Epinephrine:

SCHEDULING STATUS: S4

CURRENTLY COMPOUNDED FORMULATION:

Active ingredient(s)	Injectable	Oral equine paste	Oral carnivore paste	Orals for exotics	Oral solution/suspension	Topical treatment	Shampoo	Capsules	Oral powder
Epinephrine bitartrate	✓								

REGISTERED PRODUCT/ TRADE NAME: Epi-Pen 0.5 mg/ml®; Epinephrine 0.1 mg/ml injection®; Adrenalin

PHARMACOLOGICAL CLASSIFICATION: Alpha- and beta-adrenergic agonist

PHARMACOLOGICAL ACTION: Epinephrine is an endogenous adrenergic agent that has both alpha and beta activity. It relaxes smooth muscle in the bronchi and the iris, antagonizes the effects of histamine, increases glycogenolysis and raises blood sugar. If given by rapid IV injection it causes direct stimulation of the heart (increased heart rate and contractility), and increases systolic blood pressure. If given slowly IV, it usually produces a modest rise in systolic pressure and a decrease in diastolic blood pressure. Total peripheral resistance is decreased because of beta effects.[1]

INDICATION: Epinephrine is employed primarily in veterinary medicine as a treatment for anaphylaxis and in cardiac resuscitation. Because of its vasoconstrictive properties, epinephrine is also added to local anesthetics to retard systemic absorption and prolong effect.[1]

DOSAGE AND DIRECTIONS FOR USE:

DOGS:

For cardiac resuscitation (asystole):

- Both high dose (0.1 – 0.2 mg/kg) and low dose (0.01 – 0.02 mg/kg) IV or IO epinephrine have been advocated. In veterinary medicine (at present), either dose seems acceptable. Doses may be repeated at 3- to 5-minute intervals if there is no response. (Drobatz 2004)[1]
- Although controversial, high dose epinephrine (0.2 mg/kg) is probably more effective than low dose (0.02 mg/kg) for cardiopulmonary cerebral resuscitation. It can be given every 3-5 minutes IV, preferably in a central vein. If venous access is not obtained, multiply the dose by 2-10 times and administer into the distal trachea with a syringe and a red rubber tube. (Proulx 2002)[1]
- 0.01-0.1 mg/kg IV or IT q2-5 minutes (Rozanski 2002)[1]

For anaphylaxis:

- 0.01-0.02 mg/kg IV; or the dosage may be doubled and given via the endotracheal tube if IV line is not yet established. In less severe cases, may be given IM or SC (Cohen 1995)[1]
- 0.2 – 0.5 mg (total dose) SC or IM (Wohl 2005)[1]
- For bronchoconstriction: 20 mcg/kg (0.02 mg/kg) IV, IM, SC, or IT (Johnson 2000)[1]

For treatment of hypotension associated with anesthesia:
0.05 – 0.4 mcg/kg/min IV (Dodam 2005), (Mazzaferro 2005)

CATS:

For cardiac resuscitation:

- 0.05-0.5 mg of 1:10 000 solution intratracheally or intravenously. May need to repeat every 5 minutes. If intratracheal or IV sites are inaccessible, the intracardiac (IC) route may be used. IC dose is 0.5 to 5 mcg/kg (0.0005 to 0.005 mg/kg) (Wingfield 1985)[1]

For bronchoconstriction/anaphylaxis:

- 0.01-0.02 mg/kg IV; or the dosage may be doubled and given via the endotracheal tube if IV line is not yet established. In less severe cases, may be given IM or SC (Cohen 1995)[1]
- 20 mcg/kg (0.02mg/kg) IV, IM, SC, or IT (Johnson 2000)[1]

For feline asthma/anaphylaxis:

- 0.1 ml of a 1:1000 dilution SC or IV (Noone 1986)[1]
- Dilute 1 mL of 1:1000 in 10 mL of saline and give 1 mL/10 kg body weight IV or IM. May repeat q5 – 15 minutes. (Kittleson 1985a)[1]

HORSES:

For anaphylaxis:

- 3-5 ml of 1:1000 per 450 kg of body weight either IM or SC;
- For foal resuscitation: 0.1ml/kg of 1:1000 IV (preferably diluted with saline) (Robinson 1987)[1]

For cardiopulmonary resuscitation of newborn foals:

- 0.01-0.02 mg/kg (0.5-1 ml of a 1:1000 solution for a 50 kg foal) IV every 3 minutes until return of spontaneous circulation. If given intratracheally (IT), dose is 0.1-0.2 ml/kg (Corley 2003)[1]

RUMINANTS, SWINE:

For treatment of anaphylaxis:

- 0.5-1.0 ml/100 lbs. body weight of 1:1000 SC or IM; dilute to 1:10 000 if using IV; may be repeated at 15-minute intervals. Often used in conjunction with corticosteroids and diphenhydramine (Clark 1986)[1]

BIRDS:

- 0.1mg/kg IV or intracardiac (Harris 2003)[1]

WILDLIFE:

- Extrapolate from the various domestic species for the different uses.
- Can be used in conjunction with lidocaine to extend the time of local anaesthesia.

WARNINGS/ PRECAUTIONS/ CONTRA-INDICATIONS:

- Epinephrine can induce feelings of fear or anxiety, tremor, excitability, vomiting, hypertension (overdosage), arrhythmias (especially if patients has organic heart disease or has received another drug that sensitizes the heart to arrhythmias), hyperuricemia, and lactic acidosis (prolonged use or overdosage). Repeated injections can cause necrosis at the injection site.[1]
- Do not use with other sympathomimetic amines (e.g. isoproterenol) because of additive effects and toxicity.[1]
- Certain antihistamines (diphenhydramine, chlorpheniramine, etc.) and l-thyroxine may potentiate the effects of epinephrine.[1]
- Propranolol (or other beta-blockers) may potentiate hypertension, and antagonize epinephrine's cardiac and bronchodilating effects by blocking the beta effects of epinephrine.[1]
- Nitrates, alpha-blocking agents, or diuretics may negate or diminish the pressor effects of epinephrine.[1]
- When epinephrine is used with drugs that sensitize the myocardium (halothane, high dose of digoxin) monitor for signs of arrhythmias. Hypertension may result when epinephrine is used with oxytocic agents.[1]
- Use epinephrine with caution in cases of hypovolemia; it is not a substitute for adequate fluid replacement therapy. It should be used with extreme caution in patients with a prefibrillatory cardiac rhythm, because of its excitatory effects on the heart. While epinephrine's usefulness in asystole is well documented, it can cause ventricular fibrillation; use cautiously in cases of ventricular fibrillation.[1]
- Store below 25 °C and protect from light.

REFERENCES:

1. Plumb's Veterinary Drug Handbook, 6th Edition, Donald C. Plumb