Management of Urinary Tract Infections Across the Healthcare Continuum

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Speaker Disclosures

Dr. Ashraf: Received funding for investigator initiated study from Merck & Co., Inc.,
Learning Objectives

By the end of the session, participants will be able to:

- Recognize the difference between asymptomatic bacteriuria and a urinary tract infection
- Describe the management approach of suspected urinary tract infections
- Discuss the antimicrobial stewardship principles specific to the management of UTI in various healthcare settings
Definitions

• Urinary tract infection (UTI): Refers to an infection anywhere in the genitourinary tract

• Cystitis: Urinary symptoms are usually confined to the bladder.
  • Dysuria,
  • Frequency
  • Gross hematuria
  • Suprapubic tenderness
  • New or worsening urinary incontinence or urgency

• Pyelonephritis: Less common but more severe infection involving the renal parenchyma
  • Fever
  • Chills
  • Back pain
  • Nausea
  • Vomiting
  • Localizing bladder symptoms may or may not be present.

• Catheter-associated urinary tract infection (CAUTI): Refers to UTIs that develop in individuals with an indwelling urinary catheter

• Asymptomatic Bacteriuria: Presence of bacteria in the urine without signs or symptoms of infection that localize to the urinary tract
Asymptomatic Bacteriuria Treatment Has No Impact on Survival

- A 9-year cohort study and a controlled clinical trial involving elderly ambulatory women without indwelling catheter
- Urine cultures done every 6 months
- Control group did not receive antibiotics for positive culture but treatment group received antibiotic course
- The cure rates among treated and untreated individuals were 82.9% and 15.6%, respectively.
- No statistically significant difference in mortality between the two groups (death rate in treated vs. control groups: 13.8 vs. 15.1 /100,000 resident-days)

Abrutyn et al., Ann Intern Med 1994; 120(10): 827 – 33
Asymptomatic Bacteriuria Treatment Promotes Antimicrobial Resistance

- Randomized Control Trial: 35 patients with long-term indwelling catheters (18 in control and 17 in treatment group)
- Urine cultures obtained weekly
- Whenever bacteriuria is detected, treated with 10 days of cephalexin in the treatment group

No difference in mean bacterial strains/patient

Increase resistance in treatment group

108 fever days in control group
100 fever days in treatment group

Management of Asymptomatic Bacteriuria

- New (2019) IDSA guidelines recommend against screening for and treating asymptomatic bacteriuria in most clinical scenarios.

- The treatment is recommended in specific clinical scenarios:
  - Pregnant women
    - Usually require 4–7 days of antimicrobial treatment
  - Patients undergoing endoscopic urologic procedures associated with mucosal trauma
    - A urine culture be obtained prior to the procedure and antimicrobial therapy should be targeted to the organism identified
    - A short course (1 to 2 doses) of antimicrobial therapy is recommended initiated 30 to 60 minutes before the procedure

Limitations of Diagnostic Testing for UTI

Table 2. Comparison of Dipstick Test Results for Leukocyte Esterase and Nitrite With Laboratory Evidence of Urinary Tract Infection (UTI) in 101 Nursing Home Residents

<table>
<thead>
<tr>
<th>Dipstick test results for leukocyte esterase and nitrite</th>
<th>Laboratory evidence of UTI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Positive</td>
</tr>
<tr>
<td>Positive for either</td>
<td>40</td>
</tr>
<tr>
<td>Negative for both</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>40</td>
</tr>
</tbody>
</table>

**Note.** When the presence of leukocyte esterase and nitrite were assessed together, sensitivity was 100%, specificity was 20%, positive predictive value was 45%, and negative predictive value was 100%. UTI was defined as >100,000 colony forming units/mL on urine culture and >10 white blood cells/mm³ on urinalysis. The dipstick test for leukocyte esterase was defined as positive if the result in the medical record was trace, +, or +++. 

Analysis of 243 Urine Specimens from 76 LTCF Asymptomatic Residents

- **Bacteriuria**
- **Pyuria**
- **Significant bacteriuria**
- **Significant bacteriuria with >1 organism**

Non-Specific Signs and Symptoms are Not Diagnostic for UTI

Table 1. Baseline Characteristics, Presenting Features, and Culture Results

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Total N = 265</th>
<th>UTI n = 150</th>
<th>Non-UTI n = 115</th>
<th>P-Value UTI vs Non-UTI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Geriatric syndromes, n (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Falls</td>
<td>79 (29.8)</td>
<td>47 (31.3)</td>
<td>32 (27.8)</td>
<td>.42</td>
</tr>
<tr>
<td>New or worsened confusion</td>
<td>117 (44.2)</td>
<td>70 (46.7)</td>
<td>47 (40.9)</td>
<td>.21</td>
</tr>
<tr>
<td>New or worsened urinary incontinence</td>
<td>27 (10.2)</td>
<td>17 (11.3)</td>
<td>10 (8.7)</td>
<td>.38</td>
</tr>
<tr>
<td>Functional decline</td>
<td>108 (40.7)</td>
<td>66 (44.0)</td>
<td>42 (36.5)</td>
<td>.11</td>
</tr>
<tr>
<td>Any geriatric syndrome</td>
<td>205 (77.4)</td>
<td>117 (78.0)</td>
<td>88 (76.5)</td>
<td>.70</td>
</tr>
<tr>
<td><strong>Clinical signs, n (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Suprapubic tenderness</td>
<td>29 (10.9)</td>
<td>20 (13.3)</td>
<td>9 (7.8)</td>
<td>.08</td>
</tr>
<tr>
<td>Costovertebral angle tenderness</td>
<td>7 (2.6)</td>
<td>7 (4.7)</td>
<td>0</td>
<td>.02</td>
</tr>
<tr>
<td>Pyrexia &gt;37°C</td>
<td>87 (32.8)</td>
<td>60 (40.0)</td>
<td>27 (23.5)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Urine pungent</td>
<td>24 (9.1)</td>
<td>14 (9.3)</td>
<td>10 (8.7)</td>
<td>.82</td>
</tr>
<tr>
<td>Urine discolored</td>
<td>11 (4.2)</td>
<td>9 (6.0)</td>
<td>2 (1.7)</td>
<td>.05</td>
</tr>
<tr>
<td>Patient smells of urine</td>
<td>15 (5.7)</td>
<td>8 (5.3)</td>
<td>7 (6.1)</td>
<td>.71</td>
</tr>
</tbody>
</table>
### Presenting Features Suggestive of UTI

**Table 1. Baseline Characteristics, Presenting Features, and Culture Results**

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<th>P-Value UTI vs Non-UTI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Presenting features</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urinary tract symptoms, n (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dysuria</td>
<td>35 (12.1)</td>
<td>31 (20.7)</td>
<td>4 (3.5)</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Hematuria</td>
<td>3 (1.1)</td>
<td>3 (2.0)</td>
<td>0</td>
<td>.13</td>
</tr>
<tr>
<td>Frequency</td>
<td>27 (10.2)</td>
<td>22 (14.7)</td>
<td>5 (4.3)</td>
<td>.002</td>
</tr>
<tr>
<td>Urgency</td>
<td>6 (2.3)</td>
<td>3 (2.0)</td>
<td>3 (2.6)</td>
<td>.64</td>
</tr>
<tr>
<td>Retention</td>
<td>18 (6.8)</td>
<td>17 (11.3)</td>
<td>1 (0.9)</td>
<td>.0004</td>
</tr>
<tr>
<td>Suprapubic pain</td>
<td>15 (5.7)</td>
<td>12 (8.0)</td>
<td>3 (2.6)</td>
<td>.03</td>
</tr>
<tr>
<td>Flank pain</td>
<td>9 (3.4)</td>
<td>9 (6.0)</td>
<td>0</td>
<td>.007</td>
</tr>
<tr>
<td>Rigors</td>
<td>16 (6.0)</td>
<td>14 (9.3)</td>
<td>2 (1.7)</td>
<td>.005</td>
</tr>
<tr>
<td>Any of the above</td>
<td>85 (32.1)</td>
<td>73 (48.7)</td>
<td>12 (10.4)</td>
<td>&lt; .001</td>
</tr>
</tbody>
</table>

Diagnosis of UTI in Frail Older Adults


• Crnich Algorithm for diagnosing UTIs in residents of long-term care facilities (2014) [Annals of Long-Term Care: Clinical Care and Aging. 2014;22(9):32-36]

• International Expert Consensus Decision Tool for Empiric UTI Treatment in Frail Older Adult (2018) [J Am Med Dir Assoc. 2018 Sep;19(9):757-764]

• IOU Consensus Guidelines for the Diagnosis of Uncomplicated Cystitis in Nursing Home Residents (2018) [J Am Med Dir Assoc. 2018 Sep;19(9):765-769.e3]
IOU Consensus Guidelines for the Diagnosis of Uncomplicated Cystitis in Nursing Home Residents.

Is This A Simple Uncomplicated Bladder Infection? (Cystitis)

- Resident Has Urinary Catheter OR
  - Has ≥ 2 Warning Signs or Symptoms Suggesting Possible Complicated Urinary Tract Infection Such as Pyelonephritis, Renal Abscess, Prostatitis? (See BOX 1)

  Yes

  Evaluate & Treat As Possible Complicated UTI

  No

  Resident Has Dysuria AND One Other Symptom in BOX 2

  Yes

  Cystitis Likely Obtain Urine and Treat Empirically

  No

  Resident Has Hematuria AND Suprapubic Pain?

  Yes

  Cystitis Likely Obtain Urine and Treat Empirically

  No

  Unlikely Cystitis Active Monitoring & Evaluate for Other Cause

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Box 1: Warning Signs & Symptoms of Complicated UTI
- Fever
- Flank Pain
- Rigors / Chills
- Prostatic / Scrotal Pain
- Urinary Catheter
- Hypotension
- Elevated Serum WBC

Box 2: Simple Cystitis Symptoms
- Gross Hematuria
- Suprapubic Pain
- Urinary Frequency/Urgency

Fig. 1. Algorithm for the diagnostic approach to uncomplicated cystitis in noncatheterized nursing home residents.

Nace DA et al. J Am Med Dir Assoc. 2018 Sep;19(9):765-769.e3
Active Monitoring

Active monitoring includes:

- Frequent assessment of vital signs for early detection of sepsis,
- Assessment for hydration and keeping resident hydrated,
- Criteria for notifying the physician or other provider if patient’s condition worsens.

- Obtain vital signs (BP, Pulse, Resp Rate, Temp, Pulse Ox) every ____ hours for ____ days.
- Record fluid intake each shift for _____ days.
- Notify physician if fluid intake is less than ______ cc daily.
- Offer resident _____ ounces of water / juice every _____ hours.
- Notify physician, NP, or PA if condition worsens, or if no improvement in _____ hours.
- Obtain the following blood work ________________________________.
- Consult pharmacist to review medication regimen.
- Contact the physician, NP, PA with an update on the resident’s condition on ________.

Effectiveness of Assessment/ Communication Tool That Incorporates Active Monitoring

A – Assessment (check boxes and determine recommendation prior to call)

- Resident with indwelling catheter:
  - fever of 100°F (38°C) or 2°F (1°C) greater than baseline
  - new costovertebral tenderness
  - rigors
  - new delirium
  - hypotension
  - Any one of the above present

- Resident without indwelling catheter:
  - Acute dysuria alone;
  - OR
  - Single temperature of 100°F (38°C), multiple at 99°F (37°C) or above, or 2°F (1°C) degrees greater than baseline AND at least one new or worsening of the following:
    - urgency
    - suprapubic pain
    - frequency
    - gross hematuria
    - costovertebral angle tenderness
    - new/worsening urinary incontinence

R – Recommendation

- Protocol criteria ARE met.
  - According to our understanding of best practices and our facility protocols the resident may have a urinary tract infection and need a prescription for an antibiotic agent.

- Protocol criteria are NOT met.
  - According to our understanding of best practices and our facility protocols, the information is insufficient to indicate an active urinary tract infection. The resident does NOT need an immediate prescription for an antibiotic, but may need additional observation.

Antibiotic use for Asymptomatic bacteriuria

- Nursing Home with over 25% utilization:
  - Pre-Intervention: 73.15%
  - Post-Intervention: 69.64%
  - 68.78%

- Nursing Home with less than 25% utilization:
  - Pre-Intervention: 49.35%
  - Post-Intervention: 68.78%

McMaughan DK et al. BMC Geriatr. 2016 Apr 15;16:81
### Sample SBAR Tool for Suspected Urinary Tract Infection

**Situation:** I am concerned about a suspected UTI for the above resident.

**Background:**
- Indwelling catheter [Yes/No]
- If Yes, [Urinary|Suprapubic]
- Infection [Yes/No]
- If Yes, is this a new or recurring [Yes/No]
- UTI in last 6 months [Yes/No]
- If Yes, Date: [ ]
- Organism: [ ]
- Treatment: [ ]
- Active diagnoses (especially bladder, kidney, genitourinary condition, diabetes, receiving dialysis, antiinfective): [ ]
- Advance directive for limiting treatment (especially antibiotic use): [ ]
- Medication allergies: [ ]

**Assessment:**
- Vital signs: BP / HR / Resp. rate / Temp / O2 Sat: [ ]

<table>
<thead>
<tr>
<th>Resident WITH Indwelling Catheter</th>
<th>Resident WITHOUT Indwelling Catheter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Criteria are met to initiate antibiotics if one of the following are selected:</td>
<td>Criteria are met to initiate antibiotics if one of the following are met:</td>
</tr>
<tr>
<td><strong>No</strong></td>
<td><strong>Yes</strong></td>
</tr>
<tr>
<td>○ Fever of 100°F (38°C), or 2°F (1.1°C) above baseline, or repeated temperatures of 99°F (37°C)</td>
<td>○ Any one of the following two:</td>
</tr>
<tr>
<td>○ New back or flank pain</td>
<td>○ Acute dysuria alone (pain or burning while urinating)</td>
</tr>
<tr>
<td>○ New onset delirium (new dramatic change in mental status)</td>
<td>○ Acute pain, swelling or tenderness of the scrotal area</td>
</tr>
<tr>
<td>○ Hypertension (significant change in baseline BP of &gt;80/50)</td>
<td>○ Single temp of 100°F (38°C), or 2°F (1.1°C) above baseline, or repeated temperatures of 99°F (37°C) and at least one of the following new or worsening symptoms:</td>
</tr>
<tr>
<td>○ Acute suprapubic pain</td>
<td>○ Urgency</td>
</tr>
<tr>
<td>○ Acute pain, swelling or tenderness of the scrotal area</td>
<td>○ Suprapubic pain</td>
</tr>
</tbody>
</table>

**Recommendation:**
- Protocol criteria met. Resident may require UA and urine culture or an antibiotic.
- Protocol criteria are NOT met. Resident DOES NOT need immediate antibiotic but may need additional observation.

**Physician Orders/Response (Please check all that apply):**
- Urine culture (if indicated)
- Encourage 6-8 ozs of cranberry juice or another liquid (not water) 1 glass (8 oz) until symptoms resolve
- Record fluid intake & output until symptoms resolve (output can also be measured from urinal or by weighing diapers, etc.)
- Access vital signs, including temp, every ______ hours for ______ days
- Monitor and notify PO if symptoms worsen or unreolved in ______ days
- Other: [ ]

For antibiotic orders (if needed) please complete script below:

**Drug: [ ]**
- **Dosage:** [ ]
- **Route:** [ ]
- **Frequency:** [ ]
- **Duration:** [ ]
- **Indication:** [ ]

**Physician Signature:** [ ]

Please Fax Back to: [ ]
- **Date/Time:** [ ]

[Facility Logo]

[Resident Label]

https://www.ahrq.gov/sites/default/files/wysiwyg/nhguide/4_TK1_T1-SBAR_UTI_Final.pdf

Diagnosis of UTI in Healthy Premenopausal, Non-Pregnant Women

- Infection suspected on the basis of typical symptoms
  - Dysuria (also common with urethritis or vaginitis)
  - Frequency
  - Urgency
  - Suprapubic pain
  - Hematuria
  - Fever (temperature >38°C), chills, flank pain, costovertebral-angle tenderness, and nausea or vomiting, with or without symptoms of cystitis is suggestive of pyelonephritis

- Sudden onset of symptoms or severe symptoms localizing to bladder as well as absence of vaginal irritation and discharge are more likely to be suggestive of cystitis

- Probability of cystitis is greater than 90% in women who have dysuria and frequency without vaginal discharge or irritation

- Urinalysis and urine culture not routinely needed for suspected cystitis

- Obtain urinalysis and urine culture for suspected pyelonephritis

Choosing Empiric Antibiotic Coverage

Points to consider when choosing antibiotic coverage in addition to allergies:

- Type of UTI syndrome being treated
- Any previous urine culture results in the recent past (6 months to 2 years)
- Antibiotic susceptibility pattern (Local Antibiogram) especially if previous urine cultures are not available
- Renal/ Hepatic function
- Drug-drug interactions
- Other comorbidities
Importance of Reviewing Older Culture Results When Deciding Empiric Treatment

**Predictive Value of Older Urine Culture Results For Current Episode**

- **Empiric antibiotic NOT covering all organisms growth in last 2 years (n=43)**
  - 33% Accurate coverage for current episode
  - Odds ratio, 6.9; 95% CI, 2.7 to 17.1; P<0.001

- **Empiric antibiotic covering all organisms growth in last 2 years (n=52)**
  - 77% Accurate coverage for current episode

- **Empiric antibiotic covering all organisms growth in last 6 months (n=41)**
  - 73% Accurate coverage for current episode

## Duration of Therapy Based on Agent and UTI Syndrome

<table>
<thead>
<tr>
<th>UTI Syndrome</th>
<th>Typical Duration of Therapy</th>
</tr>
</thead>
</table>
| Uncomplicated Cystitis | 5 days for Nitrofurantoin  
3 days for Trimethoprim/Sulfamethoxazole  
1 dose for Fosfomycin  
3 days for Fluoroquinolones (Second line agent)  
3-7 days for Beta-lactams (Second line agent) |
| Pyelonephritis | 14 days for Trimethoprim/Sulfamethoxazole  
10 to 14 days for Beta-Lactams  
7 days for Fluoroquinolones |
| Catheter-associated UTI or cystitis in presence of complicating factors | 7 days if prompt resolution of symptoms  
10-14 days if delayed response to therapy |

Gupta K et al. Clin Infect Dis 2011;52:e103-20  
### Potential Complicating Factors

<table>
<thead>
<tr>
<th>Factors</th>
<th>Examples</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obstruction</td>
<td>Ureteric or urethral strictures</td>
<td>Tumors of the urinary tract</td>
</tr>
<tr>
<td></td>
<td>Nephrolithiasis</td>
<td>Prostatic hypertrophy</td>
</tr>
<tr>
<td></td>
<td>Diverticula</td>
<td>Pelvicalyeal obstruction</td>
</tr>
<tr>
<td></td>
<td>Renal cysts</td>
<td>Congenital abnormalities</td>
</tr>
<tr>
<td>Instrumentation</td>
<td>Indwelling urethral catheter</td>
<td>Intermittent catheterization</td>
</tr>
<tr>
<td></td>
<td>Ureteric stent</td>
<td>Nephrostomy tube</td>
</tr>
<tr>
<td></td>
<td>Urologic procedures</td>
<td></td>
</tr>
<tr>
<td>Impaired voiding</td>
<td>Neurogenic bladder</td>
<td>Cystocele</td>
</tr>
<tr>
<td></td>
<td>Vesicoureteral reflux</td>
<td>Ileal conduit</td>
</tr>
<tr>
<td>Metabolic abnormalities</td>
<td>Nephrocalcinosis</td>
<td>Medullary sponge kidney</td>
</tr>
<tr>
<td></td>
<td>Renal failure ((eCrCl &lt; 30 \text{ mL/min})^{17})</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>Immunosuppressed (renal transplant)</td>
<td>Male sex</td>
</tr>
<tr>
<td></td>
<td>Pregnancy</td>
<td></td>
</tr>
</tbody>
</table>

Abbreviations: \(eCrCl\) = estimated creatinine clearance


Can J Infect Dis Med Microbiol Vol 16 No 6 November/December 2005
Managing UTI in Hospitalized Critically Ill Patients

- Initiate parenteral therapy
- Third generation cephalosporin is a good choice if patient not at risk for multi-drug resistant organisms
- Broader spectrum agent can be started if at risk for multi-drug resistant pathogens
- Carbapenems are preferred agent for treatment of severe infections when suspecting infection with ESBL organism
- Consider adding vancomycin if Gram stain shows Gram-positive cocci
- Deescalate antibiotics when culture results are back

Example of an Empiric Antibiotic Selection Pathway for Sepsis and Septic Shock

| Urinary Tract | Ceftriaxone 2g IV Daily +/-  
| Gentamicin 7 mg/kg IV EIAD (consider if history of MDR pathogen or Pseudomonas) |
| History ESBL colonization Erta Penem 1g qday alone |
| Severe beta-lactam allergy (anaphylaxis, hives): Aztreonam 2g q8h PLUS Gentamicin 7mg/kg IV EIAD |

https://www.nebraskamed.com/for-providers/asp/plans

Note: This is the 2019 version of guidance which will replace the currently uploaded version on the website in the next couple of month
## Prevention of UTI in Older Adults

<table>
<thead>
<tr>
<th>Prevention Strategy</th>
<th>Supported by Evidence</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>McMurdo ME at al. J Antimicrob Chemother. 2009 Feb;63(2):389-95</td>
</tr>
</tbody>
</table>
Impact of Antibiotic Prophylaxis on Antibiotic Resistance

E. coli isolates cultured from patients with asymptomatic bacteriuria

Figure 4. Antibiotic resistance among Escherichia coli isolated from patients with symptomatic urinary tract infection. AMOX indicates amoxicillin; AMOX-CLAV, amoxicillin-clavulanic acid; CIP, ciprofloxacin; GEN, gentamicin; NIT, nitrofurantoin; NOR, norfloxacin; and TMP-SMX, trimethoprim-sulfamethoxazole.

TMP-SMX group – 2.9 UTI episodes/year
Lactobacilli group – 3.3 UTI episodes/year

Beerepoot MA et al. Arch Intern Med. 2012 May 14;172(9):704-12
Recurrent UTI in Healthy Premenopausal, Non-Pregnant Women

- Urinary symptoms that persist or recur within a week or two of treatment for uncomplicated cystitis suggest infection with an antimicrobial-resistant strain or, rarely, relapse (Culture should be obtained and broader spectrum agent should be used)

- Symptoms recurred after 1 month – (Use first line agent for treatment; if recurred within 6 months consider using a different first line agent especially if trimethoprim-sulfamethoxazole was used last time)

- Consider behavioral counselling (frequency of intercourse, stopping use of spermicide, urinating soon after intercourse etc.)

- Use of biologic mediators (such as cranberry juice) can be offered although effectiveness is questionable.

- Antimicrobial prophylaxis should be used as a last resort.

- Motivated women with previous culture-confirmed cystitis who will comply with the treatment can be offered self diagnosis & treatment by prescribing first line antibiotic treatment for future use (but re-evaluate periodically)

- Choice of antibiotics for post-coital or continuous (discontinue and re-evaluate in 6 month) antimicrobial prophylaxis should be based on susceptibility of the most recently identified pathogen and pregnancy implications.

### Strategies to Consider for Improving Antibiotic Prescribing Practices

<table>
<thead>
<tr>
<th>Outpatient</th>
<th>Hospital</th>
<th>LTCF</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Implement strategies (e.g. pocket cards, educational posters, etc.) to promote use of evidence-based diagnostic criteria and treatment recommendations</td>
<td>- Facility specific diagnosis and/or treatment guidelines</td>
<td>- Implement SBAR tool</td>
</tr>
<tr>
<td>- Communications skills training for clinicians</td>
<td>- Prospective audit and feedback</td>
<td>- Establish standing orders for active monitoring for non-specific signs and symptoms</td>
</tr>
<tr>
<td>- Incorporate evidence-based guidelines into EHR order sets</td>
<td>- Requiring prior authorization for certain class of antibiotics (e.g. fluoroquinolones)</td>
<td>- Facility-specific diagnosis and/or treatment guidelines</td>
</tr>
<tr>
<td>- Establish culture follow up program</td>
<td>- Antibiotic time-out</td>
<td>- Implement mandatory review of necessity by medical directors for all outside antibiotic orders</td>
</tr>
<tr>
<td></td>
<td>- Implementing IV to PO conversion protocols</td>
<td>- Antibiotic time-out</td>
</tr>
<tr>
<td></td>
<td>- Pharmacy-driven dose adjustment &amp; optimization</td>
<td>- Provider Feedback</td>
</tr>
</tbody>
</table>
Thank you

Questions?