



Winter Weather Safety Tips for Dogs

The winter months can be hazardous to your dog's health.

- 1 Moisturize.** Winter weather can cause itchy, flaking skin. Keep your home humidified and towel dry your dog as soon as he comes inside. Bathe your dog as little as possible during cold spells. If your pup must be bathed, use a moisturizing shampoo and/or rinse.
- 2 Protect Paw Pads.** Massage petroleum jelly or other paw protectants into paw pads before going outside to help protect from salt and chemical agents.
- 3 Dress Warmly.** If your dog has a short coat or gets chilled easily, consider a sweater or dog coat. Don't shave your dog down to the skin in winter, as a longer coat will provide more warmth.
- 4 Towel Off.** After each walk, wash and dry your pet's feet and stomach to remove ice, salt and chemicals.
- 5 Stay Inside.** Make sure your dog has a warm place to sleep that's off the floor and away from all drafts.
- 6 Eat More.** Dogs burn extra energy trying to stay warm in wintertime. Feed him or her a little bit more during cold weather months. Also make sure he or she sure has plenty of water to drink.
- 7 Collar and Chip.** Many dogs can become disoriented in winter because snow and ice can hide recognizable scents. Make sure your dog has a collar with up-to-date identification and contact information and that his or her microchip registration is up to date.
- 8 Avoid Ice.** Stay away from frozen ponds, lakes and other water when walking your dog. A frozen waterway may look as if it can support your weight, but if it doesn't, the result can be deadly.
- 9 Be Prepared.** Severe winter weather can cause power outages and make driving unsafe or impossible. Make sure you have enough food, water and medicine to get through at least 3 days.
- 10 See Your Vet.** Cold weather may worsen some medical conditions such as arthritis. Make sure your pet is as healthy as possible for cold weather.



CASE 1

A 12-year-old, 12-kg, neutered male miniature schnauzer is presented for a scheduled recheck. He has a history of degenerative mitral valve disease that has been monitored for the past 2 years. Congestive heart failure developed 5 months ago, and the patient is receiving pimobendan, benazepril, and furosemide. He is fed Royal Canin Early Cardiac Diet (royalcanin.com). Resting respiratory rates at home have been <28 breaths/minute. The owners report that the dog's appetite is reduced.

In the hospital, vital signs are temperature 100.9°F, heart rate 126 beats/minute, and respiratory rate 24 breaths/minute. A grade 6/6 systolic left apical murmur is auscultated. Lung sounds and pulse quality are normal. Mucous membranes are pink and slightly dry.

Question 1: Is this dog in active heart failure?

Answer: No. Active heart failure (eg, pulmonary edema) is unlikely, given the low respiratory rate at home and in the hospital.

Question 2: What tests would you recommend?

Answer: We would recommend biochemistry analysis including electrolytes, complete blood count, blood pressure measurement, and thoracic radiography to assess his current health status, monitor the heart disease, and document any possible adverse effects of the current medication regimen.

Test Results: Thoracic radiographs document cardiomegaly with obvious left atrial enlargement and no evidence of pulmonary venous congestion or pulmonary edema. Doppler blood pressure averaged 135 mmHg. Laboratory results from 2 visits are shown in **TABLE 2**.

Question 3: Given the test results, what are your recommendations to the owner?

Answer: Azotemia has developed (>20% increase in creatinine) that could be associated with administration of benazepril (an angiotensin-converting enzyme [ACE] inhibitor) and furosemide combined with dehydration. Other causes can be explored (eg, urinary tract infection); however, along with the history of decreased appetite, development of azotemia is considered a clinically important change. The patient does not have evidence of active CHF; therefore, it is feasible to reduce his medications. We recommended reducing benazepril dosing to once daily and reducing the total daily dose of furosemide by 20% to 25%. We added a gastroprotectant because the patient was receiving multiple oral medications and reduced perfusion to the gastrointestinal tract may have played a role. When the diuretic dose is reduced, careful monitoring of resting respiratory rates is imperative to identify pulmonary edema if it develops. Three days after medication adjustment, the owners reported an improved appetite. Ten days later, the laboratory values were also improved and remained stable at a 3-month recheck evaluation.

Take-away points from the cardiologist and internist

Case Scenarios: Cardiovascular and Renal Disease *continued*

- Scheduled recheck visits help you identify problems and address them before they become significant.
- Educating owners about at-home resting respiratory rates and what signs may indicate a problem is helpful.
- A substantial increase in blood urea nitrogen level more than creatinine can be a sign of dehydration (prerenal azotemia) in a dog of normal body condition without significant muscle wasting.

TABLE 3 CASE 2 LABORATORY RESULTS*

LABORATORY VALUES	TODAY'S VISIT	1 MONTH AGO	REFERENCE RANGE
Glucose (mg/dL)	128	101	65-131
Blood urea nitrogen (mg/dL)	61	38	19-33
Creatinine (mg/dL)	2.9	2.4	0.8-1.8
Calcium (mg/dL)	10.8	11.1	8.4-11.8
Phosphorus (mg/dL)	7.8	6.2	3.8-7.5
Total protein (g/dL)	7.2	6.8	6.1-7.7
Albumin (g/dL)	3.5	3.3	2.5-3.3
Globulin (g/dL)	3.7	3.5	2.3-3.8
Bilirubin (mg/dL)	0.1	0.1	0-0.6
Cholesterol (mg/dL)	181	162	56-161
Alanine aminotransferase (U/L)	32	38	28-84
Alkaline phosphatase (U/L)	48	41	20-109
γ -glutamyltransferase (U/L)	3	3	0-12
Sodium (mmol/L)	148	151	144-155
Potassium (mmol/L)	3.5	4.1	3.5-5.1
Chloride (mmol/L)	115	117	113-123

*Boldface indicates values outside of reference range.

CASE 2

A 9-year-old, 3.3-kg, spayed female domestic long-haired cat is presented because she has not eaten for 2 to 3 days. The owners report that the cat is hiding and seems uncomfortable. One month ago, International Renal Interest Society stage 2 chronic kidney disease (nonproteinuric, nonhypertensive) was diagnosed, and the cat has been doing well on a low-phosphorus diet. At that time, her body weight was 3.6 kg. Laboratory results from both visits are shown in Table 3.

In the hospital, vital signs are temperature 101.9°F, heart rate 180 beats/minute, respiratory rate 30 breaths/minute, and body weight 3.3 kg. A grade 3/6 left sternal murmur is auscultated; pulse quality and lung sounds are within normal limits. Mucous membranes are pale and dry. Palpation of the cranial abdomen seems to elicit pain. Laboratory results are shown in **TABLE 3**. Other test results are urine specific gravity 1.020, pH 6.5, sediment unremarkable; systolic blood pressure 110 mmHg; and SNAP feline pancreas-specific lipase test result abnormal.

Question 1: Does the cat need fluid therapy?

Answer: Yes. She has clinical (dry gums) and biochemical (increased blood urea nitrogen:creatinine ratio) evidence of dehydration. Because of her history of hiding and refusing food, the ideal route for administering fluids to restore volume and prevent further renal injury is intravenous.

Question 2: Does this cat have heart disease?

Answer: It is possible, but murmurs are common in adult cats. The murmur could be physiologic or could indicate structural heart disease.

Question 3: Do you want to perform any cardiac diagnostics? If so, what will you choose?

Answer: The most reliable way to assess this cat's cardiac status and determine whether she has heart disease is to perform echocardiography. However, if this test is not readily available, you can look for evidence of underlying heart disease with the SNAP Feline proBNP test (idexx.com). A positive test result would warrant further evaluation. Thoracic radiography can be considered, although it is an insensitive way to identify preclinical cardiac disease in cats.

Test results: Echocardiography revealed mild left ventricular wall thickening without evidence of a left ventricular outflow tract obstruction. Mild mitral regurgitation was documented, and the left atrium was mildly enlarged.

Question 4: What are your goals and concerns regarding fluid therapy in this cat?

Answer: The goals are to restore volume and support pancreatic perfusion without overloading the heart. Patients with chronic kidney disease have decreased ability to purge surplus fluids because renal blood flow is reduced, and they may not handle prolonged fluid therapy as well as a patient with good renal function.

Question 5: What is your fluid plan for this cat?

Answer: First, calculate the volume loss ($\% \text{ dehydration} \times \text{body weight}$). Estimating dehydration can be challenging, but the clinical examination (dry gums, weight loss) suggests that the volume loss is approximately 7%. Because the patient is unlikely to have substantial ongoing losses and the echocardiogram documents changes including mild left atrial enlargement, this deficit should be replaced over 24 hours (eg, 11 mL/hour) by using a replacement fluid, such as lactated Ringer's solution. Her maintenance needs are approximately 8 mL/hour and can be provided with a low-sodium fluid, such as Norm-M or 0.45% saline. Using a lower sodium fluid for this portion of the fluid plan reduces the risk for volume overload. Potassium should be added to both fluids.

Although the fluid plan for this cat is conservative, she still needs to be monitored carefully by measuring respiratory rate (ideally every hour) and heart rate (every 2 hours). An exacerbation of the murmur, presence of a gallop rhythm, or development of respiratory signs would warrant re-evaluation to determine whether volume overload has developed or thoracic radiography is required to look for evidence of pulmonary edema or pleural effusion.