Epidemiology & Prevention of UTI

NHSN 2018 Training

Theresa Rowe, DO, MS

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Objectives

- Discuss epidemiology of UTI in long-term care (LTC)
- Review the importance of using standardized definitions for UTI in LTC
- Discuss role of UTI prevention
Harms from infections among SNF residents

- Infections were among the most common cause of harm; accounting for 26% of adverse events

<table>
<thead>
<tr>
<th>Type of Harm</th>
<th>Events related to infection</th>
<th>Infection events deemed preventable</th>
<th>Transfers to hospital from infection event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adverse events (n=148)</td>
<td>39 (25.8%)</td>
<td>22 (59%)</td>
<td>34 (87.2%)</td>
</tr>
<tr>
<td>Temporary (n=113)</td>
<td>20 (16.8%)</td>
<td>9 (45%)</td>
<td>NA</td>
</tr>
</tbody>
</table>

OIG report: Adverse Events in Skilled Nursing Facilities: National Incidence Among Medicare Beneficiaries (OEI-06-11-00370), Feb 2014
### Types of infections causing harm among SNF residents

<table>
<thead>
<tr>
<th>Type of infection</th>
<th>Events (All harm)</th>
<th>Preventable events</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pneumonia and Respiratory tract</td>
<td>15</td>
<td>5 (33%)</td>
</tr>
<tr>
<td>Surgical site infection</td>
<td>14</td>
<td>9 (64%)</td>
</tr>
<tr>
<td>Urinary tract</td>
<td>14 (includes 3 cases of sepsis)</td>
<td>10 (71%)</td>
</tr>
<tr>
<td>C. Difficile infections</td>
<td>7</td>
<td>5 (71%)</td>
</tr>
</tbody>
</table>
UTI in LTCF

- Most common cause of bacterial infections in LTCF residents
- Criteria used for diagnosis are not consistent across epidemiologic studies
  - Culture alone is not enough to track true incidence of symptomatic UTI
    - Prevalence of ASB in non-catheterized LTCF 25-50% (women)
    - Prevalence of ASB in catheterized LTCF residents 100%
  - Not all studies differentiate between catheter-associated UTI and non-catheterized symptomatic UTI
Prevalence of nursing home-associated infections in the Department of Veterans Affairs nursing home care units

Linda Tsan, MD, a Chester Davis, MPH, ScD, a Robert Langberg, MA, a Christa Hojlo, RN, PhD, a John Pierce, MD, a Michael Miller, MD, PhD, b Robert Gaynes, MD, c Cynthia Gibert, MD, d Ona Montgomery, RN, e Suzanne Bradley, MD, f Chesley Richards, MD, g Linda Danko, RN, h and Gary Roselle, MD, h Washington, DC; Bedford, Massachusetts; Atlanta, Georgia; Amarillo, Texas; Ann Arbor, Michigan; and Cincinnati, Ohio

<table>
<thead>
<tr>
<th>NHAI</th>
<th>Number of residents with specific NHAI</th>
<th>Percent of all NHAI</th>
<th>Point prevalence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symptomatic UTI</td>
<td>181</td>
<td>28.3</td>
<td>1.58</td>
</tr>
<tr>
<td>Asymptomatic bacteriuria</td>
<td>79</td>
<td>12.3</td>
<td>0.69</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>60</td>
<td>9.4</td>
<td>0.52</td>
</tr>
<tr>
<td>Skin infection</td>
<td>59</td>
<td>9.2</td>
<td>0.51</td>
</tr>
<tr>
<td>Gastroenteritis</td>
<td>45</td>
<td>7.0</td>
<td>0.39</td>
</tr>
<tr>
<td>Soft tissue infection</td>
<td>37</td>
<td>5.8</td>
<td>0.32</td>
</tr>
</tbody>
</table>

CDC NH Prevalence Survey Pilot, 2013-2014

- GI infections
- Skin and soft tissue infections
- Respiratory infections
- Urinary tract infections
- Other HAIs

Palms D. Am J Infect Control. Feb 2018
## UTI Definitions

<table>
<thead>
<tr>
<th>SHEA/CDC 2012</th>
<th>Loeb Criteria 2001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swelling or tenderness of the testes, epididymis or prostate</td>
<td>Acute dysuria alone or:</td>
</tr>
<tr>
<td><strong>or:</strong></td>
<td>Fever (&gt;37.9° or 1.5°C increase in baseline) plus one of the following:</td>
</tr>
<tr>
<td>Fever or leukocytosis and ≥ 1 localizing UTI subcriteria</td>
<td>• New or worsening urgency</td>
</tr>
<tr>
<td><strong>or:</strong></td>
<td>• Frequency</td>
</tr>
<tr>
<td>≥2 UTI subcriteria</td>
<td>• Suprapubic pain</td>
</tr>
<tr>
<td><strong>AND:</strong></td>
<td>• Gross hematuria</td>
</tr>
<tr>
<td>Microorganism identified on culture in appropriate counts</td>
<td>• CVA tenderness</td>
</tr>
<tr>
<td></td>
<td>• Urinary incontinence</td>
</tr>
</tbody>
</table>
MD Diagnosis and Surveillance Criteria

- Reviewed UTI or pneumonia cases diagnosed and treated by clinicians
- 33/146 (23%) met published surveillance or management criteria

Table 2  Incidence and attributable risk of infection

<table>
<thead>
<tr>
<th></th>
<th>Device (263 f/u-mon)</th>
<th>Non-device (644 f/u-mon)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total infections⁴</td>
<td>87</td>
<td>110</td>
</tr>
<tr>
<td>Urinary tract infections⁴</td>
<td>49</td>
<td>54</td>
</tr>
<tr>
<td>Pneumonia⁴</td>
<td>23</td>
<td>20</td>
</tr>
<tr>
<td>Other infections⁵</td>
<td>15</td>
<td>36</td>
</tr>
<tr>
<td>McGeer’s criteria⁶</td>
<td>8</td>
<td>15</td>
</tr>
<tr>
<td>Minimum criteria⁶</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>McGeer’s or minimum criteria⁶</td>
<td>15</td>
<td>18</td>
</tr>
</tbody>
</table>

Prevention of UTI

- Residents with urinary catheters
- Residents without urinary catheters
  - Cranberry formulations
  - Functional improvement
Large implementation project from 2014-2016

- Technical bundle: catheter removal, aseptic insertion, using regular assessments, training for catheter care, and incontinence care planning
- Socioadaptive intervention: enhancing attitudes and behaviors related to IP practices
  - Creating safety teams: engaging leadership, frontline staff, residents
  - Enhancing communication
Figure 2. Catheter-Associated Urinary Tract Infection (UTI) Rates, as Defined by the National Healthcare Safety Network, During the 12-Month Project Period by Data Submission

No. of nursing homes reporting

<table>
<thead>
<tr>
<th></th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥2 mo of data</td>
<td>361</td>
<td>368</td>
<td>376</td>
<td>374</td>
<td>366</td>
<td>361</td>
<td>358</td>
<td>349</td>
<td>337</td>
<td>333</td>
<td>216</td>
<td>193</td>
</tr>
<tr>
<td>All expected data</td>
<td>236</td>
<td>236</td>
<td>236</td>
<td>236</td>
<td>236</td>
<td>236</td>
<td>236</td>
<td>236</td>
<td>236</td>
<td>236</td>
<td>148</td>
<td>148</td>
</tr>
<tr>
<td>70% Expected data</td>
<td>319</td>
<td>328</td>
<td>335</td>
<td>337</td>
<td>334</td>
<td>332</td>
<td>338</td>
<td>338</td>
<td>326</td>
<td>319</td>
<td>208</td>
<td>182</td>
</tr>
</tbody>
</table>
Infections are a leading cause of illness and death in long-term care facilities. These infections include catheter-associated urinary tract infections (CAUTIs).

REMEMBER C.A.U.T.I. TO PREVENT CAUTI

Catheter Removal
- Think about a catheter to any of your residents. Are the catheter really necessary?
- Remove the catheter if there are no good indications for it (see below).
- Every resident deserves to be a catheter-free resident.

Aseptic Insertion
- Only trained personnel should insert catheters.
- Use hand hygiene, and insert using aseptic technique.
- Use the smallest catheter size that will allow good drainage for the resident.
- Avoid contamination of the catheter.
- Use catheter reposition devices.

Use Regular Assessments
- Insert new urinary catheters only when there is a good indication. Incontinence is not an appropriate indication for an indwelling urinary catheter.
- Consider alternatives to using a urinary catheter.
- Use a bladder ultrasound to guide management.
- Implement a process to see whether residents need catheters.

Training for Catheter Care
- In use, wash, mind, and family.
- Maintain a closed drainage system. And materials destructed urine time.
- Use routine hygiene. Do not clean the perineal area with aeroxipe.
- Know catheter changes, catheter, and culture are not required.

Incontinence Care Planning
- Consider alternate measures to avoid a urinary catheter when developing individual resident care plans and behavioral interventions.
- Consider timed and prompted intermittent use of a小额贷款.

Remember: No catheter means no CAUTI!

Appropriate Indications for an Indwelling Urinary Catheter
- To assist in healing of open scrotal or perineal wounds in incontinent residents
- For acute urinary retention or bladder outlet obstruction
- To improve comfort for end-of-life care if needed

The AHQR Safety Program for Long-Term Care: HAIs/CAUTI

The AHQR Safety Program for Long-Term Care: HAIs/CAUTI provides guides, tools and educational videos that will help you provide safer care for residents.

Tools Available

- How to implement an infection prevention quality improvement project
- Improve safety culture
- Engage residents and families
- Practice General Infection Prevention Skills
- Prevent Catheter-Associated Urinary Tract Infection
- Catheter-Associated Urinary Tract Infection Surveillance
- Reduce Unnecessary Urine Culturing and Overuse of Antibiotics

4 Things You Should Know About Urine Cultures

1. **Bacteria** in the urine does **not necessarily** mean a catheter-associated urinary tract infection (CAUTI) is present.

Bacteriuria is the term used to describe a positive urine culture, the presence of bacteria in the urine. This could point to either asymptomatic bacteriuria or to CAUTI. People can have bacteria in the urine that do not cause symptoms or harm; asymptomatic bacteriuria is not a urinary tract infection.

2. **Chronically catheterized residents have bacteriuria 99% of the time.**

Inappropriate triggers for urine cultures include—
- Urine color
- Urine smell
- Urine sediment
- Cloudy urine
- White blood cells in the urine
- Positive dipstick

3. Urine culturing can actually **harm** residents who have no CAUTI symptoms.

If a urinary catheter is present...
- ...urine may become cloudy and odorous and have sediments,
- ...and providers might incorrectly assume infection and obtain a urine culture,
- ...which can lead to incorrect diagnoses and inappropriate treatment and antibiotic use,
- ...as well as more resistant organisms, *Clostridium difficile*, increased cost, and further complications.

4. Urine cultures should only be ordered if one or more CAUTI symptoms are present.

The presence of cloudy, odorous urine with sediments does not alone indicate a CAUTI. CAUTI signs and symptoms are the following:

- Fever (even if the resident has another possible cause for the fever such as pneumonia)*  
- Rigors
- New confusion or functional decline (with NO alternative diagnosis AND leukocytosis)
- New suprapubic pain or costoovertebral angle pain or tenderness
- New, very low blood pressure (with no alternate noninfectious cause)
- Acute pain, swelling or tenderness of testes, epididymis, or prostate
- Pus around the catheter

* See CDC’s January 2016 “Urinary Tract Infection (UTI) Events for Long-term Care Facilities,” listed below.
Surveillance

- Diagnostic stewardship
  - catheter days
  - urine cultures / month
  - antibiotic starts / month

What are the results of your efforts to prevent CAUTI? Collect outcome data monthly to find out!

Resident Days
- Every day a resident (with or without a catheter) is in your facility = one resident day.
- Collect at the same time, each day of the month.

Number of Urine Cultures
This includes urine cultures collected for every resident (i.e., with or without catheters) each month.

Number of CAUTIs
- CAUTI is counted on the first day that the cluster of signs and symptoms, lab reports, and the presence of a catheter for more than 2 consecutive days are found together.
- A CAUTI event might continue for days or even weeks, but it is counted only once, not each consecutive day.
- Note that a resident may have multiple CAUTI events in one month.

Catheter Days
- Every day a resident has an indwelling urinary catheter = one catheter day.
  - Catheter needs to stay in place (i.e., not an in and out catheterization)
  - Catheter is through the urethra (i.e., not suprapubic or urethrostomies)
  - Collect at the same time each day of the month

Example:
A facility has seven residents with indwelling urinary catheters for the month of June. During the midnight census the data to the right are collected:

<table>
<thead>
<tr>
<th>Resident Days with Catheter</th>
<th>Resident Days with Catheter</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>10</td>
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<tr>
<td>5</td>
<td>12</td>
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<tr>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>7</td>
<td>4</td>
</tr>
</tbody>
</table>

(30x3) + 10 + 12 + 7 + 4 = 123 catheter days

Remember: Data help you determine your progress!
Toolkit Sections

- **Implementation**

- **Sustainability**

- **Resources**
Effect of Cranberry Capsules on Bacteriuria Plus Pyuria Among Older Women in Nursing Homes
A Randomized Clinical Trial

Test the effect of cranberry capsules on reduction of pyuria plus bacteruria
Women aged ≥ 65 years in 21 NH
No difference in incidence of bacteria and pyuria compared with placebo

JAMA 2016;316(18):1879-1887
Figure 2. Bimonthly and Overall Adjusted Percentages of Bacteriuria Plus Pyuria Specimens by Treatment Status (N = 185)
Bottom line on cranberries?

- Probably doesn’t hurt
- Provides hydration and calories
Prevention of UTI

- Hydration and nutrition
- Provide good perineal hygiene
- Encourage good voiding habits
- Functional status

Conclusion

- UTIs are common and a significant cause of harm in LTCF
- The actual incidence of UTI in LTCF is unknown
- Evidence based approaches to reducing UTI should be utilized
- Drink up!
Thank you!

For more information, contact CDC
1-800-CDC-INFO (232-4636)

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.