Impact of a multifaceted intervention on antibiotic prescribing for asymptomatic bacteriuria and UTI in community hospital emergency departments

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Disclosures

• IRB Status: Exempt Status Approved
• Co-investigators: John J. Veillette, Jared Olson, Stephanie S. May, C. Dustin Waters, Stephanie S. Gelman, George Vargyas, Rachel Foster, Nick Tinker, Gabriel V. Fontaine, Todd J. Vento
• Conflicts of Interest: None
• Sponsorship: None
Intermountain Healthcare

- Utah, Southern Idaho, Las Vegas
- 24 Hospitals (includes virtual hospital)
- 215 Clinics
- Payer Group, SelectHealth, with 870k members
- Largest healthcare organization in Utah
- 75 telehealth services in eight states
- Referral centers for surrounding states
- Annual care provided for > 1 million patients
IMH Facilities Included in the Study

- 23 Hospital ED
- EDs are associated with facilities ranging from 10-bed rural facilities to >500-bed urban facilities
- 13 urban hospitals
- 10 rural hospitals
Background

National/local UTI Guidelines

Asymptomatic bacteriuria (ASB)
• Antibiotic treatment NOT recommended (except pregnancy or urologic procedure)
• UTI is a **clinical** diagnosis (lab data to support)
  • No symptoms → No treatment (regardless of UA/UCx)

Cystitis
• Treatment duration 3-7 days
• Nitrofurantoin, TMP/SMX, or β-lactams are first line

Pyelonephritis
• Treatment duration 7-14 days (FQ 7, TMP/SMX 7-10, β-lactam 10-14)
• Nitrofurantoin and Fosfomycin NOT effective
Background: Baseline Assessment

- UTI diagnosis accounts for over 2 million ED visits annually in the US
- We aimed to describe emergency department antibiotic prescribing for UTIs and ASB and to identify improvement opportunities

Results:

Cystitis
- 144/446 (32%) treated with FQ
- 128/446 (29%) given ≥ 10 days for cystitis

Asymptomatic bacteriuria
- 286/1005 (28%) met conservative criteria for ASB → 2068 unnecessary abx days

Pyelonephritis
- Treatment was overall appropriate
Objectives

This study aims to assess the impact of the pharmacy driven interventions on decreasing:

• Unnecessary treatment of ASB
• Prolonged durations for cystitis (> 7 days)
• Use of fluoroquinolone for cystitis
Methods

- **2017-18**: Baseline data collected
- **2019**: January to May: Baseline data analyzed June to December: Intervention Took Place
- **2020-21**: Post-intervention period
- **2021-22**: Post-intervention data collection and pre-post analysis
Methods: Interventions

- In-person Physician Education
- UTI Order Sets Updated and UTI Guidelines Implemented
Methods

Random Selection of ED Visits for UTI* January-September 2021
N = 2256

Included Patients (N = 697)
- Adults ≥18 years old
- Discharged with antibiotic therapy
- Diagnosed with ASB, UTI or cystitis

Excluded Patients (N = 406)
- Pregnancy
- Neurogenic bladder
- Antibiotic given for an infection other than UTI
- Being treated with antibiotics at the time of ED visit
- Pyelonephritis

Reviewed Records
N = 1103

Electronic Data Pull
- Demographics
- Chief complaint
- UA data
- UC results
- Abx treatment
- ED diagnosis
- 14-day all cause readmission

Manual Chart Review
- UTI diagnosis based on documented symptoms
- 14-day readmission data
Methods: Study Definitions

**Positive UA:**
- Positive leukocyte esterase
- Positive nitrites
- $\geq 5$ white blood cells per high powered field
- Presence of bacteria

**Positive urine culture:**
- Growth of any organism reported by the microbiology lab

**Cystitis:**
- ONLY focal symptoms

**ASB:**
- Positive UA without any focal symptoms
Methods: Endpoints and Analysis

Primary endpoint

• Percent of patients treated for UTI who had ASB

Secondary endpoints

• Percent of cystitis patients prescribed fluoroquinolones
• Percent of cystitis patients prescribed a prolonged antibiotic durations (>7 days)
• Percent of patients with a UTI-related readmission within 14-days

Statistical Analysis

Fisher’s Exact Test
## Demographics

<table>
<thead>
<tr>
<th></th>
<th>Pre-intervention</th>
<th>Post-intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N = 1005 (N %)</td>
<td>N = 697 (N %)</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-39</td>
<td>317 (32)</td>
<td>208 (30)</td>
</tr>
<tr>
<td>40-59</td>
<td>203 (20)</td>
<td>132 (19)</td>
</tr>
<tr>
<td>60-79</td>
<td>303 (30)</td>
<td>227 (32)</td>
</tr>
<tr>
<td>≥80</td>
<td>182 (18)</td>
<td>130 (19)</td>
</tr>
<tr>
<td><strong>Male</strong></td>
<td>199 (20)</td>
<td>121 (17)</td>
</tr>
<tr>
<td><strong>Presenting Symptoms</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Focal cystitis symptoms</td>
<td>431 (43)</td>
<td>322 (46)</td>
</tr>
<tr>
<td>Non-localizing symptoms</td>
<td>651 (65)</td>
<td>405 (58)</td>
</tr>
<tr>
<td>Clear non-UTI cause for symptoms</td>
<td>215 (21)</td>
<td>187 (27)</td>
</tr>
</tbody>
</table>
### Results

<table>
<thead>
<tr>
<th></th>
<th>Pre-intervention N = 1005 (N%)</th>
<th>Post-intervention N = 697 (N%)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ASB</strong></td>
<td>281/1005 (28)</td>
<td>202/697 (29)</td>
<td>0.97</td>
</tr>
<tr>
<td><strong>14-day UTI-related readmissions</strong></td>
<td>39/1005 (3.8)</td>
<td>31/697 (4.4)</td>
<td>0.62</td>
</tr>
<tr>
<td><strong>Cystitis</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Prolonged duration (&gt; 7 days)</strong></td>
<td>129/446 (29)</td>
<td>49/339 (15)</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td><strong>Fluoroquinolone use</strong></td>
<td>144/446 (32)</td>
<td>25/339 (7)</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>
Discussion

Limitations

• Retrospective study design
• Sample size difference between the two data sets
• Potential inter-reviewer variability
• Data does not capture anything outside of the singular ED visit
• Data not captured:
  o Susceptibility data
  o Allergies
  o Drug interactions
  o Comorbidities
  o Prior urine culture

This is overall summary data that does not capture hospital and prescriber specific data
Discussion

• Changing prescriber behavior to align with guidelines is a major challenge faced by Antimicrobial Stewards

• The interventions, in-person education and resource updates, appear to have had the most impact on prescriber behavior related to appropriate cystitis treatment duration and first-line antibiotic selection

• However, overall treatment of ASB did not improve with the interventions
Conclusions

• Multifaceted intervention improved prescribing behaviors related to appropriate treatment of cystitis, antibiotic selection and duration

• Further intervention, potentially long term and individualized, may be needed to improve prescribing behaviors related to treatment of ASB
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References


