Managing Sepsis

Recognizing Sepsis (may include some of the following):

- Resting HR >140 (dog) or >220 (cat) or <160 (cat)
- Resting respiratory rate >30
- Injected or pale mm
- Warm skin
- Hypo or hyperthermia
- Leukocytosis or leukopenia
- Thrombocytopenia
- Hypoglycemia
- Hypotension

Severe sepsis: Sepsis with hypotension (MAP< 70mmHg) that responds to supportive care and fluid therapy without vasopressors

Septic shock: Sepsis with hypotension unresponsive to fluid therapy and requiring vasopressors. Often will appreciate elevation of ALT on the chemistry.

Characterize your patient’s condition and begin treatment

1. Monitor with EKG, pulse oximeter, blood pressure
2. Large-bore peripheral catheter
3. Collect blood for: CBC/Chemistry and electrolytes, arterial or central venous blood gas, coagulation profile and/or baseline PT

Identify metabolic derangement and response to fluid challenge

1. Hypoglycemia (<60 mg/dl): give 0.2 ml 50% dextrose/kg lean body wt IV. If given peripherally dilute with sterile water to <12.5%.
2. Hypokalemia (<3 mmol): 0.25-0.5mEq/kg/h (KCL 2 mEq/ml)- faster if warranted and continue EKG monitoring with rechecks every 30-60 min
3. Hypocalcemia (<0.8 mmol): 1 ml/kg of 10% calcium gluconate (diluted and slow IV)
4. Hypothermia or shivering: use convection warmer
5. 5 minute fluid challenge:
   - Warm Crystalloids 20 ml/kg dog or 10 ml/kg cat
   - Warm Hetastarch 5 ml/kg (dog) or 2.5 ml/kg (cat)

Verify that cardiovascular goals are met

- YES: monitor and proceed to step 4
- NO: Do not send patient to surgery unless essential to control bleeding
❖ Measure CVP (if not done already and repeat fluid bolus until the goals are met, or the CVP increases by 2-3 mm Hg above baseline and remains elevated for > 5 minutes)
❖ Dog: consider adding dobutamine 5-15 mcg/kg/min if myocardial dysfunction is suspected
   (dogs only, promotes seizures in cats)
❖ Cats and small dogs: if HR <160, administer atropine 0.04 mg/kg IV. If HR does not increase begin use of epinephrine 0.2 mcg/kg/minute
❖ Nasal oxygen

*If cardiovascular goals are still not met rule out:

   Hypoxemia, anemia, recurrent hypervolemia, ongoing hemorrhage, pulmonary embolism, gastrointestinal necrosis, pericardial effusion with tamponade.

➔ Add vasopressin 1 milliunit/kg/min, increase this in increments of 1 milliunit/kg/min to a maximum of 4 milliunits/kg/min
➔ Consider glucocorticosteroids if the sepsis syndrome has been present for >8 hours and if relative adrenal insufficiency is suspected OR if the patient requires both catecholamines and vasopressin
   Use dexamethasone sodium phosphate at 0.01 mg/kg IV followed immediately by 0.01/kg/hour CRI

*If cardiovascular goals still not met (refractory hypotension?)

➔ If still not done consider adding Dobutamine 5-15 mcg/kg/min to the continuing vasopressor therapy if myocardial systolic dysfunction is suspected (dog only)
➔ Consider GIP: Glucose (0.75 grams/hour), Insulin (0.2 5units/kg/hour) Potassium (0.3 mEq/Kg hour)
   Load a 60ml syringe with 54 ml of 50% dextrose, 5.4ml KCL and 9 units of regular insulin and begin an infusion into the central venous catheter at 1.65 ml/kg/h
   Administer 0.1IU/kg of regular insulin IV once at the start of the CRI.
   Allow up to one hour of this infusion + other supportive measures to provide benefit.

Recommend euthanasia if the patient is not responsive to these measures

Identify the source of sepsis

● Ultrasound for intestinal, gallbladder, kidney or liver sources
● Echo for identification of vegetative lesions or signs of endocarditis
● Collection of samples for cytology and culture

Control sepsis
- Broad spectrum antibiotic therapy depending on source of infection

**Support Hemostasis**
- Maintain hematocrit dogs >30% and cats >25%
- Maintain Total solids/oncotic pressure (hetastarch; increasing dosage tends to promote bleeding; plasma is a poor source of albumin but may be indicated for coagulation factors)

**Miscellaneous:**
- **DIC prophylaxis**: Unfractionated heparin 5-10 U/kg/hour CRI *ONLY IF THERE ARE ADEQUATE PLATELETS*. Patients with prolonged PT consider heparin + fresh frozen plasma 10 ml/kg over 1-6 hours.
- **Glycemia control** (80-160 mg/dl): Hypoglycemia= CRI dextrose added to maintenance fluid. Hyperglycemia = discontinue glucose containing fluids +/-CRI of regular insulin
- **Remember**: Analgesia, Patient positioning, GI protection and nutrition (via feeding tube) Initial tube feeding @ 25% RER day 1, then increase to 33% RER day 2 then reassess.