Simple Cystitis: Does Urine Culture Change Management?

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Background

Simple cystitis, defined as a bladder infection in immunocompetent women aged 18-65 years without comorbidities/urological abnormalities, is the most common bacterial infection in women. Urine cultures are often sent in for these patients to ensure that the infective pathogen is sensitive to the antibiotic prescribed and to inform possible treatment modifications.

Aims

The aim of our study is to evaluate the utility of the urine culture in the treatment of patients with simple cystitis.

Methods

Data collection:
- Retrospective chart review for urine culture positivity rates and resistance patterns
  - 3 independent chart reviewers
  - 60% reviewed by 2 reviewers to evaluate interrater reliability
Population:
- Female patients
- Between the age of 18 and 65 years
- Discharged from the UC Davis Emergency Department (ED) with diagnosis of urinary tract infection between January 1, 2018 and December 31, 2018.

Exclusion criteria:
- ED visit for UTI in the last month
- Immunocompromised
- Pregnancy
- History of renal transplant
- Known structural urologic abnormality

Analysis:
- Simple statistics performed using Stata 14.2
- Cohen’s Kappa performed to determine interrater reliability

Outcomes:
- Primary: Number of cases requiring changes in antibiotic therapy
- Secondary: Return visits within 1 month for continued symptoms

Results

Cultures
- 513 charts reviewed manually
  - 91.5% agreement
  - Cohen’s kappa: 0.755
- 388/513 met inclusion criteria
- 153/388 had culture sent on initial ED visit
- 146/153 cultures were positive
  - 6 resistant cultures (3.9%, 95% CI 1.4-8.3%)

Exclusion criteria:
- Known structural urologic abnormality
- History of renal transplant
- Pregnancy
- Immunocompromised
- ED visit for UTI in the last month
- Female patients
- Between the age of 18 and 65 years
- Discharged from the UC Davis Emergency Department (ED) with diagnosis of urinary tract infection
- Between the age of 18 and 65 years
- Female patients
- Discharged from the UC Davis Emergency Department with a diagnosis of simple cystitis who do not meet our exclusion criteria
- Immunocompromised
- Known structural urologic abnormality
- History of renal transplant
- Pregnancy
- ED visit for UTI in the last month
- Female patients
- Between the age of 18 and 65 years
- Discharged from the UC Davis Emergency Department (ED) with diagnosis of urinary tract infection
- Between the age of 18 and 65 years
- Female patients
- Discharged from the UC Davis Emergency Department with a diagnosis of simple cystitis who do not meet our exclusion criteria

Return visits
- 8 return visits in culture group (8/153, 5.2%, 95% CI 2.3-10.0%)
- 12 return visits in non-culture group (12/235, 5.1%, 95% CI 2.7-8.7%)

Resistance patterns
- Sensitivities tested on 70 cultures

Table 1: Distribution of pathogens observed in positive cultures.

<table>
<thead>
<tr>
<th>Pathogen</th>
<th>Positive cultures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mixed flora</td>
<td>69</td>
</tr>
<tr>
<td>E. Coli</td>
<td>65</td>
</tr>
<tr>
<td>Klebsiella</td>
<td>5</td>
</tr>
<tr>
<td>Other</td>
<td>7</td>
</tr>
</tbody>
</table>

Table 2: Distribution of antibiotic resistances observed in susceptibility tests.

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>Resistant</th>
<th>Susceptible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amoxicillin</td>
<td>36</td>
<td>34</td>
</tr>
<tr>
<td>Ceftriaxone</td>
<td>5</td>
<td>65</td>
</tr>
<tr>
<td>Cefazolin</td>
<td>3</td>
<td>67</td>
</tr>
<tr>
<td>Gentamicin</td>
<td>3</td>
<td>67</td>
</tr>
<tr>
<td>Levofloxacin</td>
<td>5</td>
<td>63</td>
</tr>
<tr>
<td>Nitrofurantoin</td>
<td>7</td>
<td>65</td>
</tr>
<tr>
<td>Bactrim</td>
<td>5</td>
<td>23</td>
</tr>
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Figure 1: Percentages of pathogens observed in positive cultures.

Conclusion

Ordering of routine urine cultures in female patients discharged from the Emergency Department with a diagnosis of simple cystitis who do not meet our exclusion criteria is unnecessary and unlikely to change management.

- It does not appear to decrease the rate of repeat visits within 1 month for recurrent or persistent symptoms of a urinary tract infection (Culture: 8/153, 5.2%, 95% CI 2.3-10.0% vs. Non-culture: 12/235, 5.1%, 95% CI 2.7-8.7%)

Foregoing these cultures could lead to significant healthcare cost savings.

- Average billed cost of ED urine culture: $269.50
  - Potential cost savings of forgoing culture= 153x269.50 = $41,233.50
- Average billed cost of culture susceptibilities: $350.35
  - Potential cost savings of forgoing susceptibilities = 70x350.35 = $24,524.50
- Total potential healthcare cost savings = 41,233.50 + 24,524.50 = $65,758

Limitations

- Retrospective chart review
- Possibility of patients seeking initial/further care at other institutions/hospitals

References


Acknowledgements

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Thank you to the Medical Student Research Fellowship program.

Questions/comments? Email Diego Xavier Torres dxtorres@ucdavis.edu

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