First Aid, Transport, and Triage... How to Save a Life!

Rebecca Kirby, DVM, DACVIM, DACVECC
Animal Emergency Center
Glendale, WI

The emergent patient presents a special challenge because the underlying problem may not be evident for 24-48 hours post-presentation. The problems can arise from an acute illness, from a chronic illness that has decompensated, or from an unexpected complication of another illness. All post-operative patients are considered critical care patients until life-threatening anesthetic or surgical complications are ruled out. The GOLDEN RULE of emergency medicine is "treat the most life-threatening problems first"**.** Therefore, the animal's breathing, circulation and mentation must be rapidly assessed. Patients with catastrophic problems (airway obstruction, respiratory failure, and circulatory failure) can die within seconds if left untreated. Severe problems are life-threatening but allow more time for stabilization. The diagnostic, monitoring and therapeutic procedures must be coordinated with a coherent priority approach as the patient moves from the emergency situation, to surgery or diagnostic procedures, and then finally to the critical care area.

Variables that contribute to the overall success of patient resuscitation include the severity of the primary illness or injury, the amount of fluid or blood lost, patient age and previous health problems, the number and extent of associated medical conditions, time delay in instituting therapy, the volume and rate of fluid administration, and the choice of fluids - crystalloid, blood components, synthetic colloids. Therapy must be done at the right time, in the right amount and in the right order. Therapeutic failures are generally not from ignorance but rather from failure to act expeditiously at a crucial moment.

First aid and transport

Owners can provide significant medical assistance at the scene of the injury. The receptionist must try to determine from the owner what the mentation, breathing pattern and perfusion of the pet is at the time of the telephone conversation. The first concern is for the safety of the owner. Instruct the owner to survey the scene and to move to a place of safety. The nicest animal can become vicious and aggressive. Placing a light cloak or cloth over the head of the pet can remove light and sound - external stimulus that add to fear and aggression in the pet. Cats can be placed in dark boxes to minimize stress during transport. The owners should place air holes and a hole large enough for observation of the animal.

When moving the animal, try to minimize motion of the head, neck and spine. Using a flat, firm board of wood, cardboard or thick fabric that provides support is a suitable method. These materials will allow radiographs to be taken through the board without having to move the animal.

Mouth-to-nose resuscitation and chest compressions may provide enough respiratory and circulatory support to maintain life during transport. After it has been established that the animal is unconscious and not breathing, the owner is instructed to close the pet's mouth and to place their lips over the pet's nostrils. They should give 3-4 strong breaths initially into the nostrils. Frequently, this initial breathing action is enough to initiate spontaneous ventilation if there has been a respiratory arrest from a vasovagal reflex. Should breathing not become spontaneous, the owner should breath for the pet 10-12 times per minute. If they are calm enough, they can be taught to compress the esophagus behind the trachea so that the majority of the air will go down the airway instead of into the stomach. If they do not detect a heartbeat, they can perform chest compressions and ventilations at a 5:1 ratio. Of course, someone else will have to drive during transport.

Owners must be asked if there is ongoing hemorrhage or if there was bleeding seen at the site of injury. Slow, dark, oozing blood is generally low pressure venous blood. Direct digital pressure is often enough to stop the bleeding. If there is a laceration on a distal limb with venous bleeding, elevating the limb above the level of the heart is often enough to stop the bleeding. Active red, pulsating arterial bleeding should be controlled by direct digital pressure and then a pressure bandage over the bleeding site. Any long pieces of fabric or gauze can be used. Often washcloths and handtowels are adequate when applied with mild pressure. Should the blood soak through the bandage, additional material is placed over the original bandage.

Penetrating foreign objects should remain in place with the owner guarding against further penetration or movement of the object. When an arrow has penetrated the abdominal cavity, there is the potential for the blades to lacerate multiple bowel segments if the shaft of the arrow is allowed to move during transport. It is often necessary to stabilize the shaft of the arrow just outside the body, such as grabbing the shaft with pliers and holding it firmly, and then the shaft can be cut or broken off. The arrow will then go into the abdomen and be removed surgically as soon as possible.

Fractures below the elbow or hock with significant displacement should be supported. The owner can make a support splint from a rolled newspaper or magazine, which is then secured in place by long pieces of fabric. Because cats often move aggressively to remove bandages, the cost benefit ratio must be carefully assessed before placing the bandage in each individual cat.

Animals with altered mentation after trauma should be transported with the head level or elevated 20 degrees. There should not be any jerking or thrashing motions and no conpression of the neck or jugular veins.

Once it has been determined that a patient with a potentially life-threatening problem is due to arrive, the treatment staff should be notified verbally. A dry erase board can be placed in the general treatment area and all animals listed that are due to arrive, with their estimated time of arrival, species, approximate age, breed, and presenting complaint noted.

Common complaints which should motivate the team to anticipate problems and be as ready as possible ahead of time include:hit by car, dog fight, falling from height, gunshot, stabbing, potential toxicity, inability to urinate, abdominal distension, labored breathing, seizures, collapse, altered consciousness, profuse bleeding, dystocia, snake bite, prolapsed organs, heat stroke, severe cold exposure, and burns.

The nursing staff should have an idea of the usual procedures and equipment required for the critical presenting complaints. The equipment that is usually needed is laid out ahead of time, so that any patient needing life-saving intervention, time is not wasted searching for materials. There should be a list compiled by the nurses, nuder the supervision of the veterinarians, of the equipment, drugs and materials needed, termed "set-ups". There will be different set-ups for different problems. Examples are given below.

Once the patient arrives, the receptionist will notify the nurse or clinician that is triage (with or without a gurney) is required. A quick statement identifying the presenting complaint and an indication of the urgency (whether "stat" or not) completes the immediate information.

Primary survey - Triage

Triage is the art of giving priority to patients and their problems upon presentation to the hospital. The primary complaint and the time of onset are obtained and the animal is removed from the carrier or towel and quickly examined for abnormalities (Table 1). Significant changes require that the patient is taken directly to the treatment area. There are several historical or observed problems that warrant immediate triage to the treatment area, to include:trauma, profuse diarrhea, urethral obstruction, labored breathing, seizures, loss of consciousness, excessive bleeding, history of poisoning, prolapsed organs, potential snake bite, heat prostration, open wounds exposing extensive soft tissue or bone, shock, anemia, burns, dystocia, and expired animals (for the client's benefit).

Primary survey - Triage

Triage is the art of giving priority to patients and their problems upon presentation to the hospital. The primary complaint and the time of onset are obtained and the animal is removed from the carrier or towel and quickly examined for abnormalities. Significant changes require that the patient is taken directly to the treatment area. The animal suffering from any form of trauma has the potential to develop life-threatening complications at any moment and warrants immediate triage to the treatment area.

At the time of triage, the ABCs of trauma resuscitation are put into place: airway - is it patent? breathing - is it adequate to allow oxygenation and ventilation? circulation - is it adequate to deliver oxygen to the tissues? Physical evidence of catastrophic ("dying before your eyes") problems resulting from trauma include: no breathing; open mouth, neck extended labored breathing; loss of consciousness, ; blue, white or gray gum color; absent peripheral pulses; and bradyarrhythmias with poor perfusion. The top ten complications of trauma that lead to catastrophic phsycal signs are listed below. Physical findings that severe problems have occured include: abdominal distension or abdominal pain; extensor rigidity in the forelimbs and inability to move back legs (Schiff-Sherrington); flailing, disorientation, dementia or seizures; severe tachycarrhythmias (heart rates sustained above 300 bpm) with poor perfusion; muffled heart sounds; distended jugular veins; pulse deficits; inability to expand chest while breathing;

Top ten catastrophic complications of trauma

1. Cardiac arrest
2. Tension pneumothorax or pneumomediastinum
3. Closed cavity hemorrhage
4. Brain laceration or herniation
5. Open pneumothorax
6. Massive external hemorrhage
7. Cardiac tamponade
8. Bradyarrhythmias
9. Airway rupture or obstruction
10. Pulmonary parenchymal hemorrhage

It is vital that your emergency team is well trained and prepared for rapid intervention in each of these situations.

Set-ups

The nurse should learn the usual and customary procedures for therapy of various life-threatening problems. An equipment list is compiled, and when it is known that a patient having suffered trauma is due to arrive, the equipment is set-up ahead of time. Below are examples of set-ups utilized at the Animal Emergency Center:

Trauma

- The general management of trauma patients initially involves rapid but careful intravenous fluid administration, oxygen administration, and an emergency data base (PCV, TS, Azostick, glucose labstick). Therefore, the set-up includes;
- intravenous catheters
- clippers
- antiseptic cotton balls
- scrub for surgical prep
- tape (pre-cut to desired lengths)
- heparinized saline flush
- four microhematocrit tubes and test labsticks
- isotonic fluids with IV administration set in place
- needle and syringe
- oxygen hose or hood for oxygen administration

Chest tap

- When a chest tap is indicated, it is generally to provide immediate relief of respiratory distress. Therefore, speed is of utmost importance. The set-up should include:
- butterfly catheter of appropriate size or needle and IV extention tubing
- clippers and scrub for surgical prep
- large volume syringe, 3 way stop-cock attached
- sample collection containers (sterile for culture, clot tube and EDTA tube)
- large container to empty syringe into if large fluid volumes
- lidocaine, needle and syringe

Chest tube

- Occasionally, the placement of a chest tube is required for continuous drainage of fluid and/or air from the thorax. Equipment that is set-up includes:
- chest-tubes of assorted sizes
- clipper and scrub for surgical prep
- sterile gloves
- small laceration surgery pack with scalpel handle, scissors, forceps, hemostats, needle holder
- scalpel blade, sterile gauze sponges
- lidocaine, needle, syringe
- evacuation system (may be as simple as three-way stop-cock, hemostats with padded jaws, and syringe)
- tape, suture material, sterile bandage material
- sample collection containers (as listed above)

Nasal oxygen

- Nasal oxygen is being utilized with increasing frequency in emergency practices. It allows an 40-80% inspired oxygen concentration, yet allows the animal to be mobile and easily monitored. The catheter is tolerated very well and is easy to insert. The set-up for this procedure is:
- soft rubber feeding tube of a diameter large enough to fill 1/2 to 3/4 of nares
- 1, 3, or 6 cc syringe barrel
- tape and suture material
- ophthalmic topical anesthetic or dilute lidocaine
- tubing for oxygen delivery and oxygen humidification system
- oxygen source
- The flow rate is typically 50-90 ml/lb/min.

The nurses should consult with the veterinarian on duty and obtain direction and recommendations for their equipment needs. Each clinician may have a different method for performing a procedure. The top-notch nurse will keep a pocket notebook with glove sizes and various clinician preferences listed and have have equipment ready for use before it is requested.

Summary

- Important keys to successful patient management include:
- Identify and treat the most life-threatening problems first.
- Make the patient as stable as possible before undertaking stressful procedures.
- The critical patient is rapidly changing and requires intensive monitoring and frequent re-evaluation.
- It is important to anticipate complications and initiate monitoring procedures for early detection.
- It is the trend of change in monitored parameters that are more significant than a single value.

- Make sure that the treatment orders are clear and concise and that the technical staff and clinicians are making the same interpretations of monitoring values and treatment regimes.
- Many post-trauma complications do not become evident for 24-72 hours. Do not take a patient's stable condition for granted.
- There is less tolerance for error, indecisiveness, or delay in the critical patient.

Table 1. Physical parameters evaluated at triage.

Parameter	Abnormality	Interpretation
Airway	no air passage	total obstruction or respiratory arrest
	loud sounds	partial airway obstruction
	inspiratory	pharyngeal/laryngeal
	expiratory	intrathoracic trachea
Breathing patterns	loud sounds	upper airway obstruction
	rapid, shallow	pleural space disease
	labored	parenchymal
	expiratory push	small airway
External hemorrhage	pulsing blood	arterial
	slow oozing	venous
Capillary refill time	< 1 second	hyperdynamic state or peripheral vasodilation
	> 2 seconds	poor peripheral constriction
Mucous membrane color	white	anemia, severe shock
	blue	cyanosis
	brown	methemoglobinemia
	petechiation	thrombocytopenia
	brick red	hyperdynamic shock
	yellow	icterus
Pulse intensity	weak femoral	poor peripheral perfusion
	bounding femoral	hyperdynamic perfusion
Heart rate	Dog: >200 bpm	poor coronary diastolic filling
	< 60 bpm	impaired cardiac output
	Cat: >250 bpm	poor coronary diastolic filling
	< 150 bpm	impaired cardiac output
Level of consciousness	uncontrolled hyperexcitability	phase of unconsciousness, consider toxins
	seizures, stupor, coma	increased intracranial pressure
Wounds or fractures	open, unstable	bacterial invasion, nerve and muscle damage

First aid kit

The following are suggestions for materials to include in a first aid kit for your pet. Ask your veterinarian for their recommendations.

At- home first aid kit

- Bandage materials: conform stretch bandage roll tape; rolled gauze bandages; white porous tape; newspaper; gauze pads; cotton padding.
- Cleaning materials: dilute betadine solution; hand towel
- Drugs/Medications: sterile KY lubricant; eye wash; artificial tears; tissue glue; activated charcoal suspension; hydrogen peroxide 3% solution.
- Miscellaneous: thermometer; bandage scissors; aspirator bulb syringe; stethoscope; muzzle; penlight; silver nitrate sticks or powder; nail trimmers; duct tape.