The “Culture of Culturing”: when is a urine culture appropriate
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June 9, 2016
Healthcare Goals

• To improve outcome of patients and prevent hospital acquired conditions
  – Reliably provide evidenced based interventions
• To achieve significant improvements in teamwork and safety culture
How will we get there?

Key concepts: Adaptive and Technical Work

Technical Work

Sweet Spot

Adaptive Work
A Program to Prevent Catheter-Associated Urinary Tract Infection in Acute Care

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Study Population and Methods

- 926 units (59.7% non-ICU, 40.3% ICU) (more than 10% of U.S. acute care hospitals)
- 603 hospitals in 32 states, the District of Columbia and Puerto Rico
- Sponsored by the AHRQ (and based on the successful Michigan Health and Hospital Association (MHA) Keystone Center’s Bladder Bundle)
- National collaboration of professional societies, academic researchers, government agencies (IE:CDC), and state hospital associations
- Combination of application of technical practices to prevent CAUTI and addressing socio-adaptive factors (through the application of CUSP)
- 9 Cohorts of hospital units participated—reporting the results of the first 4 Cohorts
- Began March of 2011 to November of 2013 (18 months)
Goals of Program

• Reduce Catheter associated UTIs
• Improve attitudes and behavior with respect to safety (IE: safety culture)

Timeline

• 3 month baseline
• 2 months implementation phase
• 12 months—sustainability phase

Program Components

• 3 in-person meetings-”Learning Sessions” over course of 18 months
• Monthly National Content Calls—experts provided education on both technical and socio-adaptive aspects of CAUTI prevention
• Monthly coaching calls by state organizations/leaders
## Key Interventions

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Example of Intervention</th>
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<tbody>
<tr>
<td><strong>Primary</strong></td>
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<tr>
<td>Conducting daily assessment of the presence of and need for an indwelling urinary catheter</td>
<td>Conducting daily nursing rounds to review urine-collection strategies, including indications for continued urinary-catheter use</td>
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<tr>
<td>Avoiding use of an indwelling urinary catheter by considering alternative urine-collection methods</td>
<td>Promoting the use of condom catheters, bladder scanners, intermittent straight catheterization, and accurate measurement of daily weight (all in lieu of indwelling urinary catheters)</td>
</tr>
<tr>
<td>Emphasizing the importance of aseptic technique during catheter insertion and proper maintenance after insertion</td>
<td>Developing or updating the catheter-insertion policy to include all the proper steps, developing competencies for health care workers who insert catheters, and considering periodic audits of catheter placement</td>
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<tr>
<td><strong>Additional</strong></td>
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<tr>
<td>Providing feedback to the units regarding urinary-catheter use and catheter-associated UTI rates</td>
<td>Providing nurses and physicians with data on urinary-catheter use, with monthly feedback on use and catheter-associated UTIs</td>
</tr>
<tr>
<td>Addressing any identified gaps in knowledge of urinary management processes†</td>
<td>Conducting an evaluation for gaps in knowledge of infectious and noninfectious consequences of urinary-catheter use; developing tailored educational materials to fill identified gaps; using multiple venues for education, including bedside and electronic; incorporating education into annual competency testing for nurses; and using multiple venues for physicians (formal presentations and meetings, with one-to-one discussions for physicians with high use)</td>
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† UTI denotes urinary tract infection.

† Urinary management processes include proper insertion and maintenance of indwelling urinary catheters, use of alternative urine-collection methods, and prevention of infectious and noninfectious consequences of urinary-catheter use.
Results

• CAUTI rates decreased from 2.82 infections/1000 catheter days to 2.19 per 1000 catheter days (22.3% change) (unadjusted)
• (adjusted) CAUTI rates decreased from 2.4 infections/1000 catheter days to 2.05 infections/1000 catheter days (P=0.009)
• Reductions occurred mainly in the non-ICU: 2.28 to 1.54 infections/1000 catheter days (P<0.001)
• Catheter use in non-ICU decreased from 20.1% to 18.8% (adjusted for hospital size)
• Catheter use in the ICUs decreased from 61.1% to 57.6%
The Culture of Culturing

• Case examples
• When is a urine culture necessary
• Strategies to improve the culture of culturing
Polling #1

A 45 year old male who is an active intravenous drug user is admitted with fever of 103°F, confusion and respiratory distress. The patient is intubated and admitted to the intensive care unit; the CXR shows multiple pulmonary emboli and the blood cultures grow methicillin resistant *Staphylococcus aureus*. On day 3, he is still febrile with a temperature of 101.8°F. His blood cultures are still growing gram-positive cocci and the patient has a urinary catheter since intensive care unit admission.

1. Urine culture
2. No urine culture
A 73 year old patient with prostatic hypertrophy was admitted to the hospital with abdominal discomfort. On admission, he was afebrile with normal vital signs and white blood cell count. A bladder scan showed a significantly distended urinary bladder. A urinary catheter was placed and 1200 ml of urine was drained. His abdominal pain improved and he did not complain of any respiratory symptoms. The patient spiked a fever of 102°F the next day. His blood pressure was 100 systolic and heart rate 110.

1. Urine culture
2. No urine culture
Clinical Evaluation

The clinical evaluation of the patient is key to best care, and the optimal use of tests
CDC Surveillance Definition for CAUTI

SUTI 1a (Catheter-associated) Criterion
Patient must meet 1, 2, and 3 of the following:

1. Patient had an indwelling urinary catheter that had been in place for > 2 days on the date of event (day of device placement = Day 1) AND was either:
   - Still present for any portion of the calendar day on the date of event, OR
   - Removed the day before the date of event

2. Patient has at least one of the following signs or symptoms:
   - fever (>38.0°C)
   - suprapubic tenderness*
   - costovertebral angle pain or tenderness*

3. Patient has a urine culture with no more than two species of organisms, at least one of which is a bacterium of ≥10^5 CFU/ml.
   All
Bacteriuria with Catheter Use
(Garibaldi et al, Infect Control 1982; 3: 466-70)

Daily bacteriologic monitoring of 1140 cases:
• Bacteriuria at insertion: 99/1,140 (8.7%) catheterizations
• 1,041 had no colonization at insertion, 433 removed within 24 hours
• Of 608 catheterizations >24 hours, 76 (12.5%) developed bacteriuria
• Risk of bacteriuria was 3% per catheter-day
Figure 1. Routes of entry of uropathogens to catheterized urinary tract. Maki and Tambyah, Emerg Infect Dis 2001; 7: 1-6
Common Inappropriate Triggers For Urine Culture In Patients With Urinary Catheters

- Urine color, consistency and smell
- Pyuria
Physicians (N=106) and Nurses (N=159): Triggers For Cultures In Catheterized Patients
(Sibai et al, ID Week 2013, presentation 205)

<table>
<thead>
<tr>
<th>Trigger for Urine Culture</th>
<th>Resident Physicians (Answered Yes)</th>
<th>Nurses (Answered Yes)</th>
</tr>
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<tbody>
<tr>
<td>Foul smelling urine</td>
<td>75 (70.8%)</td>
<td>146 (94.8%)</td>
</tr>
<tr>
<td>Cloudy urine</td>
<td>84 (79.2%)</td>
<td>146 (94.8%)</td>
</tr>
<tr>
<td>Sediments in urine</td>
<td>57 (53.8%)</td>
<td>129 (84.3%)</td>
</tr>
<tr>
<td>Darker urine</td>
<td>39 (36.8%)</td>
<td>72 (47.7%)</td>
</tr>
<tr>
<td>Chronic UC on admission</td>
<td>46 (43.4%)</td>
<td>115 (74.2%)</td>
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All of the above should **NOT** trigger a urine culture in catheterized patients!
Resident Physicians and Pyuria: 
Obtain A Urine Culture In Catheterized Patients 
(Sibai et al, ID Week 2013, presentation 205)

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<thead>
<tr>
<th>Trigger for Urine Culture</th>
<th>Answered Yes</th>
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<tr>
<td>Urine WBC 25 cells</td>
<td>71 (67%)</td>
</tr>
<tr>
<td>Urine WBC 100 cells</td>
<td>94 (88.7%)</td>
</tr>
<tr>
<td>Urine WBC 500 cells</td>
<td>101 (95.3%)</td>
</tr>
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</table>

Pyuria in an asymptomatic patient with an indwelling urinary catheter should not be a trigger for culture or antimicrobials.
Pyuria Is Not Diagnostic Of CAUTI
(Hooton, Clin Infect Dis 2010; 50:625–663)

• Pyuria does NOT help differentiate asymptomatic bacteriuria from CAUTI

• Pyuria + bacteria ≠ CAUTI
Pyuria and Bacteriuria
(Tambyah, Arch Intern Med. 2000;160:673-677)

- 761 patients with newly inserted catheters, 10.8% developed bacteriuria or candiduria
- Defined bacteriuria as >10³ CFUs.
- Women had more bacteriuria (21.2%) than men (7.2%)
Absence of Pyuria
(Hooton, Clin Infect Dis 2010; 50:625–663)

• IDSA guidelines: “The absence of pyuria in a symptomatic patient suggests a diagnosis other than CA-UTI”
Color or Odor
(Hooton, Clin Infect Dis 2010; 50:625–663)

• IDSA guidelines:
“In the catheterized patient, the presence or absence of odorous or cloudy urine alone should not be used to differentiate CA-ASB from CA-UTI or as an indication for urine culture or antimicrobial therapy.”
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 by exposing them to inappropriate testing and treatments
2. New Foley Catheter Orders

a. Obtain an urinalysis at the time of Foley catheter insertion. Do culture and sensitivity (if U/A abnormal)

b. Nursing to document f/c insertion, size of f/c, amount of urine return, color, character of urine, any complications and UA with C&S, if indicated, sent to lab.

c. Nursing to monitor status of UA results and report to Physician, if positive. Report results during Nursing shift handoff report.

3. Existing Foley Catheter Orders

a. Obtain an urinalysis immediately upon patient admission. Do culture and sensitivity (if U/A abnormal)

b. The patient shall be assessed for Foley catheter need daily as described above (Indications for Foley Catheter Placement).

c. When patient no longer meets need for Foley catheter, the physician shall be contacted to request discontinuance of the Foley catheter.
How to Reduce Unnecessary Urine Cultures

1. Evaluate current processes for obtaining urine cultures (avoid automatic triggers or screening cultures with no appropriate indications)

2. Evaluate practice patterns (avoid PAN culturing)

3. Provide education on when it is appropriate to obtain urine cultures
How to Reduce Unnecessary Urine Cultures

4. Have periodic audits on urine culture use in the intensive care units to look for trends

5. Promote appropriate urinary catheter use to reduce risk of bacteriuria/ funguria
# Discourage Urine Culture Use

<table>
<thead>
<tr>
<th>Condition</th>
<th>Indication</th>
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<tbody>
<tr>
<td>Urine quality: color, smell, sediments, turbidity (do not constitute signs of infection)</td>
<td></td>
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<tr>
<td>Screening urine cultures (whether on admission or before non-urologic surgeries)</td>
<td></td>
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<tr>
<td>Standing orders for urinalysis or urine cultures without an appropriate indication</td>
<td></td>
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<tr>
<td>“PAN” culturing (mindfulness in evaluating source is key)</td>
<td></td>
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<tr>
<td>Obtaining urine cultures based on pyuria in an asymptomatic patient</td>
<td></td>
</tr>
<tr>
<td>Asymptomatic elderly and diabetics (high prevalence of asymptomatic bacteriuria)</td>
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<tr>
<td>Repeat urine culture to document clearing of bacteriuria (no clinical benefit to patients)</td>
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### Appropriate Urine Culture Use

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<tr>
<td>Part of an evaluation of sepsis without a clear source (CAUTI is often a diagnosis by exclusion)</td>
</tr>
<tr>
<td>Based on local findings suggestive of CAUTI (example, pelvic discomfort or flank pain)</td>
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<tr>
<td>Prior to urologic surgeries where mucosal bleeding anticipated or transurethral resection of prostate</td>
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<tr>
<td>Early pregnancy (avoid urinary catheters if possible)</td>
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Key Points Related to Obtaining Urine Cultures

<table>
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<th>KEY POINTS RELATED TO OBTAINING URINE CULTURES</th>
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<tr>
<td>Make sure clinicians are aware of the appropriate indications to obtain urine cultures</td>
</tr>
<tr>
<td>Point out the risk of indiscriminate urine culture use on patient outcomes</td>
</tr>
<tr>
<td>Address the local &quot;culture&quot; or practice of clinicians at your institution to align with optimal patient care</td>
</tr>
<tr>
<td>Avoid ordering cultures without a clinical assessment of the patient's condition</td>
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**St Joseph Mercy Hospital Urine Culturing Tool**

*Should this patient be evaluated for a urinary tract infection?*

Does the patient have any of the following **without alternate explanation**?

1. Urgency, frequency, dysuria
2. Suprapubic pain/tenderness
3. Flank, pain or tenderness
4. New onset delirium
5. Fever >38°C/100°F
6. Acute hematuria
7. Increased spasticity or autonomic dyssynergia in a spinal cord injury patient
8. ≥2 SIRS criteria (T > 38°C or < 35°C, HR > 90, RR > 20 or PaCO2 < 32 mmHg, WBC > 12 K/mm³ or < 4 K/mm³ or > 10% bands) or shock with concerns for sepsis

**Yes**
- Send UA & urine culture
- Document indication for sending urine culture
- Start empiric therapy (see reverse side)

**No**
- Do NOT send urine culture

**Empiric therapy based on classification of urinary tract infection (UTI)**

<table>
<thead>
<tr>
<th>Patient Category</th>
<th>Preferred</th>
<th>2nd Line</th>
<th>Duration</th>
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<tbody>
<tr>
<td>Asymptomatic Bacteriuria</td>
<td>Do not treat except in pregnancy, prior to urologic procedure, or anemia</td>
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<td></td>
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<tr>
<td>Definitive lower UTI</td>
<td>Ceftriaxone</td>
<td></td>
<td>48 hours</td>
</tr>
<tr>
<td>Uncomplicated Lower UTI</td>
<td>TMP/SMX or Ceftriaxone</td>
<td></td>
<td>5 days</td>
</tr>
<tr>
<td>Complicated Lower UTI</td>
<td>Ceftriaxone or TMP/SMX</td>
<td></td>
<td>7 days</td>
</tr>
<tr>
<td>Sepsis with UTI, PELLEOPHLEBITIS, PERINEAL ABSCESS</td>
<td>Ceftriaxone (if critically ill, empirically hospitalized) or Piperacillin-Tazobactam (if critically ill, empirically hospitalized and concerning for enterococci)</td>
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**Supporting documentation:**
- Complete blood count
- Urine analysis
- Urine culture

**Followup culture results and de-escaluate therapy based on final results and sensitivity.

For each antibiotic: document indication and planned duration for all patients.
Stop catheter-associated urinary tract infections (CAUTI) in critically ill patients.

1. RAISE AWARENESS & UNDERSTAND THE RISKS.

Possible misconceptions:
- "It's just a Foley, so what's the big deal?"
- "Immobilized ICU patients need Foley catheters."
- "CAUTI prevention isn't my responsibility."
- "My team needs precise input and output data for our patients throughout their ICU stay."

What the science & evidence show:
- CAUTI is a serious patient safety issue.²
- Complications associated with CAUTI result in increased length of stay, patient discomfort, excess healthcare costs, and even death.³
- It’s about more than just the Foley: Unnecessary catheterization puts patients at risk for urinary tract infections and may cause other complications such as multi-drug-resistant organisms, additional antibiotic use leading to increased risk of C. difficile infection, immobility (e.g., Foley as a 'one-point restraint'), hospital-acquired pressure ulcers, falls, and various thromboembolisms.²
- Not all critically ill, immobile patients need Foley catheters.
- All team members—from frontline staff to leaders—have a responsibility to help prevent CAUTI.
- CAUTI prevention is also tied to the “bottom line” with potential financial ramifications associated with Care and Medicaid required conditions, Value Based Purchasing, and population health.
- CAUTI outcome measures are used to assess performance.

2. CONSIDER ALTERNATIVES TO USING AN INWELLING CATHETER TO MEASURE URINE INTAKE AND OUTPUT.

- Daily weights
- Condom catheter
- Female and male urinals
- Straight intermittent catheterization
- Patient commodes
- Absorbent briefs or under pads that can be weighed to obtain urine output

3. RETHINK THE “CULTURE OF CULTURING” URINE.

- Patients may have to C. difficile infection, asymptomatic bacteriuria exposure to unnecessary antibiotics possible C. difficile infection

- If a patient develops a new fever, <4°C (99.2°F), it may be a reasonable trigger for a clinical assessment but not necessarily a laboratory or radiologic evaluation for infection.

- Don’t assume an ICU patient’s fever is due to a urinary tract infection.

4. TACKLE CAUTI

1. Pause and validate that the patient has an approved indication before catheter insertion.
2. Involve a second person during insertion to facilitate aseptic technique.
3. Evaluate continued need daily.
4. Empower nursing staff to discontinue catheter use as soon as possible.

Make a difference. Change the culture. Learn more about the On the CUSP: Stop CAUTI program.

Visit www.ontecuspsstopcauti.org for more information, including frequently asked questions.

References: