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## A Team-Based Approach to Kidney Dysfunction

Chronic kidney disease (CKD) involves the irreversible, progressive loss of kidney function over time. Because the kidneys play several important roles in the body, including filtering blood to remove waste products and maintaining proper fluid levels and blood pressure, the loss of kidney function can have a wide variety of impacts on patient health and well-being.

CKD affects 0.5% to 1% of dogs and 1% to 3% of cats.<sup>1</sup> Although CKD is relatively uncommon in young pets, disease prevalence increases with age, especially in cats, with the estimated prevalence in geriatric cats being as high as 80%.<sup>1</sup>

Risk factors for developing CKD include:

- Advanced age
- Breed predisposition (genetics)
- Underlying medical conditions (eg, periodontal issues, hypercalcemia, cardiac dysfunction, urinary tract health concerns, hyperthyroidism, diabetes, infectious causes)
- Medications
- History of acute kidney injury<sup>1</sup>

CKD can have significant impacts on quality of life, especially in its later stages. The first clinical signs of CKD typically include excessive drinking and excessive urination.<sup>2</sup> However, as disease progresses, clinical signs may expand to include weight loss, anorexia, vomiting, diarrhea, and lethargy.<sup>2</sup>

Although pets can generally maintain a high quality of life in the early stages of CKD, clinical signs advance over time, and prognosis worsens as the pet advances to later stages of disease. Quality of life can be significantly impacted, and the disease can lead to death or the pet owner's decision to euthanize. Early detection and initiation of management strategies can mitigate the clinical signs associated with CKD and slow disease progression, potentially leading to prolonged survival times.<sup>3</sup>



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### **Chronic Kidney Disease Diagnostics**

CKD can be detected by evaluating patient history, physical examination findings, imaging, and blood and urine. Although azotemia (a buildup of nitrogen-containing waste products [eg, BUN, creatinine]) is classically thought of as the most common laboratory feature, a CKD patient does not actually become azotemic until they have lost 75% of kidney function.<sup>3</sup> Azotemia can also be associated with other disorders, making it a nonspecific indicator of CKD. Isosthenuria (ie, dilute urine) is another common indicator of a decline in the kidneys' urine concentrating abilities.<sup>4</sup> In CKD patients, isosthenuria often occurs before azotemia but only after a loss of ≈66% of kidney function.<sup>4</sup>

In most patients, kidney dysfunction is noted when azotemia and isosthenuria are detected on routine laboratory tests or found in a pet with clinical signs of CKD, meaning that CKD is often not detected in many pets until later stages.

Although challenging, early detection of decreased renal function can provide benefits to the patient, allowing more opportunities for early intervention and slowing disease progression. To allow for early disease detection, veterinarians can implement screening tests in patients that are of a predisposed breed and in those with a family history of renal disorders.<sup>3</sup> Proteinuria and/or systemic hypertension, even in the absence of azotemia, may suggest the presence of CKD and warrant further testing.<sup>3</sup> Trends in an individual patient's creatinine levels should also be monitored, as early increases in creatinine can be indicative of decreasing kidney function, even if they are still within the normal reference range for that patient.<sup>3</sup> Evaluating blood work for early indicators of kidney disease is just one reason why routine wellness testing, particularly in senior pets, is recommended, even in the clinically healthy patient.

Symmetric dimethylarginine (SDMA) testing can also aid in the early detection of CKD.<sup>5</sup> This test assesses blood levels of SDMA, an amino acid that is produced within the body at a constant rate. Because SDMA is primarily cleared by the kidneys, kidney dysfunction will reduce the rate of SDMA clearance. Blood levels of SDMA become elevated earlier than creatinine in pets with CKD, making SDMA a more sensitive (but less specific) diagnostic test.<sup>6</sup>

## Staging

Once CKD has been detected, accurate staging is necessary to guide management decisions and determine a pet's prognosis. The International Renal Interest Society (IRIS) has established clear guidelines for the staging of CKD.<sup>7</sup> These guidelines divide CKD into 4 stages based on fasting blood creatinine and SDMA testing. As a patient's creatinine and SDMA increase, so does a pet's IRIS stage. Substages are then assigned based on proteinuria and blood pressure findings. Staging should be evaluated and revised as staging parameters change in patients.

Management protocols vary depending on the patient's IRIS stage. Patients in IRIS stage 4 require more aggressive interventions than patients in IRIS stage 1. However, there are basic management principles that apply to patients at all or most IRIS stages. These management principles are intended to support kidney function for as long as possible, delay the progression of CKD, and maintain the patient's quality of life.

## Management

Nutritional management is the cornerstone of support for CKD patients.<sup>8</sup> Therapeutic renal diets are formulated specifically for the needs of the renal patient, with appropriate balances of protein, sodium, and potassium and reduced levels of phosphorus.

Phosphate reduction plays a key role in CKD management, with phosphate retention being a major contributor to the progression of CKD and survival time for patients.<sup>9</sup> Although kidney diets have reduced levels of phosphorus, some patients may not consume the diet, and often, diet alone cannot appropriately control phosphorous levels.<sup>9</sup> Additional measures (ie, intestinal phosphate binders) are often needed to further reduce serum phosphate levels. Any patient that has elevated serum phosphate levels after 1 month of eating a therapeutic diet or will not consume a renal diet should be placed on

an intestinal phosphate binder.<sup>9</sup> A serum phosphate concentration in the mid-reference range is the recommended target for CKD patients.<sup>9</sup> In addition, newer testing modalities (ie, fibroblast growth factor 23 in cats) allow for the earlier detection of phosphorus overload and metabolic bone disease in stage 1 and stage 2 of CKD, which can help identify patients that would benefit from additional phosphorus reduction measures before plasma phosphate levels are profoundly elevated.<sup>10,11</sup>

Naraquin™, a dietary phosphate binder and renal support supplement for dogs and cats from Nutramax Laboratories Veterinary Sciences, Inc., provides a multimodal approach to phosphate binding in dogs and cats combined with other ingredients to support renal health. Ferric citrate, calcium acetate, and chitosan bind phosphorus within the digestive tract, allowing it to be eliminated in the feces.<sup>12</sup> Chitosan can also bind uremic toxins, promoting their excretion in the feces. Naraquin™ also contains omega-3 fatty acids and beta glucans, which contribute to supporting kidney health.<sup>12</sup>

Proteinuria and systemic hypertension should be routinely screened for and, if present, medically managed. Angiotensin-converting enzyme inhibitors, calcium channel antagonists, and angiotensin receptor blockers may all be considered based on IRIS guidelines.<sup>11,13</sup>

Potassium supplementation with potassium gluconate or potassium citrate should be considered in cases of hypokalemia.<sup>11,13</sup> Additional medications such as calcitriol and erythropoietin or molidustat may be needed as CKD progresses.<sup>11,13</sup>

Additional symptomatic support should be provided as needed. This may include antiemetics, fluid therapy, oral hydration, etc., depending on the patient's clinical signs. Patients with CKD should always have access to fresh water and oral hydration supplements as needed, as they must drink large amounts of water to maintain hydration.

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# Management: A Team-Based Approach

When it comes to CKD, every member of the veterinary team has an important role to play. Patients will require ongoing care and regular veterinary visits, making it essential for each team member to understand their role in supporting these patients.

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## Client Service Representatives

- Recognize potential clinical signs of CKD during telephone conversations.
- Schedule diagnostic evaluations promptly and appropriately when pet owners voice patient concerns.
- Ensure that an accurate patient weight is obtained at every visit, as weight monitoring plays an important role in CKD management.
- Express empathy and understanding for clients dealing with CKD in their pet, as this is a chronic, progressive process that can have significant impacts on clients' lives and the human-animal bond.
- Schedule regular follow-up visits for these pets.
- Encourage clients to contact the practice with any concerns about their pet's well-being.

## Veterinary Technician/ Assistant

- Understand the basic pathophysiology of CKD to accurately answer client questions, recognize potentially serious clinical signs, and educate clients.
- Obtain an accurate patient weight at every visit and record that weight in the patient record as part of the pet's monitoring protocol.
- Identify high-priority client concerns and relay these concerns to the veterinarian.
- Recognize potential signs of CKD in the patient medical history and on initial triage examination.
- Educate clients about the benefits of routine wellness laboratory screenings.
- Educate clients on common management approaches for CKD in pets.
- Emphasize the need for ongoing care in these pets.
- Express empathy and understanding while talking to clients about their pet's CKD, understanding that this is a chronic, progressive process that can affect both the pet's and the client's quality of life.
- Understand practice guidelines for recommended frequency of recheck visits and laboratory testing in renal patients to provide consistent



instructions to clients and set clear client expectations.

- Educate clients on any at-home management approaches, such as oral medications, dietary changes, intestinal phosphate binders, and hydration methods.
- Send clients home with relevant educational handouts and other information to support the care of patients.

## Veterinarian

- Recognize risk factors for the development of CKD to identify patients that may require further testing.
- Identify potential indicators in the patient's medical history and physical examination.
- Recommend diagnostic testing when appropriate.

- Educate clients about the advantages and limitations of testing that allow for the early detection and monitoring of CKD, such as SDMA testing and fibroblast growth factor 23 testing in cats.
- Educate clients about the pathophysiology of CKD, setting reasonable expectations regarding the need for ongoing care.
- Create customized management plans for these pets, adjusting plans to respond to changes in the pet's IRIS stage, clinical signs, and overall condition.
- Provide clients with prognostic information regarding their pet.
- Advise clients of signs they should watch for at home that may indicate a worsening of their pet's status or a

need for changes in management.

- Communicate regularly with clients to monitor patient status.
- Provide clients with resources to perform quality-of-life assessments at home.

## Conclusion

Chronic kidney disease is a chronic, progressive process that may affect many of the older pets within a practice. To provide the best possible care for these pets, it is important for all team members to have a basic understanding of this condition and be involved in caring for these pets and their owners. Adopting a team-based approach to CKD care can help veterinary practices improve consistency, client communication, and patient care.

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