Point-of-Care Urine Testing for Suspected Urinary Tract Infections in the Emergency Department: Diagnostic Accuracy, Clinical Utility, and Guidelines
SUMMARY OF A BSTRACTS

Point-of-Care Urine Testing for Suspected Urinary Tract Infections in the Emergency Department

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Acknowledgments:

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About CADTH: CADTH is an independent, not-for-profit organization responsible for providing Canada's health care decision-makers with objective evidence to help make informed decisions about the optimal use of drugs, medical devices, diagnostics, and procedures in our health care system.
Research Questions

1. What is the diagnostic accuracy of point-of-care urine testing for patients presenting to the emergency department with suspected urinary tract infections?

2. What is the clinical utility of point-of-care urine testing for patients presenting to the emergency department with suspected urinary tract infections?

3. What are the evidence-based guidelines associated with the use of point-of-care urine testing for patients presenting to the emergency department with suspected urinary tract infections?

Key Findings

Two systematic reviews (one with meta-analysis) and four non-randomized studies were identified regarding the diagnostic accuracy or clinical utility of point-of-care urine testing for patients presenting to the emergency department with suspected urinary tract infections.

Methods

A limited literature search was conducted on key resources PubMed, CINAHL database, The Cochrane Library, University of York Centre for Reviews and Dissemination (CRD) databases and a focused Internet search. No methodological filters were applied to limit retrieval by publication type. The search was limited to English language documents published between January 1, 2007 and December 4, 2017. Internet links were provided, where available.

Selection Criteria

One reviewer screened citations and selected studies based on the inclusion criteria presented in Table 1.

Table 1: Selection Criteria

<table>
<thead>
<tr>
<th>Population</th>
<th>Patients presenting to the emergency department with suspected urinary tract infections</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intervention</td>
<td>Point-of-care urine dipstick testing</td>
</tr>
<tr>
<td>Comparator</td>
<td>Q1-2: Urine culture (laboratory-based testing – gold standard); Point-of-care dipstick testing using an automated reader</td>
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<td></td>
<td>Q3: No comparator</td>
</tr>
<tr>
<td>Outcomes</td>
<td>Q1: Diagnostic accuracy</td>
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<tr>
<td></td>
<td>Q2: Clinical utility (e.g., but not limited to, length stay in emergency department)</td>
</tr>
<tr>
<td></td>
<td>Q3: Guidelines (e.g., specific to the emergency department, differences between manual and automated test reading)</td>
</tr>
<tr>
<td>Study Designs</td>
<td>Health technology assessments, systematic reviews, meta-analyses, randomized controlled trials, non-randomized studies, evidence-based guidelines</td>
</tr>
</tbody>
</table>
Results

Rapid Response reports are organized so that the higher quality evidence is presented first. Therefore, health technology assessment reports, systematic reviews, and meta-analyses are presented first. These are followed by randomized controlled trials, non-randomized studies, and evidence-based guidelines.

Two systematic reviews (one with meta-analysis) and four non-randomized studies were identified regarding the diagnostic accuracy or clinical utility of point-of-care urine testing for patients presenting to the emergency department with suspected urinary tract infections. No relevant health technology assessments, randomized controlled trials, or evidence-based guidelines were identified.

Additional references of potential interest are provided in the appendix.

Overall Summary of Findings

Two systematic reviews\(^1,^2\) (one with meta-analysis\(^3\)) and four non-randomized studies (NRS)\(^3^6\) were identified regarding the diagnostic accuracy or clinical utility of point-of-care urine testing for patients presenting to the emergency department with suspected urinary tract infections. Detailed study characteristics are provided in Table 2.

Varied conclusions on the diagnostic accuracy or clinical utility of point-of-care urine testing in the emergency department were evident.\(^1,^6\) One systematic review\(^1\) suggested that point-of-care urinalysis can provide sufficient accuracy in ruling out urinary tract infections (UTIs) in low-risk adult females. A second systematic review with meta-analysis\(^2\) concluded that rapid urine tests, including dipstick tests, were not sufficiently sensitive to identify all children with UTIs and cannot replace laboratory urine culture. However, the authors did suggest that a positive dipstick test should be considered accurate if leucocyte esterase or nitrite was positive.\(^2\) Four NRS\(^3^6\) assessed the accuracy of dipstick tests for various pediatric populations. Three of these studies\(^3^4,^6\) concluded that point-of-care urine dipstick tests provide high sensitivity and showed promising results. One study\(^6\) suggested that the lower sensitivity of point-of-care urinalysis must be considered when choosing this test for its rapid turnaround times.

Table 2: Summary of Included Studies on the Diagnostic Accuracy or Clinical Utility of Point-of-Care Urine Testing for Patients Presenting to the Emergency Department with Suspected Urinary Tract Infections

<table>
<thead>
<tr>
<th>First Author, Year</th>
<th>Study Characteristics</th>
<th>Intervention</th>
<th>Comparator</th>
<th>Outcomes</th>
<th>Author’s Conclusions</th>
</tr>
</thead>
</table>
| Meister, 2013\(^1\) | • 4 studies included  
• Females ≥18 years in the ED  
• N=948                        | • Urinalysis  
• History and physical examination | • UTI confirmed by a positive urine culture | • Sensitivity  
• Specificity  
• Likelihood ratios | *No single [history and physical examination] finding can accurately rule in or rule out UTI in symptomatic women. Urinalysis with a positive nitrite or moderate pyuria and/or bacteruria are accurate predictors of a UTI. If the pretest probability of UTI is sufficiently low, a negative urinalysis can...* |
<table>
<thead>
<tr>
<th>First Author, Year</th>
<th>Study Characteristics</th>
<th>Intervention</th>
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<th>Outcomes</th>
<th>Author’s Conclusions</th>
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<tbody>
<tr>
<td>Williams, 2010²</td>
<td>• MA performed</td>
<td>• Rapid UTI tests (including microscopy and dipsticks)</td>
<td>• Urine culture to detect UTIs</td>
<td>• Sensitivity • Specificity • Diagnostic odds ratio</td>
<td>Rapid urine tests were not sufficiently sensitive to identify all children with UTIs and therefore cannot replace urine culture. Rapid tests were reported to be negative in approximately 10% of children with UTIs confirmed with urine culture. Suggestion that dipstick tests should be considered positive if leucocyte esterase or nitrite was positive</td>
</tr>
<tr>
<td>Malia, 2017²</td>
<td>• Retrospective chart review</td>
<td>• POC dip testing</td>
<td>• Urine culture</td>
<td>• Sensitivity • Specificity</td>
<td>POC urine dip tests are as sensitive as laboratory urinalysis. POC dip testing: Sensitivity = 91.4% (95% CI, 76.9%-98.2%) Specificity = 63.9% (95% CI, 57.2%-69.3%) Lab urinalysis: Sensitivity = 91.4% (95% CI, 76.9%-98.2%) Specificity = 63.9% (95% CI, 58.2%-69.3%) Lab dip: Sensitivity = 88.6% (95% CI, 73.3%-96.8%) Specificity = 65.6% (95% CI, 59.9%-70.9%)</td>
</tr>
<tr>
<td>Kanegaye, 2014⁴</td>
<td>• Retrospective diagnostic cohort study</td>
<td>• Automated cell counts • POC dipstick urinalyses</td>
<td>• Urine culture</td>
<td>• Sensitivity • Specificity</td>
<td>POC urine dipstick with ≥1+ leucocyte esterase or positive nitrite had a sensitivity and specificity of 95% and 98%, respectively. POC dipstick testing may be an acceptable alternative in care settings that require quick decisions</td>
</tr>
<tr>
<td>Kazi, 2013⁴</td>
<td>• Retrospective study</td>
<td>• POC urinalyses and culture</td>
<td>• Laboratory-performed urinalyses and culture</td>
<td>• Sensitivity • Specificity</td>
<td>The sensitivities of POC urinalyses and laboratory-performed urinalyses was 82.5% (CI, 79.4%-85.3%) and 89.1% (CI, 86.4%-88.8%), respectively</td>
</tr>
<tr>
<td>First Author, Year</td>
<td>Study Characteristics</td>
<td>Intervention</td>
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<tr>
<td>specimens</td>
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<td>&quot;Although [POC urinalyses] offer more rapid turnaround times, the sensitivity is greater for laboratory-performed [urinalyses]. Given the difficulty in following up [pediatric] ED patients after discharge as well as the potential morbidity from untreated UTIs, the rapidity of the [POC urinalyses] must be balanced against the lower sensitivity of this assay. The benefit of more accurate diagnosis may outweigh the potentially longer [pediatric] ED length of stay associated with a laboratory-performed [urinalyses].&quot;</td>
</tr>
<tr>
<td><strong>Ramlakhan, 2011</strong></td>
<td>• Retrospective diagnostic cohort study&lt;br&gt;• Febrile children at a pediatric ED (&lt;2 years)&lt;br&gt;• N=321</td>
<td>• Urine dipstick</td>
<td>• Quantitative culture&lt;br&gt;• Sensitivity&lt;br&gt;• Specificity</td>
<td>• Dipstick urinalysis shows promising results for the detection of UTIs&lt;br&gt;&quot;A test positive for nitrite, leukocyte esterase and blood gave a specificity of 97.12% [95% CI: 94.17-98.60] and a positive likelihood ratio of 15.13 (95% CI: 6.99-32.76). A test negative for nitrite, LE, blood and protein had a sensitivity of 97.44% (95% CI: 91.12-99.29) and a negative likelihood ratio of 0.10 (95% CI: 0.02-0.39).&quot;</td>
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</table>
Randomized Controlled Trials

No literature identified.

Non-Randomized Studies


Guidelines and Recommendations

No literature identified.
Appendix — Further Information

Previous CADTH Reports


Non-Randomized Studies

Alternative Intervention – Point of Care Urine Microscopy


Alternative Population – Patients Presenting to Primary Care


Clinical Practice Guidelines – Unspecified Methodology


Review Articles


Additional References

Horizon Scans