treatment because their bacterial isolates are more likely to be resistant to various antibiotics.[19,33,93,94] When empiric therapy of an acute UTI with complicating factors is initiated, treatment should be reevaluated once urine culture and sensitivity results are available.[95] The initial selection of empiric therapy should reflect the patient's individual uropathogen history, current treatment (eg, if currently on UTI suppression antibiotics), and response to prior therapy.[33,94–104] If clinically reasonable, antimicrobial therapy should be delayed pending culture results and organism susceptibility so antimicrobial treatment can be targeted based on the uropathogen profile.[95] Table 5 displays the recommended regimens for empiric therapy of UTI with complicating factors.

Pyelonephritis

Several otherwise useful UTI antibiotics are not recommended for acute pyelonephritis treatment, including nitrofurantoin and fosfomycin; TMP-SMX is not recommended for empiric treatment because of high rates of TMP-SMX resistance. Table 6 displays the recommended acute pyelonephritis treatment regimens. Empirically initiated antibiotics should be refined when the urine culture results are available.

Nonantibiotic Treatments and Nonoral/Nonparenteral Antibiotic Treatment

Ibuprofen—Initial Symptomatic Treatment

Ibuprofen may be used as an adjunct for symptoms of acute bacterial cystis. However, in women with rUTI, there is no evidence that ibuprofen should be used in lieu of an antibiotic (see previous discussion on conditional treatment).

Chinese Herbal Medicine

There is insufficient evidence to recommend Chinese herbal medicine (CHM) as rUTI treatment. The herbal products used in CHM (up to 10–15 herbs) have undergone in vitro studies showing biologic plausibility for rUTI treatment and clinical efficacy in studies. A 2015 Cochrane systematic review compared studies of CHM vs placebo, CHM vs antibiotics, and CHM plus antibiotics vs antibiotics alone.[113] The systematic review was limited by a small number (7) of studies, small sample sizes, study design problems, and an overall high bias risk. Despite these limitations, the authors of the Cochrane review concluded that CHM may be beneficial for rUTI treatment during an acute episode (either as an independent or as an adjunct therapy) and may reduce rUTI for up to 6 months after treatment.

TABLE 6. Recommended Acute Pyelonephritis Treatment Regimens[33,39,57,60,104–112]

Antibiotics	Daily Dose	Duration of Therapy
Oral regimens in patients not requiring hospitalization		
Ciprofloxacin	500–750 mg BID	7–10 d
Levofloxacin	500 mg QD	7–10 d
Levofloxacin	750 mg QD	5 d
Alternatives		
Cefpodoxime	200 mg BID	10 d
Ceftibuten	400 mg QD	10 d
Limited to pathogens with known susceptibility (not for initial empiric therapy)		
TMP-SMX	160/800 mg BID	14 d
Amoxicillin-clavulanic acid*†	0.5/0.125 g TID	14 d
Antibiotics	**Daily Dose**	
Empirical parenteral regimen for patients requiring hospitalization		
Ciprofloxacin	400 mg BID	
Levofloxacin	250–500 mg QD	
Levofloxacin	750 mg QD	
Alternatives		
Cefotaxime*	2 g TID	
Ceftriaxone	1–2 g QD	
Ceftazidime*	1–2 g TID	
Cefepime	1–2 g BID	
Amoxicillin-clavulanic acid*†	1.5 g TID	
Piperacillin/tazobactam	2.5–4.5 g TID	
Gentamicin*	5 mg/kg QD	
Ertapenem	1 g QD	
Imipenem/cilastin	0.5/0.5 g TID	
Meropenem	1 g TID	
Doripenem	0.5 g TID	

Adapted from Grabe.[33]

*Not studied as monotherapy for acute uncomplicated pyelonephritis.

†Mainly for gram-positive pathogens.

BID, twice a day; QD, 4 times a day; TID, 3 times a day.