Controversies in CAUTI Prevention

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Controversies

1. Appropriate indications
2. Where and how do we intervene?
3. Improvement in appropriateness or reduction in use?
4. How do we define CAUTI?
5. NHSN vs. population based CAUTI rates
6. Screening urine cultures
7. Bacteriuria and antimicrobial use
Controversy #1: what are the appropriate indications?

• We support the 2009 CDC HICPAC guidelines
• Consensus based guidelines that provide a reasonable guide to institutions, healthcare workers
• Hospitals are encouraged to have a clear identification of what is considered appropriate
• Disseminate to healthcare workers the acceptable indications for use at your facility
2009 Prevention of CAUTI HICPAC Guidelines
(Gould et al, Infect Control Hosp Epidemiol 2010; 31: 319-326)

<table>
<thead>
<tr>
<th>A. Examples of Appropriate Indications for Indwelling Urethral Catheter Use $^1$-$^4$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient has acute urinary retention or bladder outlet obstruction</td>
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<tr>
<td>Need for accurate measurements of urinary output in critically ill patients</td>
</tr>
<tr>
<td>Perioperative use for selected surgical procedures:</td>
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<tr>
<td>• Patients undergoing urologic surgery or other surgery on contiguous structures of the genitourinary tract</td>
</tr>
<tr>
<td>• Anticipated prolonged duration of surgery (catheters inserted for this reason should be removed in PACU)</td>
</tr>
<tr>
<td>• Patients anticipated to receive large-volume infusions or diuretics during surgery</td>
</tr>
<tr>
<td>• Need for intraoperative monitoring of urinary output</td>
</tr>
<tr>
<td>To assist in healing of open sacral or perineal wounds in incontinent patients</td>
</tr>
<tr>
<td>Patient requires prolonged immobilization (e.g., potentially unstable thoracic or lumbar spine, multiple traumatic injuries such as pelvic fractures)</td>
</tr>
<tr>
<td>To improve comfort for end of life care if needed</td>
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</tbody>
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<table>
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<tr>
<th>B. Examples of Inappropriate Uses of Indwelling Catheters</th>
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</thead>
<tbody>
<tr>
<td>As a substitute for nursing care of the patient or resident with incontinence</td>
</tr>
<tr>
<td>As a means of obtaining urine for culture or other diagnostic tests when the patient can voluntarily void</td>
</tr>
<tr>
<td>For prolonged postoperative duration without appropriate indications (e.g., structural repair of urethra or contiguous structures, prolonged effect of epidural anaesthesia, etc.)</td>
</tr>
</tbody>
</table>

Note: These indications are based primarily on expert consensus.
Controversy #2: where and how do we intervene?

- Avoid placement?
- Prompt removal when no longer needed?
- Proper insertion technique?
- Proper maintenance?
- All?
- The absence of the catheter = no CAUTI + no mechanical complications
Limit catheter use to indications (Avoid placing the catheter unless appropriately indicated)

Limit catheter use to indications (promptly remove those that are no longer necessary)

Reduce urinary catheter days leading to a reduction in days at risk for CAUTI

Reduce risk of introducing organisms to the bladder leading to a reduction of risk of CAUTI when catheter in place

Appropriate Care of the Catheter

Proper Insertion Technique

Reducing Risk of CAUTI
Controversy #2: where and how do we intervene?

- Wish list: multi-departmental, multidisciplinary approach (whether on the same unit or in between units)
- In addition to non-ICU, target areas of high placement (ED), or high use (ICU, OR)
- Synergy/support between the different units
Controversy #2: where do we intervene?

**PACU/OR**
- Remove promptly after surgery before transfer out

**ICU**
- Evaluate for continued need
- Discontinue no longer needed before transfer out

**Non-ICU**
- Evaluate need on admission
- Evaluate for continued need

**ED**
- Avoid initial placement
- Reevaluate for continued need after patient stabilizes
Controversy #3: improvement in appropriateness or reduction in use?

• Should we follow changes in use or improvements in appropriateness or both?
• Reduction in catheter use should translate to an improvement in appropriateness
• Evaluation for appropriateness is helpful if no changes in use are seen with intervention
Improvements in utilization depend on the reduction of the inappropriate use.

<table>
<thead>
<tr>
<th>Baseline</th>
<th>Intervention</th>
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</thead>
<tbody>
<tr>
<td><strong>Patient</strong></td>
<td><strong>Catheter</strong></td>
</tr>
<tr>
<td>Days</td>
<td>days</td>
</tr>
<tr>
<td>1,000</td>
<td>200</td>
</tr>
<tr>
<td>1,000</td>
<td>200</td>
</tr>
</tbody>
</table>
So you have intervened...

- The results show marked improvement in appropriate indications, but no significant change in urinary catheter utilization
- What are the possibilities?
Improved appropriateness but not utilization

- Change in population to those that are more likely to need the catheter (very unlikely unless there was a shift in the types of patients admitted to the unit)
- Labeling of cases as having appropriate indications although they are not
Controversy #4: what is CAUTI?

- Multiple definitions
- Clinical (IDSA)
- Clinician (the physician’s impression)
- Surveillance (NHSN)
IDSA Guidelines for Diagnosis of CAUTI
(Hooton, Clin Infect Dis 2010; 50:625–663)

• Signs and symptoms: “new onset or worsening of fever, rigors, altered mental status, malaise, or lethargy with no other identified cause; flank pain; costovertebral angle tenderness; acute hematuria; pelvic discomfort”

Many signs and symptoms are not specific for CAUTI!!
IDSA Guidelines for Diagnosis of CAUTI
(Hooton, Clin Infect Dis 2010; 50:625–663)

• If catheter removed: “dysuria, urgent or frequent urination, or suprapubic pain or tenderness”

• Spinal cord injury: “increased spasticity, autonomic dysreflexia, or sense of unease”
Pyuria is not diagnostic of CAUTI

(Hooton, Clin Infect Dis 2010; 50:625–663)

• Pyuria does not help differentiating asymptomatic bacteriuria from CAUTI
• Pyuria + bacteria ≠ CAUTI
Inappropriate Treatment of Asymptomatic Bacteriuria
(Cope, Clin Infect Dis 2009; 48: 1182-8)

• The study evaluated those with asymptomatic bacteriuria and the factors associated with inappropriate antibiotic use

• Advanced age, type of predominant organism (gram negative), and an elevated urine white blood cells count were significantly associated with inappropriate treatment
The Clinician’s Practice

• Bacteriuria or candiduria are common in patients with an indwelling urinary catheter
• Clinicians tend to treat asymptomatic bacteriuria
• Reduce inappropriate antibiotic use with obtaining urine cultures only when indicated
NHSN Symptomatic CAUTI
(www.cdc.gov/nhsn/PDFs/pscManual/7pscCAUTIcurrent.pdf)

• Surveillance definition: depends on having a positive urine culture and clinical/ laboratory findings.
• Heavily dependent on the presence of fever
• May help evaluate improvement for the same hospital over time for those that are catheterized
According to CDC, this does not exclude other identified infections.
Figure 2: Identification and Categorization of SUTI Indwelling Catheter Discontinued in Prior 48 Hours

Patient had an indwelling urinary catheter discontinued within 48 hours prior to specimen collection

- Signs and Symptoms
  - At least 1 of the following with no other recognized cause:
    - fever (>38°C)
    - urgency
    - frequency
    - dysuria
    - suprapubic tenderness
    - costovertebral angle pain or tenderness

- Urinalysis
  - A positive urinalysis demonstrated by at least 1 of the following findings:
    - positive dipstick for leukocyte esterase and/or nitrite
    - pyuria (urine specimen with ≥10 WBC/mm³ of unspun urine or ≥3 WBC/high power field of spun urine)
    - microorganisms seen on Gram stain of unspun urine

- Culture Evidence
  - A positive urine culture of ≥10⁵ CFU/ml with no more than 2 species of microorganisms
  - A positive urine culture of ≥10³ and <10⁸ CFU/ml with no more than 2 species of microorganisms

- SUTI — Criterion 1a
  - CAUTI

- SUTI — Criterion 2a
  - CAUTI
NHSN Symptomatic CAUTI
(www.cdc.gov/nhsn/PDFs/pscManual/7pscCAUTIcurrent.pdf)

• Caution: if practice of obtaining urine cultures changes, the NHSN rate may be influenced without a change in true CAUTI

• Changing the frequency of obtaining urine cultures will affect the number of NHSN symptomatic CAUTI
Number of NHSN CAUTIs with a change in urine cultures (n=1,000 patients)

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Prevalence of Bacteriuria</th>
<th>% of Urine Cultures Obtained</th>
<th>Prevalence of Fever &gt;38°C</th>
<th>Number of Symptomatic NHSN CAUTIs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scenario1</td>
<td>30%</td>
<td>30%</td>
<td>20%</td>
<td>18</td>
</tr>
<tr>
<td>Scenario2</td>
<td>30%</td>
<td>60%</td>
<td>20%</td>
<td>36</td>
</tr>
<tr>
<td>Scenario3</td>
<td>30%</td>
<td>10%</td>
<td>20%</td>
<td>6</td>
</tr>
</tbody>
</table>

- If we increase the number of urine cultures, we risk overestimating the NHSN CAUTI rate and not seeing an improvement with our interventions.
- The opposite may happen if we reduce the use of urine cultures (for example, treat for possible CAUTI without obtaining a urine culture).
What may increase NHSN CAUTI rate despite improvements in process?

• An increase in obtaining urine cultures
• An intervention that leads to significant reduction in urinary catheter use, selecting a higher risk population (Fakih et al, Am J Infect Control. 2011 Aug 24; Wright et al, Infect Control Hosp Epidemiol 2011;32:635-640)
Controversy #5: NHSN vs. population based CAUTI rate

- NHSN rate reflects the risks related to insertion and maintenance of the catheter
- May be very helpful in settings where there are no significant changes in use of catheter
- Used in the ICU, may be difficult to calculate in the non-ICU because of data collection burden (catheter-days)
Population CAUTI rate: advantages

- The population based rate (with patient-days as a denominator) would help identify if there was improvement in CAUTI related to a reduction in urinary catheter use (Fakih et al, Am J Infect Control 2012; 40: 359-64)
- Easier to use in the non-ICU (saves the data collection burden of obtaining catheter-days)
- Reflects both changes in NHSN rate and utilization ratio
- Population rate= NHSN rate x UR x10
Fig 2. Percent change in population CAUTI rate and NHSN CAUTI rate across a wide range of interventions. Points A, B, and C reflect different simulated interventions. Red areas indicate that for interventions represented by these areas, the measure increased from preintervention to postintervention; blue areas indicate that the measure decreased over this period. The magnitude of the increase or decrease is reflected by the bar in the center in terms of percent change.

(Fakih et al, Am J Infect Control 2012; 40: 359-64)
Controversy #6: Screening Urine Cultures

• The practice: “screening culture on admission”, “standing orders” or “reflex orders” for urine cultures based on urinalysis results

1. may not help the hospital avoid non-reimbursement

2. May increase utilization of additional resources (testing, antibiotics, consults)

3. May adversely affect patients exposing them to inappropriate testing and treatments
Patient presents with CHF from nursing home with chronic urinary catheter...

- On admission, urine culture is done to “document present on admission” and grows *E. coli*
- Six days later, the patient develops fever (102°F) and chills. Repeat urine culture grows *E. coli*.
- The case fits the NHSN definition of symptomatic CAUTI and also would not be reimbursable by CMS.
Controversy #7: Antimicrobial use and bacteriuria

- So we have a positive urine culture: when should we use antibiotics?
- Understanding the prevalence of asymptomatic bacteriuria in patients with indwelling urinary catheters
- Understanding the risks associated with inappropriate antimicrobial use
Table 2. Prevalence of asymptomatic bacteriuria in selected populations.

<table>
<thead>
<tr>
<th>Population</th>
<th>Prevalence, %</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy, premenopausal women</td>
<td>1.0–5.0</td>
<td>[31]</td>
</tr>
<tr>
<td>Pregnant women</td>
<td>1.9–9.5</td>
<td>[31]</td>
</tr>
<tr>
<td>Postmenopausal women aged 50–70 years</td>
<td>2.8–8.6</td>
<td>[31]</td>
</tr>
<tr>
<td>Diabetic patients</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Women</td>
<td>9.0–27</td>
<td>[32]</td>
</tr>
<tr>
<td>Men</td>
<td>0.7–11</td>
<td>[32]</td>
</tr>
<tr>
<td>Elderly persons in the community(^a)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Women</td>
<td>10.8–16</td>
<td>[31]</td>
</tr>
<tr>
<td>Men</td>
<td>3.6–19</td>
<td>[31]</td>
</tr>
<tr>
<td>Elderly persons in a long-term care facility</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Women</td>
<td>25–50</td>
<td>[27]</td>
</tr>
<tr>
<td>Men</td>
<td>15–40</td>
<td>[27]</td>
</tr>
<tr>
<td>Patients with spinal cord injuries</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intermittent catheter use</td>
<td>23–89</td>
<td>[33]</td>
</tr>
<tr>
<td>Sphincterotomy and condom catheter in place</td>
<td>57</td>
<td>[34]</td>
</tr>
<tr>
<td>Patients undergoing hemodialysis</td>
<td>28</td>
<td>[28]</td>
</tr>
<tr>
<td>Patients with indwelling catheter use</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short-term</td>
<td>9–23</td>
<td>[35]</td>
</tr>
<tr>
<td>Long-term</td>
<td>100</td>
<td>[22]</td>
</tr>
</tbody>
</table>

\(^a\) Age, ≥70 years.

• Screening and treatment of bacteriuria recommended for:
  1. Pregnancy
  2. Before transurethral resection of the prostate
  3. Urologic procedures for which mucosal bleeding is anticipated

• Screening and treatment of asymptomatic bacteriuria not recommended for

1. Non-pregnant women
2. Diabetic women
3. Elderly in the community or institutionalized
4. Persons with spinal cord injury
5. Patients with indwelling catheter
Risk of Obtaining Cultures with no Symptoms

- Urinary catheter present in an asymptomatic patient
- Cloudy, odorous urine, sediments
- Inappropriate use of urine culture
- Inappropriate antimicrobial use
- More resistant organisms, *Clostridium difficile*, increased cost, Patient harm
Reduce urinary catheter use

Avoid obtaining urine cultures unless clinically indicated

Promote aseptic insertion and maintenance

Do not treat asymptomatic bacteriuria except for selected conditions

Reducing CAUTI
Summary: steps to success

1. Have clearly identified appropriate indications for urinary catheter use
2. Multi-departmental/ multidisciplinary approach to reduce urinary catheter use
3. Promote proper insertion and maintenance
4. Avoid obtaining urine cultures unless clinically indicated
5. Do not treat asymptomatic bacteriuria except for selected conditions
Numbers are important, but more important is establishing a process to improve safety at your hospital...

You do not want to run after one carrot and miss a whole bunch!