



UNIVERSITY of MARYLAND  
SCHOOL OF MEDICINE

# **'Diagnostic Stewardship' for Urinary Tract Infections**

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# Objectives

- Describe the difference between asymptomatic bacteriuria and urinary tract infection
- Recognize over-testing and over-diagnosis of UTI
- Discuss the role of UTI diagnostic stewardship in antimicrobial stewardship

# **DIFFERENCE BETWEEN ASYMPTOMATIC BACTERIURIA AND UTI**

**Bacteriuria: positive urine culture**

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graph TD; A[Bacteriuria: positive urine culture] -- red arrow --> B[Asymptomatic Bacteriuria]; A -- purple arrow --> C[Urinary Tract Infection]; B -- Symptoms --> C;
```

The diagram is a flowchart with three main components. At the top is a white box with a blue border containing the text 'Bacteriuria: positive urine culture'. Two arrows originate from the bottom center of this box: a red arrow pointing down and to the left to a red box labeled 'Asymptomatic Bacteriuria', and a purple arrow pointing down and to the right to a purple box labeled 'Urinary Tract Infection'. A grey arrow labeled 'Symptoms' points from the red box to the purple box.

**Asymptomatic  
Bacteriuria**

**Symptoms**

**Urinary Tract  
Infection**

# Recognized Signs and Symptoms of UTI

- Fevers, rigors
- Altered mental status, lethargy
- Flank pain, CVA tenderness
- Dysuria, urgency, frequency
- Acute hematuria
- Pelvic discomfort, suprapubic tenderness
- New/worsening incontinence

## Applying these criteria to the older cognitively impaired LTCF resident...

- Fever
- Altered mental status, lethargy
- Flank pain, CVA tenderness
- Dysuria, urgency, frequency
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## ...Asymptomatic bacteriuria difficult to distinguish from UTI

- Non-specific symptoms in many patients
- Presence of bacteriuria very common in LTCF residents (15-50%)
- Urine culturing done for non-specific symptoms → high likelihood of “false positive” UTI diagnosis

# Why is urine culturing done for non-specific symptoms?

- Some patients may truly have non-specific symptoms
  - However, UTI as common cause of change in mental status/behavior is a misperception
- Family request
- Lack of patient evaluation prior to antibiotics
- Repeat cultures to look for “clearance”
- Urine cultures easy to obtain!

Schulz *J Emerg Med* 2016

Nace *JAMDA* 2014

Sundvall *BMC Fam Pract* 2011



# Does asymptomatic bacteriuria get treated in LTCF residents?

- Majority of patients with positive urine tests not meeting expert consensus clinical criteria are treated for UTI
- Among older adults seen in ED for non-infectious reasons, urine cultures positive in 14%
  - 71% of those received antibiotics

Rotjanapan *Arch Int Med* 2011  
Ducharme *CJEM* 2007

# Should asymptomatic bacteriuria be treated?

- Cochrane Review
  - Review of RCTs and quasi-experimental studies that compared antibiotics to either placebo or no treatment for adults with ASB
- 9 studies, 1614 participants

# Evidence does not support the treatment of asymptomatic bacteriuria

Variable	Relative Risk (95% confidence interval)
No difference between antibiotic and non-treatment groups with respect to...	
Symptomatic UTI	1.1 (0.4 to 1.7)
Complications	0.8 (0.4 to 1.7)
Death	1.0 (0.7 to 1.4)
Antibiotics were associated with ...	
Bacteriologic cure	2.3 (1.1 to 4.8)
More adverse events	3.8 (1.4 to 10.2)

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# Asymptomatic bacteriuria might be beneficial

- Higher risk of subsequent UTI in women treated for asymptomatic bacteriuria compared to those not treated in outpatient setting
- Colonization with certain bacteria (e.g., strains of *E. coli*) prevented superinfection with other bacteria – as long as asymptomatic bacteriuria was NOT treated

Cai *Clin Infect Dis* 2012

Wagenlehner *Clin Infect Dis* 2012

Salvador *Infect Immun* 2012

Hansson *BMJ* 1989

# Guidelines do NOT support the treatment of Asymptomatic bacteriuria

## Infectious Diseases Society of America Guidelines for the Diagnosis and Treatment of Asymptomatic Bacteriuria in Adults

**Lindsay E. Nicolle,<sup>1</sup> Suzanne Bradley,<sup>2</sup> Richard Colgan,<sup>3</sup> James C. Rice,<sup>4</sup> Anthony Schaeffer,<sup>5</sup> and Thomas M. Hooton<sup>6</sup>**

<sup>1</sup>University of Manitoba, Winnipeg, Canada; <sup>2</sup>University of Michigan, Ann Arbor; <sup>3</sup>University of Maryland, Baltimore; <sup>4</sup>University of Texas, Galveston; <sup>5</sup>Northwestern University, Chicago, Illinois; and <sup>6</sup>University of Washington, Seattle

**Asymptomatic bacteriuria – even in the presence of pyuria – is NOT an indication for antibiotics**

# Summary

- Testing for non-specific symptoms + high prevalence of bacterial colonization in LTCF residents = Overdiagnosis of UTI
- Unnecessary antibiotic treatment = harm
  - Side effects, *C. difficile*, antimicrobial resistance
  - No benefit of treating asymptomatic bacteriuria

# How can we decrease UTI overdiagnosis and overtreatment?



- Two potential targets
  - Reduce *treatment* of asymptomatic bacteriuria
  - Reduce (over)diagnosis



# How can we decrease UTI overdiagnosis and overtreatment?

- Strong focus on reducing treatment through antibiotic stewardship
  - Positive urine culture or UA powerful stimulus to treat!
- Therefore important to reduce unnecessary urine testing through “diagnostic stewardship”

***In a patient unlikely to have UTI -  
Prevent a positive urine culture report***

# Urine diagnostic stewardship in LTCFs: your role

1. Develop criteria or algorithm for urine testing
2. Use observation protocols
3. Conduct surveillance and give feedback
4. Engage and educate families

# Urine diagnostic stewardship in LTCFs

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# 1. Criteria/algorithm for urine culturing

*Review published criteria*

- Several published UTI criteria for LTC
  - McGeer (1991)
  - Stone (Updated McGeer, 2012)
    - Developed for surveillance
    - Not for when antibiotics should be used
  - Loeb (SHEA, 2005)
    - Designed specifically to guide decision to start antibiotics
    - Supported by evidence

# 1. Criteria/algorithm for urine culturing

## *Difficulty of UTI diagnosis in LTCF residents*

- While specific criteria are different, all include urinary tract specific signs and symptoms
- However, this conflicts with appreciation that disease may present atypically in frail older adults
  - Leads to frequent use of non-specific symptoms and therefore overdiagnosis
- How do we reconcile the above two issues?

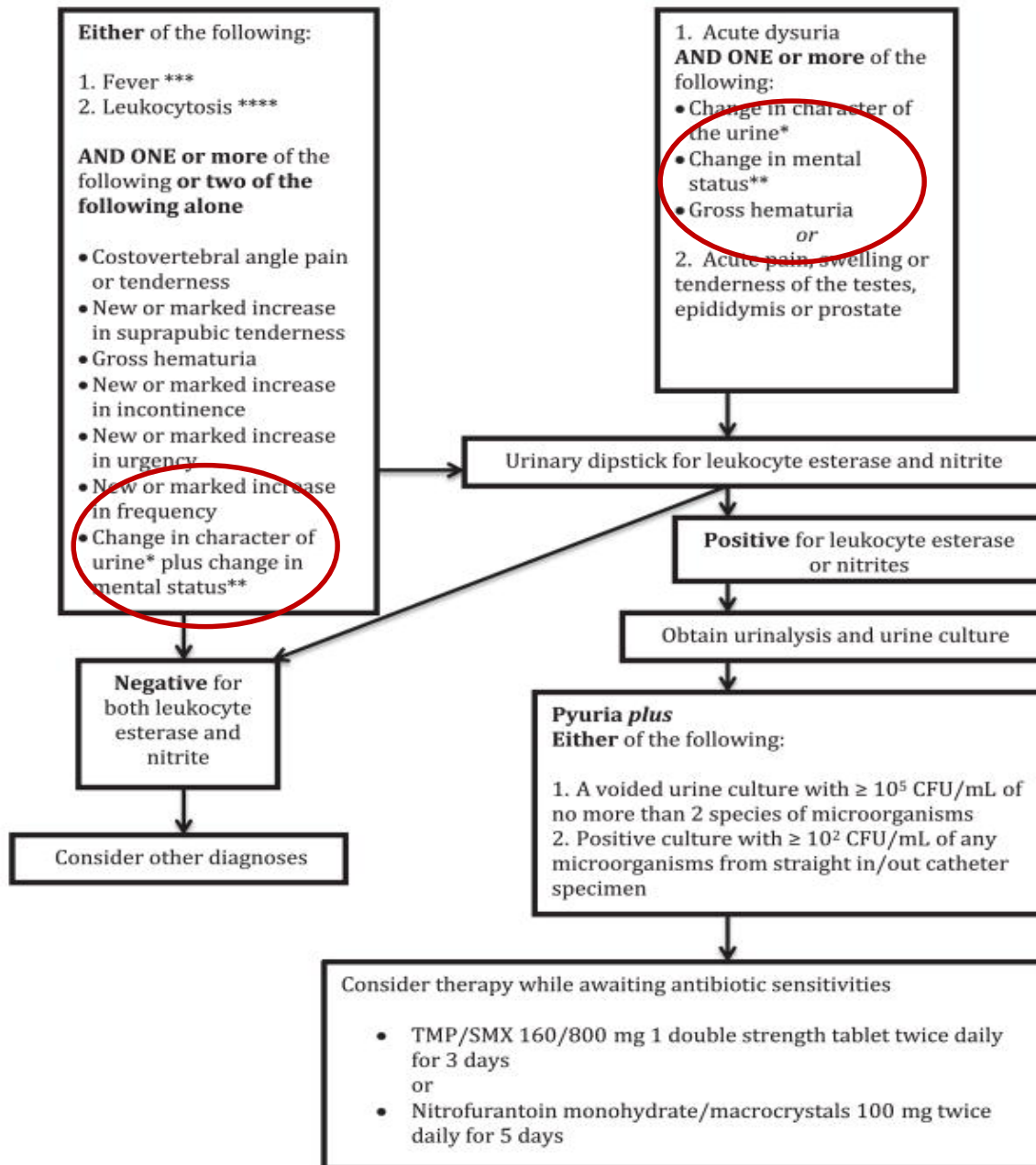
# 1. Criteria/algorithm for urine culturing

*Avoid one size fits all...*

- Most patients: require presence of fever PLUS urinary tract symptom, or two urinary tract symptoms
- Do not use changes in urine character alone
- If fever PLUS symptoms of another infection: DO NOT order urine tests
- No “test of cure” urine cultures if symptoms resolved

# UTI and Evaluation of Mental Status or Diffuse Changes in Condition

- Rarely the sole manifestation
  - Avoid ordering urine culture in patients presenting only with “altered mental status”
  - Eliminate default to urine dipstick for “change in condition”
  - Use a combination of clinical features, potentially incorporated into a diagnostic algorithm
- Patients with advanced cognitive impairment / unable to report symptoms → fever, leukocytosis, mental or functional decline



- Uses combination of clinical features
- Uses leukocyte esterase and nitrite as “screening tests”

\* Change in color or odor of urine

\*\* Change in level of consciousness, periods of altered perception, disorganized speech, or lethargy

\*\*\* Fever: Single temperature  $\geq 37.8^\circ\text{C}$  ( $>100^\circ\text{F}$ ), or  $> 37.2^\circ\text{C}$  ( $>99^\circ\text{F}$ ) on repeated occasions, or an increase of  $>1.1^\circ\text{C}$  ( $>2^\circ\text{C}$ ) over baseline

\*\*\*\*Leukocytosis:  $>14,000$  cells/mm<sup>3</sup>, or Left shift  $> 6\%$  or 1,500 bands/mm<sup>3</sup>



# Urine diagnostic stewardship in LTCFs

1. Develop criteria or algorithm for urine testing
- 2. Use observation protocols**
3. Conduct surveillance and give feedback
4. Engage and educate families

## 2. Develop observation protocol

- Why?
  - Clinicians often do not have opportunity for immediate evaluation
  - Not doing something (i.e., culture +/- treat) viewed as negative
- Promote structured observation as *meaningful action*
  - In a study of educational intervention to reduce prescribing,
    - observation and monitoring interventions increased
    - no increase in hospitalizations

Nace *JAMDA* 2014

Petterson *J Antimicrob Chemother* 2011

## 2. Develop observation protocol

### *Sample monitoring tool*

- ☐ Obtain vital signs (BP, Pulse, Resp Rate, Temp, Pulse Ox) every \_\_\_\_ hours for \_\_\_\_ days.
- ☐ Record fluid intake each shift for \_\_\_\_ days.
- ☐ Notify physician if fluid intake is less than \_\_\_\_ cc daily.
- ☐ Offer resident \_\_\_\_ ounces of water / juice every \_\_\_\_ hours.
- ☐ Notify physician, NP, or PA if condition worsens, or if no improvement in \_\_\_\_ hours.
- ☐ Obtain the following blood work \_\_\_\_\_.
- ☐ Consult pharmacist to review medication regimen.
- ☐ Contact the physician, NP, PA with an update on the resident's condition on \_\_\_\_\_.

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### 3. Conduct surveillance and give feedback

- The following types of data can be trended for review at specific frequency:
  - UTI incidence
  - Antibiotic starts for UTI
    - Above reviewed for symptoms and meeting institutional criteria
  - Antibiograms
    - High prevalence of resistance: impetus to use culturing and antibiotics well?

### 3. Conduct surveillance and give feedback

- Share the data!
- Review “outlier” clinicians or residents
  - Residents with “frequent” treatment for “UTI”
  - Residents with adverse consequences of antibiotic treatment
  - Clinicians who order urine tests frequently
  - Clinicians who order urine tests in absence of criteria
- Include data in regular and ongoing training: allows education to “stick”

# Urine diagnostic stewardship in LTCFs

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## 4. Engage and educate families

- Powerful driver of care in LTCF
- Labeling and treatment as UTI is seen as positive
  - Perceived as doing *something*
  - Strong beliefs on change in urine character, and change in resident condition=UTI
- Points for resident and family education
  - Serious harms of antibiotic overuse
  - “Choosing Wisely”
  - Reassure with observation and monitoring plan
  - False UTI label may mask evaluation for true cause of cognitive changes



# ABIM Choosing Wisely®

- 5 things patients and providers should question
- **AMDA:** Don't obtain a urine culture unless there are clear signs and symptoms that localize to the urinary tract.
- **SHEA:** Don't perform urinalysis, urine culture, blood culture or *C. difficile* testing unless patients have signs or symptoms of infection. Tests can be falsely positive leading to over diagnosis and overtreatment.

<http://www.choosingwisely.org/>

# Summary

- Overuse of urine testing for infection powerful driver of false positive UTI diagnosis and unnecessary antibiotic use
- Diagnostic stewardship of urine testing intervenes upstream of traditional antibiotic stewardship
- Multi-pronged approach necessary to reduce overtesting

Questions?