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How Do You Reflex? Evaluation of Urinalysis Reflex Parameters to Promote Antimicrobial Stewardship

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Disclosures

The presenters have no real or perceived conflicts of interest related to content in this presentation

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Learning Objectives

At the end of this session, participants should be able to:

1. Recall strategies for effective patient screening to improve identification of urinary tract infections.
2. Identify current evidence-based guidelines and recommendations for the management of urinary tract infections (UTIs) and urinalysis (UA) reflex parameters to reduce unnecessary antibiotic prescribing.
3. Recognize strategies for implementing UA reflex parameter change to improve antimicrobial stewardship and encourage reduction of antibiotic resistance.

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ASYMPTOMATIC BACTERIURIA & CULTURE REVIEW

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Overview of Asymptomatic Bacteriuria (ASB)

- What is asymptomatic bacteriuria?
- Populations at risk
- How does this relate to urinalysis (UA) reflex change?

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Asymptomatic Bacteriuria (ASB)

What is ASB?

- Presence of bacteria in the urine in the absence of urinary symptoms
- Diagnosis
  - One bacterial species grows in the urine with at least 100,000 colony-forming units (CFUs) per mL, with or without pyuria
- Incidence & contributing factors

Sources:
1. Colgan R, et al. Asymptomatic Bacteriuria. *Am Fam Physician*. 2020; 102(1):99-104.
2. Nicolle L, et al. Clinical Practice Guideline for the Management of Asymptomatic Bacteriuria: 2019 Update by IDSA. *Clinical Infectious Diseases.* 15 May 2019; 68(10) e83-e110.
3. Givler D, et al. Asymptomatic Bacteriuria. *National Library of Medicine:* Asymptomatic Bacteriuria - StatPearls - NCBI Bookshelf (nih.gov) Accessed 06/18/2024.

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Asymptomatic Bacteriuria (ASB)

At-risk Populations

- Diabetic Patients
  - Recommend against screening or treating ASB
- Elderly
  - Recommend against screening or treating ASB

Sources:

1. Nicolle L, et al. Clinical Practice Guideline for the Management of Asymptomatic Bacteriuria: 2019 Update by IDSA. *Clinical Infectious Diseases.* 15 May 2019; 68(10) e83-e110
2. Givler D, et al. Asymptomatic Bacteriuria. *National Library of Medicine:* Asymptomatic Bacteriuria - StatPearls - NCBI Bookshelf (nih.gov). Accessed 06/18/2024.
3. Krzyzaniak N, et al. Antibiotics versus no treatment for asymptomatic bacteriuria in residents of aged care facilities: a systematic review and meta-analysis. *Br J Gen Pract*. 9 Aug 2022;e649-658.
4. Asghar M, et al. Characteristics of Asymptomatic Bacteriuria in Diabetes Mellitus Patients: A Retrospective Observational Study. *Cureus.* 26 Feb 2021;13(2):e13562.

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Assessment Question #1

A 75-year-old female patient with type 2 diabetes presents to the clinic for a routine follow-up. She has no urinary symptoms and feels well. Her routine laboratory results include a urinalysis that shows significant bacteria, but no pyuria. The patient has no fever, flank pain, or dysuria.

Would you treat this patient for a urinary tract infection?

A. Yes
B. No

Source: Nicolle L, et al. Clinical Practice Guideline for the Management of Asymptomatic Bacteriuria: 2019 Update by IDSA. *Clinical Infectious Diseases.* 15 May 2019; 68(10) e83-e110

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Asymptomatic Bacteriuria (ASB)

At-risk Populations

IDSA screen & treat

- Pregnant women
- Endoscopic urologic procedures associated with mucosal trauma

Sources:
1. Nicolle L, et al. Clinical Practice Guideline for the Management of Asymptomatic Bacteriuria: 2019 Update by IDSA. *Clinical Infectious Diseases*. 15 May 2019; 68(10) e83-e110
2. Sheppard M, et al. Asymptomatic bacteriuria in pregnancy. Aust N Z J Obstet Gynaecol 2023;63:696-701.
3. ACOG, Graseck A, et al. Urinary Tract Infections in Pregnant Individuals. *Obstetrics & Gynecology*. Aug 2023;142(2):435-445.

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Assessment Question #2

A 28-year-old pregnant patient at 16 weeks' gestation came into the clinic for routine prenatal screening. Her urinalysis reveals the presence of significant bacteriuria without pyuria. A subsequent urine culture shows significant growth of *Escherichia coli* (>100,000 CFU/mL).

Which of the following is the most appropriate antibiotic regimen for this patient?

A. No treatment necessary as the patient is asymptomatic
B. Treat with nitrofurantoin 100mg twice daily for 7 days
C. Advise increased fluid intake and repeat the urine culture on next visit
D. Treat with ciprofloxacin 500mg twice daily for 3 days

Source: Nicolle L, et al. Clinical Practice Guideline for the Management of Asymptomatic Bacteriuria: 2019 Update by IDSA. *Clinical Infectious Diseases.* 15 May 2019; 68(10) e83-e110

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Answer: Question #2

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Asymptomatic Bacteriuria (ASB)

Treatment

- Options
  - Nitrofurantoin
  - Fosfomycin
  - Sulfamethoxazole/trimethoprim
  - Beta-lactams
- Duration: 4-7 days

Sources:
1. Nicolle L, et al. Clinical Practice Guideline for the Management of Asymptomatic Bacteriuria: 2019 Update by IDSA. *Clinical Infectious Diseases*. 15 May 2019; 68(10) e83-e110
2. Sheppard M, et al. Asymptomatic bacteriuria in pregnancy. Aust N Z J Obstet Gynaecol 2023;63:696-701.
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Asymptomatic Bacteriuria (ASB)

Why identify?

Identification of ASB is key

- Avoid unnecessary antibiotic use
- Reduction of antibiotic resistance
- Prevents complications in specific populations

Sources:
1. Nicolle L, et al. Clinical Practice Guideline for the Management of Asymptomatic Bacteriuria: 2019 Update by IDSA. *Clinical Infectious Diseases.* 15 May 2019; 68(10) e83-e110
2. Vaughn V, et al. A Statement Quality Initiative to Reduce Unnecessary Antibiotic Treatment of Asymptomatic Bacteriuria. *JAMA Inter Med*. 2023;183(9):933-841.
3. Krzyzaniak N, et al. Antibiotics versus no treatment for asymptomatic bacteriuria in residents of aged care facilities: a systematic review and meta-analysis. *Br J Gen Pract*. 9 Aug 2022;e649-658.
4. Petty L, et al. Risk Factors and Outcomes Associated with Treatment of Asymptomatic Bacteriuria in Hospitalized Patients. *JAMA Intern Med*. 2019;179(11):1519-1527.

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Culture Review

Relation to UA Reflex

- Emergency Medicine Pharmacist culture review
- Peer Review Trending
- Retrospective data analysis of urinalyses (UAs) in the emergency department at study institution

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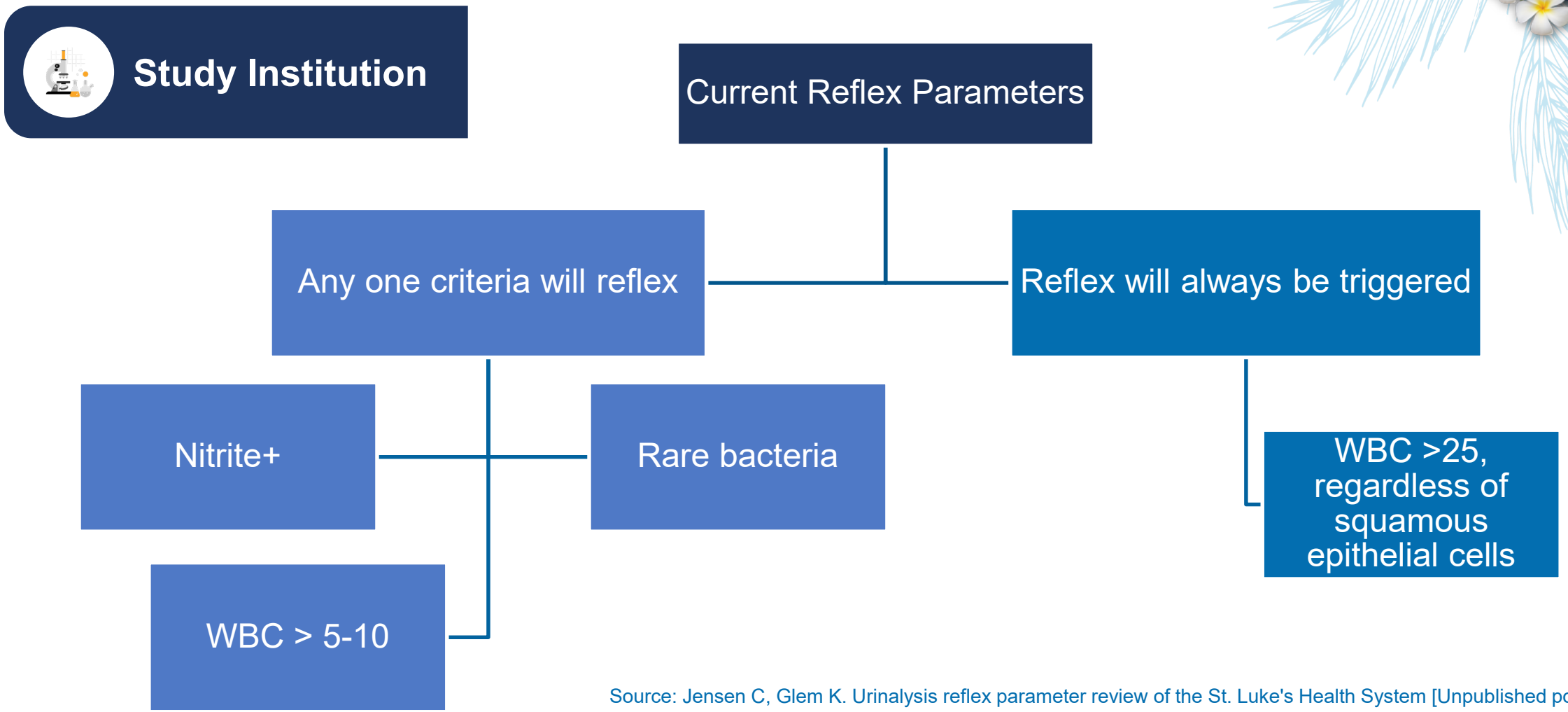
Emergency Department Review



Source: Jensen C, Glem K. Urinalysis reflex parameter review of the St. Luke's Health System [Unpublished policy]. Accessed via SLHS system policy 02/2022.

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Emergency Department Review

Suggested UA Reflex Parameters

- WBC >5-10 & Nitrite
- WBC >5-10 & Bacteria
- Nitrite + & Leukocyte esterase (LE)
- Nitrite + & Bacteria
- Leukocyte esterase & Bacteria present

Sources:
1.Ourani M, et al. Evaluation of evidence-based urinalysis reflex to culture criteria: Impact on reducing antimicrobial usage. *International Journal of Infectious Disease*. 2021; 102: 40-44.
2.Vaughn V, et al. A Statement Quality Initiative to Reduce Unnecessary Antibiotic Treatment of Asymptomatic Bacteriuria. *JAMA Internal Medicine*. 2023;183(9):933-841.
3.Getty Images. Used with permission of HealthTrust.

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Emergency Department Review

Challenges

- Importance of stakeholders
- Study population
- Identification of patients who could be missed
- Education for urinary tract infections (UTIs)

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GUIDELINES FOR UTI DIAGNOSIS & TREATMENT

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Guidelines for UTI Diagnosis & Treatment

- Guidelines for UTI Diagnosis & Treatment
- Role of Urinalysis (UA)
- UA Reflex Parameters

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Diagnosis & Treatment

Guidelines for UTI Diagnosis & Treatment

IDSA

- Asymptomatic Bacteriuria
  - >100k CFU bacteria +/- pyuria in absence of symptoms attributable to urinary tract infection
  - Treat in pregnancy, urologic procedures w/ mucosal trauma
- Urinary Tract Infection
  - Frequency, urgency, dysuria, flank pain
  - Non-specific symptoms should be evaluated for other cause

Sources:
1. Kalpana G, et al, 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, Clinical Infectious Diseases, Volume 52, Issue 5, 1 March 2011, Pages e103–e120.
2. Lindsay EN, et al, Clinical Practice Guideline for the Management of Asymptomatic Bacteriuria: 2019 Update by the Infectious Diseases Society of America, Clinical Infectious Diseases, Volume 68, Issue 10, 15 May 2019, Pages e83–e110.

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Guidelines for UTI Diagnosis & Treatment

Diagnosis & Treatment

AUA UTI “Spectrum”

- ASB
- **LUTS/OUS**
  - Lower Urinary Tract Symptoms/Other Urologic Symptoms
- **BUS**
  - Bacteriuria of Unknown Significance
- UTI

Source: Advani SD, et al. Proposing the "Continuum of UTI" for a Nuanced Approach to Diagnosis and Management of Urinary Tract Infections. J Urol. 2024 May;211(5):690-698.

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Poll Question

UA Reflex

What UA reflex parameters are currently in use at your facility?

A. Single positive parameter (e.g., leukocyte esterase, nitrite, WBC or bacteria)
B. Combination parameters (at least two of the above)
C. Do not use reflex parameters (providers must order culture separately)
D. Not sure

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Guidelines for UTI Diagnosis & Treatment

Role of Urinalysis (UA)

Dipstick

- Leukocyte esterase
- Nitrite

Microscopy

- WBCs
- Bacteria

Source:Hooton TM, et al. Asymptomatic Bacteriuria and Pyuria in Premenopausal Women. Clin Infect Dis. 2021 Apr 26;72(8):1332-1338.

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Guidelines for UTI Diagnosis & Treatment

Role of Urinalysis (UA)

- Varying sensitivity/specificity
- 78% of healthy premenopausal women w/ pyuria during a 3-month period[1]
- Useful NEGATIVE predictive value

Source:
1. Hooton TM, et al. Asymptomatic Bacteriuria and Pyuria in Premenopausal Women. Clin Infect Dis. 2021 Apr 26;72(8):1332-1338.

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Guidelines for UTI Diagnosis & Treatment

UA Reflex Parameters

- Automatic reflex to culture when high PPV
- Evidence-based criteria?
  - Low pre-test probability=high false positive rate
- Single positive parameter commonly used
- Ourani et al.[1] 2021 study implementing two criteria
  - PPV increased from **as low as 20%** to as high as 98%
  - 36% reduction in inappropriate antibiotic use

Source:
1.Ourani M, et al. Evaluation of evidence-based urinalysis reflex to culture criteria: Impact on reducing antimicrobial usage. *International Journal of Infectious Disease*. 2021; 102: 40-44.

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Assessment Question #3

Which of the following strategies can be effectively implemented to modify UA reflex parameters, with the goal of enhancing antimicrobial stewardship and reducing antibiotic resistance?

A. Increasing the frequency of urine cultures regardless of symptoms
B. Implementing evidence-based criteria for UA reflex ordering
C. Prescribing broad-spectrum antibiotics preemptively
D. Encouraging the use of antibiotics for all positive UA results

Source: Ourani M, et al. Evaluation of evidence-based urinalysis reflex to culture criteria: Impact on reducing antimicrobial usage. *International Journal of Infectious Disease*. 2021; 102: 40-44.

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UA REFLEX DATA

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UA Pre-implementation Reflex Data

Reflex Criteria	PPV for infection
WBC > 5-10	46.5%
Bacteria >/= rare	58.9%
Nitrite+	71.4%
Any reflex criteria	46.9%
WBC & Nitrite	**80%**
WBC & Bacteria	**63.9%**
Nitrite & Leukocyte esterase	**73.3%**

Source: Jensen C, Glem K. Urinalysis and urine culture review of the St. Luke's Health System [Unpublished data]. Accessed via SlicerDicer in Epic. Retrieved 04/2023.

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IMPLEMENTATION OF NEW UA REFLEX PARAMETERS

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Implementation of New UA Reflex Parameters

- Description of new UA Reflex Parameters implemented
- Outcomes & benefits of parameter change
- Steps for approval in study institution

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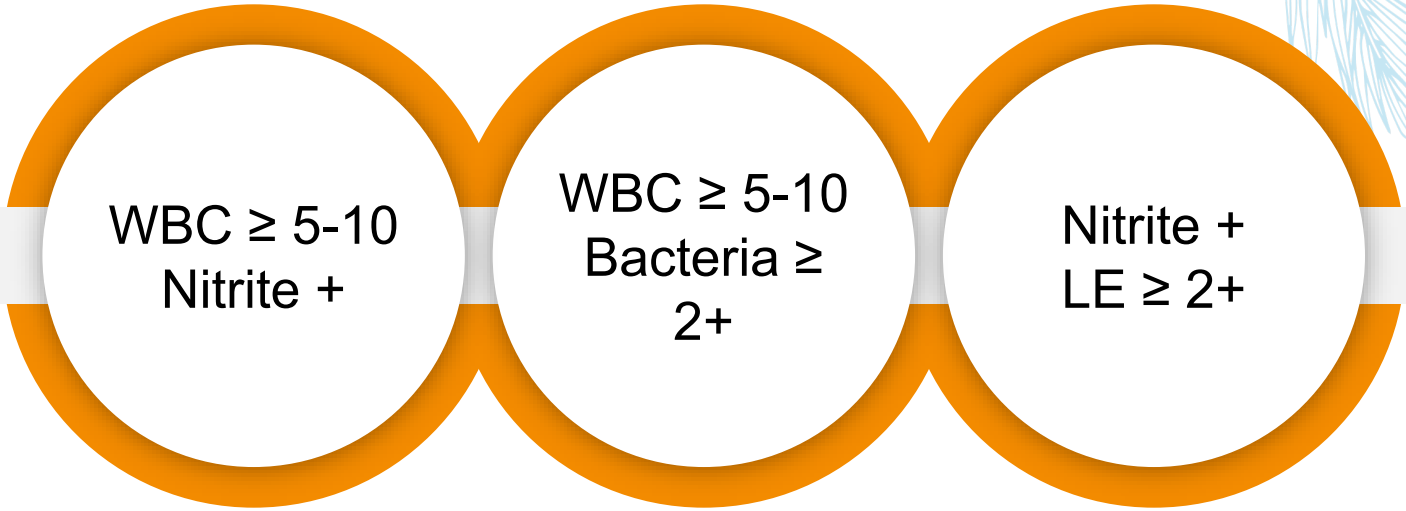
Implementation of New UA Reflex Parameters

New UA Reflex Parameters



Source: Ourani M, et al. Evaluation of evidence-based urinalysis reflex to culture criteria: Impact on reducing antimicrobial usage. *International Journal of Infectious Disease*. 2021; 102: 40-44.

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UA Post-implementation Reflex Data

	Pre-implementation	Post-implementation
WBC & Nitrite	80%	83%
WBC & Bacteria	63.9%	90.5%
Nitrite & LE	73.3%	83.7%
Total # cultures	115 (87%)	103 (76%)

Source: Jensen C, Glem K. Urinalysis and urine culture review of the St. Luke's Health System emergency department [Unpublished data]. Accessed via SlicerDicer in Epic. Retrieved 02/2024.

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UA Post-implementation Challenges

- Education, education, education!
- Provider reliance on reflex criteria to acquire culture
- Differences in how cultures are ordered
  - Inpatient vs. Emergency Department

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Implementation of New UA Reflex Parameters

Steps for Approval

- Prioritization group approval
- Small work group
  - Microbiology
  - Pharmacy
  - Infectious Disease
- Stakeholder presentations/approvals
  - Emergency Medicine
  - Hospitalist Medicine
  - Ambulatory/Clinic

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Poll Question

UA Reflex

Based upon today's discussion, what would be your preferred approach to UA reflex parameters?

A. Single positive parameter (e.g., leukocyte esterase, nitrite, WBC or bacteria)
B. Combination parameters (at least two of the above)
C. Do not use reflex parameters (providers must order culture separately)
D. Not sure

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CONCLUSION & FUTURE DIRECTION

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Conclusion & Future Direction

Ongoing evaluation

- Case reviews of “fall-outs”
- Reassessment of ED build
- UA reflex removal

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References

1. Colgan R, et al. Asymptomatic Bacteriuria. *Am Fam Physician*. 2020; 102(1):99-104.
2. Nicolle L, et al. Clinical Practice Guideline for the Management of Asymptomatic Bacteriuria: 2019 Update by IDSA. *Clinical Infectious Diseases.* 15 May 2019; 68(10) e83-e110.
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5. Asghar M, et al. Characteristics of Asymptomatic Bacteriuria in Diabetes Mellitus Patients: A Retrospective Observational Study. *Cureus.* 26 Feb 2021;13(2):e13562.
6. Sheppard M, et al. Asymptomatic bacteriuria in pregnancy. Aust N Z J Obstet Gynaecol 2023;63:696-701.
7. ACOG, Graseck A, et al. Urinary Tract Infections in Pregnant Individuals. *Obstetrics & Gynecology*. Aug 2023;142(2):435-445.
8. Vaughn V, et al. A Statement Quality Initiative to Reduce Unnecessary Antibiotic Treatment of Asymptomatic Bacteriuria. *JAMA Inter Med*. 2023;183(9):933-841.
9. Petty L, et al. Risk Factors and Outcomes Associated with Treatment of Asymptomatic Bacteriuria in Hospitalized Patients. *JAMA Intern Med*. 2019;179(11):1519-1527.
10. Jensen C, Glem K. Urinalysis reflex parameter review of the St. Luke's Health System [Unpublished policy]. Accessed via SLHS system policy 02/2022.

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References

11. Ourani M, et al. Evaluation of evidence-based urinalysis reflex to culture criteria: Impact on reducing antimicrobial usage. *International Journal of Infectious Disease*. 2021; 102: 40-44.
12. Kalpana G, et al, 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, Clinical Infectious Diseases, Volume 52, Issue 5, 1 March 2011, Pages e103–e120.
13. Lindsay EN, et al, Clinical Practice Guideline for the Management of Asymptomatic Bacteriuria: 2019 Update by the Infectious Diseases Society of America, Clinical Infectious Diseases, Volume 68, Issue 10, 15 May 2019, Pages e83–e110.
14. Advani SD, et al. Proposing the "Continuum of UTI" for a Nuanced Approach to Diagnosis and Management of Urinary Tract Infections. J Urol. 2024 May;211(5):690-698.
15. Hooton TM, et al. Asymptomatic Bacteriuria and Pyuria in Premenopausal Women. Clin Infect Dis. 2021 Apr 26;72(8):1332-1338.
16. Jensen C, Glem K. Urinalysis and urine culture review of the St. Luke's Health System [Unpublished data]. Accessed via SlicerDicer in Epic. Retrieved 04/2023.
17. Jensen C, Glem K. Urinalysis and urine culture review of the St. Luke's Health System emergency department [Unpublished data]. Accessed via SlicerDicer in Epic. Retrieved 02/2024.

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Thank You

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