



# RhAPP

RHEUMATOLOGY ADVANCED  
PRACTICE PROVIDERS

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# RhAPP

RHEUMATOLOGY ADVANCED  
PRACTICE PROVIDERS

## Bugs & Drugs

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# Learning Objectives

- Summarize the value of a local antibiogram
- Recognize potential short falls of antibiotics discussed
- Identify potential alternative antibiotic choices for the infectious processes discussed

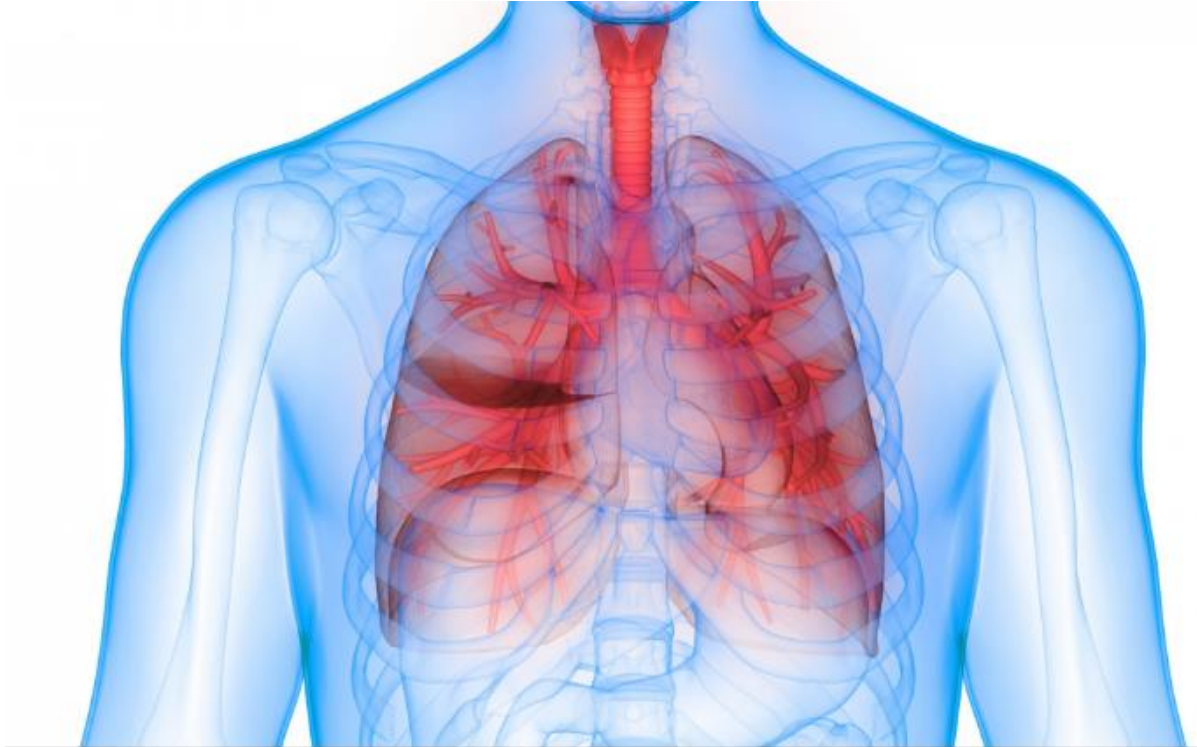
# Antibiograms Are Your Friend

- Generally produced as a joint effort by infectious diseases and the microbiology laboratory
- Demonstrate local susceptibility rates of common pathogens to commonly used antibiotics
- Ask about this at your institution
  - Preferably an outpatient specific antibiogram

# Antibiograms Are Your Friend

GRAM-NEGATIVE ORGANISMS	# Isolates	Amox/Clav	Ampicillin	Amp/Sulb	Aztreonam	Cefazolin (f)	Cefepime	Ceftriaxone	Cefuroxime	Ciprofloxacin (g)	Ertapenem	Gentamicin	Levofloxacin (g)	Meropenem	Nitrofurantoin
<b>Escherichia coli (h)</b>															
ED Systemic	33	93	54	66	90	84	90	90	90	90	100	93	90	100	–
ED Urine (i)	955	89	58	64	95	92	95	95	93	88	100	94	88	100	98
Outpatient Systemic	46	93	58	69	93	76	93	93	91	82	100	91	82	100	–
Outpatient Urine (i)	3,440	89	63	67	94	92	96	95	93	87	99	93	88	100	98
<b>Klebsiella pneumoniae (h)</b>															
ED Urine	96	90	R	78	92	90	92	92	86	91	100	96	95	99	46
Outpatient Urine	570	95	R	84	95	95	96	96	91	96	99	98	97	100	45
<b>Pseudomonas aeruginosa</b>															
ED Urine	36	R	R	R	86	R	94	R	R	80	R	86	77	95	R
Outpatient Systemic	69	R	R	R	89	R	92	R	R	91	R	95	92	97	R
Outpatient Urine	149	R	R	R	90	R	93	R	R	81	R	86	81	100	R

# Azithromycin for Community Acquired Pneumonia (CAP)





# Azithromycin for CAP

## Common pathogens in community acquired pneumonia (CAP)

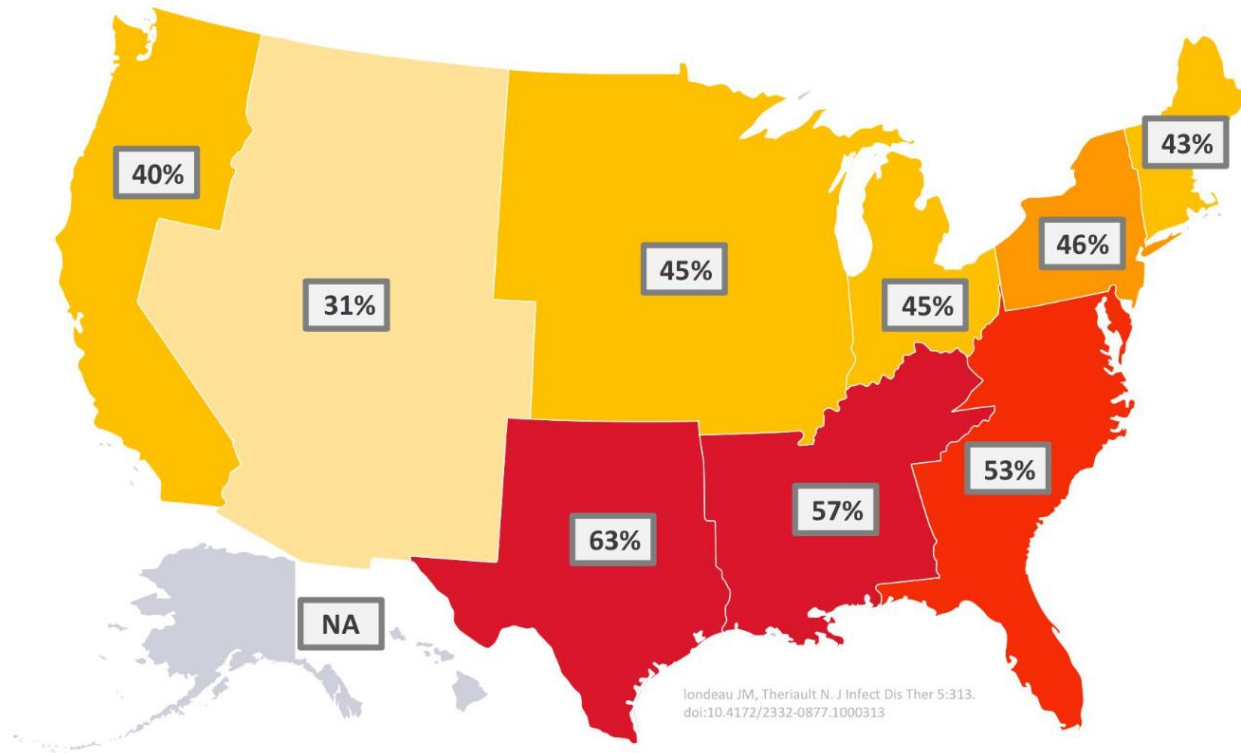
### Typicals

- *Streptococcus pneumoniae*
- *Haemophilus influenzae*
- *Moraxella catarrhalis*

### Atypicals

- *Mycoplasma pneumoniae*
- *Chlamydia pneumoniae*
- *Legionella spp.*

# *S. pneumoniae* Resistance to Azithromycin



# Azithromycin: Alternative for CAP

- Doxycycline
  - Less resistance
  - Same duration
  - Generally well tolerated
    - Avoid taking with foods or medications containing  $\text{Ca}^{2+}$ ,  $\text{NaHCO}_3$ ,  $\text{Zn}^{2+}$ , Fe,  $\text{Mg}^{2+}$  (2 hours before or 6 hours after) to avoid chelation
    - Causes sensitivity to the sun

# Sulfamethoxazole/Trimethoprim for Urinary Tract Infection (UTI)



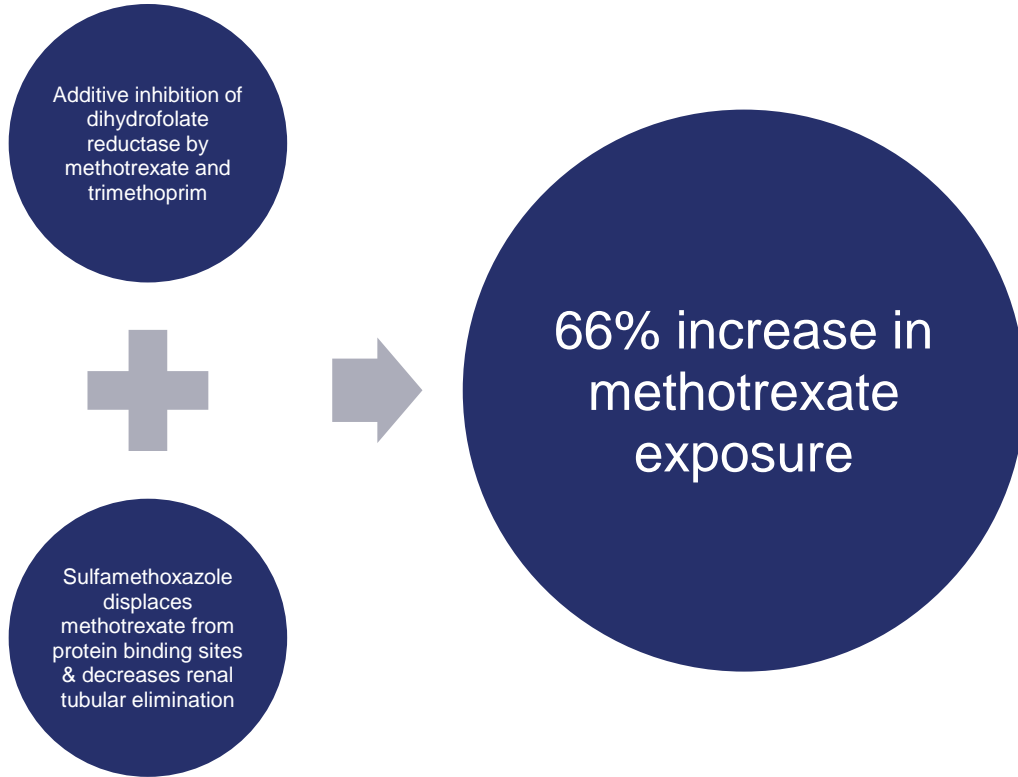
# Sulfamethoxazole/Trimethoprim for UTI

Review > Clin Infect Dis 2011 Mar 1;52(5):e103-20. doi: 10.1093/cid/ciq257.

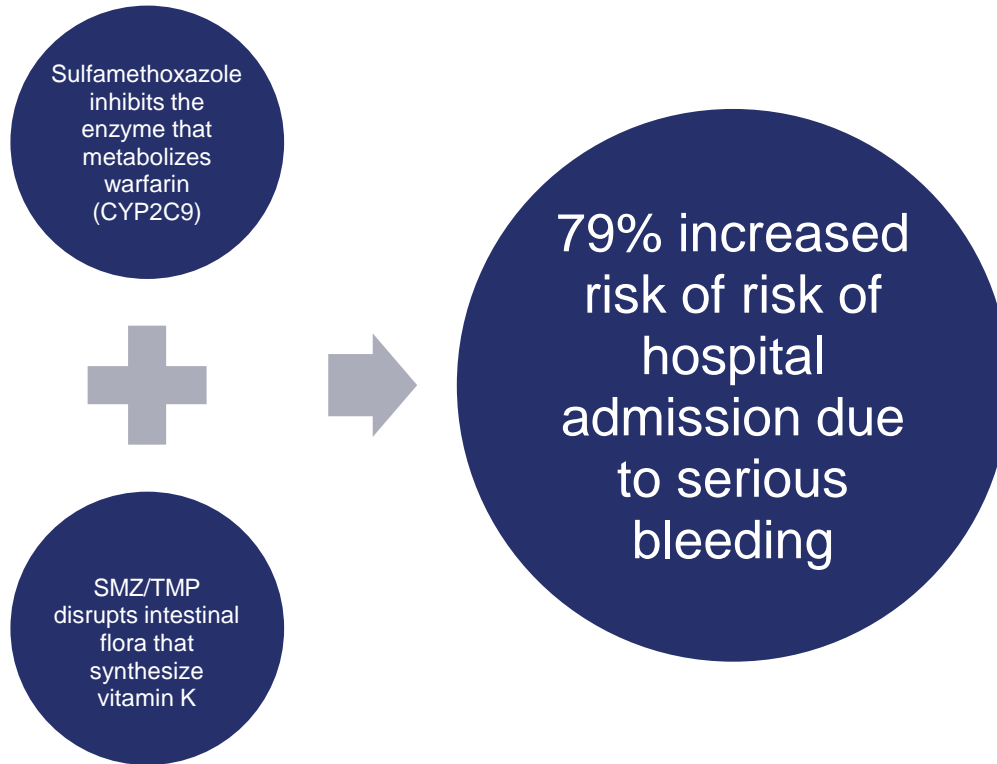
## International clinical practice guidelines for the treatment of acute uncomplicated cystitis and pyelonephritis in women: A 2010 update by the Infectious Diseases Society of America and the European Society for Microbiology and Infectious Diseases

- IDSA recommends against empiric use when *E.coli* resistance is >10%
- Adverse affects
- Drug-drug interactions

# Sulfamethoxazole/Trimethoprim Drug-Drug Interactions of Note: Methotrexate



# Sulfamethoxazole/Trimethoprim Drug-Drug Interactions of Note: Warfarin



# Sulfamethoxazole/Trimethoprim Drug-Drug Interactions of Note: ACE Inhibitors, ARBs, Spironolactone

Trimethoprim  
impairs renal  
potassium  
excretion

Additive  
potassium  
sparing effects  
w/ ACEi,  
ARBS, &  
spironolactone

12 times higher risk  
of hyperkalemia  
then with other  
antibiotics



# Sulfamethoxazole/Trimethoprim : Alternatives for Lower UTI

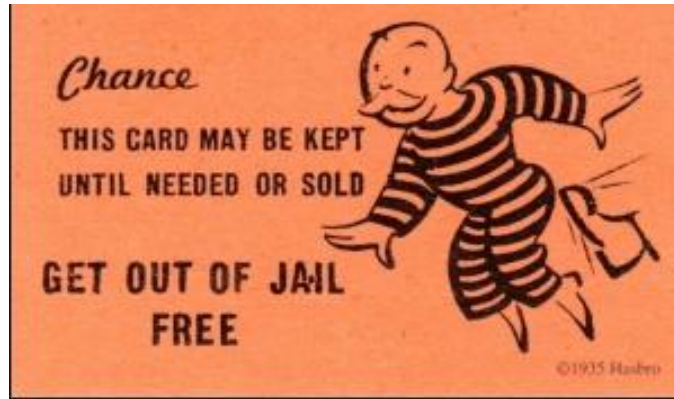
- Nitrofurantoin
  - Extremely low resistance to common urinary pathogens
  - Well tolerated
  - Data for use in patients with creatinine clearance as low as 30 ml/min

# Sulfamethoxazole/Trimethoprim : Alternatives for Lower UTI

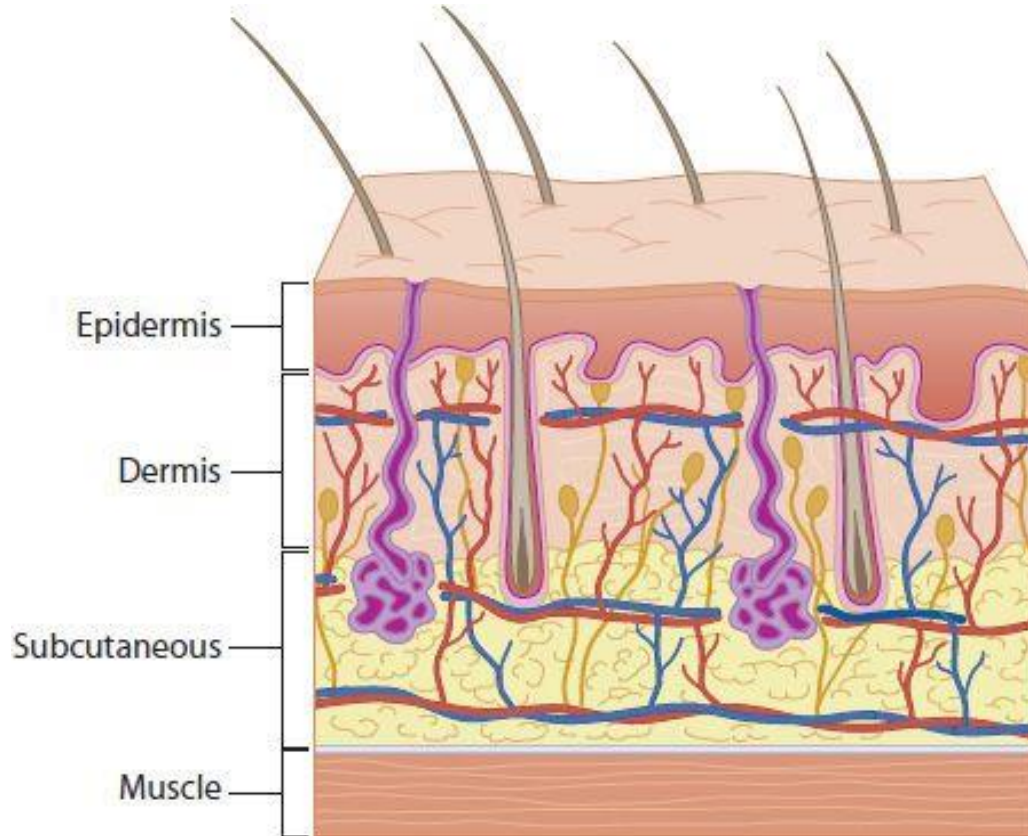
- Cephalexin
  - Generally well tolerated
  - Less resistance for lower cystitis
    - Clinical & Laboratory Standards Institute (CLSI) has higher breakpoints for systemic infections such as pyelonephritis
      - Use caution in this population

# Alternatives for Lower UTI

- Fosfomycin
  - Uncomplicated: 3g PO x1
  - Complicated: 3g PO q48h x 3 doses



# Clindamycin for Skin and Soft Tissue Infection (SSTI)



# Clindamycin for SSTI

- *Staphylococcus aureus* resistance
  - Inducible resistance
- Adverse affects
  - Diarrhea
  - *Clostridioides difficile* infection
    - Odds ration 15-20 x placebo

# Clindamycin: Alternatives for SSTI

## Purulent SSTI

- Trimethoprim/sulfamethoxazole
- Doxycycline

## Non-purulent

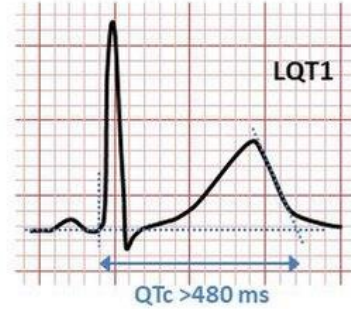
- Dicloxacillin
- Cephalexin

# Alternatives for SSTI

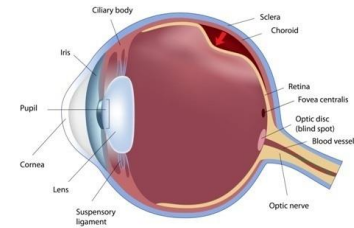
- Linezolid
  - Available as a generic which has greatly reduced its price
  - Caution
    - Serotonin syndrome when combined with other pro-serotonergic medications
    - Myelosuppression
      - Associated with therapy  $\geq 14$  days



# Fluoroquinolones Are Not Your Friend



Retinal Detachment





# Fluoroquinolones – Adverse Effects

Commonly Known Adverse Effects	Lesser Know Adverse Effects
QT Prolongation	GI Perforation
<i>Clostridioides difficile</i> infections	Aortic aneurism/dissection
Tendinopathy	Retinal detachment
Peripheral neuropathy	Hypo/Hyperglycemia
Black box warnings	Seizures/Psychiatric AEs

# Fluoroquinolones: Other Issues

- Increasing resistance
  - Low barrier
- These are the only oral options we have with activity against *Pseudomonas aeruginosa*

# Fluoroquinolones: Alternatives

UTI

Nitrofurantoin,  
cephalexin

PNA

Doxycycline,  
cefuroxime + azithromycin

Sinusitis

Amoxicillin/Clavulanate,  
doxycycline

# Tools to Bring Home



# Tools to Bring Home

## Urinary Tract Infection: Outpatient Prescribing Recommendations

### Uncomplicated Cystitis

	Agent/dosing*	<i>E. coli</i> SUSC. †
1 <sup>st</sup> line	Nitrofurantoin 100mg BID x 5 days	98%
2 <sup>nd</sup> line	Cephalexin 500mg BID-TID x 3 – 5 days	92%
Other options	Cefuroxime 250mg BID x 3 – 5 days	93%
	Cefdinir 300mg BID x 3 – 5 days	93%
	SMX/TMP DS 1 tab BID x 3 days	79%
	Cipro 250mg BID x 3 days Levaquin 250 daily x 3 days	88%

\* Dosing assumes normal renal function; consult [PawooQ](#) for renal dose adjustments

† Per 2018 [apubioarap](#).

### Complicated Cystitis

	Agent/dosing*	<i>E. coli</i> SUSC. †
1 <sup>st</sup> line	Nitrofurantoin 100mg BID x 5 days†	98%†
2 <sup>nd</sup> line	Cephalexin 500mg TID x 7 days	92%
Other options	Cefuroxime 250mg BID x 7 days	93%
	Cefdinir 300mg BID x 7 days	93%
	SMX/TMP DS 1 tab BID x 5-7 days	79%
	Cipro 250mg BID x 5-7 days Levaquin 250mg daily x 5-7 days	88%

\* Dosing assumes normal renal function; consult [PawooQ](#) for renal dose adjustments

† Per 2018 [apubioarap](#). † Avoid use in men

### Pyelonephritis

	Agent/dosing*	<i>E. coli</i> SUSC. †
1 <sup>st</sup> line	Cefuroxime 500mg po BID x 10-14 days	93%
Other options	Cefdinir 300mg BID x 10-14 days	93%
	SMX/TMP DS 1 tab BID x 14 days	79%
	Cephalexin 500mg QID x 10-14 days	84%
	Ciprofloxacin 500mg BID x 7 days Levofloxacin 750mg daily x 5 days	88%

\* Dosing assumes normal renal function; consult [PawooQ](#) for renal dose adjustments

† Per 2018 [apubioarap](#); urinary isolates

### UTI: Empiric Coverage of Pseudomonas

	Agent/dosing*
Uncomplicated	Ciprofloxacin 250mg BID x 3 days Levofloxacin 250mg daily x 3 days
Complicated	Ciprofloxacin 250mg BID x 5-7 days Levofloxacin 250mg daily x 5-7 days
Pyelonephritis	Ciprofloxacin 500mg BID x 7 days Levofloxacin 750mg daily x 5 days

\* Dosing assumes normal renal function; consult [PawooQ](#) for renal dose adjustments

*Pseudomonas* spp. risk factors include but not limited to:

- 1.) Urine culture with *Pseudomonas* spp. within 4 weeks
- 2.) Hospitalized within 90 days
- 3.) Reside in nursing home/LTAC
- 4.) Receive hemodialysis
- 5.) Antibiotics or chemotherapy within 30 days

### A note about Fluoroquinolones

FQs carry multiple boxed warnings and have been associated with many severe adverse reactions:

Commonly Known Adverse Effects	Lesser Known Adverse Effects
QT prolongation	GI perforation
<i>Clostridium difficile</i> infection	Aortic aneurysm/dissection
Tendinopathy	Retinal detachment
Peripheral neuropathy	Hypo/hyperglycemia
	Seizures

- FQs have a low barrier to resistance.
- Resistance rates to FQs have increased rapidly.
- Ciprofloxacin and levofloxacin are our only oral agents with reliable activity against *Pseudomonas* spp.
- FQs should be reserved for a few clinical scenarios where other antibiotics are not safe or feasible.

### Likely Pathogens: Community Acquired UTI

Uncomplicated Cystitis	<ul style="list-style-type: none"> <li>• <i>E. coli</i> (75-95%)</li> <li>• Other Enterobacteriaceae</li> <li>• <i>S. saprophyticus</i></li> </ul>
Complicated Cystitis	<ul style="list-style-type: none"> <li>• <i>E. coli</i> (65%)</li> <li>• <i>Klebsiella</i> spp. (8%)</li> <li>• <i>Pseudomonas</i> spp. (2%)</li> <li>• Gram-positive cocci (10-12%)</li> </ul>
Pyelonephritis	<ul style="list-style-type: none"> <li>• <i>E. coli</i> (70-95%)</li> <li>• Other Enterobacteriaceae</li> <li>• <i>S. saprophyticus</i></li> </ul>

Updated 2/2020.

This is intended as a guide for evidence-based decision-making and should not replace clinical judgement.

# Tools to Bring Home

## Urinary Tract Infection: Outpatient Prescribing Recommendations

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1 <sup>st</sup> line		
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Other options		

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1 <sup>st</sup> line		
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### Pyelonephritis

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Other options		

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### UTI: Empiric Coverage of *Pseudomonas*

	Agent/dosing*
Uncomplicated	
Complicated	
Pyelonephritis	

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# Conclusion

- Local antibiograms can help determine which antibiotic therapy is best for empiric therapy
- Azithromycin monotherapy for CAP is unlikely to be the optimal empiric therapy
- Clindamycin for SSTI is unlikely to be the optimal empiric therapy
- Fluoroquinolones carry a long list of adverse affects, are experiencing increased resistance, and should be reserved



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## Questions?