Asymptomatic Bacteriuria and Altered Mental Status

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Objectives

- Definitions
- Scope of the problem
- Is altered mental status a symptom?
- Guideline recs
- What to do about it?

Asymptomatic Bacteriuria (ASB)

- Bacteriuria - presence of 1 or more species of bacteria growing in the urine at specified quantitative counts ($\geq 10^5$ colony-forming units [CFU]/mL)

- Pyuria - WBCs in the urine (+ leukocyte esterase or WBC on microscopy)

- ASB – bacteriuria without localizing symptoms of UTI
  - (+/- inflammation…doesn't matter)

- Antibiotics do not decrease ASB or prevent subsequent development of UTI…may cause harm

Urine Basics

- Urine is easy to collect
- It is often “positive”
- The bladder is not as sterile as we thought
- WBCs ≠ infection

Prevalence of Asymptomatic Bacte

Population	Pyuria*	ASB
Diabetic patients	70%	1 – 27%
Elderly (community & LTCF)	90%	4 – 50%
Indwelling catheter (short)	30 – 75%	9 – 23%
Indwelling catheter (long)	> 90%	> 90%
Hemodialysis	31%**	25-28%
Hospitalized w/o UTI	33%**	19%

*Pyuria in patients with ASB unless otherwise specified

** Pyuria in all patients screened

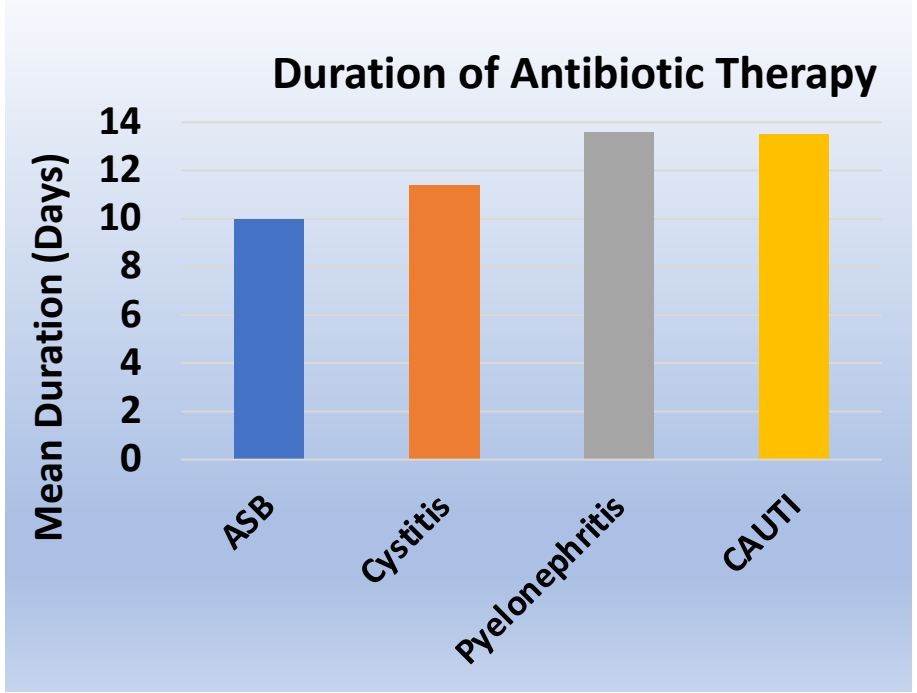
Table 1. Prevalence of Asymptomatic Bacteriuria Reported for Different Populations

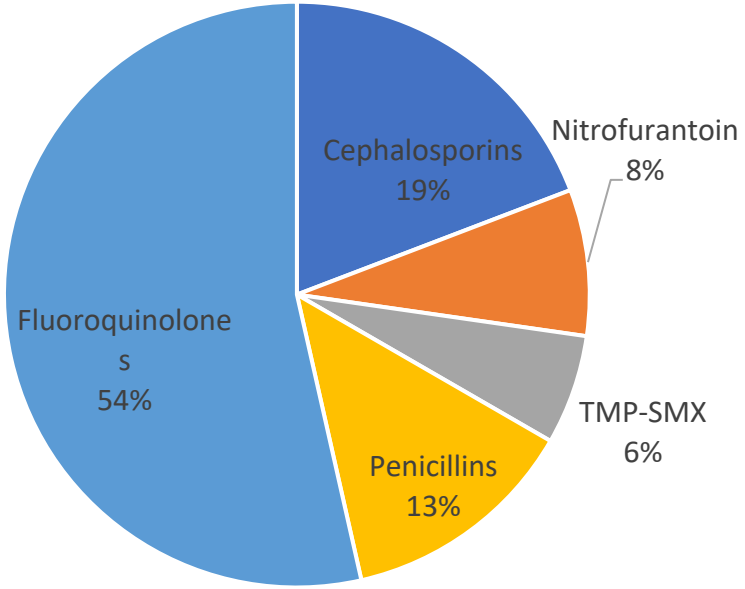
Population	Prevalence, %	Reference
Children		
Boys	<1	[7]
Girls	1–2	[8–10]
Healthy women		
Premenopausal	1.0–5.0	[11]
Pregnant	1.9–9.5	[11]
Postmenopausal (age 50–70 y)	2.8–8.6	[11]
Persons with diabetes		
Women	10.8–16	[12]
Men	0.7–11	[12]
Elderly persons in the community (age ≥70 y)		
Women	10.8–16	[13]
Men	3.6–19	[13]
Elderly persons in a long-term care facility		
Women	25–50	[13]
Men	15–50	[13]
Persons with spinal cord injury		
Intermittent catheter use	23–69	[14]
Sphincterotomy/condom catheter	57	[15]
Persons with kidney transplant		
First month posttransplant	23–24	[16, 17]
1 mo–1 y post-transplant	10–17	[16]
>1 y post-transplant	2–9	[16]
Persons with indwelling catheter use		
Short-term	3%–5%/day catheter	[18]
Long-term	100	[19]

43
19
7.

Management of Bacteriuria in VA Hospitals

- 2014 Evaluation of inpatients with bacteriuria
- N= 2225 (national), n= 118 (SLC)
- No signs or symptoms of UTI (ASB*): 64%
- Antibiotic use for ASB: SLC 78%, National 72%
- **Only pyuria, altered mental status and lethargy significantly associated with treatment of ASB**





*ASB: asymptomatic bacteriuria

Spivak ES, et al. Clin Infect Dis. 2017 Sep 15;65(6):910-917.

Assessment of Testing and Treatment of Asymptomatic Bacteriuria Initiated in the Emergency Department

Lindsay A. Petty,[1] Valerie M. Vaughn,[2] Scott A. Flanders,[3] Twisha Patel,[4] Anurag N. Malani,[5] David Ratz,[3] Keith S. Kaye,[1] Jason M. Pogue,[4] Lisa E. Dumkow,[6] Rama Thyagarajan,[7] Lama M. Hsaiky,[8] Danielle Osterholzer,[9] Steven L. Kronick,[10] Elizabeth McLaughlin,[3] and Tejal N. Gandhi[1]

- 43 hospital cohort study of patients admitted through ED with ASB (2018 – 2020)
- Goal to assess:
  - Factors associated with antibiotic treatment by EM clinicians
  - Effect of treatment on outcomes
- 74.4% (1830/2461) treated with antibiotics for ASB
- Predictors for Emergency Medicine clinician treatment
  - Dementia, spinal cord injury, incontinence, urinary catheter, **altered mental status**, leukocytosis, and abnormal urinalysis
- 80% started in the ED stayed on antibiotics for $\geq$ 3 days

Open Forum Infect Dis . 2020 Nov 3;7(12):ofaa537.

RESEARCH ARTICLE Open Access

The scientific evidence for a potential link between confusion and urinary tract infection in the elderly is still confusing - a systematic literature review

Sean Mayne[1*], Alexander Bowden[1,2], Pär-Daniel Sundvall[3,4] and Ronny Gunnarsson[3,4]

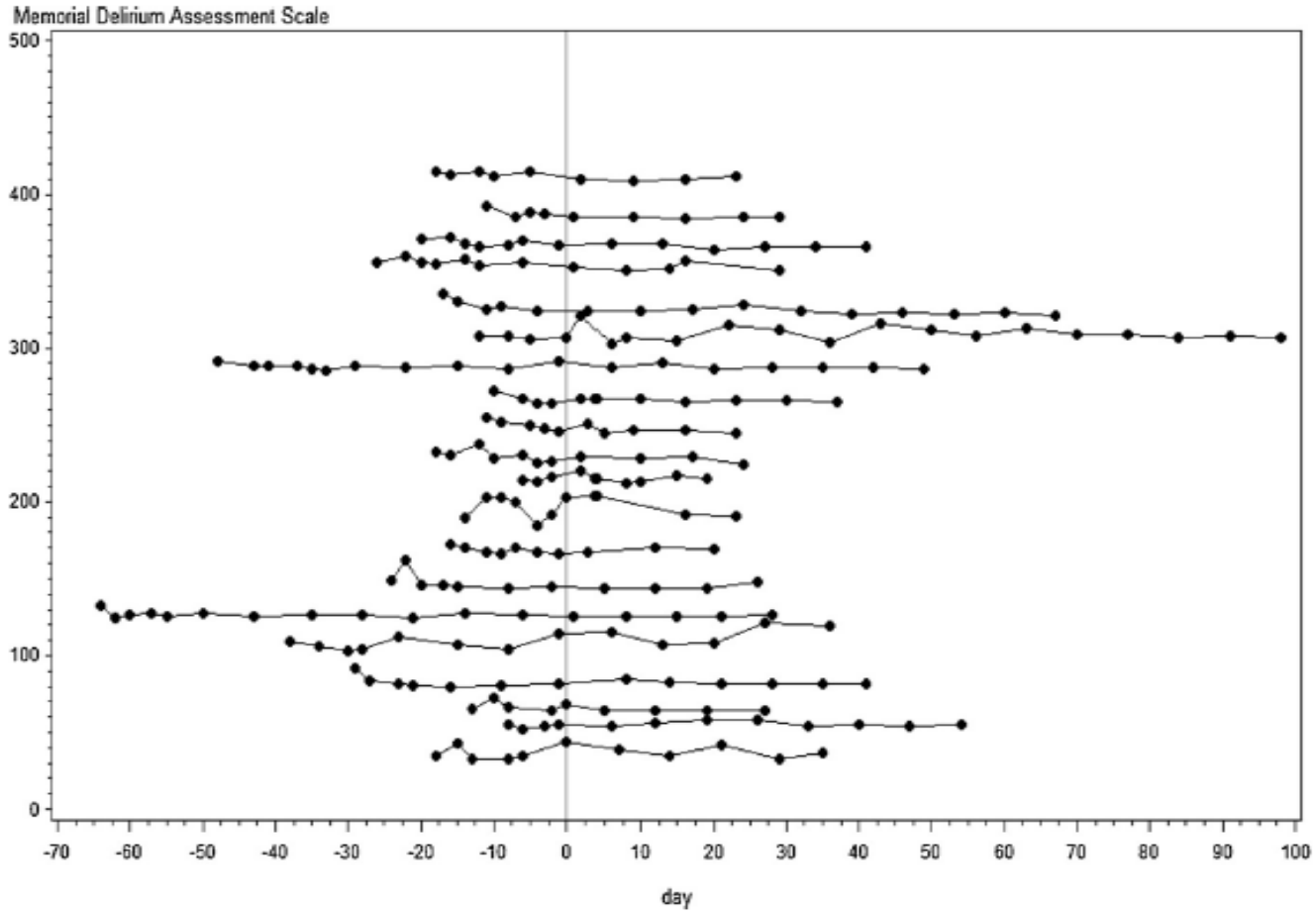
- Assess association between confusion and UTI in the elderly
- 22 articles included
- Poor case definitions of confusion and UTI limit validity
- ”As no study used an acceptable definition of confusion and UTI, an association could not be reliably established”

BMC Geriatr. 2019 Feb 4;19(1):32. doi: 10.1186/s12877-019-1049-7.

Treatment of asymptomatic UTI in older delirious medical in-patients: A prospective cohort study

- Prospective cohort study elderly in-patients
- Screened for delirium after admission
- Assess rate of treatment of asymptomatic UTI (delirium + no localizing infectious symptoms)
- Primary outcome = Poor functional recovery

- 1235 screened, 343 delirious
- 92/343 (27%) treated
- Primary outcome (treated vs. not)
  - RR 1.3 (CI 1.14 – 1.48)
- C. difficile: 7.5% (treated) vs. 3.2%
  - (OR, 2.45 [95% CI, .86–6.96])



*Poor functional recovery = Death, new LTCF residence OR functional decline

Dasgupta M, et al. Arch Gerontol Geriatr. 2017 Sep;72:127-134.

Clinical Infectious Diseases

IDSA FEATURES

Clinical Practice Guideline for the Management of Asymptomatic Bacteriuria: 2019 Update by the Infectious Diseases Society of America[a]

Lindsay E. Nicolle,[1] Kalpana Gupta,[2] Suzanne F. Bradley,[3] Richard Colgan,[4] Gregory P. DeMuri,[5] Dimitri Drekonja,[6] Linda O. Eckert,[7] Suzanne E. Geerlings,[8] Béla Köves,[9] Thomas M. Hooton,[10] Manisha Juthani-Mehta,[11] Shandra L. Knight,[12] Sanjay Saint,[13] Anthony J. Schaeffer,[14] Barbara Trautner,[15] Bjorn Wullt,[16] and Reed Siemieniuk[17]

Additions to the 2019 Guideline

- Values and Preferences
- New evidence for previously addressed populations
- Non-localizing symptoms in those with high risk of ASB
- Populations not previously addressed
  - Solid organ transplant patients, neutropenia, non-urologic surgery

Nicolle LE, et al. Clin Infect Dis. 2019 May 2;68(10):1611-1615.

In an Older, Functionally or Cognitively Impaired Patient, Which Non-localizing Symptoms Distinguish ASB From Symptomatic UTI?

- Observational evidence suggests patients with delirium and reduced mobility are more likely to have ASB and pyuria
- Delirium likely attributable to underlying underlying host factors rather than ASB
- Falls also common in elderly patients with ASB and often lead to UA/urine culture and diagnosis of UTI
- *"Current evidence does not suggest a causal relationship between bacteriuria and presentations without classic localizing UTI symptoms, such as changes in mental status or falls."*

V. In an Older, Functionally or Cognitively Impaired Patient, Which Nonlocalizing Symptoms Distinguish ASB From Symptomatic UTI?

Recommendations

1. In older patients with functional and/or cognitive impairment with bacteriuria and delirium (acute mental status change, confusion) and without local genitourinary symptoms or other systemic signs of infection (eg, fever or hemodynamic instability), we recommend assessment for other causes and careful observation rather than antimicrobial treatment (*strong recommendation, very low-quality evidence*).
2. In older patients with functional and/or cognitive impairment with bacteriuria and without local genitourinary symptoms or other systemic signs of infection (fever, hemodynamic instability) who experience a fall, we recommend assessment for other causes and careful observation rather than antimicrobial treatment of bacteriuria (*strong recommendation,*

Nicolle LE, et al. Clin Infect Dis. 2019 May 2;68(10):1611-1615.

Original Investigation | Infectious Diseases

March 13, 2024

Bacteremia From a Presumed Urinary Source in Hospitalized Adults With Asymptomatic Bacteriuria

Sonali D. Advani, MBBS, MPH[1]; David Ratz, MS[2]; Jennifer K. Horowitz, MA[3]; et al

» Author Affiliations | Article Information

JAMA Netw Open. 2024;7(3):e242283. doi:10.1001/jamanetworkopen.2024.2283

- **Primary outcome**: bacteremia from presumed urinary source (blood culture with matching organism ± 3 days of urine culture)

Slide Credit to Ali Earl PharmD

Notable characteristics

N= 11,590	
Median Age	78.2 [67.7-86.6] yrs
Female Sex	74.2%
Blood cultures obtained ± 3d of urine culture	31%
Complicated urologic history*	54.6%
Received antibiotics for UTI	72.2%
Spinal cord injury	1.5% (n=172)
*Kidney stones, urologic surgery or suprapubic catheter or nephrostomy within 30 days, history of obstruction/retention, neurogenic bladder, or urinary incontinence within 30 days	

Most common organisms: *E. coli*, Klebsiella spp.

Slide Credit to Ali Earl PharmD

Results

- Primary Outcome occurred in 1.4% of patients

Outcomes	Bacteremia from a presumed urinary source, No. (%)		
	Without (n = 11 429)	With (n = 161)	*P* value
30-d mortality	519 (4.5)	15 (9.3)	.004
30-d readmission	1888 (16.5)	23 (14.3)	.48
30-d ED visit	1257 (11.0)	16 (9.9)	.669
CDI event at 30 d	97 (0.8)	0 (0)	.647
Duration of hospitalization, median (IQR)	4 (3-6)	6 (4-7)	<.001
Receipt of antibiotics the day of or day after urine culture,	8207 (71.8)	157 (97.5)	<.001
Total antibiotic duration among those on antibiotics day of culture or day after, median (IQR)	6 (4-8)	13 (9-15)	<.001

Slide Credit to Ali Earl PharmD

Results

Table 2. Risk Factors for Bacteremia in Hospitalized Adults With Asymptomatic Bacteriuria, Multivariable Model

Variable (n = 11 039)	No. (%)	aOR (95% CI)	*P* value[a]
Age, median (IQR), y	78.3 (67.9-86.6)	1.01 (1.00-1.02)	.09
Male sex	2851 (25.8%)	1.45 (1.02-2.05)	.04
Hypotension (SBP<90)	828 (7.5%)	1.86 (1.18-2.93)	.008
≥2 SIRS criteria	3315 (30.0%)	1.72 (1.21-2.46)	.003
Dementia without AMS	4846 (43.9%)	1.38 (0.97-1.96)	.08
AMS (with or without dementia)	975 (8.8%)	0.5 (0.21-1.18)	.11
Change in urine color or character	2082 (18.9%)	1.36 (0.92-2.02)	.12
Fatigue	2985 (27.0%)	1.53 (1.08-2.17)	.02
Urinary retention	860 (7.8%)	1.87 (1.18-2.96)	.01
UA WBC/hpf >25	6477 (58.7%)	3.31 (2.10-5.21)	<.001
Log serum WBC, median (IQR)[b]	2.2 (1.9-2.5)	3.38 (2.48-4.61)	<.001

Slide Credit to Ali Earl PharmD

Urinary Tract Infection (UTI) Diagnosis and Treatment – Neilsen Rehabilitation Hospital

Table of Contents

Diagnostic Considerations

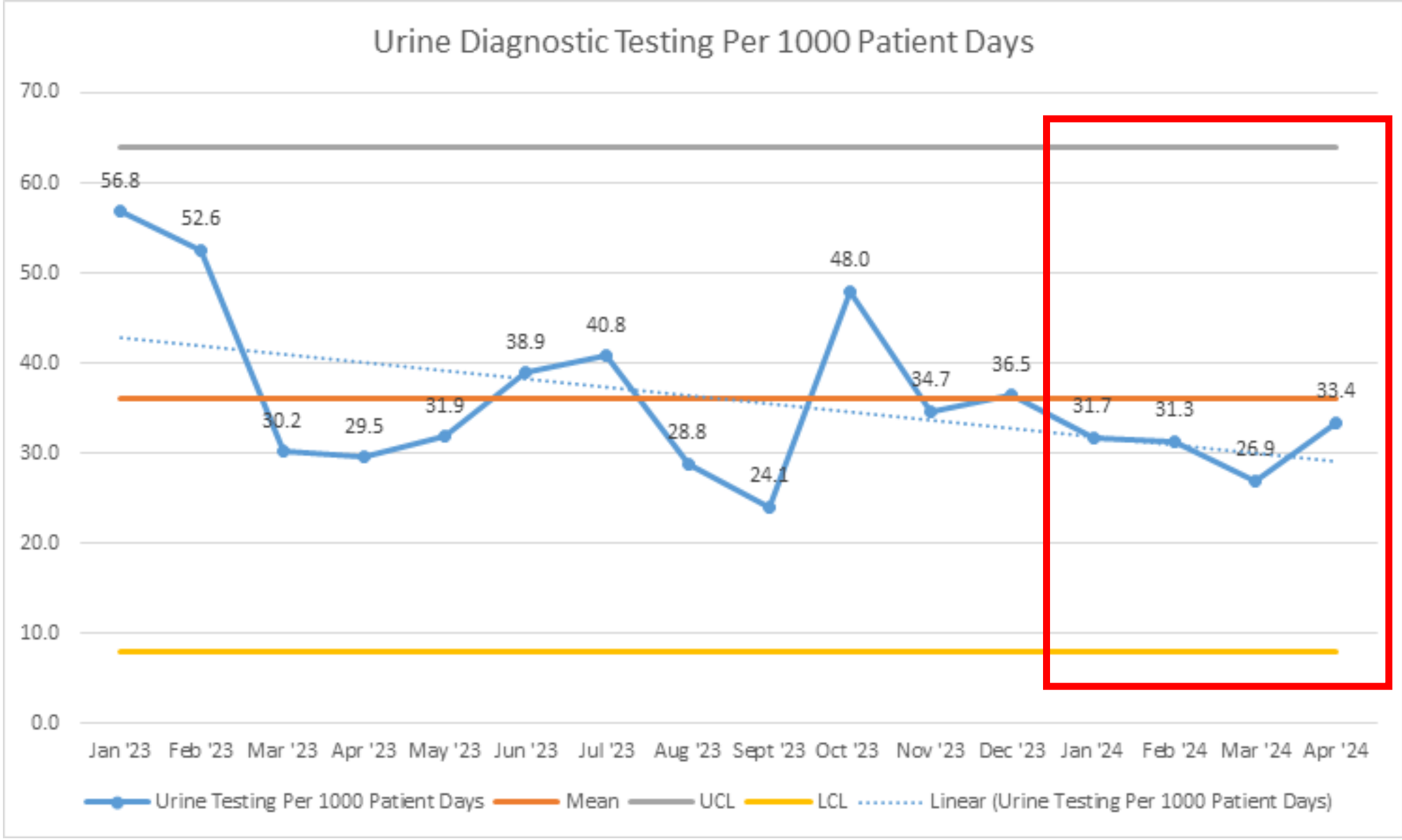
- Diagnosis is based on clinical signs and specific symptoms of UTI + positive urine culture
- Diagnosis should not be based on a urine culture, urinalysis, urine microscopy, or gross appearance or smell of urine alone.

Specific signs and symptoms

- Symptoms must be present for diagnosis of UTI
- Specific: Flank pain or tenderness, suprapubic tenderness, pelvic discomfort, dysuria, urgency, frequency
- NOT signs or symptoms (may occur in patients with a UTI but alone are inadequate for diagnosis and empiric treatment): abnormal urinalysis alone, malodorous urine, cloudy urine, falls, acute-onset delirium without signs of systemic infection, hematuria, urinary retention

- Acute-onset delirium, confusion, or agitation
    - A causal relationship between bacteriuria and changes in mentation/delirium has not been established.

    - Observational data suggests bacteriuria is more common in patients with delirium; however, the limited outcomes data that exists suggests no clinical improvement with antibiotic treatment.
    - IDSA guidelines for the Management of Asymptomatic Bacteriuria recommend assessment for other causes for cognitive impairment with careful observation, rather than empiric antimicrobial treatment for patients with delirium and no local genitourinary symptoms nor systemic signs of infection (eg, fever or acute hemodynamic instability).
    - In the absence of specific symptoms and/or fever, the following strategies should be pursued **prior** to evaluating for a UTI
        - If **medications** are a potential source of symptoms
            - Assess all medications (including 'PRN' medications) for potential contribution to changes in mentation either by ongoing drug-drug interactions, new adverse drug effects, or potential withdrawal from recently discontinued medications (eg, opioids, benzodiazepines, etc.)
        - If the **environment** is a potential source of symptoms
            - Evaluate for potential causes of overstimulation (eg, noise, temperature, tubes/lines)
            - Utilize consistent staff and schedules (including sleep/wake, timed toileting, etc.) when possible
            - Implement frequent reorientation to the environment by both staff and family when possible
            - Monitor sleep quality and cycles
        - If **metabolic disturbances** are a potential source of symptoms
            - Evaluate for dehydration, hypoglycemia, electrolyte imbalances or hypoxia
        - If **acute worsening of chronic process** is a potential source of symptoms
            - Evaluate for changes in status of intracranial processes
            - Assess for changes in pain


Urine Diagnostic Testing Per 1000 Patient Days
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
56.8
52.6
30.2
29.5
31.9
38.9
40.8
28.8
24.1
48.0
34.7
36.5
31.7
31.3
26.9
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Mar '24
Apr '24
Urine Testing Per 1000 Patient Days
Mean
UCL
LCL
Linear (Urine Testing Per 1000 Patient Days)

Thank you.

Questions