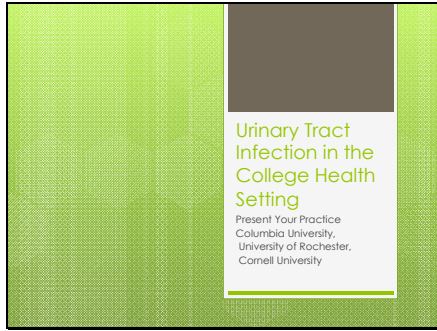


# Urinary Tract Infection in the College Health Setting

Lisa Stankus, NP and P. Davis Smith, MD

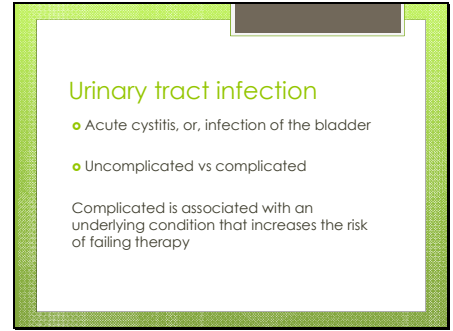
Slide 1



Urinary Tract Infection in the College Health Setting

Present Your Practice  
Columbia University,  
University of Rochester,  
Cornell University

Slide 4

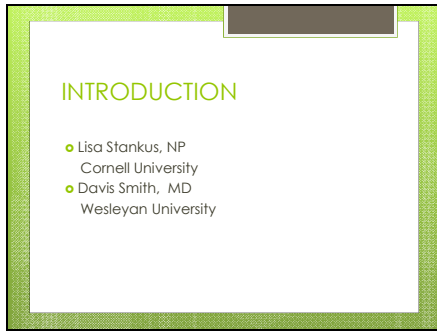


### Urinary tract infection

- Acute cystitis, or, infection of the bladder
- Uncomplicated vs complicated

Complicated is associated with an underlying condition that increases the risk of failing therapy

Slide 2



### INTRODUCTION

- Lisa Stankus, NP  
Cornell University
- Davis Smith, MD  
Wesleyan University

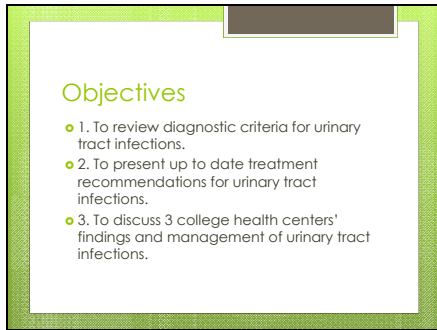
Slide 5



### Epidemiology

- The lifetime probability that a woman will have a UTI is 60%
- 10.8% of women > 18 years old reported at least one UTI in the past 12 months
- By the age of 24, 1/3 of women will have had at least one UTI treated
- Sexually active young women are disproportionately affected

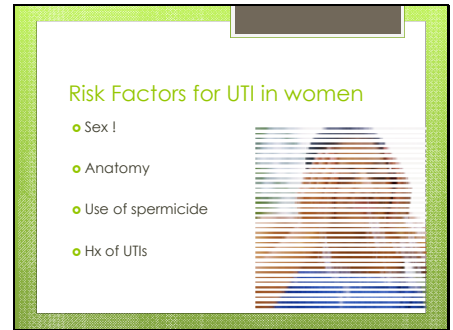
Slide 3



### Objectives


- To review diagnostic criteria for urinary tract infections.
- To present up to date treatment recommendations for urinary tract infections.
- To discuss 3 college health centers' findings and management of urinary tract infections.

Slide 6



### Risk Factors for UTI in women

- Sex !
- Anatomy
- Use of spermicide
- Hx of UTIs



Urinary Tract Infection in the College Health Setting  
 Lisa Stankus, NP and P. Davis Smith, MD

Slide 7

### MICROBIOLOGY

- Mainly e. coli
- Other species of Enterobacteriaceae:
  - Klebsiella pneumoniae
  - Proteus mirabilis
  - Staph saprophyticus


Slide 10

### Lab diagnosis (cont)

- Dipstick analysis
  - Screening tool for diagnosis of UTI.
  - Dipstick detects leukocyte esterase and nitrite in the urine.
  - Also specific gravity, blood, pH

Leukocyte esterase used to detect >10 leukocytes per high power

Nitrite test fairly sensitive for detecting >10(S) CFU of enterobacteriaceae per mL of urine



Slide 8

### CLINICAL MANIFESTATIONS

- Dysuria
- Frequency
- Urgency
- Suprapubic pain
- Hematuria
- vs pyelonephritis

Slide 11

### Dipstick analysis

- The positive predictive value (PPV) (96%) and the specificity (94%) of the nitrite test were high for all samples - Nys et.al 2006
- A negative nitrite with a positive leucocyte esterase (LE) showed a high PPV (79%) and sensitivity (82%).
- When both nitrite and LE tests were negative, ~ 50 % of samples were culture positive.
- Good to rule IN, not rule OUT.

Slide 9

### DIAGNOSIS

- Clinical history
- Physical examination
- Lab diagnosis

Slide 12

### Common UTI bacteria

	E. Coli	Proteus	Klebsiella	Staph sapro
Gram negative	Yes	Yes	Yes	Gram positive
Nitrite producing	varies	yes	varies	NO

# Urinary Tract Infection in the College Health Setting

Lisa Stankus, NP and P. Davis Smith, MD

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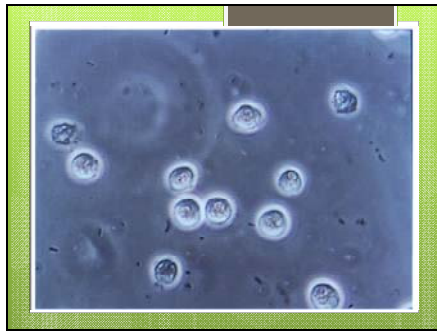


Slide 16

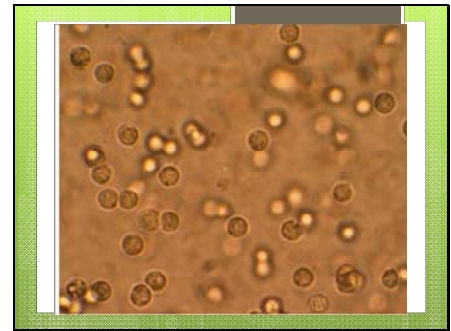
### Pyuria

- Sterile pyuria is urine which contains white blood cells while appearing sterile by standard culturing techniques.
- Sterile pyuria is listed as a side effect from some medications such as paracetamol (acetaminophen).
- Its occurrence is also associated with certain disease processes, such as Kawasaki Disease and renal TB.
- There are many known causes, including systemic or infectious disease, structural and physiological reasons, intrinsic renal pathology, or drugs.

Slide 14



Slide 17



Slide 15

### Lab diagnosis

- Urinalysis - to assess for pyuria
- Pyuria is the presence of at least 8000 leukocytes per mL of uncentrifuged urine which corresponds to 2 to 5 leukocytes per high power field in centrifuged sediment

Slide 18

### Youtube clip

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# Urinary Tract Infection in the College Health Setting

Lisa Stankus, NP and P. Davis Smith, MD

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### Lab diagnosis (cont'd)

- Indications for Urine culture in young women
- Suspicion of a complicated infection
- Atypical symptoms
- Failure to respond to initial therapy (?resistance)
- Recurrent symptoms less than one month after treatment of a previous UTI for which no culture was done

Slide 22

### 2010 IDSA Guidelines

- IDSA GUIDELINES: Kalpana Gupta, Thomas M. Hooton, Kurt G. Naber, Björn Wullf, Richard Colgan, Loren G. Miller, Gregory J. Moran, Lindsay E. Nicolle, Raul Raz, Anthony J. Schaeffer, and David E. Soper. 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. *Clin Infect Dis.* (2011) 52(5): e103-e120 doi:10.1093/cid/ciq257

Slide 20

### ACOG 2008 Treatment guidelines

- In nonpregnant, premenopausal women, screening for and treatment of asymptomatic bacteriuria is not recommended
  - Level of evidence A
- Antibiotic class should be changed when resistance rates are higher than 15% to 20%
  - Level of evidence A
- Patients with acute pyelonephritis should complete 14 days of total antimicrobial therapy, regardless of whether treatment is on an inpatient or outpatient basis
  - Level of evidence A

Slide 23

### Microbial Spectrum

- 75%–95% of cases of uncomplicated cystitis and pyelonephritis are caused *Escherichia coli*
- The balance are caused by other species of Enterobacteriaceae
  - *Proteus mirabilis*
  - *Klebsiella pneumoniae*
  - *Staphylococcus saprophyticus*

Slide 21

### ACOG 2008 Treatment guidelines cont'd

- For uncomplicated acute bacterial cystitis in women, antibiotics should be administered for 3 days
  - Level of evidence, A
- Urine culture is not required for the initial treatment of a symptomatic lower UTI with pyuria and/or bacteriuria
  - Level of evidence, B
- For the treatment of acute uncomplicated cystitis, beta-lactams, including first-generation cephalosporins and amoxicillin, are less effective than the preferred antimicrobials listed
  - Level of evidence, C

Slide 24

### Resistance

- In evaluating choice of empiric antimicrobial therapy for uncomplicated UTIs, local antimicrobial susceptibility patterns of *E. coli* in particular should be considered.
- The resistance patterns of *E. coli* strains causing uncomplicated UTI varies considerably between regions and countries.
  - What does this really mean for our well-travelled students?

# Urinary Tract Infection in the College Health Setting

Lisa Stankus, NP and P. Davis Smith, MD

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## More about Resistance

- Four large studies reporting in vitro susceptibility of *E. coli* causing uncomplicated UTI in North America and Europe were reviewed.
- All of these demonstrate considerable geographic variability in susceptibility.
- Resistance rates >20%
  - Reported in all regions for ampicillin
  - Reported in many countries and regions for trimethoprim with or without sulfamethoxazole
- Resistance rates <10%
  - Fluoroquinolone in most parts of North America and Europe
    - There was a clear trend for increasing resistance compared with previous years.
    - The resistance data for nitrofurantoin in these studies suggest that *E. coli* strains have acquired resistance genes for quinolones
  - First and second generation cephalosporins
  - Aminoglycoside antibiotic
- Nitrofurantoin, fosfomycin, and mecillinam (the latter 2 not tested in the Canadian study) had good in vitro activity in all the countries investigated.

Slide 28

## Collateral Damage

- Defined as: Ecological adverse effects of antimicrobial therapy
- Selection of drug-resistant organisms
- Colonization or infection with multidrug-resistant organisms
- Use of broad spectrum cephalosporins has been linked to subsequent infection with
  - Vancomycin-resistant enterococci
  - Extended-spectrum beta-lactamase-producing *Klebsiella pneumoniae*
  - Beta-lactam-resistant *Acinetobacter* species
  - Clostridium difficile*
- Use of fluoroquinolones has been linked to
  - Infection with methicillin-resistant *S. aureus*
  - Increasing fluoroquinolone resistance in gram-negative bacilli, such as *Pseudomonas aeruginosa*

Slide 26

## The Resistance Continues

- Local resistance rates reported in hospital antibiograms are often skewed by cultures of samples obtained from inpatients or those with complicated infection
- They may not predict susceptibilities in women with uncomplicated community-acquired infection.
  - Resistance rates tend to be lower in this group.

Slide 29

## So why does Nitrofurantoin still work?

- The preserved in vitro susceptibility of *E. coli* to nitrofurantoin, fosfomycin, and mecillinam over many years of use suggests these antimicrobials cause only minor collateral damage.
  - The mechanism is thought to be these drugs' minimal effects on normal fecal flora.
- In contrast, increased rates of antimicrobial resistance have been demonstrated for antimicrobials that affect the normal fecal flora more significantly.
  - Such as: trimethoprim, trimethoprim-sulfamethoxazole, quinolones, and ampicillin

Slide 27

## End of the Resistance

- As the population resistance prevalence of a specific agent increases, the likelihood of failure outweighs the benefits of using the drug empirically.
- For most agents, clinical and bacterial outcomes are not well studied for varying levels of resistance
  - Recommended thresholds for using alternative agents are based on expert opinion or secondary analyses of studies.
- However, good evidence is available for trimethoprim-sulfamethoxazole.
  - Clinical, in vitro, and mathematical modeling studies consistently suggest a 20% resistance prevalence for the threshold at which the agent is no longer recommended for treatment of acute cystitis

Slide 30

## And the winner is...

- Nitrofurantoin monohydrate/macrocrystals (100 mg twice daily for 5 days)
  - Minimal resistance
  - Minimal propensity for collateral damage
  - Efficacy comparable to 3 days of trimethoprim-sulfamethoxazole

# Urinary Tract Infection in the College Health Setting

Lisa Stankus, NP and P. Davis Smith, MD

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### Can we still use Bactrim?

- Trimethoprim-sulfamethoxazole (160/800 mg [1 double-strength tablet] twice-daily for 3 days) is an appropriate choice:
- If local resistance rates of uropathogens causing acute uncomplicated cystitis do not exceed 20%.
- Or if the infecting strain is known to be susceptible.

Slide 34

### Do we need to risk Collateral Damage?

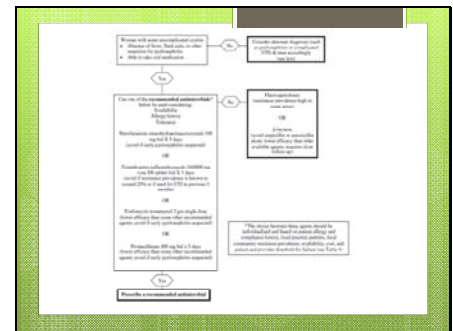
- For uncomplicated cystitis...
- There is minimal risk of progression to tissue invasion or sepsis
- Studies of placebo demonstrate a 25%-42% rate of clinical cure
- Uncomplicated UTI is one of the most common indications for antimicrobial exposure in an otherwise healthy population
- Even small collateral damages will add up

Slide 32

### What about that Fosfowhatsis stuff?

- Fosfomycin trometamol (Monural) (3 g in a single dose)
- An appropriate choice for therapy where it is available
  - Minimal resistance
  - Minimal propensity for collateral damage
- But it appears to have inferior efficacy compared with standard short-course regimens

Slide 35



Slide 33

### What about fluoroquinolones?

- Ofloxacin, ciprofloxacin, and levofloxacin, are highly efficacious in 3-day regimens, but:
- They have a propensity for collateral damage
- They should be reserved for important uses other than acute cystitis
- These agents should be considered alternative antimicrobials for acute cystitis

Slide 36

### Case #1

- + urgent urination + painful urination. No frequent urination and No blood in urine. Treated 2 weeks ago and still having soreness and itching. Urine is cloudy. Completed medication but symptoms never completely resolved. No mid-back pain, No vomiting, and No fever. + vaginal discharge (white). No abdominal pain. Treated for yeast 9/9/11
- + Are you sexually active + unprotected intercourse (prior to last menses. No unprotected coitus since menses). No possible pregnancy

# Urinary Tract Infection in the College Health Setting

Lisa Stankus, NP and P. Davis Smith, MD

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Test Name	Result	Flag(s)	Reference Range	Reported Date	Footnote
ROUSE - Routine Urinalysis					
U COLOR	Yellow	A	Straw-Yellow	9/22/2011 9:15 AM	LL
U CLARITY	Slightly Cloudy	A	Clear	9/22/2011 9:15 AM	LL
U GLUCOSE	Trace	A	Negative	9/22/2011 9:15 AM	LL
U BILIRUBIN	Negative		Negative	9/22/2011 9:15 AM	LL
U KETONE	Trace	A	Negative mg/dL	9/22/2011 9:15 AM	LL
U SPECIFIC GRAVITY	>=1.030	A	1.010 - 1.025	9/22/2011 9:15 AM	LL
U BLOOD	Large	A	Negative	9/22/2011 9:15 AM	LL
U PH	6.0		5.0-8.5	9/22/2011 9:15 AM	LL
U UROBILINOGEN	0.2		0.2-1.0 EU/DL	9/22/2011 9:15 AM	LL
U NITRITE	Positive	A	Negative	9/22/2011 9:15 AM	LL
U LEUKOCYTES	Moderate	A	Negative	9/22/2011 9:15 AM	LL
U PROTEIN	>=300	A	Negative mg/dL	9/22/2011 9:15 AM	LL
U WBC	>100	A	None /HPF	9/22/2011 9:15 AM	LL
U RBC	>100	A	None /HPF	9/22/2011 9:15 AM	LL
U EPITHELIAL	Few	A	None /LPF	9/22/2011 9:15 AM	LL
U BACTERIA	3+	A	Negative /LPF	9/22/2011 9:15 AM	LL
MUCOUS	2+	A	None /LPF	9/22/2011 9:15 AM	LL

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Test Name	Result	Flag(s)	Reference Range
ROUSE - Routine Urinalysis			
U COLOR	Yellow	A	Straw-Yellow
U CLARITY	Slightly Cloudy	A	Clear
U GLUCOSE	Negative		Negative
U BILIRUBIN	Negative		Negative
U KETONE	Trace	A	Negative mg/dL
U SPECIFIC GRAVITY	>=1.030	A	1.010 - 1.025
U BLOOD	Moderate	A	Negative
U PH	6.0		5.0-8.5
U UROBILINOGEN	0.2		0.2-1.0 EU/DL
U NITRITE	Negative		Negative
U LEUKOCYTES	Moderate	A	Negative
U PROTEIN	30	A	Negative mg/dL
U WBC	>100	A	None /HPF
U RBC	>100	A	None /HPF
U EPITHELIAL	Many	A	None /LPF
U BACTERIA	2+	A	Negative /LPF
MUCOUS	2+	A	None /LPF

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### Urine culture

Test Name	Result	Flag(s)	Reference Range
UR0974 - URINE CULTURE			
PRELIMINARY	Microbiology results	A	
>100,000 cfu/mL			
Klebsiella pneumoniae			
Susceptibility Test	Klebsiella pneumoniae		
Ampicillin	S		
Ceftriaxone	S		
Cephalexin	S		
Ciprofloxacin	S		
Isoniazid	S		
Nicotifloxacin	S		
Moxifloxacin	S		
Tetracycline	I		
Trimethoprim/Sulfamethoxazole	S		

Slide 41

### Patient Education

- Self care
  - \* Fluids – push them @
  - \* Pyridium/Urilst – tell the patient about SE
  - \* Take all the medication
- \* Follow-up - #1 important!  
If worsen  
If no change

Slide 39

### Case #2

- + urgent urination + painful urination. No frequent urination and No blood in urine. No mid-back pain, No vomiting, and No fever.
- no vaginal discharge (white). No abdominal pain.
- + Are you sexually active
- No possible pregnancy

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Doc: Jordan PH # 12305789 DOB: 1/1/1980 Age: 31 Sex: Unknown  
Encounter # Y123456

#### NURSE DYSURIA VISIT

##### SUBJECTIVE

LMP:  frequent urination  urgent urination  painful urination  blood in urine

mid back pain:  vomiting:  fever:

abdominal pain:  vaginal discharge:

Are you sexually active:  possible pregnancy:  unprotected intercourse:

Current Method of Birth Control:

How long have you had your symptoms?

Please also read into type of self treatment?

# Urinary Tract Infection in the College Health Setting

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Current Method of Birth Control:

How long have you had your symptoms?  
 Have you used any type of self-treatment?  
 - Enter text here -

history of gonorrhea  
 history of chlamydia  
 history of herpes  
 history of diabetes  
 history of chronic illness  
 history of kidney infection  
 history of more than 3 urinary infections in the past 6 months  
 - Enter text here -

[Medications](#)

[Allergies](#)

[Past Medical/Family/Social History](#)

- Enter text here -

Slide 46

Nursing Undersignature: [Click here to sign](#)

**CLINICIAN CONSULT**

Above note reviewed  urinalysis result reviewed

Assessment:  UTI likely  UTI unlikely  Other (please note below)

- Enter text here -

LAB/Urta Culture, In-House  
 Refill/Order 500 MG Capsule, TAKE 1 CAPSULE TWICE A DAY X 5 DAYS, 5 DAYS, QTY 10 Capsule, 0 REFILLS  
 Refill/Order DS 300-150 MG Tablet, 1 TABLET EVERY 12 HOURS FOR 3 DAYS, 3 DAYS, QTY 6 Tablet, 0 REFILLS  
 Refill/Order HO 250 MG Tablet, 1 TABLET TWICE A DAY X 3 DAYS, INDEF DAYS, QTY 6 Tablet, 0 REFILLS

Other:  
 - Enter text here -

Clinician Signature: [Click here to sign](#)  
 Remember to sign any orders by clicking on Orders link below.

[Orders](#)

**Nursing Response to Clinician Consult**

Patient notified of above plan

- Enter text here -

Slide 44

**OBJECTIVE**

Vitals

Cuff size:  Pediatric  Small Adult  Regular Adult  Large Adult  Thigh

BP elevated (systolic >140 OR diastolic >90)

Cornell Gannett Health Services

- Enter text here -

Targeted Exam

toxic appearance  
 CVA tenderness

Urinalysis Specific Gravity:  < or = 1.005  > or = 1.010

Urinalysis results:  all normal  abnormalities present

Pregnancy Test:  Negative  Positive [click](#)

[Procedures](#)

Slide 47

## Gannett Health Services Utilization Review 2010

- Analysis of the Costs Associated with Diagnosis and Treatment of Female Patients seen by Nursing for the complaint of Dysuria
- Time frame June 2007 - may 2008 and June 2008 - May 2009
- Purpose: to develop new guidelines for dysuria

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[Procedures](#)

**ASSESSMENT**

- Enter text here -

**Diagnoses (required)**

OxDYSURIA

**Encounter Code (required)**

EAMNURSE VISIT W/CLINICIAN CONSULT OR PROCEDURE

**PLAN**

- Enter text here -

Patient is reminded to call back if signs or symptoms worsen or have further questions  
 Assess for contraindications to antibiotics  
 UTI pamphlet given  
 Follow-up instructions given  
 Referred to clinician for visit  
 - Enter text here -

Nursing Undersignature: [Click here to sign](#)

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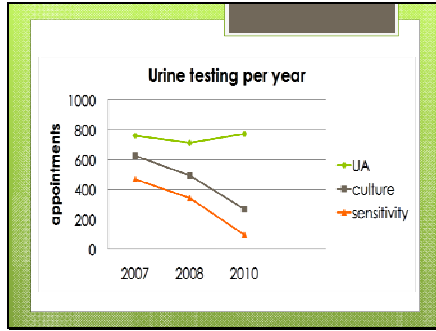
## Sample testing scenarios

1. Urinalysis with micro \$27.00
2. Urinalysis with reflex to micro \$30.00
3. Urinalysis with reflex micro and culture and sensitivity \$145.00

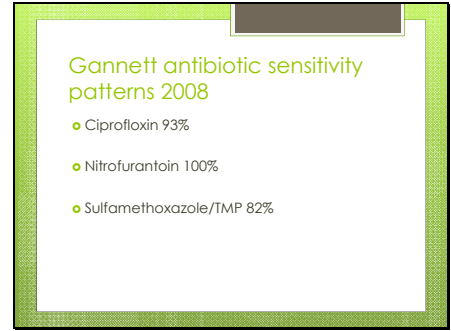


Urinary Tract Infection in the College Health Setting  
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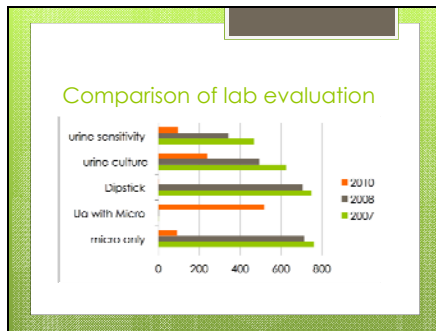
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Slide 52



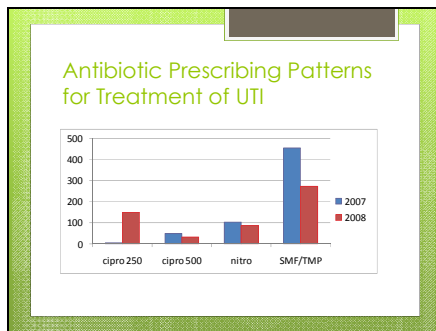
Slide 50



Slide 53

**Columbia University**  
 Assessment of UTI evaluation and management practices  
 Melanie J. Benitz, MD  
 Clinical Coordinator/Primary Care Physician

Slide 51



Slide 54

**Why we looked at UTI data**

- We see many patients every week with urinary symptoms.
- Anecdotally, we seemed to prescribe antibiotics without using strict criteria.
- Nurses often manage UTI walk-in patients.

# Urinary Tract Infection in the College Health Setting

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### Applied 3 key questions to this QI:

- What are we trying to accomplish?
  - Better evidence-based management of UTI symptoms.
- How will we know that a change is an improvement?
  - Lower return rate of patients.
  - Lower prescribing rate of antibiotics.
  - Lower rate of negative urine cultures.
- What changes can we make that will result in an improvement?

Slide 58

### UTI QI Results

- 32 of 83 cultures sent had no growth
- 18 of the 32 patients were treated with antibiotics empirically.
- 2 of these patients had a negative urine dip.
- 7 patients had urine dips positive only for blood.
- No patients who had positive cultures had urine dips that were positive only for blood.
- None of the 32 no growth cultures were nitrite positive

Slide 56

### UTI QI Method

- EHR report
  - All patients with a diagnosis of urinary frequency, UTI, cystitis and dysuria
  - April 20, 2007 – October 30, 2007.
- All paper and electronic charts reviewed
  - Diagnosis
  - Urine dip results
  - Urine culture – if sent and result
  - Antibiotics prescribed
  - Return visits

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### Positive Cultures

- 50 cultures were positive for 1 or more organism.
- 31 of the positive cultures grew out E. Coli (62%)
  - 6 of the 31 (19%) E. Coli cultures were resistant to bactrim
  - No other organisms (19/50) were bactrim-resistant
- All 8 patients that were nitrite positive on dipstick had positive cultures

Slide 57

### UTI QI Results

- 91 visits met criteria.
  - 72 unique patients
    - 60 with 1 visit
    - 7 with 2 visits
    - 5 with 3+ visits
- 86 urine dips sent
- 83 cultures sent

Slide 60

### Positive Cultures

- 9 patients with positive cultures were not empirically treated with antibiotics.
- Presenting symptoms were either minimal, or urine dip was negative for LE, blood and nitrite.
- All patients were recalled when the culture results came back
  - 2 had resolved spontaneously,
  - 7 were treated with appropriate antibiotics.

# Urinary Tract Infection in the College Health Setting

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### Positive cultures cont'd

- 5 patients were empirically treated with cipro or nitrofurantoin because of a patient report of prior bactrim-resistant UTI.
- In all cases the urine culture was either sensitive to bactrim or showed no growth.

Slide 64

### Practice Changes cont'd

- If a urine dip is positive for blood only, no antibiotic is given and a urine culture is sent.
- If a urine dip is positive for nitrites, antibiotics are prescribed and no culture is sent.

Slide 62

### Adverse Events

- 1 patient developed a rash on bactrim and was switched to cipro (and had a negative culture)
- 1 patient developed nausea and vomiting on bactrim and was switched to cipro (and also had a negative culture)

Slide 65

### Practice Changes cont'd

- If a urine dip is positive for LE and blood, and the patient is symptomatic, treat empirically. Do not send culture.
- For patients who were empirically treated and return with symptoms within 30 days, a urine culture is sent, and treatment given if above criteria are met.

Slide 63

### UTI Practice Changes

- Urine dip results will be documented in the EHR (prior to this QI, they were filed in the paper chart).
- The template was changed to allow easy input of urine dip results.
- If a urine dip is negative, no antibiotics are prescribed.
- Urine culture is sent if the patient complains of symptoms of dysuria, urgency or frequency.

Slide 66

### UTI Follow Up

- Over the next 6 months data was collected to evaluate:
  - The number of cultures being sent.
    - Predicted to decrease.
  - Number of antibiotic prescriptions being written.
    - Predicted to decrease.
  - Percentage of UTI's resistant to bactrim.
    - If >20%, we would change our use of bactrim as a first line drug.

# Urinary Tract Infection in the College Health Setting

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### UTI Follow Up

- The EHR was used to repeat the QA project, from November 1, 2007 – April 30, 2008.
- Diagnoses/Urine Dips/Cultures:

	4/20/07 – 10/31/07	11/1/07 - 4/30/08
# of visits	91	87
# of UDips	86 (95%)	75 (86%)
# of UCx	83 (91%)	53 (61%)

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### Further practice changes to be instituted

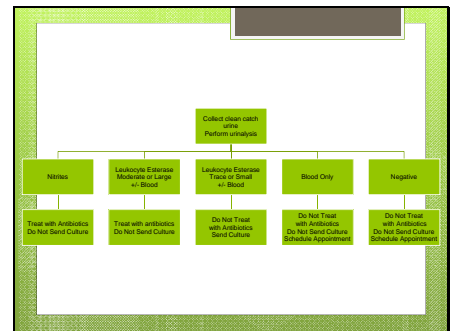
- Bactrim resistance has exceeded 20%
  - First line treatment is now macrobid or cipro.
- Improve documentation
  - Provider must add addendum to nursing note if protocol is not followed with reasons
- Better reading of dips
  - Attempt to read dip even if uristat has been taken

Slide 68

### Did the previous practice changes make a difference?

- Number of cultures being sent:
  - Reduced from 91% of visits to 61%
- Number of antibiotic prescriptions being written:
  - Unchanged
  - Bactrim Resistance
    - Increased from 19% to 33%

Slide 71



Slide 69

### Further practice changes to be instituted

- To further reduce number of cultures being sent (especially no growth cultures):
  - No culture will be sent if dip is positive for blood only or is negative.
    - Schedule provider appointment.
  - If UDip has trace or small LE, send cx and do not treat until cx results back.
  - If UDip has moderate or large LE, do not send cx and treat with antibiotics.

Slide 72

### UTI Further Follow Up

- The QI evaluation has been repeated annually (data from 6 month intervals have been combined to reflect 12 month intervals).

	5/1/07 – 4/30/08	5/1/08 – 4/30/09	5/1/09 – 4/30/10	5/1/10 – 4/30/11
Total number of visits	178	175	182	181
Number of urine dips	161 (90%)	175 (100%)	181 (99%)	180 (99%)
Number of urine cultures	136 (76%)	82 (45%)	82 (45%)	100 (55%)
Number of antibiotic prescriptions	129 (72%)	100 (57%)	121 (66%)	118 (65%)

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### No Growth Cultures

	5/1/07 – 4/30/07	5/1/08 – 4/30/09	5/1/09 – 4/30/10	5/1/10 – 4/30/11
No growth Culture	56 (43%)	49 (48%)	35 (43%)	60 (54%)
Antibiotic Rx	30 (54%)	11 (22%)	12 (34%)	18 (30%)

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### Improvements cont'd

- Number of antibiotic prescriptions being written:
  - Decreased from 72% of all visits to 65% of all visits.
  - Fewer antibiotics were given to patients when the urine culture was subsequently negative (reduced from 54% to 30%).
  - There has been little variation in the number of antibiotics that are added after positive cultures come back (stable at 4.5%).

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### Positive Cultures

	5/1/07 – 4/30/08	5/1/08 – 4/30/09	5/1/09 – 4/30/10	5/1/10 – 4/30/11
Positive Cultures	77	54	46	50
E. Coli	52 (68%)	37 (69%)	33 (72%)	46 (92%)
Bactrim Resistant	13(25%)	5 (14%)	10 (30%)	12 (26%)
Cipro Resistant	n/a	0	5 (15%)	3 (7%)
Nitrofurantoin Resistant	n/a	n/a	n/a	1 (2%)

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### Improvements cont'd

- Antibiotic Resistance:
  - Having seen an increase in bactrim resistance to 33% after the first 2 series, our first line antibiotic was changed to cipro.
  - We began to see a significant amount of cipro resistance (15%), and per IDSA guidelines have changed our first line antibiotic to nitrofurantoin.

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### Did our changes result in an improvement?

- Number of cultures being sent:
  - Reduced from 91% of visits in first 6 month cycle, to 76% in first year, and has decreased further to 55%.

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### Recurrent UTI's

# Urinary Tract Infection in the College Health Setting

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### Recurrent UTI's

- Most recurrences are thought to represent reinfection rather than relapse
- Arbitrarily defined as a relapse if the infecting strain is the same and the recurrence occurs within two weeks of the completion of treatment for the original infection
- Common among young, healthy women
  - Generally have anatomically and physiologically normal urinary tracts.

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### Behavioral risk factors

- Not well-studied.
- In one large case-control study, the frequency of sexual intercourse was the strongest risk factor for recurrent UTI in a multivariate analysis

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### Recurrent UTI Epidemiology

- Study of college women with their first UTI
  - 27 percent experienced at least one culture-confirmed recurrence within the six months following the initial infection
    - 2.7 percent had a second recurrence during this same time period
  - When the first infection is caused by *Escherichia coli*, women appear to be more likely to develop a second UTI within six months than those with a first UTI due to another organism

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### Behavioral risk factors cont'd

- Other risk factors identified were:
  - Spermicide use during the past year
  - Having a new sex partner during the past year
  - Having a first UTI at or before 15 years of age
  - Having a mother with a history of UTIs

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### Biologic/Genetic factors

- Women with recurrent UTI have been shown to have an increased susceptibility to vaginal colonization with uropathogens, even during asymptomatic periods.
- This difference appears to partially result from a greater propensity for uropathogenic coliforms to adhere to the uroepithelial cells.

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### Not risky

- No associations were found in this large study or earlier studies with:
  - Pre- and postcoital voiding patterns
  - Frequency of urination
  - Delayed voiding habits
  - Wiping patterns
  - Douching
  - Use of hot tubs
  - Frequent use of pantyhose or tights
  - Body mass index [\[34\]](#)

# Urinary Tract Infection in the College Health Setting

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### Pelvic anatomy

- Study of 213 women, 100 with a history of recurrent UTI and 113 controls.
- The mean distance from the urethra to anus was significantly shorter in cases than in controls (4.8 versus 5.0 cm,  $p = .03$ ).
- There were no differences between cases and controls in urethral length, post-void urine residual, or urine voiding characteristics.

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### Prevention cont'd

- Cranberry juice
  - Laboratory studies have demonstrated that cranberry juice inhibits adherence of uropathogens to uroepithelial cells.
  - Possibly attributable to fructose and proanthocyanidins.
- Clinical data on the efficacy of cranberry juice have been limited by study design.

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### Preventive behaviors

- Sex
  - Decrease or eliminate the usage of spermicide-containing contraceptives.
  - Abstinence trial

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Thank you.

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### Prevention cont'd

- Postcoital voiding and liberal fluid intake
  - It is reasonable to suggest to women that early postcoital voiding and more liberal fluid intake to increase the frequency of micturition might be helpful.
  - These have not been shown in controlled studies to be associated with a reduced risk of recurrent UTI.
  - But, they are unlikely to be harmful.