Urinary Tract Infections

The Myths and Treatment

Dr. Jennifer Grant

June 22, 2016

Agenda

- The myths of UTI
  - The myth
  - How to manage it
- Local data (SPH)
- Discussion

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Acknowledgement

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Formulation of the problem

- 22-89% of antimicrobial Rx for LTC residents is inappropriate
- 30-50% Hospital Prescriptions are inappropriate
- UTIs are in the top two reasons for Rx
- UTI treatment can be avoided 39% of the time (CDC March 2014)

Choosing Wisely USA & Canada

- SHEA:

"Don't perform urinalysis, urine culture . . .unless patients have signs or symptoms of infection."

- AMDA:

"Don't obtain a urine culture unless there are clear signs and symptoms that localize to the urinary tract."

- IDSA:

"Don't treat asymptomatic bacteruria with antibiotics."

- Urology:

"Don't use antimicrobials to treat asymptomatic bacteriuria in the elderly."

- Hospitalist Medicine:

"Don't prescribe antibiotics for asymptomatic bacteriuria (ASB) in non-pregnant patients."

- Geriatrics:

"Don't use antimicrobials to treat bacteriuria in older adults unless specific urinary tract symptoms are present."

It is safe not to treat bacteriuria in those with non-specific symptoms

There is compelling evidence to support NOT treating asymptomatic bacteriuria in residents of long-term care facilities

Data from 4 RCT demonstrate the lack of benefit

Conclusion: Treatment of asymptomatic bacteriuria is neither beneficial or effective.

But . . . It is still being done

- A 12 month antibiotic utilization in chronic care study showed that 30% of prescriptions for a urinary indication were for asymptomatic bacteriuria
  - Loeb M *et al.* A J Gen Intern Med. 2001 Jun; 16(6):376-83.

The Myths

- Cloudy/smelly urine and UTI
- Bacteriuria and UTI
- Squamous cells and UTI
- Pyuria and UTI
- Nitrates and UTI
- Altered Mental Status and UTI
- Yeast in urine

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Clinical Reviews

TOP TEN MYTHS REGARDING THE DIAGNOSIS AND TREATMENT OF URINARY TRACT INFECTIONS

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□ **Abstract—Background: Urinary tract infections (UTI) are the most common type of infection in the United States. A Centers for Disease Control and Prevention report in March 2014 regarding antibiotic use in hospitals reported "UTI" treatment was avoidable at least 39% of the time. The accurate diagnosis and treatment of UTI plays an important role in cost-effective medical care and appropriate antimicrobial utilization. Objective: We summarize the most common misperceptions of UTI that result in extraneous testing and excessive antimicrobial treatment. We present 10 myths associated with the diagnosis and treatment of UTI and succinctly review the literature pertaining to each myth. We explore the myths associated with pyuria, asymptomatic bacteriuria, candiduria, and the elderly and catheterized patients. We attempt to give guidance for clinicians facing these clinical scenarios. Discussion: From our ambulatory, emergency department, and hospital experiences, patients often have urine cultures ordered without an appropriate indication, or receive unnecessary antibiotic therapy due to over-interpretation of the urinalysis. Conclusions: Asymptomatic bacteriuria is common in all age groups and is frequently over-treated. A UTI diagnosis should be based on a combination of clinical symptoms with supportive laboratory information. This review will assist providers in navigating common pitfalls in the diagnosis of UTI.** © 2016 Elsevier Inc.

□ **Keywords—urinary tract infection; UTI; cystitis; urinalysis; treatment; diagnosis; stewardship; antimicrobial; asymptomatic bacteriuria**

INTRODUCTION

Urinary tract infections (UTI) are the most common type of infection in the United States. Emergency medicine providers are frequently faced with making this common diagnosis. A Centers for Disease Control and Prevention (CDC) report in March 2014 regarding antibiotic use in hospitals reported "UTI" treatment was avoidable at least 39% of the time (1). How is it that something that seems so simple is so often misdiagnosed and treated in emergency departments (EDs)? The 10 myths outlined below address the common fallacies as they pertain to the diagnosis of UTI, and reveals the evidence behind the myth.

Myth 1: The Urine Is Cloudy and Smells Bad. My Patient Has a UTI

Truth 1: Urine color and clarity or odor should not be used alone to diagnose or start antibiotic therapy in any patient population.

RECEIVED: 27 January 2016;

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Myth 1

- “ Cloudy and Smelly Urine are indicators of UTI”

Myth 1

“ Cloudy and Smelly Urine are indicators of UTI”

Urine Colour and Odour should not be used diagnose UTI in any patient population

- Sens 13.3%, PPV 40%
  - For bacteriuria, not infection
- Odour is subjective
  - Affected by hydration and urea concentration
  - Stagnant urine stinks!

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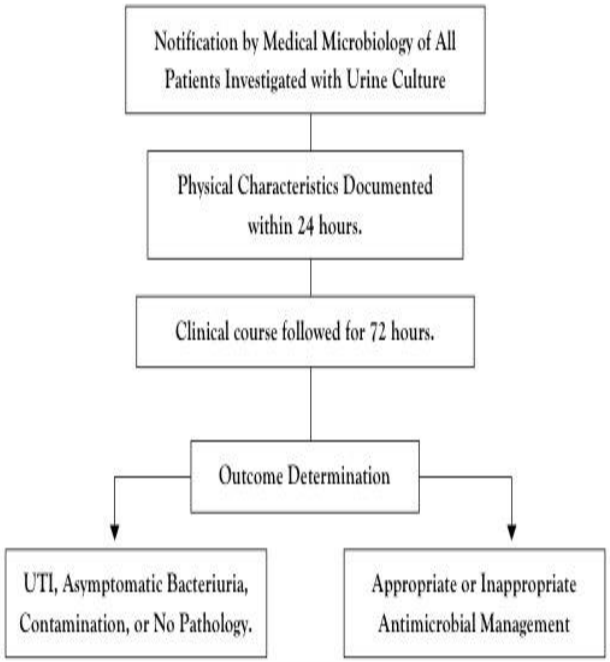
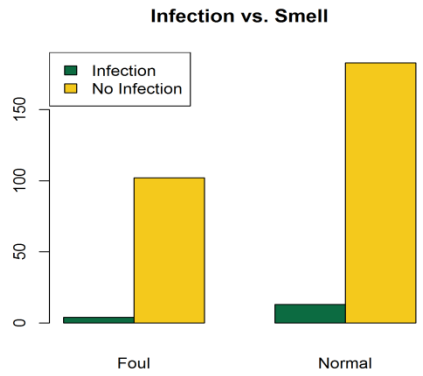
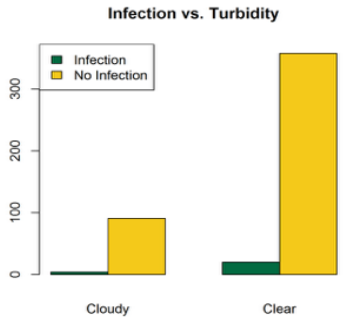
SOUR-PEE study

(Scent of Urine and other Physical Characteristics in the Evaluation of UTI)

- Observational Study n=537
- Cloudy urine: +LR = 0.82 [0.33, 2.05]
  - LR = 1.05 [0.87, 1.26]
- Smelly Urine: +LR = 0.66 [0.28, 1.57]
  - LR = 1.19 [0.9, 1.57]







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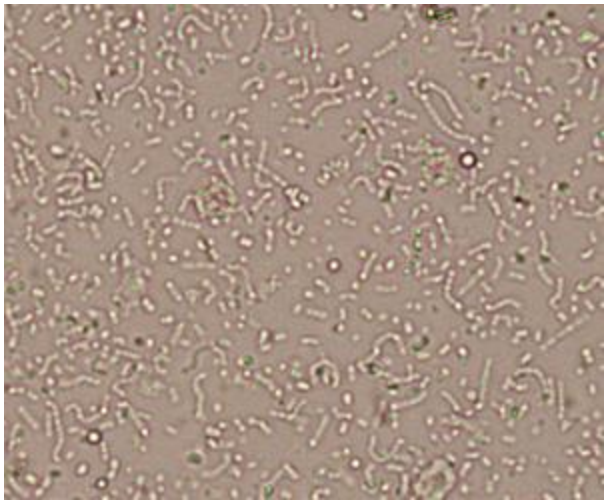
Myth 2

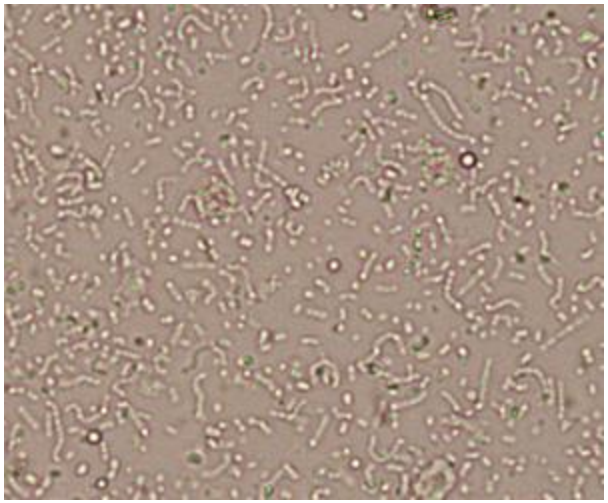
“ Bacteria detected in urine (microscopy or other) is diagnostic of UTI”



Bacteria seen in urine is not diagnostic of UTI

Myth 2

“ Bacteria detected in urine (microscopy or other) is diagnostic of UTI”



Bacteria seen on microscopy do not mean that a patient has a UTI

Reasons for false positive microscopy:

1. Contamination
2. Growth after collection
3. Colonization
4. Concentration (sedimentation)
5. Asymptomatic bacteruria
6. Other infections (urethritis, cellulitis)

Myth 3

“ Positive urine cultures with >5 squamous cells per HPF are considered positive and require treatment.”

Myth 3

“ Positive urine cultures with >5 squamous cells per HPF are considered positive and require treatment.”

A good urine specimen has <5 Epithelial cells per HPF

- Contaminated specimens should be recollected
- Cultures will grow perineal flora and not reflect urinary pathogens

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Myth 4

“ A positive Leukocyte esterase is diagnostic of UTI and requires treatment.”

Myth 4

"A positive Leukocyte esterase is diagnostic of UTI and requires treatment."

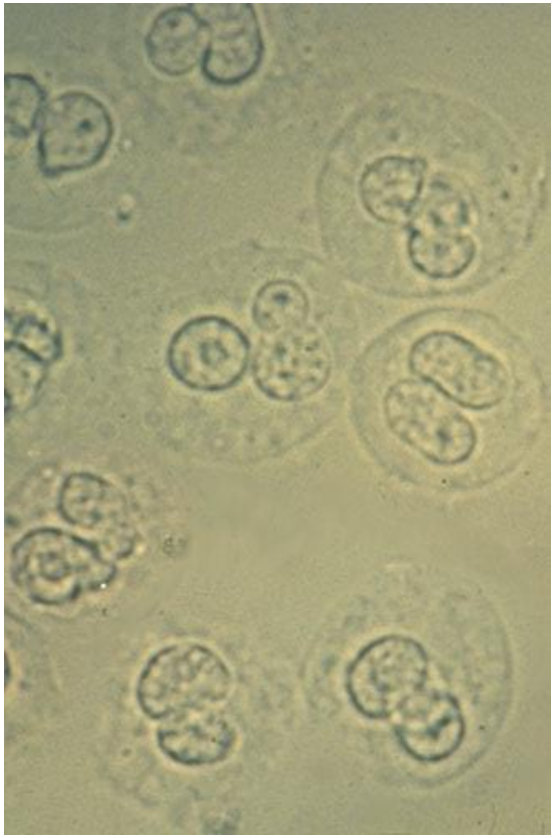
LE shows the presence of WBC but does determine their Clinical Signifcance

Patients can have WBC in the urine for many reasons

- Catheterization
- Stones
- Vaginitis/urethritis
- Asymptomatic bacteriuria

Myth 5

“ Pyuria is diagnostic of UTI.”



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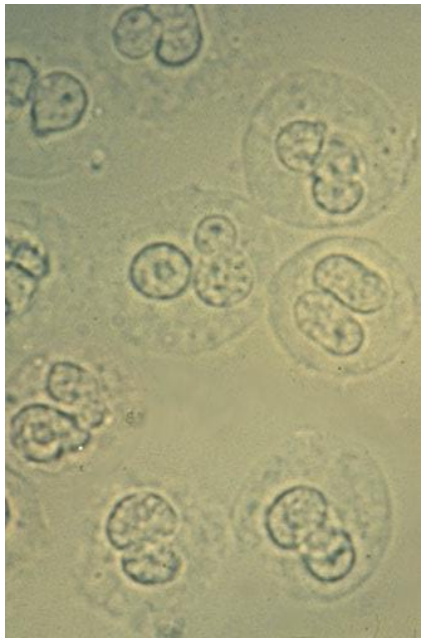
Myth 5

“ Pyuria is diagnostic of UTI.”



The presence of WBC does not diagnose UTI

Patients can have WBC in the urine for many reasons

- Catheterization
- Stones
- Vaginitis/urethritis
- Asymptomatic bacteriuria
- Sedimentation
- Non-infectious bladder inflammation

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Myth 6

“ The presence of nitrates is diagnostic of UTI.”

Myth 6

"The presence of nitrates is diagnostic of UTI."

Nitrates show the presence of gram negative bacteria, not their clinical significance

The presence of bacteria can be due to

- Asymptomatic bactiuria
- Growth after collection
- Perineal contamination
- Biofilm formation on catheter

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But . . .

- Negative Nitrate and LE **ARE** useful in eliminating UTI: NPV 88% [84%,92%]

- Positive LE and Nitrate have poor sensitivtiy 48%

So

-LE/-Nit = no UTI, + LE/+Nit means nothing

Myth 7

“ Patients with Bacteriuria will progress to a UTI and should be treated.”

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The natural history of ASB is to remain ASB

Myth 7

“ Patients with Bacteriuria will progress to a UTI and should be treated.”

Treating ASB leads to adverse events and is unlikely to benefit patients

- 15-50% of elderly have ASB
- So ASB >> UTI with + UC
- Treatment of ASB leads to more resistance and toxicity without improving patient care

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Myth 8

“ Falls and altered mental status in the elderly are usually due to UTI.”

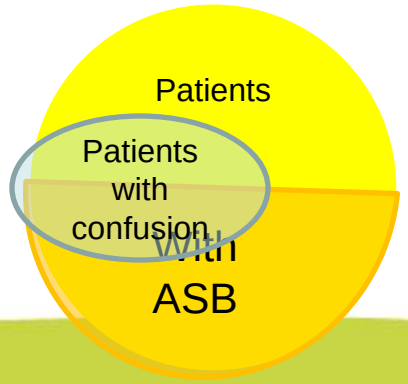
Myth 8

“ Falls and altered mental status in the elderly are usually due to UTI.”

There are many causes of confusion, most of which aren’t UTI

Conflation of ASB with UTI results in correct diagnosis being missed.

- Systemic signs should be present for UTI to cause aLOC
- UTI is Dx of exclusion



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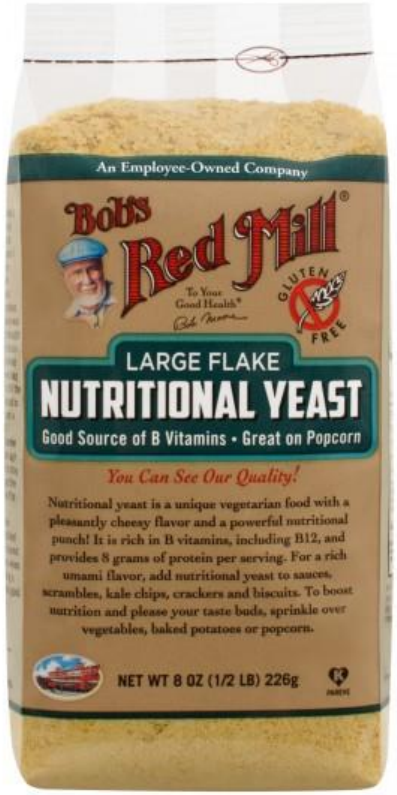
Myth 9

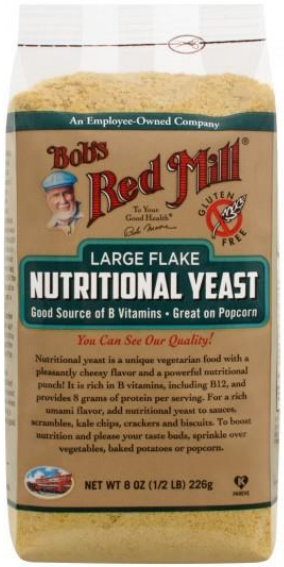
“ Yeast (candida) in the Urine signifies fungal UTI and should be treated.”



Yeast is very rarely a urinary pathogen

Myth 7

“ Patients with Bacteriuria will progress to a UTI and should be treated.”



Perineal and catheter colonization cause positive cultures

- Treatment of candiduria does not benefit patients*
- Remove/change catheter
- Evaluate Non-catheterized patients for vaginosis/balanitis

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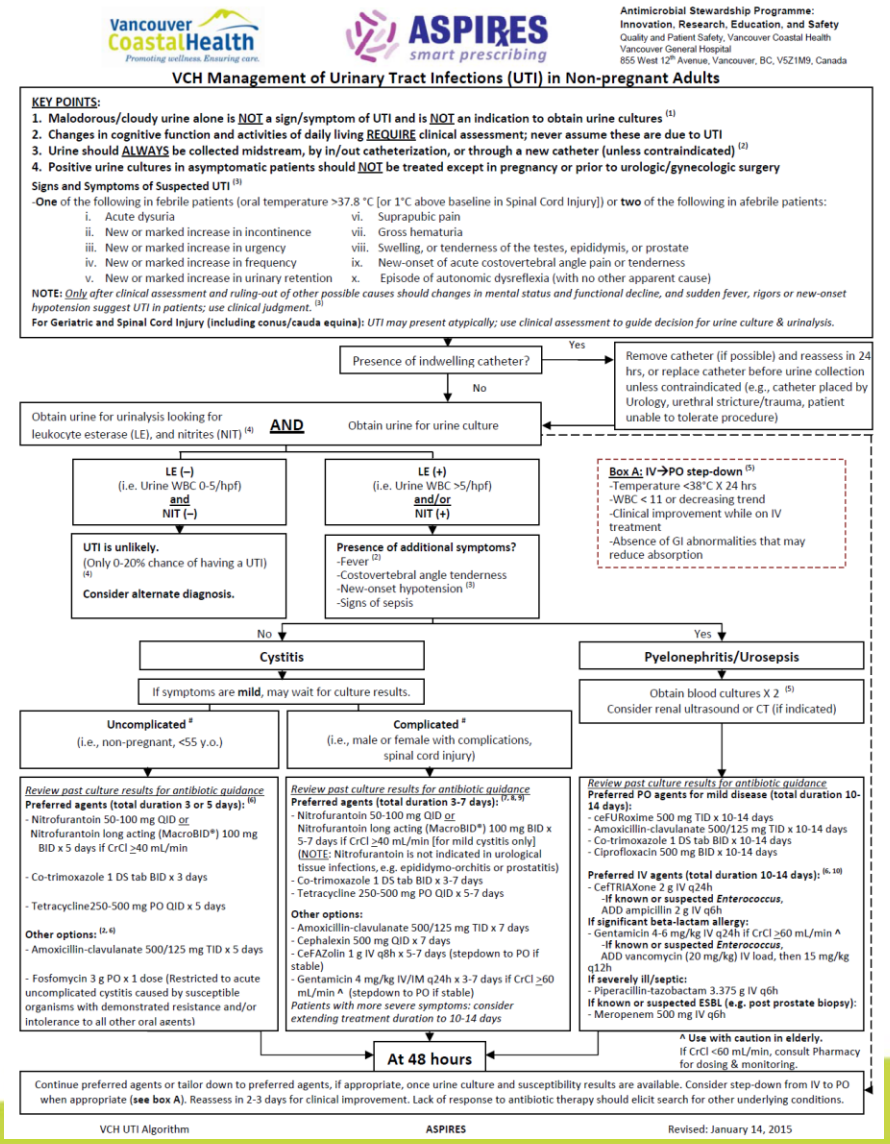
* Note that some patient populations are excepted

Summary

- UTI Can **ONLY** be diagnosed in the presence of symptoms and signs of UTI

- Not:
  - Microscopy, UA, flow cytometry, culture, smell, appearance or non-specific confusion.

UTI MANAGEMENT ALGORITHM



KEY PRINCIPLES

1. Culture only if **SYMPTOMS** of UTI are present
2. Changes in cognitive function **REQUIRES** clinical assessment
   - **DO NOT ASSUME** these are due to UTI
3. Collect urine for **UA** and culture
   - Provides critical information for interpretation
4. Collect urine culture without **CONTAMINATION**
   - Clean catch *OR*
   - In and out *OR*
   - Change and collect through new catheter
5. Treat patients with **SYMPTOMS**, not cultures

SYMPTOMS OF UTI

UTI symptoms

- **ACUTE DYSURIA** and one of the following in febrile (or 1°C above baseline in Spinal Cord Injury) or two of the following in afebrile patients:
  - New or increased incontinence
  - New or increased urgency
  - New or increased frequency
  - New or increased retention
  - Suprapubic pain
  - Gross hematuria
  - Swelling of testes, epididymis, or prostate
  - Costovertebral pain

Not UTI symptoms

- Cloudy urine
- Smelly urine
- Confusion without other signs of infection*
- Vaginal discharge

- *Note:
  - Only after clinical assessment and rule-out of other causes should change of mental status suggest UTI

HOW TO COLLECT A GOOD URINE SAMPLE

Clean catch

- Client must be **ABLE** to collect urine alone or with help
- Clean perineum or prepuce
- Let first few drops go
- Collect sample
- Do not allow urine to contact perineum or foreskin (no bedpans!)

Catheter

- Must be collected through a **NEW** catheter
- In and out if client cannot perform a clean catch
- Replace existing Foley catheter with a new one to collect sample
- Exception
  - catheter placed by urology*

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* Results must be viewed with scepticism.

WHEN TO TREAT A POSITIVE URINE CULTURE

- If patient has ongoing **SYMPTOMS** of UTI
- Prior to **UROLOGIC** surgery
- Patient shows signs of **SEPSIS** with no other identifiable source of infection

Many patients over the age of 50 years have positive urine cultures.
Most don't have a UTI and don't need treatment.

WHICH ANTIBIOTIC TO SELECT FOR UTI

- **Nitrofurantoin** and **Co-trimoxazole** are preferred agents for lower UTI treatment
- Ceftriaxone is preferred for pyelonephritis and mild urosepsis (unless enterococcus is suspected)
- Pipercillin-tazobactam is preferred for urosepsis
- Fluoroquinolones are **NOT** recommended due to high propensity for collateral damage and resistance (antibiogram suggests only 60% susceptibility)

Gram-Negative Organisms, % Susceptible

WHICH ANTIBIOTIC TO SELECT FOR UTI

	E.coli		*K.pneumoniae*		*E.cloacae*		*P.mirabilis*		*S.marcescens*		*Acinetobacter***		*P.aeruginosa*	
Year	2012	2013	2012	2013	2012	2013	2012	2013	2012	2013	2012	2013	2012	2013
# Isolates	1265	1389	223	260	61	60	129	152	29	25	14	23	139	146
Antibiotic														
Ampicillin	61	61	0	0	0	0	76	72	0	0	0	0	0	0
Cephalexin	84	87	94	93	0	0	8	27	0	0	0	0	0	0
Cefazolin	88	89	97	94	0	0	29	30	0	0	0	0	0	0
Cefotaxime	92	92	100	97	87	87	99	98	100	100	14	22	0	0
Ceftazidime	92	92	100	97	89	87	100	100	100	100	86	91	94	97
Ciproflox	80	78	98	97	97	95	81	76	93	100	100	96	84	94
Gentamicin	94	83	99	99	97	97	95	93	100	100	93	100	94	97
Imipenem	100	100	100	100	100	93	99	96	96	96	100	100	96	97
Meropenem	100	100	100	100	100	95	100	100	100	96	100	100	96	98
Pip/tazo	98	99	99	97	90	90	98	100	100	100	93**	96	97	99
SXT	79	80	97	94	90	88	79	69	97	100	100	91	0	0
Tetracycline	80	77	96	87	87	93	0	0	0	0	100	96	0	0
Tobramycin	92	92	100	99	97	93	93	92	69	92	93	91	96	99
Nitrofurantoin (simple cystitis only)	98	98	41	44	27	31	0	0	0	0	0	0	0	0

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WHEN TO REASSESS UTI THERAPY

- Patients generally should start feeling better **within 36 hrs** of initiating treatment
- Continue preferred agents or tailor-down to preferred agents once UC results are back **(48 hrs)**
- If on IV therapy, Step down to PO if patient temperature <38°C X 24 hrs
- **Reassess after 2-3 days** to ensure clinical improvement; if no improvement, search for underlying cause

IV to PO Conversion

- Not necessary with bioequivalent drugs
  - Ciprofloxacin, Co-trimoxazole, Fluconazole
- Can be done
  - Patient has a functional GI tract
  - Patient is improving
  - Afebrile for 24 hours
- Shorter LOS, fewer complications

Treatment Duration

- Cystitis:
  - 3-5 days sufficient, Nitrofurantoin 5-7 days
- Pyelonephritis/Urosepsis
  - 7 days is usually sufficient (esp. young healthy females)
  - Up to 14 days if slow response or urological abnormalities
  - Follow patient for defervescence, clinical improvement

Questions?

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