

Another One Bites The Dust...Unless You Learn CPR First

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The RECOVER initiative, which is short for Reassessment Campaign on Veterinary Resuscitation - is a collaboration between the American College of Veterinary Emergency and Critical Care (ACVECC) and the Veterinary Emergency and Critical Care Society (VECCS). It was established to create, refine, and promote standardized, evidence-based CPR protocols in veterinary medicine. Since its inception in 2012, RECOVER has aimed to improve CPR outcomes through updated guidelines, education, and ongoing research.

The second iteration of these guidelines, known as RECOVER 2.0, builds on this foundation and reflects the most current understanding and best practices for CPR in veterinary patients. These updated guidelines were released in August 2024.

Basic Life Support (BLS)

Cardiopulmonary arrest (CPA), or cardiac arrest, is the sudden cessation of effective blood flow due to the failure of the heart to pump. In veterinary patients - especially dogs and cats - CPA often results from respiratory arrest leading to hypoxia. The absence of oxygen causes the heart to stop, making immediate recognition and action essential.

Signs of CPA include unresponsiveness and the absence of breathing or the presence of abnormal agonal breaths. If there is any uncertainty about whether the patient is alive, it is best to assume they are in CPA and begin resuscitation efforts.

The first two steps upon identifying CPA are to call for help and to start chest compressions right away. The ultimate goal is to achieve Return Of Spontaneous Circulation (ROSC), restoring normal heart and lung function.

Chest Compressions

Chest compressions are the cornerstone of BLS and should be tailored to the patient's body type. Three techniques are used:

- The thoracic pump method is applied by placing hands over the widest part of the chest, commonly used for broad-chested dogs like Labradors. Compression depth is 1/3 to 1/2 the width of the chest.
- The cardiac pump technique involves compressions directly over the heart, suited for keel-chested breeds such as greyhounds and small animals like cats. The compression depth with this technique is also 1/3 to 1/2 the width of the chest.
- For barrel-chested dogs, like bulldogs, sternal compressions are performed with the animal in dorsal recumbency. For patients in this position, the compression depth is 1/4 the width of the chest.

Compressions should occur at a rate of 100 to 120 per minute, with a depth of one-third to one-half the width of the chest (or one-quarter for dorsal recumbency). Full chest recoil is essential, and compressors

should rotate every two minutes to prevent fatigue. Proper posture and hand positioning are critical for effective compressions.

Ventilation

Ventilation is equally important in resuscitation. If the patient is not intubated, mouth-to-nose breathing or a tight-fitting mask may be used, though compressions-only CPR is preferred if there is a zoonotic risk.

Ideally, the patient should be intubated as soon as possible, with placement confirmed using a laryngoscope. Suction equipment should be readily available to manage regurgitation or pulmonary edema. Once intubated, breaths can be delivered using an ambu bag or anesthesia machine, at a rate of 10 breaths per minute with a one-second inspiratory time. Each breath should deliver about 10 ml/kg.

For one rescuer, a 30:2 compression-to-breath ratio should be used. With two rescuers, one breath should be given every six seconds while compressions continue uninterrupted.

Team Roles and Communication

Effective CPR requires a coordinated team effort. A designated leader, typically a veterinarian or highly trained technician, should assign roles based on staff experience and availability. Key roles include the compressor, airway manager, IV access and drug administrator, and the recorder or timer. Additional team members may assist with setting up suction, managing the crash cart, or retrieving supplies.

Clear communication is vital. Instructions should be concise, loud (but not shouted), and repeated when drugs are administered. Closed-loop communication helps reduce errors and ensures everyone is on the same page.

Advanced Life Support (ALS)

ALS builds on BLS by incorporating drug administration, ECG monitoring, defibrillation, and advanced interventions. Once compressions are in progress, ECG leads should be placed to allow rhythm analysis at the end of the first cycle.

Every two minutes, compressions are paused briefly to assess for pulses and evaluate the ECG. All team members should be trained to recognize cardiac rhythms.

EtCO₂ monitoring is highly valuable, offering insight into both ventilation and circulation. A sudden spike in EtCO₂, typically over 10 mmHg, can be the first indicator of ROSC. The target during CPR is at least 18 mmHg.

Pharmacologic Interventions

The primary pharmacologic agents used during CPR include vasopressors such as epinephrine and vasopressin. Epinephrine is effective but should not be used at high doses due to adverse neurological outcomes. Vasopressin is particularly useful in acidic environments.

Atropine may be used early in cases of non-shockable rhythms such as asystole or pulseless electrical activity (PEA), or if it is thought that the CPA was due to a vagal event. Repeated doses are not advised. Reversal agents should be used appropriately, particularly if CPA is drug-induced.

Intravenous fluids may be beneficial in hypovolemic patients but can be harmful in euvolemic individuals. Bicarbonate is only indicated when CPR exceeds 15 minutes and acidosis is confirmed by blood gas analysis.

Antiarrhythmic drugs can be considered in cases of refractory ventricular fibrillation or pulseless ventricular tachycardia, though defibrillation remains the most effective intervention.

Open-Chest CPR

In certain cases, open-chest CPR (OCCPR) may be the only effective method. This includes patients with pleural or pericardial effusion, those already undergoing thoracic surgery, or giant breed dogs with conformation that limits external compressions.

OCCPR requires a rapid thoracotomy and intensive post-ROSC care, and it should be initiated promptly when indicated.

Rhythms and Defibrillation

Rhythms during arrest are categorized as shockable (ventricular fibrillation, pulseless ventricular tachycardia) and non-shockable (asystole, PEA). Shockable rhythms should be treated with a defibrillator as soon as they are identified. Biphasic defibrillators are preferred due to their increased efficacy.

Defibrillation should occur after a complete two-minute cycle unless the arrest is witnessed. The dose can be doubled after the first shock and maintained thereafter. If a defibrillator is not available, a precordial thump may be attempted.

Debriefing and Team Support

Following a CPR event, a structured debriefing should take place. Team members should reflect on the code, discussing what went well and identifying areas for improvement. This process strengthens team dynamics, reinforces training, and improves future outcomes.

Ongoing communication throughout resuscitation should be brief, clear, and timely. Team members should monitor each other's actions and the patient's status, offering corrections and support when needed. Creating an environment of mutual respect encourages all individuals to contribute actively and speak up when patient safety is at risk.