Cystitis, Uncomplicated (uUTI)	Alternatives
Antimicrobial Considerations	
Amox/Clav	* Second-line for empiric Tx of uUTI (use 7 day course) * First-line if etology known to be Gm+ * *E. coli* resist approx 25 - 40% in many US locations
Amoxicillin	* Third-line agent for empiric Tx of uUTI * Trials have shown lower durable eradication rates even in susceptible
Cephalexin	* Never first-line for empiric uUTI
Fluoroquinolones	* Use ONLY if severe symptoms AND - Allergy to first-line agents or - Abx treatment in prior 3 months (except FQ)
Fosfomycin	* Lower efficacy compared to NF/SMX-TMP
Nitrofurantoin	* Good choice d/t minimal resistance and comparable efficacy * Do NOT use in upper urinary tract infx d/t poor penetration * Inactive against *Proteus, Pseudomonas* * Frequent GI upset
Pregnancy Considerations	* 7-day therapy recommended * SMX-TMP - do not use near term (2 weeks before EDC) * NF - do not use in last trimester or during labor (neonatal hemolytic anemia risk)
SMX-TMP	* Use if *E. coli* resist < 20% and no use in past 90 days
Trimethoprim	* TMP alone is equiv to SMX-TMP when used for 7 + days * Fever ADRs compared to SMX-TMP

Pathogen-Specific Therapy - uUTI	
E. coli	1st = Nitrofurantoin, SMX/TMP, 2nd = FQ, Amox/Clav, Amox (last resort)
Staphylococcus saprophyticus	1st = Amox/Clav, Amox; 2nd = FQ, SMX/TMP, TMP, Cephalexin

Cystitis, Complicated or Catheter-related (cUTI)	Alternatives
Antimicrobial Considerations	
Aztreonam	* Reasonable empiric choice in pts with rash or immeidate hypersensitivity to PCN. For severe infx, combine with second agent
Carbapenems	* For severe pts. * covers *Pseudomonas* (except Ertapenem) * Can be used in pts with PCN allergy if rxn NOT a type-1 immediate hypersensitivity
Cefepime	* for Severe pts if ESBL-risk is low * Covers *Pseudomonas* * Can be use in PCN-allergy if NOT type-1 Immediate hypersensitivity
Ceftazidime	* for Severe pts if ESBL-risk is low * Covers *Pseudomonas* * Can be use in PCN-allergy if NOT type-1 Immediate hypersensitivity
Fluoroquinolones	* For empiric cUTI in mild infection

Pathogen-Specific Therapy - cUTI	
Acinetobacter sp.	1st - Imipenem; 2nd - FQ, Amp/Sulf
Enterobacteriaceae	1st - FQ ; 2nd - Ceftazidime, Cefepime, Pip/Tazo, SMX/TMP, Imipenem, Meropenem
MRSA	1st - Vancomycin ; 2nd - SMX/TMP, Linezolid
Pseudomonas aeruginosa	1st - Ceftazidime, Cefepime ; 2nd - Pip/Tazo, FQ, Imipenem, Meropenem
VRE	1st - Nitrofurantoin (lower UTI only) ; 2nd - Linezolid, Daptomycin, Ampicillin
Candida albicans	1st - Fluconazole

Pyelonephritis - Outpatient	Alternatives
Considerations	
Bacteremia	* 7 days of Tx may be as effective as 14 days in pts with Gm(-) bacteremia * Follow-up blood cultures are unlikely helpful in Gm(-) bacteremia
Beta-lactams (PO)	* Second-line due to high rates of relapse
Duration	* Uncompilcated = 7 days (for FQ) * Complicated 10 - 14 days
Fosfomycin	* Do NOT use due to limited systemic absorption

Cystitis Information

FQ resist to *E. coli* > 10% - consider initial IV dose	* Ceftriaxone 1gm IV or IM * Gentamicin 5mg/kg IV or IM * Ciprofloxacin 400mg IV x 1
Gentamicin	* Effective for first dose in OP therapy * May be preferrable for first dose (OP) due to long Post-Abx Effect
Nitrofurantoin	* Not recommended as it does NOT attain therapeutic levels in renal parenchyma
SMX-TMP	* Usually not appropriate for empiric therapy * 14 days is appropriate Tx for pathogens KNOWN to be sens

Pathogen-specific Therapy - Pyelonephritis	
E.coli , including *Enterobacteriaceae*	OP - 1st Line = FQ OP - 2nd Line = SMX/TMP, Cephalexin, Cefixime, Ceftriaxone, Gentamicin
	IP (until afebrile x 48hrs, then OP regimen) FQ, Gent ± Ampicillin, Ceftriaxone ± Gent
Staphylococcus saprophyticus	OP - 1st Line = FQ OP - 2nd Line = Amox/Clav
	IP (until afebrile x 48hrs, then OP regimen) = FQ, Ceftriaxone ± Gent

UTI Treatments in Pregnancy	
Asymptomatic Bacteriuria and Cystitis	* Nitrofurantoin 100mg BID x 5 days - consider alternate near-term in G6PD-deficient mothers d/t theoretical risk of maternal and fetal hemolytic anemia * Cephalexin 500mg PO BID x 3 - 7 days * Cefuroxime 500mg PO BID x 3 - 7 days * Fosfomycin 3gm PO x 1 * SMX-TMP may be considered during 2nd and 3rd trimester - Theoretical risk of neural tube defects during 1st trimester (TMP) - Theoretical risk of kernicterus with near-term use
Pathogen-Specific Therapy in Pregnancy	
E. coli and other *Enterobacteriaceae*	ABU & Acute Cystitis 1st - Cephalexin, Cefuroxime, Nitrofurantoin 2nd - Ceftriaxone Acute Pyelonephritis 1st - Ceftriaxone, Cefazolin, Cefuroxime 2nd - Ampicillin, Gentamicin, Pip/Tazo
Staphylococcus saprophyticus or Group B beta-hemolytic *Streptococcus*	ABU & Acute Cystitis 1st - Amox/Clavulanate, Amoxicillin 2nd - Cephalexin, Nitrofurantoin Acute Pyelonephritis 1st - Amp/Sulbactam 2nd - Cefoxitin

Urine Analysis Pearls	.
Leukocyte Esterase - positive --> indicates pyuria	
Nitrite - positive --> may indicated Gram-negative bacteria	
WBC - > 10 / HPF --> pyuria	
Epithelial Cells > 20 / HPF --> may indicate contamination	

Cystitis Information

Pearls
E. coli resistance is increasing to SMX/TMP and FQ
ESBL-producers are often susceptible to fosfomycin or ertapenem
IF failure on 3-day course, culture and Tx for 2 weeks
Pregnancy
- 7-day Tx recommended
- Do not use sulfonamides near term (2 weeks before EDC) --> incr risk of kernicterus
- Do not use nitrofurantoin in last trimester of pregnancy nor during labor for fear of causing hemolytic anemia in the newborn
- Avoid fluoroquinolones throughout pregnancy
Phenazopyridine 200mg PO TID x 2 days to reduce sx
Duration
- For CAUTI, tx for 7 days if prompt resolution of sx
- For CAUTI, tx for 10 - 14 days if delayed response

Antimicrobial Pearls	Considerations
Nitrofurantoin	Cystitis, uncomplicated * Good choice d/t minimal resistance and comparable efficacy * Do NOT use in upper urinary tract infx d/t poor penetration
SMX-TMP	Cystitis, Uncomplicated * Use if E. coli resist < 20% and no use in past 90 days
Fosfomycin	Cystitis, uncomplicated * Lower efficacy compared to NF/SMX-TMP
Fluoroquinolones	Cystitis, uncomplicated * Use ONLY if severe symptoms AND - Allergy to first-line agents or - Abx treatment in prior 3 months (except FQ)