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Acute-on-Chronic Kidney Disease in a Cat

HARLEY, A 15-YEAR-OLD, CASTRATED DOMESTIC SHORT-HAIRED CAT, was hospitalized for acute-on-chronic kidney disease. On admission, he was receiving oral prednisone at 5 mg q24h for feline asthma, fluoxetine at 5 mg q24h for inappropriate urination, and amlodipine at 2.5 mg q24h for hypertension secondary to chronic kidney disease. Mild mature neutrophilia and moderate azotemia were evident on CBC and serum chemistry results, respectively. Remaining parameters were within normal limits. Urinalysis results showed isosthenuria, pyuria, and mixed bacteriuria; urine culture results were pending. Abdominal ultrasonography showed moderate bilateral renal pelvic dilation and subtle hyperechoic areas within the renal cortices. In addition, Harley was persistently hypertensive at 220 mm Hg systolic pressure as measured by Doppler ultrasound. Pyelonephritis was suspected.

Which of the following drugs could be safely administered?

Based on the information provided, how would you grade the following drugs and why?

Turn the page and
compare your results ►

	 RED = do not use	 YELLOW = proceed with caution	 GREEN = safe
Acetaminophen			
	RED	YELLOW	GREEN
Amoxicillin–clavulanic acid			
	RED	YELLOW	GREEN
Buprenorphine			
	RED	YELLOW	GREEN
Cyproheptadine			
	RED	YELLOW	GREEN
Enalapril			
	RED	YELLOW	GREEN
Enrofloxacin			
	RED	YELLOW	GREEN
Maropitant			
	RED	YELLOW	GREEN
Meloxicam			
	RED	YELLOW	GREEN
Mirtazapine			
	RED	YELLOW	GREEN
Sucralfate			
	RED	YELLOW	GREEN



**RED LIGHT,
GREEN LIGHT**

PEER REVIEWED

Did you answer?

The following represents the best responses based on drug metabolism, pharmacokinetics, species, diagnosis, clinical and laboratory data, and other pertinent findings.

Acetaminophen

| CORRECT RESPONSE



Although this patient would most likely benefit from pain management, acetaminophen is contraindicated in cats at any dose. In cats, deficient acetaminophen glucuronidation results in toxic metabolites that may cause methemoglobinemia.

Amoxicillin–clavulanic acid

| CORRECT RESPONSE



Antibiotics are indicated in cases of pyelonephritis, and pending urine culture results, amoxicillin–clavulanic acid is a safe, broad-spectrum antibiotic choice for this patient. Adverse GI effects can occur in cats but are usually minor.

Buprenorphine

| CORRECT RESPONSE



Patients with pyelonephritis may need some level of pain control, and buprenorphine is a safe analgesic for cats. Buccal administration is traditionally well tolerated and effective.

Cyproheptadine

| CORRECT RESPONSE



See mirtazapine for comparison

Cyproheptadine is a safe appetite stimulant for use as an alternative to mirtazapine; however, cyproheptadine is not a good choice in patients receiving fluoxetine because it may decrease or reverse the effects of selective serotonin reuptake inhibitors (SSRIs). It is a good antidote in cases of serotonin syndrome.

Enalapril

| CORRECT RESPONSE



Control of hypertension is needed, but options better than enalapril are available. The elimination rate of enalapril may be affected in patients with kidney disease, as it is cleared primarily through renal excretion. A better option may be benazepril, which is cleared in part by the liver and does not accumulate in cats with mild-to-moderate renal insufficiency. Either drug may cause azotemia in some patients by adversely affecting the glomerular filtration rate (GFR). This patient should be monitored closely for worsening azotemia, hyperkalemia, or hypotension if any angiotensin-converting enzyme (ACE) inhibitor is given.

What Did You Say?

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Enrofloxacin

| CORRECT RESPONSE

If urine culture and sensitivity results indicate use of a fluoroquinolone, enrofloxacin is not an ideal choice for kidney disease and, of the veterinary fluoroquinolones, carries the greatest risk for dose-dependent retinotoxicity. Marbofloxacin, pradofloxacin, and orbifloxacin have much lower risks at label doses.

Maropitant

| CORRECT RESPONSE

Cats with chronic kidney disease often develop signs of nausea, vomiting, and decreased appetite attributable to uremia. Maropitant is an approved antiemetic for use in cats and, if necessary, would have been a safe, effective choice for this patient. There is no evidence that the dose needs to be adjusted in cats with kidney disease. This neurokinin-1 receptor antagonist may also aid in treating visceral pain.

Meloxicam

| CORRECT RESPONSE

NSAIDs should not be used for pain in cats that are dehydrated or have preexisting renal disease (ie, considerable risk for renal toxicity). NSAIDs should not be given with prednisone because the combination can exacerbate adverse GI effects (eg, ulceration).

Mirtazapine

| CORRECT RESPONSE

The use of mirtazapine with fluoxetine, an SSRI, is contraindicated, as it can cause serotonin syndrome. In addition, mirtazapine should be used with caution in patients with reduced renal function, as drug clearance may be impaired.

Sucralfate

| CORRECT RESPONSE

Although sucralfate administration is not contraindicated in this patient, the benefits are limited unless oral, esophageal, gastric, or duodenal ulceration is suspected. Sucralfate has a local rather than systemic effect, as it binds to ulcerated tissues. Sucralfate may also decrease absorption and efficacy of any aluminum-containing medications (eg, fluoroquinolones) that may be used in this patient.

SUGGESTED READING

Effect of maropitant, a neurokinin-1 receptor antagonist, on the minimum alveolar concentration of sevoflurane during stimulation of the ovarian ligament in cats. Niyom S, Boscan P, Twedt DC, et al. *Vet Anaesth Analg* 40:425-431, 2013.

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MARIE A. CHARTIER, DVM, DACVIM, is particularly interested in gastroenterology and is a member of the Comparative Gastroenterology Society. She joined the IVG network of hospitals in 2013. Dr. Chartier earned her undergraduate degree in biology at Roger Williams University and her DVM from Louisiana State University. She completed a small animal rotating internship in medicine and surgery at Angell Animal Medical Center in Boston and a 3-year residency in small animal internal medicine at Veterinary Specialty Hospital in San Diego.