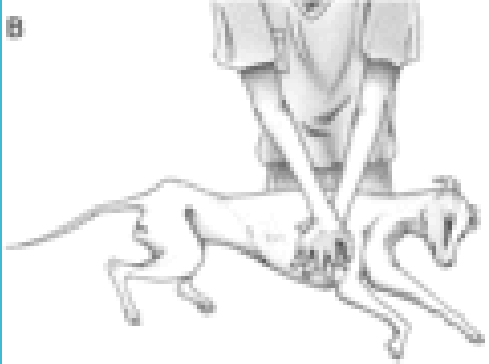
- Dorsal vs lateral recumbancy
- Thoracic pump
  - Widest part of chest, 7<sup>th</sup> ICS
- Cardiac pump
  - Ventral 1/3 of chest, 5<sup>th</sup> ICS
- Technique
  - Compress 1/3-1/2 of chest (with recoil!)
  - Rate = 100-150 bpm
  - Lock elbows and use both hands



A



B



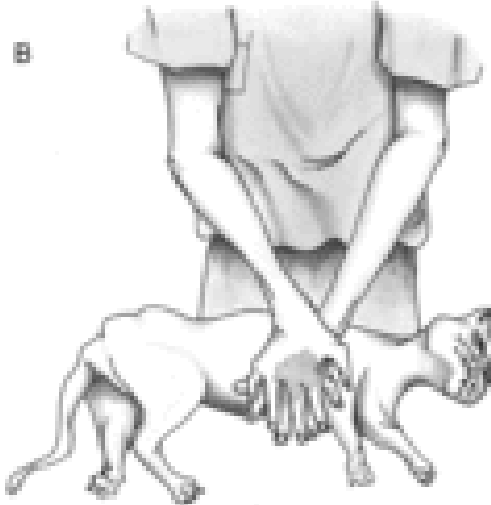
C



A



B



# Keeping a steady Rhythm

- "Stayin' Alive" Bee Gees- 103 BPM
- "Dancing Queen" ABBA- 100 BPM
- "Can't Stop the Feeling" Justin Timberlake- 100 BPM
- "I Will Survive" Gloria Gaynor- 117 BPM
- "Girls Just Want to Have Fun" Cyndi Lauper- 120 BPM
- "Hips Don't Lie" Shakira- 100 BPM



Whatever you do...

## #2 Breathing/Airway

- Intubation
  - Assess for foreign objects
  - Suction airways if needed
  - Intubate + inflate cuff + tie in ET tube
- Confirm with auscultation
- Practice intubating in lateral recumbancy, do not stop chest compressions

## Breathing/airway

- Technique
  - Approximately 10 brpm (slow down!)
  - Tidal volume = 10 ml/kg
  - Inspiratory time = 1 second
  - Do not exceed PPV of 10-20 mmHg
  - Allow complete recoil of Ambu/Anesthesia Bag
- Continue to assess placement

**Unresponsive, Apneic Patient**


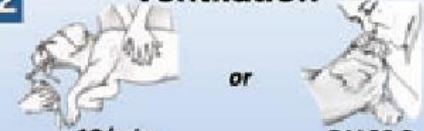


**Initiate CPR Immediately**

**Basic Life Support**

**1 full cycle = 2 minutes**

uninterrupted compressions/ventilation

<b>1</b> <b>Chest Compressions</b>  <b>100-120/min</b> • Lateral recumbency • 1/3-1/2 chest width	<b>2</b> <b>Ventilation</b>  <b>10/min</b> • Intubate in lateral • Simultaneous compressions <i>or</i> <b>C:V 30:2</b> • Interpose compressions
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- Alternate compressor every 2 min to avoid fatigue
- Communicate during transition to avoid interruption



*That's all Folks!*

Basic Cardiac Life Support

KEEP  
CALM  
and...



...ok, not THAT calm!

**ADVANCED LIFE SUPPORT  
(ALS)**

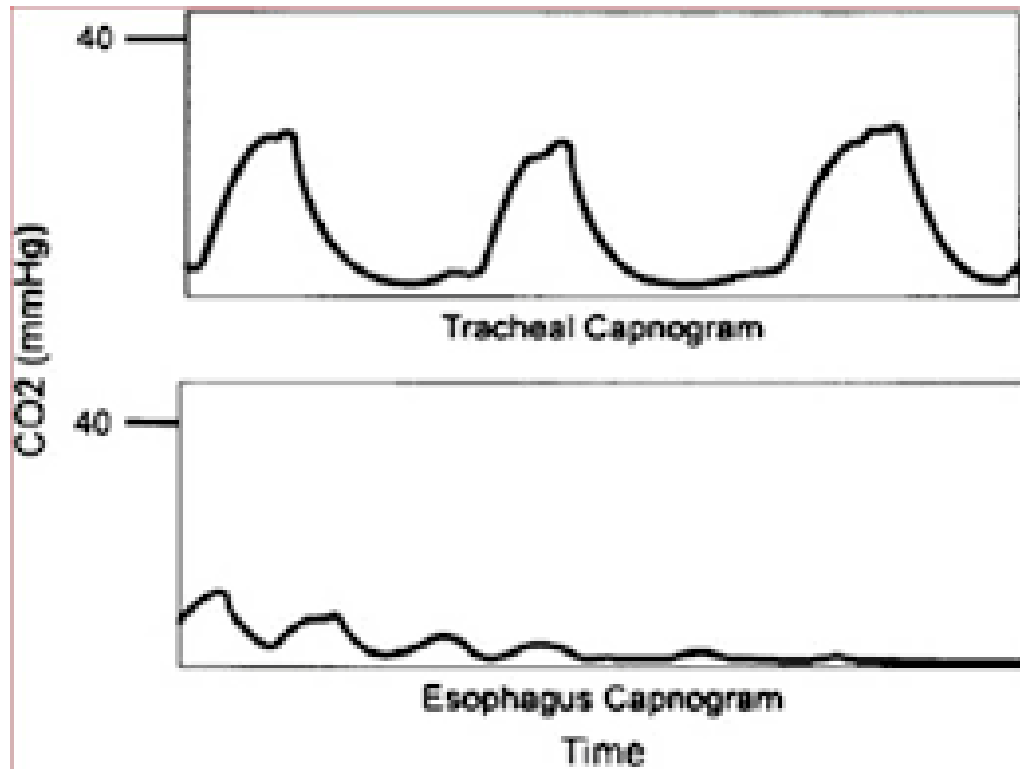


# #3 Monitoring

- 1. EKG
  - Visualize compressions
  - Assess rhythm
    - Asystole
    - Pulseless Electrical Activity (PEA)
    - Ventricular tachycardia
    - Ventricular fibrillation
  - Use alcohol or gel?

# Monitoring

2. Capnograph (ETCO<sub>2</sub>)
  - Normal = 35-45 mmHg
  - Awesome compressions = 12-15 mmHg
  - Assess for fatigue
  - Assess for appropriate intubation



# Monitoring

- 3. Other (less effective due to poor perfusion)
  - Blood pressure (Oscillometric vs Doppler)
  - SpO<sub>2</sub>

# #4 Obtain Vascular Access

- Routes
  - Intravenous (IV) – Cephalic, Saphenous, Jugular
  - Intraosseous (IO)
  - Intra-tracheal (IT)
    - Shown to be less effective than IV/IO
    - Typically clinician will double IV dose
    - Red rubber cath introduced into ET tube, followed by breath

# #5 Administer Reversals

- Opioids → Naloxone (0.04 mg/kg)
- Alpha-2 agonists → Atipamezole (0.01 mg/kg)
- Benzodiazepines → Flumazenil (0.01 mg/kg)
- STOP CRIs (Fentanyl, Isoflurane, Ketamine, etc)

# #6 Emergency Drugs

- Epinephrine
  - Alpha-1, Beta-1, Beta-2 adrenergic agonist
  - Low dose = 0.01 mg/kg, High dose= 0.1 mg/kg
- Vasopressin
  - V<sub>1</sub> receptors
  - 0.8 U/kg
- Atropine
  - Anticholinergic, sympatholytic
  - 0.04 mg/kg

# CPR Emergency Drugs and Doses

		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
<b>DRUG</b>		<b>DOSE</b>	<b>ml</b>	<b>ml</b>	<b>ml</b>	<b>ml</b>	<b>ml</b>	<b>ml</b>	<b>ml</b>	<b>ml</b>	<b>ml</b>	<b>ml</b>	<b>ml</b>
<b>Arrest</b>	<b>Epi Low</b> (1:1000)	<b>0.01 mg/kg</b>	0.03	0.05	0.1	0.15	0.2	0.25	0.3	0.35	0.4	0.45	0.5
	<b>Epi High</b> (1:1000)	<b>0.1 mg/kg</b>	0.25	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5
	<b>Vasopressin</b> (20 U/ml)	<b>0.8 U/kg</b>	0.1	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2
	<b>Atropine</b> (0.54 mg/ml)	<b>0.05 mg/kg</b>	0.25	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5
<b>Anti-Arrhyth</b>	<b>Amiodarone</b> (50 mg/ml)	<b>5 mg/kg</b>	0.25	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5
	<b>Lidocaine</b> (20 mg/ml)	<b>2-8 mg/kg</b>	0.25	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5
<b>Reversal</b>	<b>Naloxone</b> (0.4 mg/ml)	<b>0.04 mg/kg</b>	0.25	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5
	<b>Flumazenil</b> (0.1 mg/ml)	<b>0.01 mg/kg</b>	0.25	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5
	<b>Atipamezole</b> (5 mg/ml)	<b>50 ug/kg</b>	0.03	0.05	0.1	0.15	0.2	0.25	0.3	0.35	0.4	0.45	0.5
<b>Defib</b> <small>Monophasic</small>	<b>External Defib</b> (J)	<b>2-10 J/kg</b>	20	30	50	100	200	200	200	300	300	300	360
	<b>Internal Defib</b> (J)	<b>0.2-1 J/kg</b>	2	3	5	10	20	20	20	30	30	30	50
<b>Defib</b> <small>Biphasic</small>	<b>External Defib</b> (J)	<b>2-4 J/kg</b>	6	15	30	50	75	75	100	150	150	150	150
	<b>Internal Defib</b> (J)	<b>0.2-0.4 J/kg</b>	1	2	3	5	6	8	9	10	15	15	15


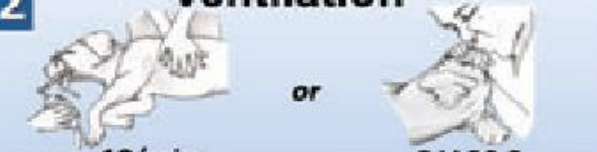
Reprinted with permission from the Veterinary Emergency & Critical Care Society ([veccs.org](http://veccs.org))  
RECOVER Initiative CPR Emergency Drugs and Doses chart.

# CPR Algorithm

Unresponsive, Apneic Patient

Initiate CPR Immediately

**Basic Life Support**  
1 full cycle = 2 minutes  
uninterrupted compressions/ventilation

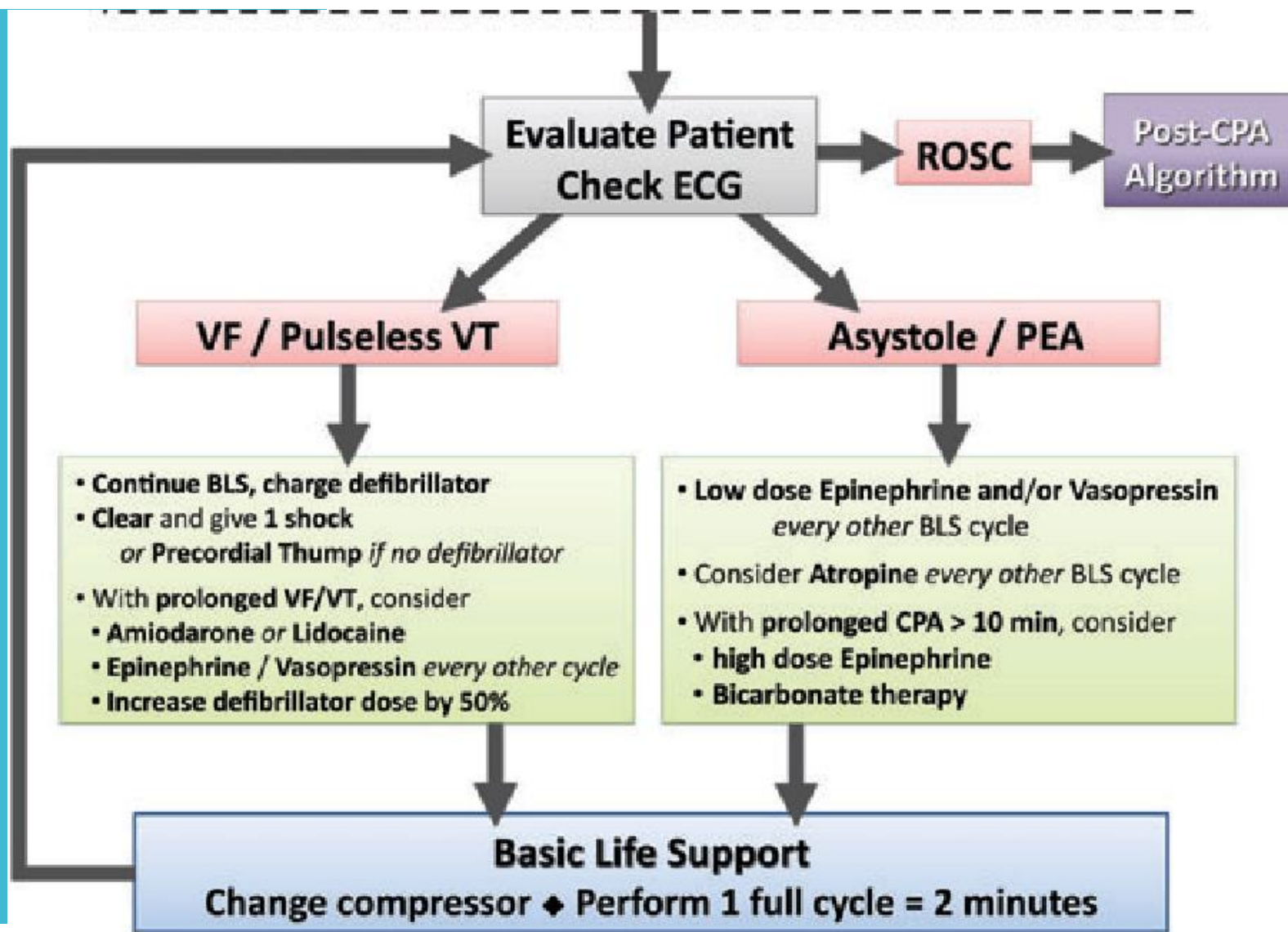
<p><b>1</b> <b>Chest Compressions</b></p>  <p><b>100-120/min</b></p> <ul style="list-style-type: none"><li>• Lateral recumbency</li><li>• <math>\frac{1}{2}</math>-<math>\frac{3}{5}</math> chest width</li></ul>	<p><b>2</b> <b>Ventilation</b></p>  <p><b>10/min</b> <i>or</i> <b>C:V 30:2</b></p> <ul style="list-style-type: none"><li>• Intubate in lateral</li><li>• Simultaneous compressions</li><li>• Interpose compressions</li></ul>
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**Advanced Life Support**

<p><b>3</b> <b>Initiate Monitoring</b></p> <ul style="list-style-type: none"><li>• Electrocardiogram (ECG)</li><li>• End Tidal CO<sub>2</sub> (ETCO<sub>2</sub>)</li><li>• &gt;15 mmHg = good compressions</li></ul>	<p><b>4</b> <b>Obtain Vascular Access</b></p>	<p><b>5</b> <b>Administer Reversals</b></p> <ul style="list-style-type: none"><li>• Opioids – Naloxone</li><li>• <math>\alpha</math>2 agonists – Atipamezole</li><li>• Benzodiazepines – Flumazenil</li></ul>
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# #7 Diagnostics or Procedures

- A-FAST or T-FAST
- Blood work
  - Glucose
  - iStat8
- Paracentesis

# #8 Recording

- Records drugs
- Records dosages
- Records times – alerts team at 2-minute intervals



# Float

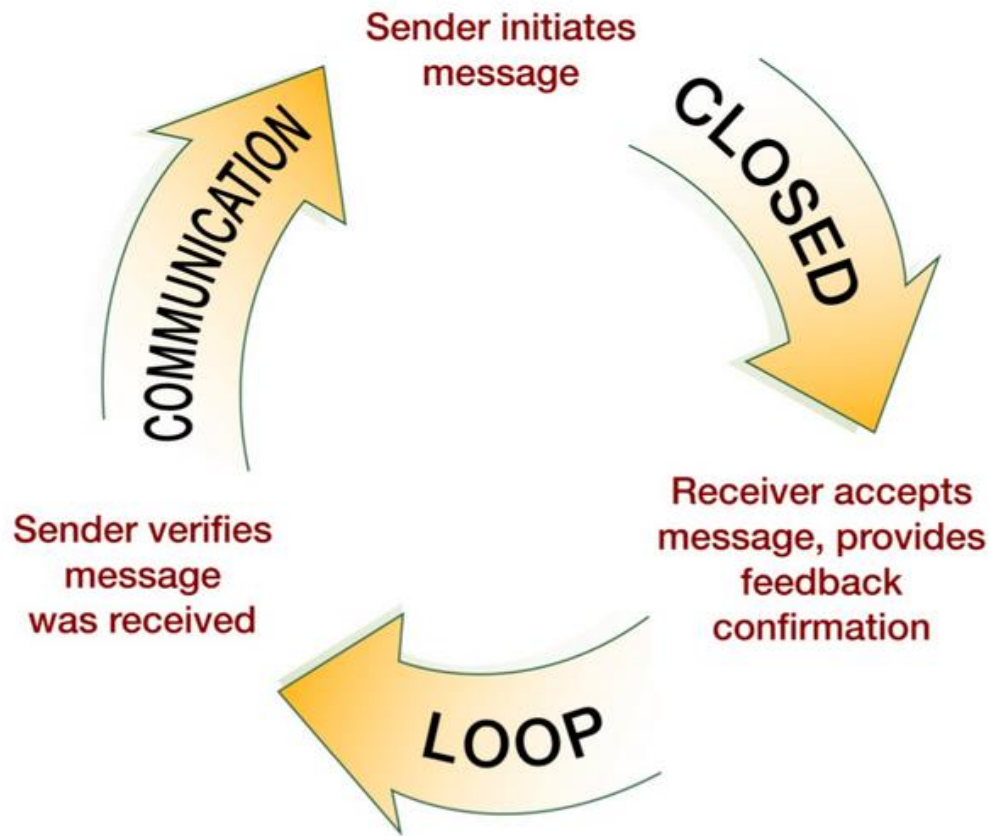
Help keep area clear

Held hand off items

Avoid the "Bystander Effect"

# CPR Cycles

- Cycle at 2-minute intervals
  - Recorder calls out 2-minute intervals
  - Transition compressor every 2 minutes
  - Typically, drugs will be administered every other interval
- Roles -> LEAD
  - #1 Compressor
  - #2 Airway/breathing
  - #3 Monitors
  - #4 Vascular access
  - #5 Drugs
  - #6 Recorder



## Closed Loop Communication

"Give 0.2 mls of Epi"

"Drawing up 0.2 mls of Epi"

"Handing off 0.2 mls of Epi"

"Giving 0.2 mls of Epi IV"

"0.2 mls of Epi given at 2:36 pm"

# Debriefing

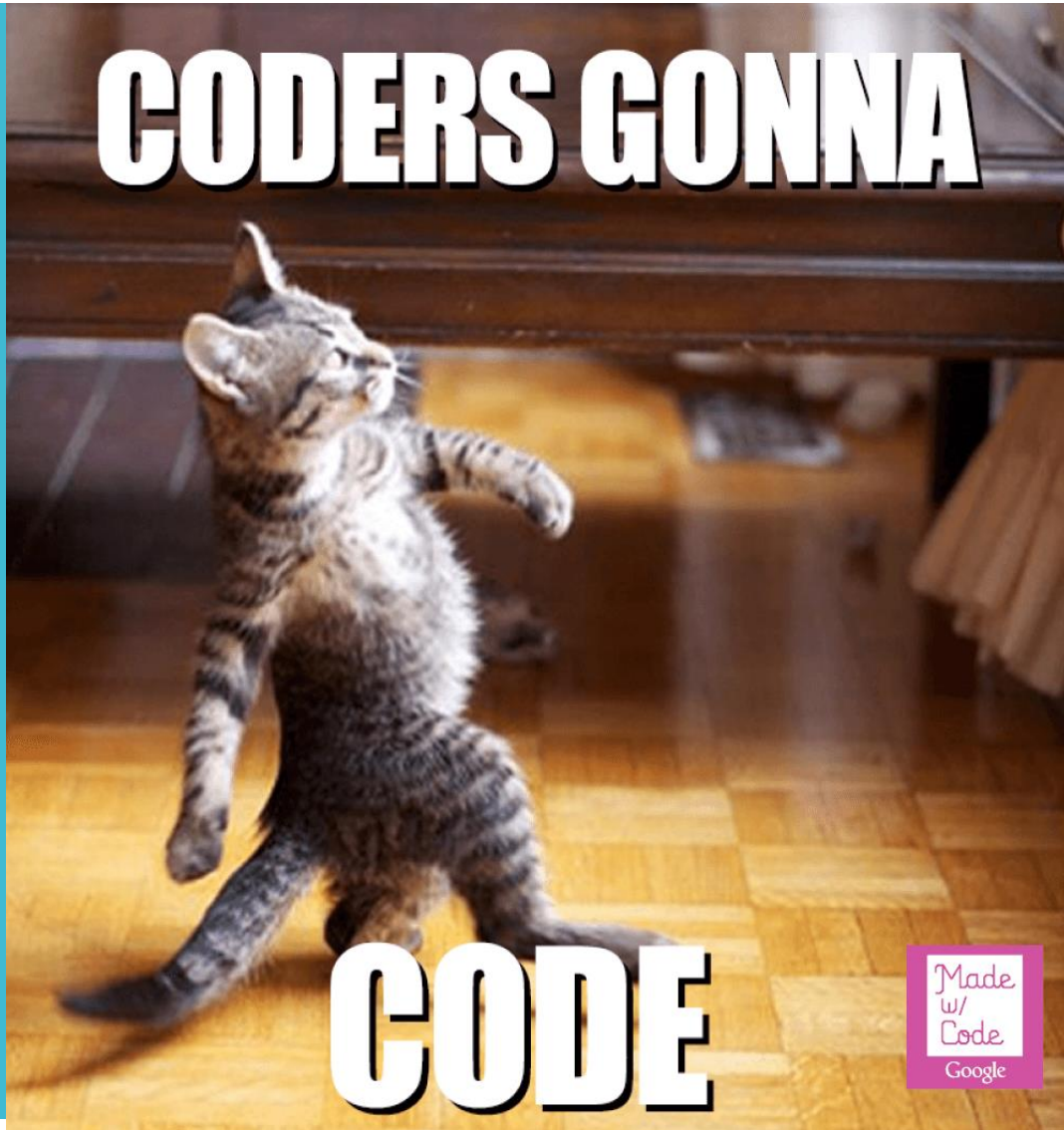
- Always re-group with your team to discuss code
- Things that went well?
- Things that need improvement?
- Questions?
- Become a cohesive team!

# Outcome

- Discontinue efforts if:
  - Owners elect discontinuation
  - DVM discretion
  - No response -> fixed and dilated pupils, absent corneal reflex
- If successful ROSC, celebrate (briefly), then prepare for post-arrest care



**CODERS GONNA**



**CODE**



# Post-arrest Care

- Systemic Inflammatory Response Syndrome (SIRS)
- Multi-Organ Dysfunction Syndrome (MODS)
  - GIT Dysfunction, Bacterial translocation
  - Vascular Dysfunction, Hypotension
  - Acute Kidney Injury, Hepatic Dysfunction
  - ALI/ARDS
  - DIC, Coagulopathy, Thrombosis
- 5% of successful codes (ROSC) make it to discharge

Questions?

