



WASHINGTON STATE SOCIETY  
FOR POST-ACUTE  
AND LONG-TERM CARE  
MEDICINE



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# Urine Polymerase Chain Reaction-Based (PCR) Testing Guidance Document

## Introduction:

- Urine polymerase chain reaction-based (PCR) laboratory testing has been promoted to clinicians as an alternative method of obtaining urine cultures.
- Due to the high prevalence and overuse of antibiotics for asymptomatic bacteriuria (ASB) in the post-acute and long-term care population, guidance on the topic of PCR urine testing is provided to ensure safety.
- This document is intended to provide guidance but does not replace clinical judgement.

## What is Urine Polymerase Chain Reaction (PCR) Based Testing?

- This is a multiplex testing method that uses pathogen-specific primers to detect several pathogens and some antibiotic resistance genes<sup>1</sup>. There are two options: quantitative and qualitative. Quantitative PCR determines the quantity of pathogen present and qualitative PCR determines if a pathogen is present or absent.
- PCR-based technology has been utilized for specific disease states (e.g., COVID-19, *Clostridioides difficile*).

## What is Urine PCR's Place in UTI Diagnosis?

- This testing method is not FDA-approved for diagnosing UTIs and lacks evidence showing improved patient outcomes<sup>1,4,5</sup>.
- There are a lack of studies in which strict best practice definitions for UTI were utilized. It cannot replace standard urine culture techniques<sup>2</sup>. Standard urine culture techniques remains the gold standard for urine testing when indicated by UTI symptoms<sup>2</sup>.

## What Is Known About Urine PCR?

- It cannot reliably discern between pathogenic and colonizing agents<sup>2</sup>. Collection techniques that involve swabbing the briefs may further contaminate the sample, especially in incontinent residents.

This can lead to overtreatment of colonizing organisms and distress for the provider and the resident.

- It has a higher sensitivity rate than a standard urine culture, but is more likely to generate a positive result for organisms that are not considered clinically significant (e.g., organisms found as a part of normal skin flora)<sup>2,4,5</sup>.
- It detects DNA of organisms that are no longer viable, unlike standard urine culture techniques<sup>4</sup>. Results from PCR are displayed as cells/mL or copies/ $\mu$ L, which counts all alive and dead cells in a sample. The standard colony-forming units/mL (CFUs/mL) measure takes into account only the cells that can actively divide under specified conditions.
- There is a lack of data to provide guidance on the interpretation of organism-specific cell counts<sup>6</sup>. The current treatment threshold for  $\geq 100,000$  CFUs/mL in a symptomatic resident is not equivalent to the copies/ $\mu$ L or cells/mL result that is reported from PCR testing.
- PCR is unable to detect which antibiotics an organism is sensitive to<sup>2</sup>. It can only test for the presence of a limited number of resistance genes; however, it does not specify which organisms those genes are associated with<sup>2</sup>.
- Results from PCR are faster than standard urine culture; however, the results may not accurately reflect the causative organism. It also cannot diagnose a UTI.
- Reports that are generated recommending antibiotic therapies based upon the PCR test result may encourage the clinician to select overly-broad antibiotics to cover organisms that are colonizers.

## Recommendations:

- Share educational information with residents and family members about the definition of UTI and how unnecessary treatment can lead to potential harms
  - Communication training for staff:
    - [WA DOH's Communicating With Residents and Families About Antibiotics](#) is a free continuing education activity for nurses and medical assistants working in the post-acute and long-term care setting.
  - Handouts that can be provided to residents and families:
    - [CDC's Do You Need Antibiotics Brochure](#)
    - [Residents and Families UTI Pamphlet \(English\)](#)
    - [Residents and Families UTI Pamphlet \(Spanish\)](#)
- Refrain from ordering urine testing in asymptomatic residents.
- Use [Loeb Criteria](#) to determine the need to treat with antibiotics.
- Order traditional urine testing when testing is needed.
- Implement a facility-specific antibiogram for treatment guidance when empiric treatment is needed.
- Interpret any microbiology result using evidence-based guidelines and determine if proper collection techniques were followed.
- Consult local infectious diseases specialists & urologists for assistance with complicated cases.

**More in-depth information can be found in the stewardship team's publication below:**

Antimicrobial Stewardship & Healthcare Epidemiology: [Urine Polymerase Chain Reaction Tests: Stewardship Helper or Hinderance?](#) Published 5/8/24

## Frequently Asked Questions:

### 1. How is a UTI diagnosed?<sup>7,8</sup>

UTI Syndrome	Clinical and Microbiological Findings
Asymptomatic bacteruria	≥ 100,000 CFUs/mL of ≥ 1 bacteria in urine culture without urinary symptoms present
Uncomplicated or simple cystitis	Localized symptoms such as acute dysuria, suprapubic tenderness, new/worsening incontinence, frequency, urgency, gross hematuria <b>PLUS</b> ≥ 100,000 CFUs/mL of ≥ 1 bacteria in urine culture
Catheter-associated UTI	Systemic symptoms such as fever, rigors, chills or localized symptoms such as those described above plus suprapubic/costovertebral tenderness or acute pain/swelling/tenderness of testes, epididymis, prostate. <b>PLUS</b> ≥ 100,000 CFUs/mL of ≥ 1 bacteria in urine culture

### 2. What are the most common causative organisms?

- a. *Escherichia coli* causes 75% - 95% of uncomplicated UTIs<sup>9</sup>. Other common pathogens include *Klebsiella pneumoniae*, *Proteus mirabilis*, and *Staphylococcus saprophyticus*<sup>9</sup>. Other pathogens may cause UTI, but these are typically associated with complex cases and special circumstances. These are rarely isolated in uncomplicated UTIs<sup>9</sup>. Other organisms may represent colonizers or be present as the result of contamination of the lab specimen. Local infectious diseases experts can provide guidance on interpreting microbiological test results.

### 3. What is sensitivity and specificity?<sup>10</sup>

a.

<b>Sensitivity</b>	The ability of a test to yield a positive result for a disease
<b>Specificity</b>	The ability of a test to yield a negative result for a disease

### 4. What do I do with a urine test result that shows multiple organisms?

- a. Interpret all culture results using evidence based guidelines. Ensure proper collection technique was followed. Consult local infectious diseases specialists for assistance with complex results.

### 5. Where can I get guidance for UTI diagnosis and treatment?

- a. [Journal of the American Medical Director's Association: Diagnosis, Treatment, and Prevention of Urinary Tract Infections in Post-Acute and Long-Term Care Settings: A Consensus Statement From AMDA's Infection Advisory Subcommittee](#)
- b. [Infectious Diseases Society of America: Clinical Practice Guideline for the Management of Asymptomatic Bacteriuria](#)

- c. [Infectious Diseases Society of America: Uncomplicated Cystitis and Pyelonephritis \(UTI\)](#)
- d. [Loeb Criteria](#)
- e. [WA DOH's Medical Provider's FAQs about UTI](#)
- f. [WA DOH & WA-PALTC's Antimicrobial Stewardship of Urinary Tract Infections in the Long-Term Care Setting Series](#)

**6. How can I get an antibiogram?**

- a. Reach out to your contract laboratory and request an antibiogram that is compliant with Clinical Laboratory Science Institute (CLSI) standards. This [sample letter created by the Minnesota Department of Health](#) can provide guidance.

## Sources:

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## Antimicrobial Stewardship

[ams@doh.wa.gov](mailto:ams@doh.wa.gov)

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