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# A “Crash Course” in Veterinary CPR: RECOVER Guidelines

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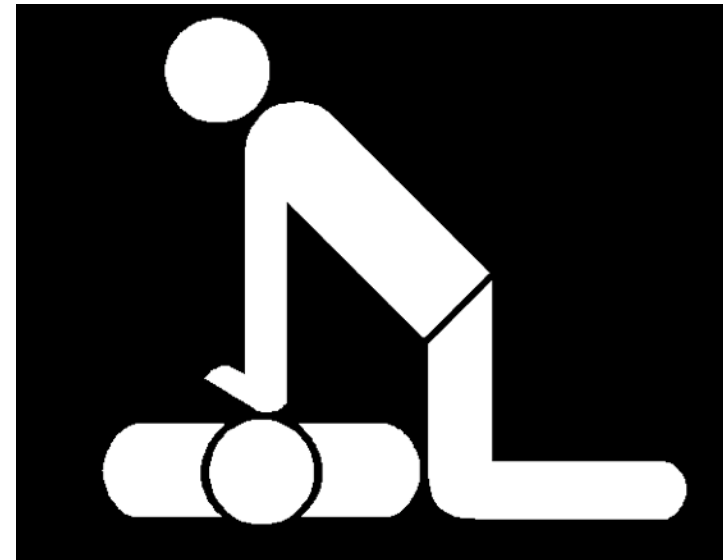
# What is RECOVER?

- REassessment
- Campaign
- On
- VEterinary
- Resuscitation
- RECOVER – Good acronym = good study?



# Outline

- Briefly discuss parts of RECOVER initiative
  - Preparedness and prevention
  - Basic life support
  - Advanced life support
- Clinical guidelines



# Part 1: Preparedness

# Crash Carts



# Crash Carts

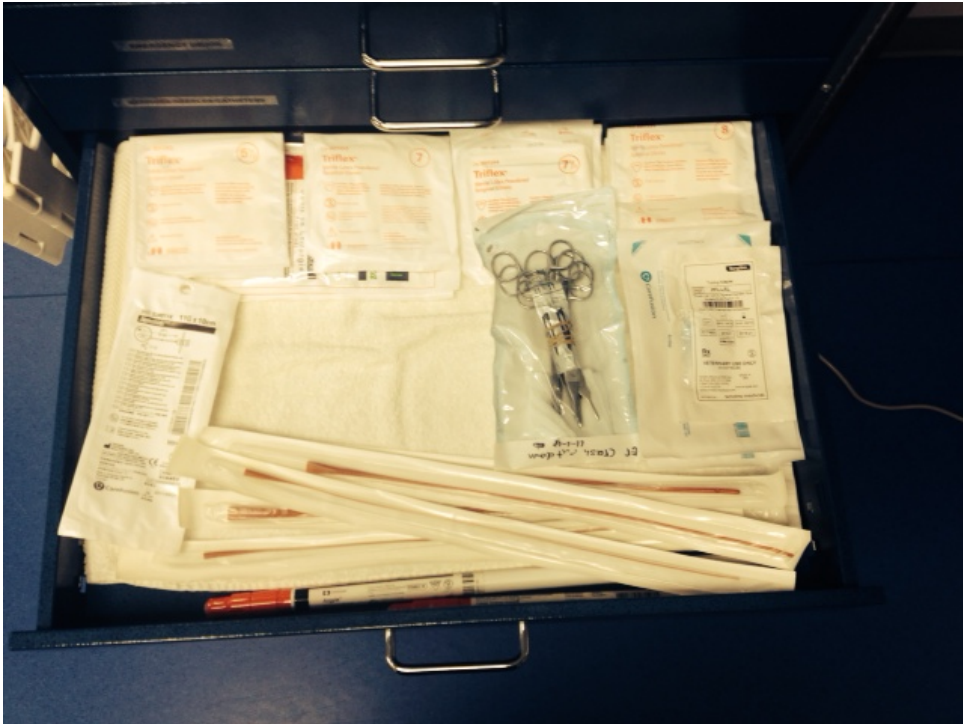


# Crash Carts



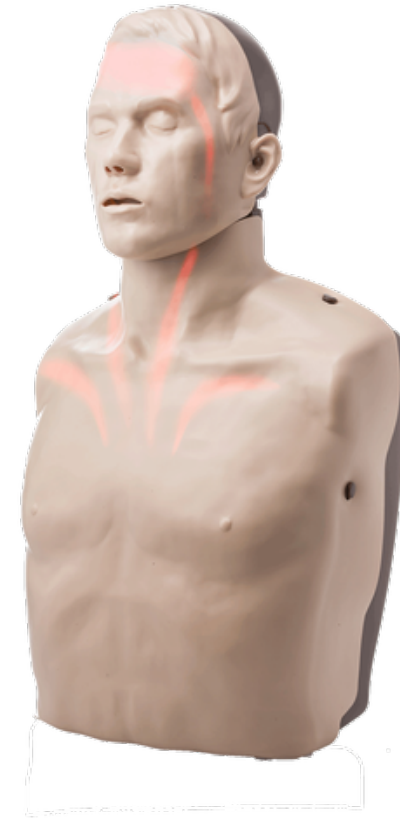


# Crash Carts



# Staff Training Exercises

- Identifying arrest
- Manikin or cadaver practice
- Knowing your role in an arrest
- Debriefing after an arrest
  - The good, the bad and the ugly
- Lectures on CPR 😊



# Determining Rolls During Arrest

- First person – Compressions
- Second person – Airway and breathing
- Third person – Monitoring
- Fourth person – Drugs and fluids
  
- Rotate in and out for each role especially compressions

# Communication, Debriefing and Post-training Assessment

- Closed loop communication improves effectiveness of CPR efforts
- Debriefing is an effective way to discuss CPR
- Can improve future CPR efforts
- Safe for the patients



# Preparedness Recommendations

- Organized, pre-stocked stations improve performance
- Debriefing is safe, improves future performance
- Development of standardized veterinary CPR education
- Development of hi-fi training manikins

# Part 2: Basic Life Support (BLS)

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# Basic Life Support

- Recognition of CPA
- Airway management
- Ventilation
- Chest compressions
- Should be performed in conjunction with ALS and monitoring



# Recognition of CPA

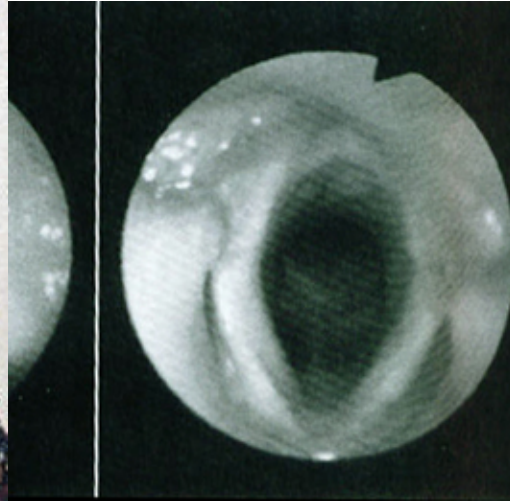
- Question: In unresponsive pets, any factors that increase likelihood of diagnosing cardiac arrest?
- Conclusion: Unresponsiveness and apnea +/- pulse palpation is reason to start CPR
- Question: In pets *not* in CPA, do chest compressions cause harm?
- Conclusion: Benefit of early CPR outweighs the harm of chest compressions (I-B)



# Airway and Ventilation

- Mouth-to-snout ventilation may be considered
- Bag-mask breathing may be considered
- Acceptable to use 10mL/kg tidal volume and 1 second inspiratory time
- Ventilation should be 10 breaths/minute

# Intubation



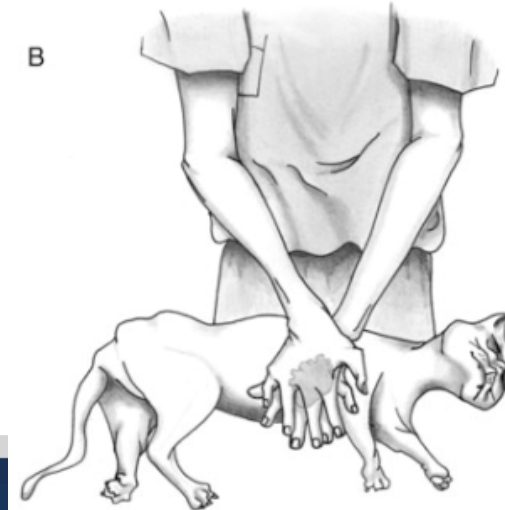
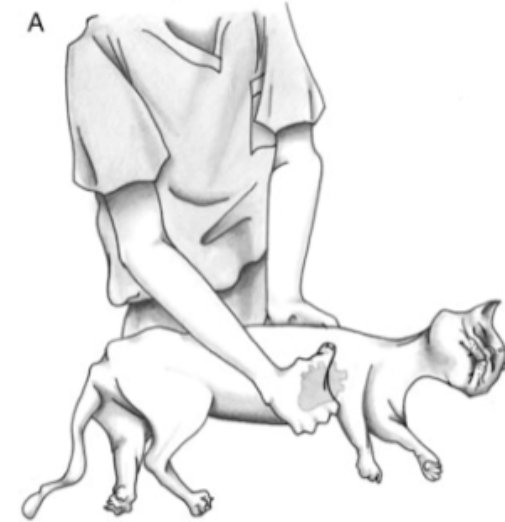
# Chest Compressions

- Chest compressions only?
  - Start compressions, intubate ASAP
- Compress chest 1/3 -1/2 in lateral recumbency
- Compression:ventilation = 30:2 in NON-intubated patients
- ABC vs. CAB?
- Minimal interruptions in compressions

# Hand Placement/Rate/Recoil

- Cardiac pump vs. thoracic pump in medium and large breed dogs?
- Lateral or sternal recumbency?
- A rate of 100 – 120 / minute is recommended
- Complete chest wall recoil should be allowed
- Interposed abdominal compressions may be considered
- Alternate rescuer every 2 minutes

# Basic Life Support



# Part 2: Conclusions

- Rapid recognition and initiation of CPR
- Immediate initiation of chest compressions
- Ventilation at 10 breaths/minute
- Chest compressions – push hard, push fast
- CPR uninterrupted for 2-minute intervals
  - Interruptions kept to a minimum

# Part 3: Advanced Life Support (ALS)

# Vasopressors and Vagolytics

- High-dose vs. low-dose epinephrine
- Vasopressin during CPR
- Atropine -> Patients with increased vagal tone may benefit





# Defibrillation

- Treatment of choice for VF
- Biphasic defibrillation is preferred
- Compressions between shocks
- Compress first, shock later?
- Escalating doses of energy may be considered



# Other Various ALS Topics

- Open chest CPR
  - Can be considered if closed-chest CPR is unsuccessful
  - Intrathoracic disease
- Intratracheal drug administration
- N.A.V.E.L.
  - If no IV or IO access
  - Use 2-fold increase in dose IT
  - Use 10-fold increase for Epinephrine

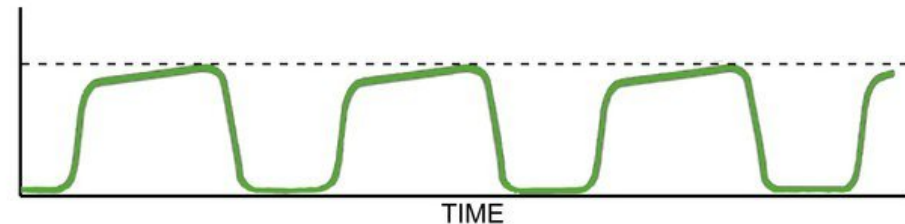
# Part 3: Conclusions - ALS

- Low dose Epinephrine early, high dose late
- Vasopressin can be considered
- Atropine may be helpful (vagal arrests)
  
- Defibrillate with a biphasic defibrillator
- Shock then compress then check ECG

# Part 4: Monitoring

# Diagnosing CPA

- Diagnosing life is easier than diagnosing death
  - Lay rescuers poor at pulse palpation
  - Doppler is not reliable
  - ECG may be helpful
  - EtCO<sub>2</sub> that rapidly decreases can confirm CPA



# Monitoring During CPR

- ECG should be used to identify rhythm
  - Minimize interruptions
- EtCO<sub>2</sub> may help to prognosticate ROSC
  - EtCO<sub>2</sub> is correlated with CPP
  - Surrogate for cardiac output
  - Determines *quality* of CPR
  - Increased EtCO<sub>2</sub>:
    - Correlates with increased ROSC
    - May indicate ROSC

# Other Monitoring Parameters

- Monitor ventilation
  - Increased ventilation may cause poor outcome
- Measure venous blood gas
  - Better predictive value for ROSC
- Measuring electrolytes may help direct therapy
- Coarse ventricular fibrillation is better

# Part 4: Conclusions - Monitoring

- Pulse palpation for CPA is not recommended
- Look, listen and feel for proper intubation
  - Then use EtCO<sub>2</sub>
- ECG is important for rhythm determination
  - Minimize interruption of compressions
- EtCO<sub>2</sub> is an early indicator for ROSC
  - EtCO<sub>2</sub> >15mmHg in dogs, >20mmHg in cats



# Part 5: Clinical Guidelines

# Preparedness and Prevention

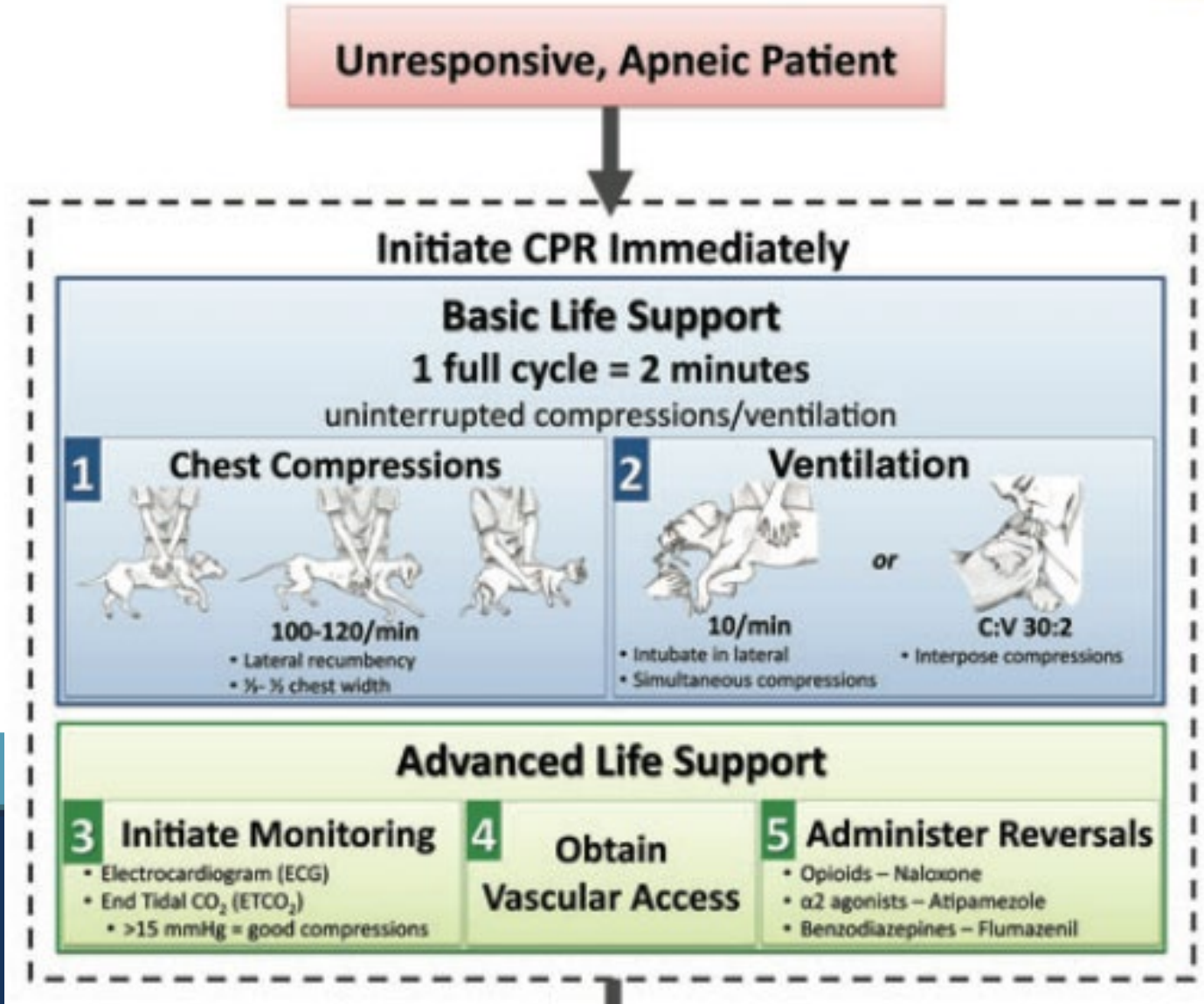
- Have a crash cart... restock it frequently
- Have visual aids, they increase compliance
- Train personnel (hands off and hands on)
  - Refresh every 6 months
- Debrief your staff after a code
- Communication is key during an arrest
  - Closed-loop communication limits error

# Basic Life Support

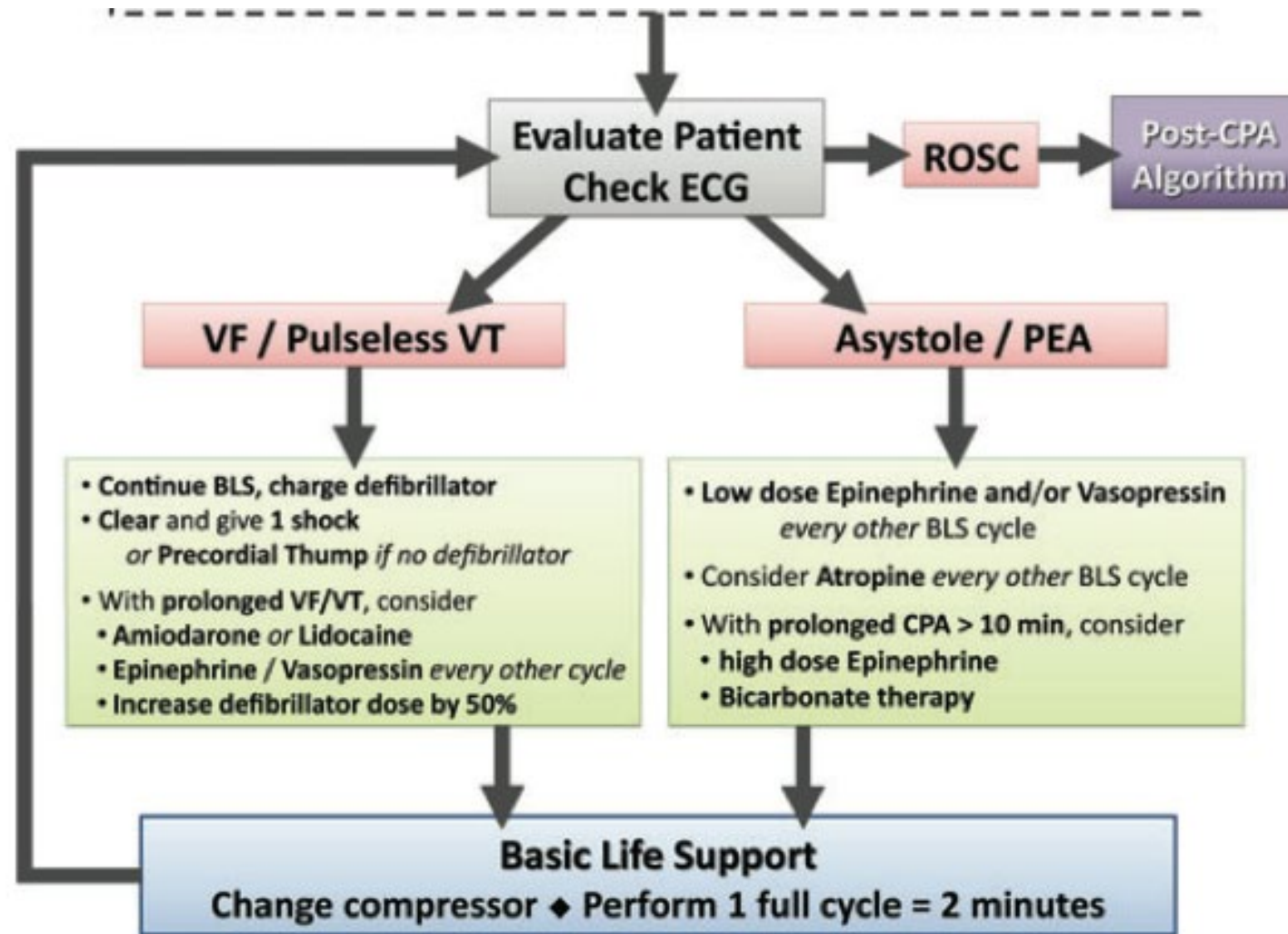
- Early endotracheal intubation
- Compress and ventilate simultaneously
- Minimize increased intrathoracic pressure
- Alternative breathing techniques:
  - Tight fitting mask
  - Mouth-to-snout
  - 30:2 ratio??



# Basic Life Support Algorithm



# Advanced Life Support Algorithm



# Post Arrest – Brief Summary

- Check venous blood gas/lytes
- Consider mannitol or hypertonic saline
- Look for underlying cause of arrest
- Start vasopressors if necessary/turn on mechanical ventilator
- Prepare for impending arrest again

Questions?



# Thank You

**Further Questions:**  
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