

## Guidance® UTI: Personalized Therapy Options from Sample to Result in Less than One Day

Urinary Tract Infections (UTIs) can cause many potentially life-threatening complications, with approximately 25% of all adult sepsis cases resulting from urosepsis [1]. Both traditional culture and molecular diagnostic solutions that only identify organisms and resistance genes provide limited information when used alone. Guidance® UTI is a unique and proprietary solution which not only identifies uropathogens and resistance genes, but also provides information regarding susceptibility to antibiotic resistance. Guidance® UTI is an evidence-based, proprietary UTI test capable of delivering results that could guide personalized therapy options in less than one day from receipt in the lab [2-4].

### Urinary Tract Infections (UTIs): Complications and Costs

Complicated UTIs (cUTIs) occur in individuals who have one or more risk factor(s) predisposing a patient to a higher likelihood of treatment failure and/or poor outcomes [5,6]. UTI complications can incur enormous medical expenses. In 2018, urosepsis was responsible for approximately 25% of all adult sepsis cases [1], translating to \$10.4 billion in medical costs in the Medicare population [7].

### Limitations of Standard Urine Culture (SUC) or PCR Alone

Historically, standard urine culture (SUC) has been the preferred testing method for UTIs, despite significant limitations [2], which could negatively impact patients with complicated and elevated-risk UTIs. SUC favors the growth of *E. coli* over other pathogens and may miss fastidious organisms [3]. In polymicrobial communities, interactions among bacteria influence the growth and survival of each species. SUC often fails to identify more than two organisms in polymicrobial infections, resulting in 'mixed flora' or 'contamination' findings. One study found that SUC missed 67% of uropathogens in patients with severe urinary tract symptoms, and 36% of the patients experienced persistent symptoms after receiving directed treatment based upon SUC results [2].

Polymicrobial interactions can also impact susceptibility results. In traditional antimicrobial susceptibility testing (AST), each bacterium is grown in isolation against individual antibiotics, providing no opportunity to assess the effect of bacterial interactions on antibiotic effectiveness. Ignoring bacterial interactions may lead to treatment failure, which can have serious clinical consequences or could lead to inappropriate or delayed treatments. SUC and traditional AST can take 2-4 days from acquiring the sample to receiving a result. Such delay may lead to increased use of empiric therapy, poor antibiotic stewardship, and poor patient outcomes.

Molecular diagnostic technologies such as multiplex PCR offer high sensitivity, specificity, and accuracy in identifying several bacterial targets in the same reaction [4]. Certain PCR panels should target organisms known as uropathogens and relevant with a given patient population. Since PCR amplifies genetic material, it can detect both live and nonviable organisms. Although promising, research studies have not yet shown an association between PCR results alone and improved outcomes.

### Guidance® UTI Solutions

The Guidance® UTI Assay is intended for patients with a presumption of active UTI infection that requires the identification of a causative organism and antibiotic susceptibility results for appropriate management. These patients should be symptomatic and either at higher risk of UTI complications or seen in a urology or urogynecology setting. Guidance® UTI is a laboratory-developed test using multiplex PCR for the detection and quantification of 27 bacterial and yeast organisms. This test is also capable of detecting antibiotic resistance genes by targeting 32 genes among six classes of antibiotic resistance markers. Microbial susceptibility is simultaneously evaluated for 19 antibiotics, using a unique patented and proprietary technology called Pooled Antibiotic Susceptibility Testing (P-AST™). P-AST accounts for interactions in polymicrobial infections that may alter antibiotic resistance [8]. By combining the sensitivity of PCR pathogen identification, antibiotic resistance gene detection, and P-AST™, Guidance® UTI provides results that could help or enable physicians to guide personalized UTI therapy options in less than one day from receipt of specimen. Guidance® UTI allows more informed, rapid, and directed treatments that could improve patient outcomes.



## Evidence of Guidance® UTI

Scientific evidence demonstrating the successful application of Guidance® UTI is summarized below.

- According to a recent study [9]:
  - Guidance® UTI was associated with a 13.7% reduction in hospital/ emergency department (ED) utilization.
  - ED utilization and hospital admission rates for UTI were higher in patients whose prior outpatient treatment was guided by results from SUC than patients for whose prior treatment was guided by results from Guidance® UTI.
  - For a group of 30,000 patients with UTIs, a 13.7% reduction in hospitalizations would result in 156 fewer admissions and more than \$10 million in savings.
- A prospective study [4] with 2,511 enrolled patients from 37 urology offices across seven states shows that Guidance® UTI detected organisms and polymicrobial infections more accurately than SUC.
- A post hoc analysis of a total of 3,124 patients from two studies demonstrated that polymicrobial conditions can interact to change susceptibility results [8]. Pooled Antibiotic Susceptibility Testing (P-AST), which is a component of Guidance® UTI, determines susceptibility against the pool of organisms in polymicrobial infections.
- A post hoc analysis showed that there was only a 60% concordance between antibiotic resistance genes and phenotypic susceptibility. Genotypic resistance and phenotypic susceptibility results should be provided for appropriate management [10].
- A Medicare database study [11] demonstrated Guidance® UTI testing is associated with reductions in critical adverse outcomes, healthcare resource utilization, and cost for complicated UTI. Overall, the study found that Guidance® UTI led to a \$463.46 savings per cUTI patient tested, and a total savings of \$11.6M for every 25,000 cUTI cases.

## Conclusion

Guidance® UTI is a lab-developed test that combines the accuracy and sensitivity of PCR to identify uropathogens and antibiotic resistance genes with a pooled antibiotic susceptibility test. In complicated Urinary Tract Infections (cUTIs), it has been associated with reduced inpatient admission, urgent care visits, and the rate of adverse outcomes such as sepsis [11].

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