Emerging human uropathogens, including Aerococcus urinae and Coagulase-Negative Staphylococci are more frequently detected by Guidance® UTI than standard urine culture, in female patients symptomatic of urinary tract infection

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Introduction: SUC Misses Emerging Organisms

Introduction

The standard urine culture (SUC) has been the gold standard test for the diagnosis of urinary tract infection (UTI). Its limited culture conditions are bias for the identification of classical E. coli and monomicrobial UTI infections. Recently, other bacterial species, including other Gram-negative and Gram-positive bacteria, have increasingly been acknowledged for their role in UTI. Furthermore, recent research in this field has demonstrated that not all UTIs are monomicrobial and that polymicrobial infections are common. Novel advanced methods, such as multiplex polymerase chain reaction (mPCR) can provide clinically relevant microbiological data missed by SUC.

Aerococcus urinae is a Gram-positive bacterium that has been isolated from urine from UTI, urgency urinary incontinence, and overactive bladder. It has been known to cause bacteremia and endocarditis, generally preceded by UTI and UTI symptoms.

Coagulase-Negative Staphylococci (CoNS) is a group of Gram-positive cocci. Nosocomial isolates of CoNS are often found in polymicrobial cultures. Among them, S. saprophyticus is the second most frequent causative microorganism of uncomplicated lower UTI in young sexually active women. The organisms are increasingly being studied as they can become pathogenic in certain conditions.

Both A. urinae and CoNS are found in catheter samples and midstream collected samples (Table 1)

Methods and Results

Methods: Female patients from a prospective study, recruited by 75 physicians from 37 urology offices in seven states between July 26, 2018 and February 27, 2019, were included in the analysis (Western IRB 20181661). Guidance® UTI and SUC were performed on their urine samples. Detection at > 10⁵ CFUs in SUC or > 10⁷ bacteria/mL in Guidance® UTI were defined as positive for A. urinae and CoNS (S. saprophyticus, S. haemolyticus, S. lugdunensis, and S. saprophyticus).

Results: A total of 1,360 female patients, with an average age of 73.3 years, were included in this analysis. All patients enrolled in the study presented with UTI symptoms. Most of the urine samples (94.2%) were voided mid-stream urine (Table 2).

A. urinae and CoNS were detected in 159 and 15 (p < 0.0001) and 55 and 17 (p < 0.0001) patients by PCR and SUC, respectively (Table 3).

There were 144 patients detected with A. urinae by PCR, but missed by SUC (Table 2). Among the 144 patients, 70.8% were polymicrobial (A. urinae was detected with > 1 other bacteria). SUC reported normal urogenital microflora in 30 of the 144 patients (26.4%) and no bacteria detected in 57 (39.6%) patients (Table 4).

PCR identified 40 patients with CoNS that were missed by SUC (Table 3), with 65.7% being polymicrobial (Table 4). Thirty percent (30%) of these patients were reported normal urogenital microflora by SUC (Table 4).

Table 3. Detection of A. urinae and CoNS by PCR and SUC

<table>
<thead>
<tr>
<th>Sample Type</th>
<th>PCR Positive</th>
<th>SUC Positive</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. urinae</td>
<td>159</td>
<td>15</td>
<td>&lt; 0.0001</td>
</tr>
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<td>CoNS</td>
<td>15</td>
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Table 3. Results of the patient samples detected by PCR, but missed by SUC

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Conclusions

M-PCR/P-AST-based Guidance® UTI is more powerful than SUC in detecting emerging uropathogens, A. urinae, and CoNS in female symptomatic UTI patients. This may be due to the limited ability of SUC to detect emerging organisms and polymicrobial infections.

References
