IMPACT OF ANTIMICROBIAL STEWARDSHIP INTERVENTIONS ON ANTIBIOTIC PRESCRIBING BY EMERGENCY DEPARTMENT PHYSICIANS FOR THE OUTPATIENT MANAGEMENT OF URINARY TRACT INFECTIONS

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IRB Status: Approved
Disclosure

• Speaker: Mariah Cadavos
  • Potential conflicts of interest – none
  • Financial support – none

• The research presented is subject to different interpretation

• This presentation is educational in nature and abides by non-commercial guidelines
Abbreviations

- AMS = antimicrobial stewardship program
- ED = emergency department
- FQ = fluoroquinolone
- PAMC = Providence Alaska Medical Center
- UTI = urinary tract infection
- SMX-TMP = sulfamethoxazole-trimethoprim
Learning Objectives

• Identify the most common pathogen known to cause UTIs

• Describe possible effects of local guideline on prescribing patterns for outpatient management of UTIs

• Identify potential areas for pharmacy intervention to improve prescribing practices
Pre-Assessment

1. The most common pathogen known to cause UTIs is:
   A. *Coagulase-negative Staphylococcus*
   B. *Enterococcus faecalis*
   C. *Escherichia coli*

2. Utilization of ____ decreased in patients w/ acute cystitis after implementation of the UTI guideline.
   A. Levofloxacin
   B. Cephalexin
   C. Sulfamethoxazole-Trimethoprim

3. What is an intervention pharmacists can make when managing antibiotics for UTIs? Select all that apply.
   A. Optimizing duration of antibiotics
   B. Tailoring antibiotic choice based on patient specific factors (allergies, administration preference)
   C. Implementing an AMS guideline
Providence Alaska Medical Center
Anchorage, AK

- Tertiary, non-profit, community medical center
- Level II trauma center
- Largest hospital in Alaska
  - 402 beds
  - 62 emergency department beds
- AMS program
  - Implemented August 2013
  - PharmD – Full Time
  - MD – Part Time
- ED pharmacy service
  - Implemented October 2018
  - Pharmacist coverage from 0700 - 0200

https://www.architectsalaska.com/project/providence-hospital/
In 2015, CDC reported that UTIs are amongst the twenty leading primary diagnosis groups in the ED
- 2.2 million visits/year
  - 1.8 million females

UTIs most commonly caused by *Escherichia coli (E.coli)*
- PAMC susceptibility rates
  - 79% SMX-TMP
  - 81% Cefazolin
  - 85% Ciprofloxacin/Levofloxacin

Effective antibiotic selection is imperative to reduce resistance and promote high quality, cost effective care
Methodology

• Retrospective pre-/post guideline implementation chart review of patients diagnosed w/ acute cystitis or acute pyelonephritis

• Time period: April 1, 2016 – August 31, 2018

• AMS “PAMC Adult Emergency Department UTI Treatment Guidelines” were implemented April 1, 2017
  • Reviewed patients 1 year prior to and after guideline
  • Reviewed patients a brief time period after ED pharmacy service implementation

Primary Objective
Empiric antibiotic, dose, frequency, and duration vs.
“PAMC Adult Emergency Department UTI Treatment Guideline” recommendations
## Empiric Antibiotic Recommendations

### Acute Cystitis

**First Line:**
1. Nitrofurantoin 100 mg BID x 5 d
2. Cephalexin 500 mg BID x 7 d
3. *Ciprofloxacin 250 mg BID x 3 d

### Acute Pyelonephritis

**Consider administration of initial single dose IM antibiotic:**
1. Ceftriaxone 1 gm IM/IV
2. Gentamicin 3 mg/kg IM

**Followed by:**
1. Cephalexin 1 g TID x 14 d
2. Levofloxacin 750 mg daily x 5 d
3. Ciprofloxacin 500 mg BID x 7 d

*only use when no other alternatives exist*
# Methodology

<table>
<thead>
<tr>
<th>Inclusion Criteria</th>
<th>Exclusion Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>• &gt; 18 years of age</td>
<td>• &lt; 18 years of age</td>
</tr>
<tr>
<td>• Admitted and discharged directly from the ED</td>
<td>• Known structural/functional abnormalities of the genitourinary system</td>
</tr>
<tr>
<td>• Primary/secondary diagnosis of uncomplicated cystitis or pyelonephritis (ICD 10 codes)</td>
<td>• Immunocompromised (i.e. kidney transplant recipients)</td>
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<tr>
<td></td>
<td>• Urinary tract instrumentation within the preceding 7 days</td>
</tr>
<tr>
<td></td>
<td>• Currently on suppressive antibiotic therapy for UTI prophylaxis</td>
</tr>
<tr>
<td></td>
<td>• Concomitant infections</td>
</tr>
<tr>
<td></td>
<td>• Boarded in the ED &gt; 48 hrs</td>
</tr>
<tr>
<td></td>
<td>• Pregnant</td>
</tr>
<tr>
<td></td>
<td>• Catheterized</td>
</tr>
<tr>
<td></td>
<td>• Incarcerated</td>
</tr>
</tbody>
</table>
## Baseline Characteristics

<table>
<thead>
<tr>
<th></th>
<th>Pre-Guideline (n = 71)</th>
<th>Post-Guideline (n=143)</th>
<th>P-value (X²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (range)</td>
<td>41 (18-92) ± 20</td>
<td>43 (19-91) ± 20</td>
<td>0.54</td>
</tr>
<tr>
<td>Male, n (%)</td>
<td>6 (8)</td>
<td>21 (14.7)</td>
<td>0.20</td>
</tr>
<tr>
<td>Female, n (%)</td>
<td>65 (92)</td>
<td>122 (85.3)</td>
<td></td>
</tr>
<tr>
<td>Acute Cystitis</td>
<td>37 (52)</td>
<td>93 (65)</td>
<td>0.07</td>
</tr>
<tr>
<td>Acute Pyelonephritis</td>
<td>34 (48)</td>
<td>50 (35)</td>
<td></td>
</tr>
<tr>
<td>CrCl &lt; 60 ml/min, n (%)</td>
<td>7 (9.8)</td>
<td>12 (8.3)</td>
<td>0.13</td>
</tr>
<tr>
<td>Known diabetes, n (%)</td>
<td>11 (15.4)</td>
<td>24 (16.8)</td>
<td>0.06</td>
</tr>
<tr>
<td>Antibiotics in past 90 days, n (%)</td>
<td>8 (11.3)</td>
<td>19 (13.3)</td>
<td>0.16</td>
</tr>
<tr>
<td><strong>History of recurrent UTI, n (%)</strong></td>
<td><strong>9 (12.7)</strong></td>
<td><strong>7 (4.9)</strong></td>
<td><strong>0.04</strong></td>
</tr>
<tr>
<td>Urine culture <em>E. coli</em>, (100k CFUs), n (%)</td>
<td>22 (31%)</td>
<td>29 (20%)</td>
<td>0.09</td>
</tr>
</tbody>
</table>
## Results

<table>
<thead>
<tr>
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<th>Pre-Guideline (n = 71)</th>
<th>Post-Guideline (n=143)</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Guideline antibiotic at discharge, n (%)</td>
<td>47 (66)</td>
<td>86 (60)</td>
<td>0.39</td>
</tr>
<tr>
<td>Guideline antibiotic regimen at discharge, n (%)</td>
<td>2 (2.8)</td>
<td>25 (17.4)</td>
<td>0.002</td>
</tr>
<tr>
<td>• Acute cystitis</td>
<td>1 (1.4)</td>
<td>19 (13.2)</td>
<td>--</td>
</tr>
<tr>
<td>• Acute pyelonephritis</td>
<td>1 (1.4)</td>
<td>6 (4.2)</td>
<td></td>
</tr>
<tr>
<td>Bug-drug mismatch</td>
<td>5 (7.0)</td>
<td>5 (3.4)</td>
<td>0.25</td>
</tr>
</tbody>
</table>

*Applies to patients requiring new prescription after susceptibility report resulted*
Antibiotic Utilization
Acute Cystitis

PRE AND POST GUIDELINE
Levofloxacin prescribing (p<0.02)

NITROFURANTOIN
CEPHALEXIN
CIPROFLOXACIN
LEVOFLOXACIN
SMX-TMP

PRE-GUIDELINE
POST-GUIDELINE
Antibiotic Utilization
Acute Pyelonephritis

PRE AND POST GUIDELINE

Cephalexin prescribing (p<0.002)
SMX-TMP prescribing (p<0.003)
Antibiotic Utilization

• **Acute Cystitis**
  • Empiric levofloxacin use decreased (p<0.02)

• **Acute Pyelonephritis**
  • Empiric SMX-TMP use decreased in patients diagnosed w/ acute pyelonephritis (p<0.003)
    • Not recommended in guideline, in response to resistance rates
  • Empiric cephalexin use increased after guideline implementation
    • Appropriate
Results
Clinical Outcomes

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<tr>
<td>30 day UTI readmission rate, n (%)</td>
<td>1 (1.4)</td>
<td>5 (3.5)</td>
<td>0.38</td>
</tr>
<tr>
<td>90 day UTI readmission rate, n (%)</td>
<td>0</td>
<td>1 (0.7)</td>
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</tbody>
</table>
Conclusion

• Implementation of an AMS guideline for outpatient management of UTIs led to increased adherence to appropriate antibiotic regimen.

• Implementation of an AMS guideline did not show any difference in 30 and 90 day readmission rates for UTIs.
Discussion

• Future Directions
  • ED pharmacy urine culture callbacks

• Limitations
  • Retrospective chart review
  • Small sample size
  • Single institution
  • Only included patients with acute cystitis and acute pyelonephritis
Post-Assessment

1. The most common pathogen known to cause UTIs is:
   A. Coagulase-negative Staphylococcus
   B. Enterococcus faecalis
   C. Escherichia coli

2. Utilization of ____ decreased in patients w/ acute cystitis after implementation of the UTI guideline.
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References


