Systematic Review of Interventions to Reduce Catheter-Associated Urinary Tract Infection in the Long-Term Care Setting

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Dr. Meddings has received honoraria for educational content development and lectures related to CAUTI from SHEA, APIC, RAND, hospitals and hospital associations.
Learning Objectives

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

1. To **summarize the major findings from a recent systematic literature review** regarding evidence regarding the impact of interventions to reduce catheter-associated urinary tract infection (CAUTI) in the long-term care setting

2. To understand the **development of an evidence-based CAUTI bundle** of preventative interventions appropriate for implementation in the long-term care setting
Methods

- Dual-abstraction of included intervention studies
- Quality scoring using a modified Diamond-Black tool
- Evidence tables describing interventions, quality, outcomes
- CAUTI bundle development derived from evidence review
Study Eligibility Criteria

Controlled studies (including randomized and non-randomized trials) in English that assess the impact of interventions to reduce **UTI events** and/or to reduce **urinary catheter use** in the LTC setting, or related settings of rehabilitation units and spinal cord programs.

Outcomes:

- **UTI events** categorized by primary outcomes of nosocomial UTI and CAUTI, or secondary outcome of bacteriuria.
- **Urinary catheter types**: acute and chronic use of indwelling urethral, indwelling suprapubic, intermittent use, and external “condom” catheters.
Results: Study Selection

Identification

5660 total records retrieved by systematic search

Screening

577 records remain after screening by title/abstract

15 new records added after reference list review

Eligibility

209 full-text articles reviewed as potential interventions

60 remaining records, draft abstracted for setting, design, and outcomes to confirm eligibility

Included

30 records (29 studies) dual-abstracted

Final: 28 records (27 studies) summarized in detail
<table>
<thead>
<tr>
<th>Interventions with recent systematic reviews (summarized, but not abstracted in detail)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cranberry use</td>
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<tr>
<td>Catheter coatings</td>
</tr>
<tr>
<td>Antimicrobial prophylaxis</td>
</tr>
<tr>
<td>Washout/irrigation</td>
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<tr>
<td>Sterile vs. clean intermittent catheterization</td>
</tr>
<tr>
<td>Catheter change frequency</td>
</tr>
<tr>
<td>28 records (summarizing 27 studies) reviewed in detail for abstraction</td>
</tr>
<tr>
<td>Single interventions studied by 9 studies</td>
</tr>
<tr>
<td>Multiple interventions studied by 18 studies</td>
</tr>
</tbody>
</table>
Interventions Studied in Abstracted Studies

- Improving hand hygiene
- Improving patient hygiene
- Improving patient hydration
- Infection surveillance as an intervention
- Initiation of infection control programs
- Programs to improve patient incontinence and ambulation
- Barrier precaution interventions (prompted, pre-emptive)
- Supplementation with rice vinegar, vitamin/minerals
- Culture change, nurse ownership of CAUTI/urinary catheter use
Results: CAUTI Outcomes

No uniform reporting of CAUTI events or urinary catheter use in the long-term care setting:

• Symptomatic criteria varied (if even specified)
• Laboratory diagnosis criteria varied
• CAUTI measures varied:
  ▪ CAUTI per 1000 catheter-days
  ▪ CAUTI per 1000 resident-days
  ▪ CAUTI counts or incidence

8 studies reported reductions in CAUTI measures, but only one reported a statistically significant reduction.

Many studies were underpowered to report changes in CAUTIs.
Results: Urinary Catheter Outcomes

Only 10 studies reported urinary catheter use measures. **No uniform reporting of catheter use in long-term care residents:**

- Prevalence of indwelling catheters
- Prevalence of indicated and non-indicated catheters
- Urinary catheter utilization ratios
- Number of catheterizations
- Number of catheters used
- Time to become catheter-free

**6 studies** reported reductions in urinary catheter use, but only 1 study reported a statistically significant reduction (many underpowered).
## Outcomes Reported

<table>
<thead>
<tr>
<th>Study</th>
<th>CAUTI, UTI or Bacteriuria</th>
<th>Catheter Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abraham 2012</td>
<td><strong>CAUTI</strong>/1000 device days: 10.1 -&gt; 0</td>
<td>-</td>
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<tr>
<td>Ahlbrecht 1999</td>
<td>Symptomatic UTI rate: 1.18 -&gt; 1.14</td>
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<tr>
<td></td>
<td>UTI (female, non-ambulatory): 2.4 -&gt; 3.1*</td>
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<tr>
<td>Brownhill 2013</td>
<td>Mean <strong>CAUTI</strong>/month: 18.3 -&gt; 4.3</td>
<td>Mean No. Indwelling/ month: 67 -&gt; 61</td>
</tr>
<tr>
<td></td>
<td>Mean UTI/month: 55 -&gt; 18.75</td>
<td>Prevalence Indwelling: 23.5% -&gt; 19.1%</td>
</tr>
<tr>
<td>Cassel 2008</td>
<td>-</td>
<td>Prevalence Indwelling: 21% -&gt; 10%</td>
</tr>
<tr>
<td>Chung 2012</td>
<td>Symptomatic <strong>CAUTIs</strong>: 3 -&gt; 0</td>
<td>-</td>
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<tr>
<td></td>
<td>Catheter-associated bacteriuria severity: 1.4 -&gt; 2.1</td>
<td>-</td>
</tr>
<tr>
<td>Cools 1988</td>
<td>% residents treated for UTIs or CAUTIs: 50%-&gt; 12.5%</td>
<td>Prevalence Indwelling: 21% -&gt; 10%</td>
</tr>
<tr>
<td>Darouiche 2006</td>
<td>Symptomatic <strong>CAUTI</strong>/1000 device days: 4.9 -&gt; 2.7</td>
<td>-</td>
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<tr>
<td></td>
<td>% of catheterized with CAUTIs: 24.1%-&gt; 13.3%</td>
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<tr>
<td>Evans 2013</td>
<td>MRSA UTIs: <strong>33% reduction</strong></td>
<td>-</td>
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<tr>
<td>Fendler 2002</td>
<td>Symptomatic <strong>CAUTI</strong>/1000 resident days: 0.77-&gt;0.63</td>
<td>-</td>
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<tr>
<td>Flynn 2011</td>
<td><strong>CAUTI</strong>/1000 device days: 3.09-&gt; 0.99</td>
<td>Utilization Ratio: 0.2 -&gt; 0.16</td>
</tr>
<tr>
<td>Galeon 2014</td>
<td><strong>CAUTI</strong>/1000 device days: 24% reduction</td>
<td>-</td>
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<tr>
<td>Gokula 2013</td>
<td>-</td>
<td>No. Indwelling catheters used: 68 -&gt; 13</td>
</tr>
<tr>
<td>Klay 2005</td>
<td>UTIs: 31-&gt; 6</td>
<td>-</td>
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<tr>
<td>Lin 2013</td>
<td>Bacteriuria: experimental 39-&gt;23%, control 17-&gt;10%</td>
<td>-</td>
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<td>Liu 2007</td>
<td>Symptomatic UTI/1000 resident days: 0.19-&gt;0.14</td>
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<td>McConnell 1984</td>
<td>Mean UTI/month (ranges): 3-9 -&gt; 1-3</td>
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<tr>
<td>Mentes 2003</td>
<td>Hydration-linked UTI: 4.1% -&gt; 0%</td>
<td>-</td>
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<tr>
<td>Mody 2015</td>
<td>Symptomatic <strong>CAUTI</strong>/1000 device days: 10.63-&gt;6.18*</td>
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<td>Priefer 1982</td>
<td>% residents with symptomatic <strong>CAUTI</strong>: 83% → 30%</td>
<td>-</td>
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<tr>
<td>Saint 2006</td>
<td>(Symptomatic UTI or bacteriuria or death)/1000 patient days: condom catheter 70, indwelling catheter 131</td>
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<td>Salamon 2009</td>
<td>Symptomatic <strong>CAUTIs</strong> in Unit A: 17→0, Unit B: 1→2</td>
<td>Utilization Ratios: A: 0.17→0.13, B:0.14→0.15</td>
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<td>Suardi 2001</td>
<td>-</td>
<td>Fewer Foleys used*</td>
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<td>Tang 2006</td>
<td>Symptomatic <strong>CAUTIs</strong> by day 14: ISC 1, Foley 0</td>
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<td>Van Gaal, 2011</td>
<td>Symptomatic UTI incidence: experimental 0.03→0.02, usual care 0.03→0.02</td>
<td>% with correct indication experimental <strong>34→32%</strong>, usual care 16→34%</td>
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<td>Yeung 2011</td>
<td>UTI hospitalization/1000 resident days: experimental <strong>0.27→0.16</strong>, control 0.09→0.27</td>
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<td>Olsen-Scribner 2014</td>
<td>No difference in low CAUTI rates. Higher compliance (91% vs. 72%) with catheter care and use with one-on-one teaching compared to on-line only teaching</td>
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<tr>
<td>Miller 2014</td>
<td>Higher rates of UTIs (p=0.02) in NH’s with lower implementnation of culture change</td>
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CAUTI Bundle Recommendations

Derived from current evidence review regarding CAUTI prevention interventions in the long-term care setting

&

Evidence previously reviewed systematically regarding CAUTI prevention in the acute-care setting*

CAUTI Bundle for LTC

| CAUTI Bundle for LTC |   |   |   |   |
CAUTI Bundle for LTC

| C | Catheter removal: Remove the catheter if there is no appropriate indication for it; catheters in newly admitted patients should be removed to assess if still needed; every resident deserves to be catheter-free and infection-free. |
## CAUTI Bundle for LTC

| A | Aseptic insertion of indwelling catheters: only trained personnel should insert catheters; use hand hygiene and insert using sterile technique; avoid contamination of the catheter; use catheter securing devices. |
## CAUTI Bundle for LTC

| U | Use regular assessments: insert new urinary catheters only when there is an appropriate indication; consider alternatives to using a urinary catheter; use a bladder ultrasound to guide management; implement a process to see whether residents need catheters. |
### CAUTI Bundle for LTC

| Training for catheter care: train staff, residents and families; maintain a closed drainage system, and maintain unobstructed urine flow; use routine hygiene; do not clean the periurethral area with antiseptics; routine catheter changes, urinalysis, and cultures are not required. |
| Incontinence care planning: consider alternatives to using a urinary catheter when developing individual resident care plans and behavioral interventions; consider timed and prompted voiding and use of a voiding diary. |
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Infections are a leading cause of illness and death in nursing homes.

These infections include catheter-associated urinary tract infections (CAUTIs).

**CAUTI**

- **Catheter Removal**
  - Think about catheters in any of your residents. Are the catheters really necessary?
  - Remove the catheter if there is no good indication for it. (See below.)
  - Every resident deserves a chance to be catheter-free and infection-free.

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

- **Use Regular Assessments**
  - Insert new urinary catheters only when there is a good indication.
  - 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**
  - Train staff, resident, AND family.
  - Maintain a closed drainage system, and maintain unobstructed urine flow.

- **Incontinence Care Planning**
  - Consider alternatives to using a urinary catheter when developing individual resident care plans and behavioral interventions.
  - Consider timed and prompted voiding and use of a voiding diary.

**Appropriate Indications for a Urinary Catheter**

- To assist healing of stage III or stage IV perineal and sacral wounds in incontinent residents
- Chronic and acute urinary retention or obstruction
- Hospice or palliative care associated with intractable pain

Would you like to know more? Participation in the AHRQ Safety Program for Long-Term Care: CAUTI gives you access to informative resources and events such as educational webinars and state-level training sessions that will help you to provide safer care for your residents. Talk to the project lead in your facility, or visit www.ltcsafety.org (login and password: ltcsafety).

**The AHRQ Safety Program for Long-Term Care: CAUTI**

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Bibliography of 28 Included Records (27 Studies)


Thank you!

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