CAUTI and the culture of culturing: connecting the dots

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Disclosures

Barbara DeBaun provides clinical consultation to Magnolia Medical

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## Learning Objectives

- Describe the impact urine specimen ordering, collection and interpretation has on antibiotic stewardship
- Discuss the connection between urine culture management and CAUTI
- Describe three examples of urine culture management practices that directly impact CAUTI and antibiotic stewardship
CAUTI’s

- Most common type of HAI in US
- Account for 35% of HAI’s
- Cost $565 million/year in US
- Causes 8,205 deaths/year in US
What do we know about urinary catheter use?

50%

5%
Impact on Patient

50% of patients found a catheter to be uncomfortable or painful (VA study)

Urinary catheters restrict a patient’s ability to ambulate

Retention and incontinence
Reasons for Inappropriate UC and UA Ordering

Multi-hospital survey of internal medicine resident physicians designed by 6 board-certified ID physicians

100 total responses, overall knowledge 48%

Resident 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>
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<tbody>
<tr>
<td>Foul smelling urine</td>
<td>75 (70.8%)</td>
<td>146 (94.8%)</td>
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<tr>
<td>Cloudy urine</td>
<td>84 (79.2%)</td>
<td>146 (94.8%)</td>
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<tr>
<td>Sediments in urine</td>
<td>57 (53.8%)</td>
<td>129 (84.3%)</td>
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<tr>
<td>Darker urine</td>
<td>39 (36.8%)</td>
<td>72 (47.7%)</td>
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<tr>
<td>Chronic UC on admission</td>
<td>46 (43.4%)</td>
<td>115 (74.2%)</td>
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</table>
Key ways to prevent CAUTI

1. Preventing Unnecessary and Improper Placement
2. Maintaining Awareness & Proper Care of Catheters
3. Prompting Catheter Removal
4. Preventing Catheter Replacement
Indications: can we challenge any of these?

- Perioperative use for selected procedures (e.g. urologic, large volume infusions, intraoperative monitoring)
- Hourly assessment of urine output in ICU
- Acute urinary retention or obstruction
- Open pressure sores or skin grafts
- End of life comfort care at request
Nurse-driven protocol (for real)
GET Creative TO ENGAGE STAFF

Have you ex-foley-ated today?

WHY THE FOLEY?!
Alternatives to Indwelling Catheters

Male, female urinals
Bedside commode

Male external catheters

Intermittent straight catheters

Scale

Incontinence care supplies

Bladder ultrasound

Pictures are not intended to imply recommendations for specific products or brands.
Consider Female Foley alternatives
Ways to engage patients and family

- Include patients and their family in care decisions
- Involve patients and their family in safety rounds
- Provide CAUTI prevention education to patients
- Share what you are doing to help prevent infections
- Include days of use on white board
White Boards

Goals:
- Wean O2
- SBP < 160
- D/C Foley
- Foley Care Completed: Day 1 PM

Questions:
- Can my Foley be D/C’d?
- # Days with Foley: 4

- Mean O2
- SBP < 160
- D/C Foley
- Foley Care Completed: Day 1 PM

We help people lead longer, better lives.
Is there a difference?

“Is that foley still needed?”

“Can that foley come out?”

“Why is that foley still in?”
Our words matter

Does the patient have a urinary catheter?

If yes... “What is the indication?”
The “Culture of Culturing”…what does that mean?
When and why do we culture urine?

- Admitted with a catheter
- Routinely for perioperative patients
- New catheter is inserted
- Urine is smelly, dark or cloudy
- Patient appears septic (e.g. pan culturing)
- Because that’s how we roll
Reasons for Inappropriate UC and UA Ordering

78.4% would obtain sample in patients with chronic urinary catheter on admission

3.1%-24.7% agreed with taking culture when patient has pyuria

Randomized study of 208 patients at University of Michigan Health

75 patients (62.5%) had a reason documented that was inconsistent with current guidelines, including for bacteriuria before an orthopedic procedure and altered mental status

No documented reason for ordering a UC was found in 37.5% of patients

Fever was the sole indication for obtaining a UC in nearly three-quarters

Emergency Room

- 212 patients had UA orders
- 84.4% lacked symptoms

Pre-test Probability

The probability that THIS SPECIFIC PATIENT has the condition that this test is designed to find
What happens when our ‘culture of culturing’ is off?
Impact of UC Contamination

- 1-year randomized, retrospective ED or inpatient study with contaminated UCs (>2 organisms at ≥10,000 CFU/ml)

- 139 complications in 64 of 131 patients:
  - Initiation of antibiotics – 48.8%
  - Urinary catheter removal – 13%
  - Placement of a new catheter – 12%
  - Collection of additional UC – 8.4%

- 1-year extrapolation: 869 unnecessary interventions

“Healthcare Associated” CAUTI
Urine is the “Rodney Dangerfield” of specimens
Asymptomatic bacteriuria

- Isolation of a specified quantitative count of bacteria in an appropriately collected urine specimen obtained from a person without symptoms or signs referable to urinary infection
What do we know about asymptomatic bacteriuria (ASB)?

- Present in >30% of nursing home patients and 100% of those who are chronically catheterized.
- 23% to 50% of antibiotic days for UTI are unnecessary treatment of ASB.
- ASB is a benign condition that generally does not require treatment.
The Impact on Healthcare When Proper Urine Culture Management is Not Implemented

- **Clinician**
  - Improper ordering

- **Nursing**
  - Improper collection

- **Laboratory**
  - False-positive results, workloads

- **Pharmacy**
  - Increased costs

- **ID**
  - Ineffective antibiotic stewardship

- **IP**
  - Inaccurate analysis

- **Finance**
  - Increased costs

- **Patient**
  - Adverse effects
Pre-culture order strategy (pro-active vs reactive)

“Establish a pre-culture strategy that directs efforts at **how cultures are ordered** rather than by solely addressing issues after the UA and UC is sent.”
## Appropriate Urine Culture Use

- Part of an evaluation of sepsis without a clear source (CAUTI is often a diagnosis by exclusion)

- Based on local findings suggestive of CAUTI (example, pelvic discomfort or flank pain)

- Prior to urologic surgeries where mucosal bleeding anticipated or transurethral resection of prostate

- Early pregnancy (avoid urinary catheters if possible)
Concise Communication

Use of diagnostic stewardship practices to improve urine culturing among SHEA Research Network hospitals

Kaede V. Sullivan MD, MSc¹, Daniel J. Morgan MD, MS²,³ and Surbhi Leekha MD, MPH²

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- 44% have published indications for ordering a urine culture
- 17% require the indication to be entered into the EMR when ordering a urine culture
<table>
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<th>Discourage Urine Culture Use</th>
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<tr>
<td>Urine quality: color, smell, sediments, turbidity (do not constitute signs of infection)</td>
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<tr>
<td>Screening urine cultures (whether on admission or before non-urologic surgeries)</td>
</tr>
<tr>
<td>Standing orders for urinalysis or urine cultures without an appropriate indication</td>
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<td>“PAN” culturing (mindfulness in evaluating source is key)</td>
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<td>Obtaining urine cultures based on pyuria in an asymptomatic patient</td>
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<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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Eliminate screening 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
Order Sets

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.
Post-culture order strategies
Urine Handling after Collection (w/in 2 hrs. of collection)

- Refrigeration (2°C-8°C)

- Preservation

Limitations: designated refrigerators not always available; temperature monitoring requirements; space; funding

Preservative maintains original organism load for 72h at room temperature
• 96% stated that nurses receive training on appropriate urine collection technique
• 39% stated that their lab proceeds with urine culture even when there is a delay in transporting specimen
• 35% encourages use of transport devices containing boric acid preservative
Labeling of specimen…what’s missing?
Reflex Urine Culturing

- Involves screening urine samples with a urinalysis (UA) first
- Urine is processed for culture only if pre-defined criteria are met

Examples of Triggers for reflexive urine cultures:
- Leukocyte Esterase – moderate to large
- Nitrite – positive
- WBC - ≥5-10 per hpf
- Bacteria - positive
Concise Communication

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^1Department of Pathology and Laboratory Medicine, Lewis Katz School of Medicine at Temple University, Philadelphia, Pennsylvania, ^2Department of Epidemiology and Public Health, University of Maryland School of Medicine, Baltimore, Maryland and ^3Veterans Affairs Maryland Healthcare System, Baltimore, Maryland

- 66% of US facility labs offer reflex urine cultures
- 54% have an EMR that is configured to guide the provider toward reflex cultures
- Of those who use reflex, 96% allow urine culture to be ordered without a UA
- 19% restrict urine cultures to certain circumstances (e.g. pregnancy, urology procedures)
Criteria used to designate a UA as ‘positive’ varies
96% reported inclusion of WBC/hpf with variety of WBC cut offs
76% reported inclusion of leukocyte esterase (LE) and nitrite status
<table>
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<tr>
<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>
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<tr>
<td>Point out the risk of indiscriminate urine culture use on patient outcomes</td>
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<tr>
<td>Address the local &quot;culture&quot; or practice of clinicians at your institution to align with optimal patient care</td>
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<tr>
<td>Avoid ordering cultures without a clinical assessment of the patient's condition</td>
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Reducing Unnecessary Urine Culture Summary

- Evaluate current processes for obtaining urine cultures (avoid automatic triggers or screening cultures with no appropriate indications)
- Evaluate practice patterns (avoid PAN culturing)
- Education on when it is appropriate to obtain urine cultures
- Periodic audits on urine culture use in the intensive care units to look for trends
- Promote appropriate urinary catheter use to reduce risk of bacteriuria/ funguria
4 Performance Improvement Recommendations on Urine Culture Management

1. Modify the EMR to include appropriate and inappropriate indications for UA/UCs that address patient symptoms

2. Educate all clinicians who order UCs- emphasize appropriate indications for UC and UTI symptoms in catheterized and non-catheterized patients

3. Carefully evaluate patients with fever and order UCs as appropriate

4. Reflex urine testing should be considered ONLY if used in conjunction with careful clinical evaluation for S/S of UTI.
Commentary

It is time to define antimicrobial never events

Jiajun Liu PharmD¹,², Keith S. Kaye MD, MPH³, Nicholas J. Mercuro PharmD⁴,⁵, Susan L. Davis PharmD⁴,⁵, Twisha S. Patel PharmD⁶, Lindsay A. Petty MD⁶, Gwendolyn M. Pais PhD¹ and Marc H. Scheetz PharmD, MSc¹,²

¹Pharmacometrics Center of Excellence, Department of Pharmacy Practice, Midwestern University Chicago College of Pharmacy, Downers Grove, Illinois, ²Northwestern Memorial Hospital, Chicago, Illinois, ³University of Michigan Medical School, Ann Arbor, Michigan, ⁴Henry Ford Hospital, Detroit, Michigan, ⁵Eugene Applebaum College of Pharmacy, Wayne State University, Detroit, Michigan and ⁶Michigan Medicine, University of Michigan, Ann Arbor, Michigan
<table>
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<tr>
<td>Antibiotic use for a nonsusceptible organism after identification and susceptibility</td>
</tr>
<tr>
<td>Antibiotic use that exceeds 2 days after causative organism identified and susceptibility results available when de-escalation is possible (can safely be treated by a narrower agent)</td>
</tr>
<tr>
<td>Postsurgical antibiotic prophylaxis exceeds national guidelines</td>
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<tr>
<td>Antibiotic use for viral upper respiratory tract infections</td>
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<tr>
<td>Antibiotic use for asymptomatic bacteriuria</td>
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Tools to Use
CAUTI Discovery Tool – Specimen Collection Tracer

Opportunities identified:
- Use of a collection device
- Collecting routine specimens

Tool revised
Articles of interest

**Appropriate Urine Culture Article**

Promoting appropriate urine culture management to improve health care outcomes and the accuracy of catheter-associated urinary tract infections

Robert Garcia BS, MT(ASCP), CIC, FAIPC 1, Eric D. Spitzer MD, PhD 2

1 Infection Control Department, Stoney Brook Hospital, Stoney Brook, NY
2 Department of Infection, Stoney Brook University Hospital, Stoney Brook, NY

Key Words: Urine culture; Appropriate bacteriuria; Antimicrobial stewardship; Bannon testing; Contamination

Published literature indicates that the unjustified ordering or improper collection of urine for urinalysis or culture from either catheterized patients or those without indwelling devices, or misinterpretation of positive results, often leads to adverse health care events, including increased hospital costs, over-reporting of hospital-acquired urinary tract infection events, over-treatment of patients with antibiotic-resistant organisms, selection of multidrug-resistant organisms, and Overtreatment of difficult-to-treat infections. Moreover, national guidelines that provide evidence-based direction on how to perform tests (and the basis for subsequent care, including therapy decisions or surveillance interventions) are inappropriate and common in some settings. Inappropriate catheterization of the urinary tract, in particular, is not widely known or not adhered to. This article provides published evidence on the influence of inappropriate ordering of urine specimens and subsequent treatment of asymptomatic bacteriuria and associated adverse events; reviews research on bacterial contamination and preservation; and describes best practices in the collection, handling, and testing of urine specimens for culture or biochemical analysis in both catheterized and noncatheterized patients. The goal is to provide infection preventionists (IP) with a coherent evidence-based framework that will assist them in facilitating the implementation of a urine culture management program that reduces patient harm, enhances the accuracy of catheter-associated urinary tract infection surveillance, improves antibiotic stewardship, and reduces costs.

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**Non-infectious Complications of Catheters Article**

**JAMA Internal Medicine | Original Investigation**

A Multicenter Study of Patient-Reported Infectious and Noninfectious Complications Associated With Indwelling Urethral Catheters

Senjay Saint, MD, MPH; Barbara W. Taunton, MD, PhD; Karen E. Fowler, MPH; John Colace, BA; David Feltz, MS; Ctri Lewis-Kronish, MD; John M. Hellingworth II, MD; Ng, Sarah L. H. INTRODUCTION Indwelling urethral catheters (ie, Foley catheters) are important in caring for certain hospitalized patients but can also cause complications in patients.

OBJECTIVE To determine the incidence of infectious and noninfectious patient-reported complications associated with the indwelling urethral catheter.

DESIGN, SETTING, AND PARTICIPANTS A prospective cohort study of consecutive patients with placement of a new indwelling urethral catheter while hospitalized at 1 of 4 US hospitals in 2 states. The study was conducted from August 26, 2015, to August 18, 2017. Participants were evaluated at baseline and contacted at 14 days and 30 days after insertion of the catheter about complications associated with the indwelling urethral catheter and how catheterization affected their social activities or activities of daily living.

EXPOSURES Indwelling urethral catheter placement during hospitalization. Patients were enrolled within 3 days of catheter insertion and followed up for 30 days after catheter placement, whether the catheter remained in or was removed from the patient.

MAIN OUTCOMES AND MEASURES Infectious and noninfectious complications associated with an indwelling urethral catheter as well as how the catheter affected patient social activities or activities of daily living.

Supplemental content
Resources

Change Package

Top 10 Checklist

CAUTI Prevention Bundle
Elaborated Evidence-Based CAUTI Tool: Catheter Associated Urinary Tract Infection (CAUTI) Prevention

ANSA Evidence-Based CAUTI Tool

Innovations in Evidence-Based CAUTI Prevention:

- [Image of a flowchart or diagram]

More resources

American Hospital Association

Advancing Health in America
And even more resources
Let’s end with a story
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