

Feline Emergency and Critical Care Medicine

COPYRIGHTED MATERIAL

1 APPROACH TO THE CRITICALLY ILL CAT

Kenneth J. Drobatz

Unique Features

The major point to emphasize regarding cats is that they are very subtle in their manifestation of critical illness/disease. What might appear to be subtle clinical signs may only be the tip of the iceberg regarding the severity of the condition. A full assessment of the vital parameters of a cat that “is not doing well” is essential to avoid missing serious underlying problems.

- A. The general approach to the critically ill cat involves three phases: triage, primary survey, and secondary survey. The first two phases are for rapid assessment and recognition of the most life-threatening conditions.
 - a. Triage is a process for sorting injured or sick animals based on their need for or likely benefit from immediate medical treatment.
 - b. The primary survey is a more in-depth assessment utilizing the triage principles.
 - i. Telephone triage (box 1.1)
 1. The initial contact between the client and the veterinary hospital is often via telephone. This conversation can allow for triage of the cat, help in the diagnosis, and provide information regarding first aid treatment.
 - a. Immediate aims of telephone triage: Determine if the cat needs to be assessed by a veterinarian on an emergency basis, provide information for first aid for the cat, and calm the owner.
 - b. Questions asked on the phone should determine the following:
 - i. The nature of the injury
 - ii. Respiratory status
 - iii. Mucous membrane (mm) color
 - iv. Level of consciousness
 - v. Presence and severity of bleeding
 1. Owners often overinterpret the severity of the bleeding.
 - vi. Heart rate
 - vii. Presence/severity of wounds
 - viii. Ability to ambulate
 - ix. Presence of fractures
 - x. Presence/severity of vomiting and diarrhea
 - xi. Ability to urinate (especially male cats)
 - xii. Abdominal distention
 - xiii. Ingestion of toxins (rare in cats)

Box 1.1. Telephone triage—symptoms to determine.

1. Nature of problem/injury
 - a. Cardiovascular status (HR, mm color)
 2. Neurologic status (mentation/seizures/ability to ambulate)
 3. External hemorrhage
 4. Vomiting/diarrhea severity
 5. Ability to urinate
 6. Toxin ingestion
 7. Pain
 8. Hiding/not eating/listless (warrants evaluation)
 - xiv. Coughing (rare in cats)
 - xv. Seizures/altered mentation
 - xvi. Presence and severity of pain (difficult for owner to assess accurately)
- c. Conditions that demand immediate attention
- i. Respiratory distress (open-mouth breathing is generally a sign of severe respiratory distress in cats).
 - ii. Severe bleeding
 - iii. Straining to urinate without passing urine (often confused with constipation by owners)
 - iv. Bleeding from body orifices
 - v. Seizures/altered mentation/decreased level of consciousness.
 - vi. Toxin ingestion.
 - vii. Severe coughing (often confused by owners with retching or vomiting)
 - viii. Protracted vomiting or diarrhea
 - ix. Extreme pain
 - x. Hiding/not eating/listless
 1. Owners often just state that their cat is hiding/not eating or listless. The range of severity of disease with this complaint can be wide, and therefore it should be recommended that the cat be evaluated by a veterinarian. Cats hide disease very well.
- d. Advising first aid
- i. Relying on the owner's interpretation of the cat's problem can be risky.
 - ii. If the problem is clear (e.g., previous condition with same clinical signs, etc.), then advice over the phone is reasonable.
 - iii. If in doubt at all about the cat's condition, the default recommendation is that the cat should be brought in for evaluation.
 - iv. If trauma has occurred:
 1. The cat should be placed on a board or blanket/towel for support that will minimize movement of fractured bones.
 2. Although rolling newspapers into splints has been recommended for stabilization of fractures, we advise against this for both the cat's and the owner's sakes.
 3. Owners should be warned that handling a painful cat is dangerous as even the most docile cat may bite when it is painful.
2. Calming the owner
- a. The owner may be extremely upset about the pet while talking on the phone.
 - b. If the owner is overly upset, it is advisable to ask if there is someone else present who can drive him or her and the pet to the clinic.

- v. Abducted elbows (rare in cats)
 - vi. Extended head and neck (rare in cats)
 - vii. Paradoxical respirations
 - viii. Flaring of nares
 - ix. Cats exhibiting signs iv–viii are generally in extreme respiratory distress.
2. Cardiovascular system (assessing for poor tissue perfusion)
 - a. Assess mucous membrane color, capillary refill time, pulse quality, pulse rate, and rhythm (see chap. 3—Shock)
 - b. Signs of cardiovascular system derangement that require immediate transfer to treatment room (see chap. 3—Shock)
 - i. Pale, gray, or hyperemic mucous membranes (normal feline mucous membranes tend to be less pink than in the canine, and cats' hyperemic mucous membranes don't tend to be as red as the dogs')
 - ii. Very rapid or prolonged capillary refill time (<1 second and >2–3 seconds).
 - iii. Weak or bounding pulses (cats' pulses don't tend to get as bounding as dogs')
 - iv. Very rapid, slow, or irregular pulse/heart rhythm
 3. Neurologic system
 - a. Assess mentation and ability to ambulate (see chap. 25—General Approach and Overview of the Neurologic Cat)
 - b. Signs of neurologic system abnormalities that require immediate transfer to the treatment area:
 - i. Severe changes in mentation (stupor, coma, obtundation, extreme hyperexcitability, seizures)
 - ii. Inability to walk or move legs
 4. Urinary tract system
 - a. Assess ability to urinate and palpate urinary bladder (especially sick male cats)
 - b. Abnormalities in urinary tract system that require immediate transfer to the treatment area (see chap. 23—Urologic Emergencies: Ureter, Bladder, Urethra, GN, CRF):
 - i. Inability to urinate
 - ii. Large, firm, nonexpressable urinary bladder
 5. Other assessments that require immediate transfer to the treatment area:
 - a. Recent ingestion of toxin
 - b. Topical exposure to toxin
 - c. Severe vomiting and diarrhea (rare in cats compared to dogs)
 - d. Owner is very concerned.
 - e. Obvious limb fractures
 - f. Severe pain
 - g. Recent trauma
 - h. Burns (fire, chemical, or hot water)
 - i. Excessive bleeding
 - j. Dystocia
 - k. Prolapsed organs
 - l. Open wounds
 - m. Animals that have died
 - n. Insect or snake bites
 - o. If in doubt, transfer to treatment area for further assessment.
- c. Primary survey (see box 1.3)
 - i. The primary survey is a more detailed and in-depth assessment of the four major body systems. The goal is to establish the relative stability of the cat and to further determine if immediate therapy is warranted.

Box 1.3. Primary survey.

1. Respiratory system
 - a. Physical: mm color, respiratory rate/effort, upper airway sounds, thoracic auscultation
 - b. Objective: Pulse oximetry, arterial blood gas analysis
2. Cardiovascular system
 - a. Physical: mm color, CRT, pulse rate/quality, cardiac auscultation, rectal-to-toe temperature difference
 - b. Objective: ECG, blood pressure, lactate concentration, CVP (central venous pressure)
3. Neurologic system
 - a. Physical: mentation, cranial nerve function, ability to ambulate/motor movement, limb pain sensation, and spinal reflexes
 - b. Objective: none on an emergency basis
4. Urinary tract:
 - a. Physical: Palpate urinary bladder for distention; palpate kidneys for size, shape, pain, symmetry.
 - b. Objective: Measure BUN, creatinine, blood gas analysis, potassium concentration.

ii. Respiratory system

1. Similar parameters should be assessed as in triage: mucous membrane color, upper airway sounds, respiratory rate, rhythm, and effort.
2. Auscultation of all regions of the thorax and trachea
3. Pulse oximetry and arterial blood gas give more objective and detailed information regarding lung function (the stress of obtaining an arterial blood gas may outweigh the benefit in a cat with respiratory compromise).
4. Any animal showing signs of respiratory compromise should be given oxygen supplementation (see chap. 10—Respiratory Emergencies and Pleural Space Disease).
 - a. Evaluation for the underlying cause should be immediately undertaken if the cat will tolerate this further assessment.

iii. Cardiovascular system

1. Similar parameters should be assessed as in triage: mucous membrane color, capillary refill time, pulse quality, rate, and rhythm. Cardiac auscultation and rectal-to-toe temperature difference can also provide assessment of tissue perfusion status.
2. More objective assessments include ECG evaluation, blood pressure determination, blood lactate concentration, central venous pressure measurement, pulmonary artery catheterization and determination of pulmonary artery hemoglobin saturation with oxygen, measurement of cardiac output, tissue oxygen delivery, and consumption. (The pulmonary artery catheter is rarely used in cats for these determinations. See chap. 3—Shock).
 - a. Anecdotal impression is that cats with poor tissue perfusion often have low rectal temperature.
 - b. Cats in shock often are bradycardic compared with dogs, which are usually tachycardic.
3. Cardiovascular system derangements are life-threatening and should be addressed immediately (see chap. 3—Shock).

iv. Neurologic system

1. Assessment of the neurologic system is primarily through physical examination.
2. Abnormalities of brain function may manifest as changes in mentation, gait, or cranial nerve function.
3. Abnormalities of spinal cord or peripheral nerve function are manifested with normal mentation/cranial nerves, but abnormal limb findings such as loss of conscious proprioception, ataxia, changes in limb reflexes, altered sensation, and motor function.

4. Abnormalities in brain function require rapid assessment and treatment of the underlying cause before irreversible damage can occur (see chap. 25—General Approach and Overview of the Neurologic Cat).
 5. Note: cats with severe altered perfusion may have abnormal neurologic function until perfusion abnormalities are corrected. Use caution when interpreting abnormal neurologic findings when perfusion is severely compromised.
- v. Urinary tract system
1. Initial primary survey physical evaluation of the urinary tract system is palpation of the urinary bladder, determination of urethral obstruction, and palpation of the kidneys for size, shape, symmetry, and pain.
 2. More objective primary survey rapid assessment includes determination of blood urea nitrogen (BUN), serum creatinine and potassium concentrations, and blood gas analysis.
- d. Secondary survey (box 1.4)
- i. The secondary survey occurs after assessment and stabilization of the immediate life-threatening conditions.
 - ii. The secondary survey includes a full physical assessment (“head-to-tail” physical examination), a detailed medical history, imaging studies, and clinical pathology as indicated. Response to therapy may also be included as part of the secondary survey.
 - iii. A comprehensive diagnostic and therapeutic plan can be developed; prognosis and costs can be estimated as well.
- e. Emergency clinical pathology database (box 1.5)
- i. Rapid assessments of packed cell volume (PCV), total solids (TS), dipstick blood glucose, dipstick BUN, and a blood smear provide relatively immediate and essential information for evaluation of the critically ill patient.
 1. The blood for these evaluations can be obtained by filling three heparinized capillary tubes from the hub of an intravenous catheter that is being placed or by filling them from the hub of a 25-gauge needle placed in a peripheral vein.
 2. Detailed evaluation of the findings of the emergency database can be obtained from their respective following chapters.

Box 1.4. Secondary survey.

1. Head-to-tail physical examination
2. Detailed medical history
3. Imaging studies
4. Clinical pathology
5. Response to therapy

Box 1.5. Emergency database.

1. PCV
2. Total solids
3. Dipstick BUN
4. Dipstick glucose
5. Blood smear

3. General interpretation of abnormal emergency database findings
 - a. PCV and TS should be interpreted together.
 - i. Increased PCV and TS
 1. Dehydration (anecdotally TS is a more sensitive assessment of dehydration in the cat).
 - ii. Increased PCV and normal TS
 1. Polycythemia
 2. Dehydration with protein loss
 - iii. Normal PCV and increased TS
 1. Dehydration (common)
 2. Dehydration and anemia (common)
 3. Increased globulin production
 4. Lipemic serum or severely hemolyzed serum can give an increased TS reading on a refractometer.
 - iv. Decreased PCV and decreased TS
 1. Blood loss (most common)
 2. Nonregenerative anemia with protein loss
 3. Nonregenerative anemia and liver dysfunction
 4. RBC destruction and protein loss
 - b. Increased glucose
 - i. Stress (most common)
 - ii. Diabetes mellitus
 - iii. Iatrogenic (intravenous glucose supplementation)
 - c. Decreased glucose
 - i. Insulin overdose
 - ii. Liver failure
 - iii. Sepsis
 - iv. Neonatal/juvenile hypoglycemia
 - d. Decreased BUN
 - i. Diuresis
 - ii. Liver dysfunction/failure
 - e. Increased BUN
 - i. Prerenal (most common)
 1. Dehydration (common)
 2. GI hemorrhage (uncommon)
 - ii. Renal dysfunction/failure (common)
 - iii. Postrenal (common in male cats)
 - f. Blood smear evaluation
 - i. Accurate evaluation of blood smear is highly dependent upon the quality of the smear that is made. A quality smear should:
 1. Have a feathered edge and a broad monolayer in which RBC are evenly distributed and have minimal overlap. This area is where WBCs are most easily identified and where RBC abnormalities can be most readily seen. Abnormal cell types, platelet clumps, and microfilariae may be found along the feathered edge.
 - ii. For emergency purposes, gross evaluation of the three major cell lines is all that is needed.
 1. For rapid assessment of platelets and WBC count, first look at the feathered edge at low to medium power.
 - a. Gross decreases in WBC (panleukopenia) can be recognized rapidly by the paucity of WBCs on the feathered edge (WBCs tend to accumulate at the

- feathered edge; therefore, if the feathered edge lacks them, it is very likely that the WBC count is very low).
- b. Platelet clumps on the feathered edge suggest adequate platelets. These clumps can result in a falsely low estimate of platelet numbers when the estimate is based on the count from the monolayer.
2. After viewing the feathered edge, move to the monolayer just inside the feathered edge and evaluate the quality (see above) of the smear.
 - a. Evaluate WBCs: Estimate the absolute number as low, normal, or high by using the high dry magnification.
 - i. Estimate a differential WBC count using high dry magnification.
 - ii. Evaluate leukocyte morphology using the oil immersion magnification.
 - b. Evaluate platelets: Estimate the number. Adequate platelet number (enough to prevent bleeding) is indicated by observing 3–4 platelets/oil immersion field or noting several platelet clumps at lower magnification. In cats with a normal RBC count, one platelet per 20 RBCs suggests a normal platelet count as well.
 - c. Evaluate RBCs: RBCs should be evaluated for size, shape, color, and parasites.
 - g. Evaluation of hematocrit tube supernatant
 - i. A large buffy coat indicates a high WBC count.
 - ii. Icteric serum could be due to prehepatic, hepatic, and posthepatic causes.
 - iii. Hemolyzed serum can be due to poor blood collection technique or intravascular hemolysis (rare in cats).
 - iv. Lipemic serum can be due to pancreatitis, immediately postseizure (anecdotal), or postprandial.
 - f. The emergency plan (box 1.6)
 - i. After the initial assessment, a problem list should be generated with prioritization of most life-threatening to least life-threatening.
 - ii. Plans (diagnostic, therapeutic, and monitoring) should then be made for each of those problems.
 1. The plan itself depends upon the problem, the stability of the cat, the nature of the cat (e.g., fractious), and the number and skill of the available nursing staff.
 2. After making a plan for each problem, they should be collated so that a comprehensive, cohesive, and clear order sheet can be written.
 3. Categories covered by emergency orders:
 - a. Fluid therapy
 - b. Medications to be given
 - c. Diagnostics to be performed
 - d. Parameters to be monitored
 - e. Nursing care

Box 1.6. General emergency plan.

(Should be made for each problem separately and then consolidated for final order sheet)

1. Fluid therapy (type, route, rate)
2. Medication to be administered (type, dose, rate, frequency, compatibility)
3. Diagnostic plan (imaging, clinical pathology, etc.)
4. Monitoring (physical parameters, clinicopathology, electronic)
5. General nursing care orders

4. Fluid therapy orders should include (see chap. 8—Fluid Therapy) the following:
 - a. Type of fluid to be administered
 - b. Route of administration
 - c. Rate of administration
5. Medication orders should include the following:
 - a. Type of medication
 - b. Dose of medication
 - c. Rate of administration
 - d. Frequency of administration
 - e. Medications should be reviewed for compatibility with other administered therapies, as well as whether they are tolerated by cats, and potential untoward reactions that may occur.
 - i. The orders should note monitoring for these reactions, and contingency orders should be available in case a reaction occurs.
6. Diagnostic plan
 - a. Should be considered for all problems and then listed together in order of priority of completion.
 - i. The stability of the cat, as well as the importance of the information in the emergency management of the cat, should determine the priority.
7. Monitoring plans
 - a. Monitoring plans can be categorized into physical examination, clinicopathologic, and electronic parameters.
 - b. Monitoring is extremely important in critical care to detect trends. This allows anticipation of problems before they occur.
 - c. Common physical parameters that are monitored
 - i. Mucous membrane color
 - ii. Capillary refill time
 - iii. Pulse rate and rhythm
 - iv. Pulse quality
 - v. Lung sounds
 - vi. Respiratory rate and effort
 - vii. Neurologic function
 1. Mentation
 2. Cranial nerves
 3. Long tracts (especially voluntary motor capabilities and pain sensation for spinal cord injuries).
 4. Urination. Bladder size is easily palpable in cats and gives an estimate of urine production.
 5. Vomiting/bowel movements
 6. Rectal temperature
 7. Abdominal palpation
 8. Assessing skin and mucous membranes for petechiations/ecchymoses
 - viii. Body weight
 - d. Common clinicopathologic parameters
 - i. PCV, TS, dipstick BUN, and glucose
 - ii. Electrolytes
 - iii. Blood gas parameters
 - iv. Blood smear
 - v. Coagulation parameters
 - e. Electronic monitoring parameters
 - i. Central venous pressure

- ii. Electrocardiogram
 - iii. Blood pressure
 - iv. Pulse oximetry
 - v. Pulmonary artery catheter placement (not commonly done in cats) to measure cardiac output, oxygen delivery, oxygen consumption, peripheral vascular resistance, and mixed venous oxygen saturation.
- f. Common nursing orders
- i. Keep patient clean and dry.
 - ii. Check comfort (pain, etc.).
 - iii. Turn patient as needed.
 - iv. Other nursing orders will be for the specific patient needs.
- iii. General comments
1. Emergency plans will need to be tailored to individual patient needs, the specific disease condition, the severity of the cat's condition, the physiologic stability of the cat, and the number and skill of the nursing staff. Additionally, the owner's personal needs and financial capability must also be considered.
 2. If the best emergency plan cannot be accommodated by your facility, then referral should be considered and discussed with the client.

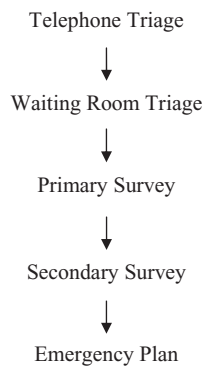


Fig. 1.1. Algorithm for "Approach to the Critically Ill Cat."