

UROLOGY/RENAL MEDICINE

Diagnosis and Treatment of Recurrent Urinary Tract Infections

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The classifications of urinary tract infection (UTI) have been revised based on the 2019 International Society for Companion Animal Infectious Diseases guidelines.¹

Sporadic cystitis, previously known as “simple” or “uncomplicated” UTI, is a sporadic bacterial infection causing cystitis and lower urinary tract signs. The term “complicated UTI” is no longer recommended, as patients with functional or anatomic abnormalities of the urinary tract may still develop bacterial cystitis.

Subclinical bacteriuria is the presence of bacteria identified on urine culture in patients that lack lower urinary tract signs. Older literature often refers to “occult UTI,” which is likely subclinical bacteriuria.

Recurrent UTI is the occurrence of 3 or more infections within 12 months. This condition requires investigation to determine whether it is reinfection, a relapsing UTI, or a refractory UTI.

Reinfection is the return of a UTI—but due to a different organism—within 6 months of discontinuation of antibiotic therapy.

Relapsing UTI occurs when the same organism is cultured again within 6 months of discontinuation of antibiotic therapy. This suggests that the patient has a condition that allows for recolonization or one that prevents total eradication of infection; additional diagnostics are warranted in these patients.

Refractory UTI occurs when a positive urine culture is obtained during appropriate antibiotic therapy (based on in vitro susceptibility testing).

Refractory UTI has several possible causes, including:

- Decreased renal drug elimination (results in lower-than-expected urine drug concentration)
- Inappropriate drug dose or administration schedule
- Low drug bioavailability (due to drug compounding, gastrointestinal disease, or other cause)
- Poor drug compliance

Additionally, some drugs may show efficacy in vitro but, for unknown reasons, the same effect is not present in vivo.

CULTURE AND SENSITIVITY TESTING

Ideally, all patients with a suspected recurrent UTI should have a urine sample collected via cystocentesis and evaluated by aerobic culture and antibiotic susceptibility testing. Urine culture is considered the gold standard in the diagnosis of UTI, and the antibiotic susceptibility report is an essential tool in the successful eradication of recurrent UTI.

The lipophilic drugs that achieve effective concentrations within the prostate include fluoroquinolones, sulfonamides, and macrolides; treatment is guided by urine culture and susceptibility results.

Culture results can guide the diagnostic and therapeutic management of recurrent UTI (see **ALGORITHM**).

CAUSES OF DRUG FAILURE

Urine antibiotic concentrations in veterinary patients with kidney disease are just beginning to be studied.² Reduced glomerular filtration rate may decrease excretion of drugs into urine, resulting in decreased urine concentrations. Additionally, patients with polyuria due to other causes (e.g., diabetes mellitus, hyperadrenocorticism) may experience further reduction of urine drug concentration due to increased daily urine volume and subsequent dilution of filtered antibiotic. Such patients may require a higher dosage or more frequent administration to achieve therapeutic urine concentrations. Consultation with a veterinary pharmacologist, nephrologist, or urologist is recommended to optimize drug therapy in these cases.

CHOOSING EFFECTIVE ANTIBIOTICS

When infection is present in the kidney parenchyma (pyelonephritis), prostate (prostatitis), or deep layers of the bladder wall, antibiotics must reach high enough concentrations within tissue to be effective. Some antibiotics (e.g., amoxicillin, amoxicillin–clavulanic acid, cefovecin) will not reach sufficient tissue concentrations to effectively eliminate tissue infections.

In early stages of prostatitis, the blood–prostate barrier may be compromised, allowing delivery of water-soluble antibiotics to the site of infection. However, after the initial inflammation resolves, this barrier is restored and these antibiotics may no longer reach effective tissue concentrations within the prostate, preventing bacterial cure. The lipophilic drugs that achieve effective concentrations within the prostate include fluoroquinolones, sulfonamides, and macrolides; treatment is guided by urine culture and susceptibility results.

Pyelonephritis is best empirically treated with fluoroquinolones or third-generation cephalosporins, then adjusted based on antimicrobial susceptibility testing.¹



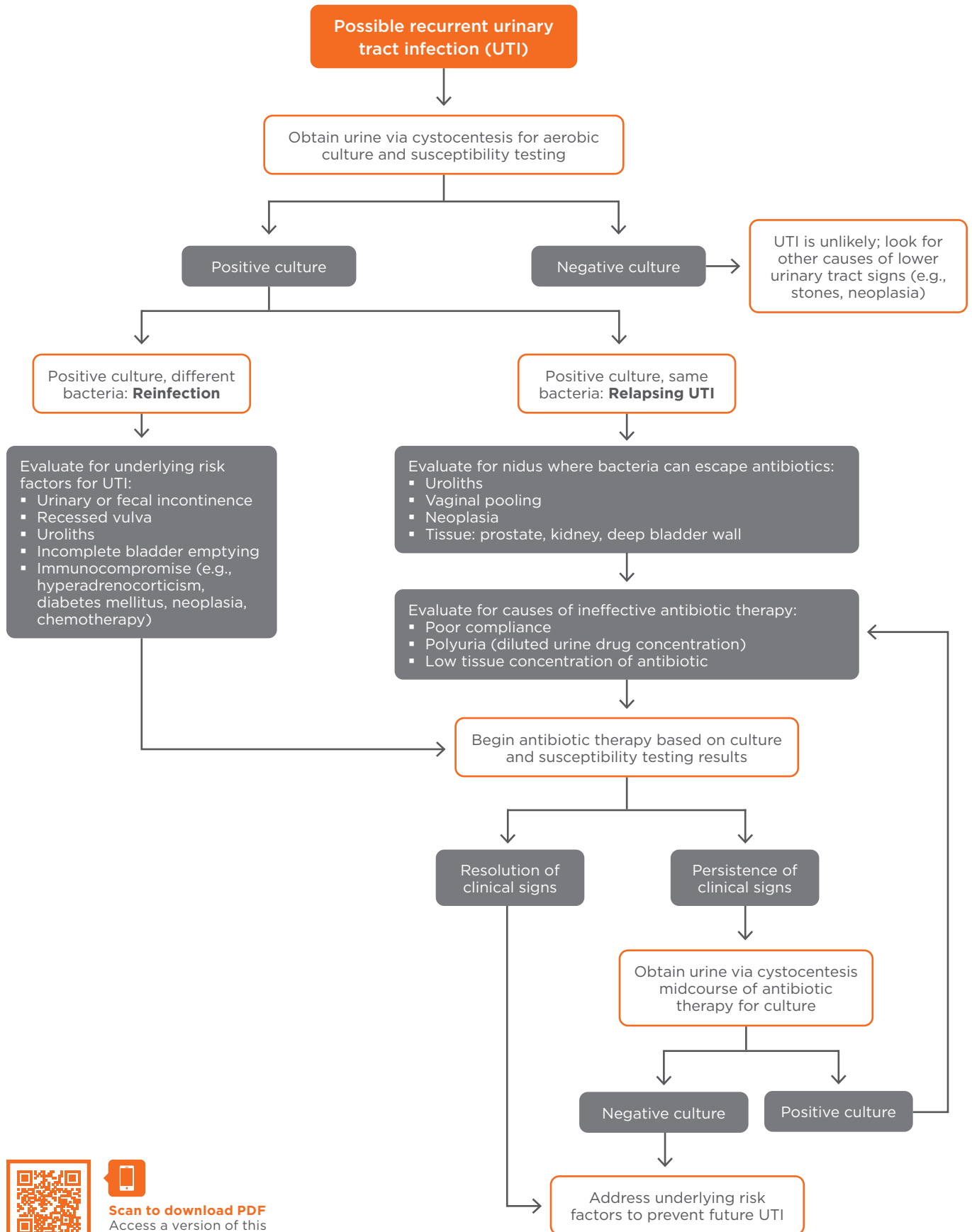
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Dr. Foster completed an internal medicine residency at the University of Wisconsin and currently runs the nephrology/urology and extracorporeal therapies services at Friendship Hospital for Animals in Washington, D.C. Dr. Foster's research interests include nontraditional uses of extracorporeal blood purification, glomerulonephritis, and drug pharmacokinetics in patients with kidney disease. He has lectured internationally on these subjects and has published numerous manuscripts and book chapters on nephrology and urology. He is a past president of the American Society of Veterinary Nephrology and Urology (ACVNU), a current board member of the International Renal Interest Society, and the president-elect and a founding member of the ACVNU.

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