Beyond the Bundle: Evidence Based Interventions to Reduce CAUTI in the ICU Setting

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Session Objectives

- Identify risk factors for the development of catheter associated urinary tract infection
- Define key care practices based on the evidence that can reduce and sustain zero CAUTI’s
- Discuss strategies to overcome barriers

INTERVENTIONAL PATIENT HYGIENE (IPH)

- VAP/HAP
- Oral Care/Mobility
- HAND
- Patient
- HYGIENE
- Catheter Care
- Skin Care/Bathing/Mobility
- CA-UTI
- CA-BSI
- SSI
- HASI

Why HAI's?
Protecting Patients From Harm

Estimates: 183 Hospitals in 10 States

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>HAI:</td>
<td>722,000/year</td>
</tr>
<tr>
<td>HAI-related deaths:</td>
<td>75,000/year</td>
</tr>
<tr>
<td>Hospitalized patients develop infection:</td>
<td>1 out of 25 (4%)</td>
</tr>
<tr>
<td>Death due to sepsis/septic shock:</td>
<td>700/day</td>
</tr>
<tr>
<td>Money spent:</td>
<td>$45 billion/year</td>
</tr>
<tr>
<td>Increase risk of readmission:</td>
<td>27 days vs. 59 days</td>
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</tbody>
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Improvement Seen Except CAUTI’s

- 46 percent decrease in CLABSI between 2008 and 2013
- 19 percent decrease in SSI related to the 10 select procedures tracked in the report between 2008 and 2013
- 6 percent increase in CAUTI between 2009 and 2013
- 8 percent decrease in MRSA bacteremia between 2011 and 2013
- 10 percent decrease in C.difficile infections between 2011 and 2013

www.cdc.gov/hai/progress-report
Preventing CAUTI’s Through Evidence Based Care Practices

The Why

- Urinary tract infection (UTI) are one of the most common hospital-acquired infections
- Along with other device associated infections (CLABSI and VAP) account for 25% of all hospital acquired infections
- 70-80% of CAUTI are due to urinary catheters
- 12-16% of inpatients are catheterized
- Leads to increased morbidity and costs ($896)
- Medicare no longer reimburses U.S. hospitals for the additional costs of certain infections
- CLA-BSI & CAUTI are 65% of the clinical conditions for VBP
- CAUTI prevention is part of the 2012 National Patient Safety Goal

Trends in CAUTI’s: 2001 to 2010

• Retrospective analysis of the national hospital discharge surveys from 2001 to 2010, adult age > 18 years
• 70.4 million catheterize patients
• 3.8 million developed a CAUTI
• Incidence of CAUTI ↓ from 9.4 cases per 100 catheterizations to 5.3 cases per 100 catheterizations
• CAUTI mortality ↓ from 5.4% to 3.7% (Overall Mortality 2.1%)
• Hospital LOS ↓ 9 days to 7 days
• Independent predictors of CAUTI’s
  – Female sex, emergency hospital admission, transfer from another facility, Medicaid payment (p < .0001)

CUSP & CAUTI Interventions

Adaptive /Cultural

1. Educate on the Science of Safety
2. Identify Defects (Staff Safety Assessment)
3. Senior Executive Partnership
4. Learn from Defects
5. Implement Teamwork & Communication Tools

Technical

1. Insertion
   Limiting use
   Using aseptic technique for site prep, equip & supplies
2. Maintenance
   • Securing the catheter for unobstructed flow
   • Maintaining the sterility of the urine collection system
   • Replacing the urine collection system when required
   • Collecting urine samples
An 82-year-old woman was admitted for congestive heart failure...

- She had a urinary catheter placed and was started on diuretics. She appeared frail. Her physician and nurses felt that keeping the catheter in place would make her more comfortable.
- On the 5th day of admission, she started complaining of chills, had a fever of 102°F, and her BP dropped to 90 systolic. Blood cultures and urine cultures grew Escherichia coli. She was diagnosed with symptomatic CAUTI and had to be treated with intravenous antibiotics.
A 78-year-old Nursing Home Resident was Admitted for a Gastrostomy Tube Change...

- The ED nurse noted that he was incontinent. The male patient was confused because of long-standing dementia. Although a bladder scan did not show any urinary retention, the nurse spoke to the ED physician about placing a catheter. Several hours after the catheter was placed, the patient pulled it out, leading to a urethral injury and hematuria.
- This required a urology evaluation.

Inappropriate Use in Non-ICU: Michigan Experience 2007-10

<table>
<thead>
<tr>
<th></th>
<th>Baseline % of all patients with catheters (57.6%)</th>
<th>% of patients with catheters without appropriate indications*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-obstructive renal insufficiency</td>
<td>2.2</td>
<td>3.8</td>
</tr>
<tr>
<td>Transferred from intensive care</td>
<td>4.2</td>
<td>7.3</td>
</tr>
<tr>
<td>Patient request</td>
<td>1.5</td>
<td>2.6</td>
</tr>
<tr>
<td>Confusion</td>
<td>4.6</td>
<td>8.0</td>
</tr>
<tr>
<td>Incontinence</td>
<td>6.5</td>
<td>11.3</td>
</tr>
<tr>
<td>Other or no clear reasons</td>
<td>38.6</td>
<td>67.0</td>
</tr>
</tbody>
</table>

*Based on the 1983 CDC recommendations

Mean CAUTI Rates

<table>
<thead>
<tr>
<th>Unit</th>
<th>2009 NHSN S-CAUTI Rate (per 1,000 catheter days)</th>
<th>2010 NHSN S-CAUTI Rate (per 1,000 catheter days)</th>
<th>2012 NHSN CAUTI Rate (per 1,000 catheter days)</th>
<th>2013 NHSN CAUTI Rate (per 1,000 catheter days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICU (med-surg, major teaching)</td>
<td>2.3</td>
<td>2.2</td>
<td>2.4</td>
<td>2.7</td>
</tr>
<tr>
<td>ICU (med-surg, &gt;15 beds)</td>
<td>1.2</td>
<td>1.3</td>
<td>1.6</td>
<td>1.7</td>
</tr>
<tr>
<td>General wards (med-surg)</td>
<td>1.6</td>
<td>1.5</td>
<td>1.4</td>
<td>1.3</td>
</tr>
</tbody>
</table>

Isn’t this a patient safety issue, not just CAUTI?

Pathogenesis of CAUTI

- Source: colonic or perineal flora on hands of personnel
- Microbes enter the bladder via extraluminal (around the external surface) (proportion = 2/3) or intraluminal (inside the catheter) (1/3)
- Daily risk of bacteriuria with catheterization is 3% to 10%; by day 30 = 100%

Disrupting the Lifecycle of the Urinary Catheter

1. Preventing Unnecessary and Improper Placement
2. Maintaining Awareness & Proper Care of Catheters
3. Prompting Catheter Removal
4. Preventing Catheter Replacement

(Meddings, Clin Infect Dis 2011)
CDC, SHEA, IDSA and NHS: Indications for Placement

- Perioperative use for selected surgical procedures
- Urine output in critically ill patients
- Management of acute urinary retention and urinary obstruction
- Assistance in pressure ulcer healing for incontinent patients
- At a patient request to improve comfort (SHEA) or for comfort during end of life care (CDC)

Ann Arbor Criteria for Appropriate Use

Urine incontinence in patients for whom nurses find it difficult to provide skin care despite other urinary management strategies and available resources, such as lift teams and mechanical lift devices
Examples: turning causes hemodynamic or respiratory instability, strict prolonged immobility (such as in unstable spine or pelvic fractures), strict temporary immobility after a procedure (such as after vascular catheterization), or excess weight (≥ 300 lb) from severe edema or obesity

- Daily (or hourly) measurement of urine volume is required to provide treatment
- Examples: management of hemodynamic instability, hourly titration of fluids, drips (e.g., vasopressors, inotropes), or life-supportive therapy
- Examples: acute renal failure work-up, or acute N or oral diuretic management, N fluid management in respiratory or heart failure

- Single 24-h urine sample for diagnostic test that cannot be obtained by other urine collection strategies
- Reduce acute, severe pain with movement when other urinary management strategies are difficult
- Example: acute unrepaird fracture
- Improvement in comfort when urine collection by catheter addresses patient and family goals in a dying patient
- Management of gross hematuria with blood-clotting urine

Clinical condition for which SIC or external catheter would be appropriate but placement by experienced nurse or physician was difficult or patient for whom bladder emptying was inadequate with nonindwelling strategies during this admission

Before & After QI Project

• 60 day comparison
• Use of a novel EMC device vs. indwelling catheter
• Inclusion criteria:
  – No restraints
  – No BPH
  – No neurogenic bladder
  – Cooperative
  – Hospitalize 2 wks or greater
• Monitored wear time and evaluated the skin

Average Wear Time = 24hrs

Fitzwater M, IP Kindred Albuquerque, 2015

Core Recommendations

• Insert catheters only for appropriate indications (1B)
• Leave catheters in only as long as needed (1B)
• Ensure that only properly trained persons insert and maintain catheters (1B)
• Insert catheters using aseptic technique and sterile equipment (acute care settings) (1C)
• Consider use of alternatives (II)
• Maintain a close drainage system (1B)
• Secure the system (1B)
• Maintain unobstructed urine flow (1B)
• Key the collecting bag below the level of the bladder at all times (1B)

Simplified Insertion Checklist for Urinary Catheter

<table>
<thead>
<tr>
<th>Components of Checklist</th>
<th>Compliant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hand hygiene before and after procedure</td>
<td>Yes</td>
</tr>
<tr>
<td>Sterile gloves, drapes, sponges, aseptic sterile solution for cleaning, and single use packet lubricant used</td>
<td>Yes, after correction</td>
</tr>
<tr>
<td>Aseptic insertion technique (no contamination during placement)</td>
<td></td>
</tr>
<tr>
<td>Proper securement of urinary catheter post-procedure</td>
<td></td>
</tr>
<tr>
<td>Closed drainage system and bag below patient post-procedure</td>
<td></td>
</tr>
</tbody>
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Challenges with Current Appropriate Alternatives: External Male Catheters

1 out of every 200 men is born with what’s medically known as ‘micro-penis’

Buried Penis
Common Problems

• Most common problems are:
  – Skin irritation and maceration
  – Difficult to keep the condom from falling off/retraction of the penis or decrease size
  – Ischemia and penile obstruction/tightness
  – Adherence: requires to secure on the shaft & adhesive mechanisms are challenging

A New Male External Catheter

- Hydrocolloid alternative
  - Hydrocolloid wafer shaped adheres to the glans penis
  - Acts as a skin protectant
  - Protects the glans penis from excessive moisture
  - The seal is reinforced by a second hydrocolloid strip
  - Can be used with circumcised and uncircumcised males
  - Clean glans penis with a remover & alcohol

Core Recommendations

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Securement Devices

Core Recommendations

- Do not clean the periurethral area with antiseptics to prevent CAUTI while the catheter is in place. Routine hygiene (e.g., cleansing of the meatal surface during daily bathing) is appropriate. (IB)
- Further research is needed on the use of antiseptic solutions vs. sterile water or saline for periurethral cleaning prior to catheter insertion. (No recommendation/unresolved issue)
- If the CAUTI rate is not decreasing with a comprehensive strategy, consider using antimicrobial/antiseptic impregnated catheters. (IB)
- Practice hand hygiene in standard precautions according to CDC & HICPAC guidelines

Supports Recommendations of the National Patient Safety Goal NPSG.07.06.01
How We Bathe May Impact CA-UTI’s

Why are there so many bugs in here?

Bath Basins
Potential Source of Infection

Large multi-center study evaluates presence of multi-drug resistant organisms

- Contaminated: 62% (686 basins/88 hospitals)
- Gram negative bacilli: 45% (495 basins/86 hospitals)
- Colonized w/ VRE: 35% (385 basins/80 hospitals)
- MRSA: 3% (36 basins/28 hospitals)

Waterborne Infection

Hospital Tap Water
- Bacterial biofilm
- Most overlooked source for pathogens
- 29 studies demonstrate an association with HAIs and outbreaks
- Transmission:
  - Drinking
  - Bathing
  - Rinsing items
  - Contaminated environmental surfaces
- Immunocompromised patients at greatest risk


Reducing UTI’s Through Basinless Bathing

CA-UTI 7.5 per 1000 catheter days to 4.42 per 1000 catheter days, then to .46 per 1000 catheter days

Stone S, APIC 2010
Impact on UTI with Basin Bathing

The Effect of Bathing with Basin and Water and UTI Rate, LOS and Costs

<table>
<thead>
<tr>
<th>Unit Census: 14</th>
</tr>
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<tbody>
<tr>
<td>Phases</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>--------</td>
</tr>
<tr>
<td>I- Pre-Packaged Bathing Washcloths (9 months)</td>
</tr>
<tr>
<td>II- Basin/Water (9 months)</td>
</tr>
<tr>
<td>III- Additional Product Cost, UTI, LOS, COSTS</td>
</tr>
</tbody>
</table>

\(^1\) Based on 3 packages of 8 towels each
\(^2\) Based on product cost of towels, soap, and basin
\(^3\) Difference between phase I pre-package/phase II basin water
Prepackaged Disposable Bathing

Studies show

Prepackaged disposable bathing cloths result in:

- Nurse satisfaction
- Improved skin condition
- 78% fewer UTIs
- Amount of product used
- Time spent
- Cost
- Variation in bathing process

Larson E. et al. AJCC. 2004; 13(3):235-41

Cleansing of Patients with Indwelling Catheter

- Indwelling catheter care should occur with the daily bath (basinless bathing), as a separate procedure using clean technique
- There is no evidence to support 2x a day indwelling catheter care
- If a large liquid stool occurs, bathe the patient with basin less bathing
- Use separate cloths to clean front to back in the perineal area and 6 inches of the catheter**
- Apply barrier cloth to area of skin requiring protection

For Successful Banning of Basins for Patient Care

We need to provide alternatives for the other functions:

<table>
<thead>
<tr>
<th>Current</th>
<th>New</th>
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<tbody>
<tr>
<td>Emesis</td>
<td>Emebags being installed in every adult and ped pt. room, ACU, PACU</td>
</tr>
<tr>
<td>Storage of patient items</td>
<td>Clear plastic &quot;baggies&quot;</td>
</tr>
<tr>
<td></td>
<td>Trial of &quot;Concierge List&quot; to decrease waste of unused/unneeded products</td>
</tr>
<tr>
<td>Foot soaks</td>
<td>Shampoo caps, prepackaged</td>
</tr>
<tr>
<td>Shampoo patient’s hair</td>
<td>Shampoo caps par’d on all units</td>
</tr>
<tr>
<td>24 hour urine, ice</td>
<td>Store some basins in lab to be dispensed with each 24 hour jug.</td>
</tr>
<tr>
<td>Bath cloths with no insulation, cold halfway through bath.</td>
<td>Bath cloths with insulation to stay warm longer</td>
</tr>
</tbody>
</table>

Quinn B, Presented at NACNS, San Diego CA March 5-7, 2015

Additional Recommendations: SHEA Compendium Update 2014

- Replace the catheter and the collecting system using aseptic technique when breaks in aseptic technique, disconnection, or leakage occur (quality of evidence: III).

- For examination of fresh urine, collect a small sample by aspirating urine from the needleless sampling port with a sterile syringe/cannula adaptor after cleansing the port with disinfectant (quality of evidence: III).

- Unresolved
  - Antiseptic or sterile saline foe meatal cleaning before insertion

Additional Recommendations: SHEA Compendium Update 2014

- Develop a protocol for management of post-op urinary retention
  - Bladder scanner
  - Intermittent catheterization
- Do not routinely use antimicrobial/antiseptic impregnated catheters
- Do not screen for asymptomatic bacteriuria in catheterized patients
- Unresolved
  - Antiseptic or sterile saline foe meatal cleaning before insertion

THINGS TO CONSIDER

Cost-Benefit Ratio

CA-UTI vs. IAD & Pressure Ulcer
Moisture Injury: Incontinence Associated Dermatitis

- Inflammatory response to the injury of the water-protein-lipid matrix of the skin
  - Caused from prolonged exposure to urinary and fecal incontinence
- Top down injury
- Physical signs on the perineum & buttocks
  - Erythema, swelling, oozing, vesiculation, crusting and scaling

Brown DS & Sears M, OWM 1993;39:2-26

IAD Assessment Tool

Reminder Systems May Reduce Inpatient Catheter Use and Associated UTIs

Reminder Systems

- 56% reduction

Stop Order Systems

- 41% reduction

Reminder Systems


Stop Order Systems

- Overall: P<0.001
- Reminder: P<0.001
- Stop Order: P=0.03

Nurse Driven Protocol

- Assessment of criteria for insertion
- Examine alternatives to indwelling catheters
  - External condom catheters for male patients without urinary retention or bladder outlet obstruction*
  - Intermittent catheterization several times per day (post-op)
- Use of the bedside bladder ultrasound to assess urinary retention (reduce rates by 30-50%)
  - If minimal or no urine found in the bladder alternative strategies should be considered prior to catheterization
- Prevalence evaluation to determine number of catheters versus the number of catheters that met criteria

Stop Order


Nurse Driven Protocol

Implement a Documentation Structure

- Physician order for placement
- Indications for insertion
- Date & time of insertion
- Who inserted the catheter
- Nursing documentation
  - Placement, daily presence, maintenance care, date and time of removal
  - Criteria for removal & justification for continued use


Nurse Directed Catheter Removal

- 300 bed community teaching hospital
- Implementation of a nurse directed urinary catheter removal protocol
  - Protocol linked to physician catheter order
  - Physician documentation of catheter insertion criteria & device specific charting in progress notes
  - Bi-weekly unit specific feedback
- Results: 50% ↓ in catheter use & 70% ↓ in CAUTI

Parry MF, et al. AM J Of Infect Control, 2013;41:1178-81
Removal of No-Longer Indicated Catheters

- Nurse-driven removal of no longer needed catheters
  - Pilot study: 45% reduction in unnecessary catheter utilization (Fakih et al, Infect Control Hosp Epidemiol 2008; 29: 815-9)
- Most of the units involved were non-intensive care

Tools Used with Intervention

- Lecture for nurses
- Pocket cards, posters
CAUTI Prevention Bundles

Outcome Measures:
- UTI rate/1000 patient days
- UTIs / 1000 catheter days

Process Measures:
- UC days/ 1000 patient days
- Percent appropriate catheters/total number of catheters
Advocacy Starts with Us

How to Sustain Your Success

- After implementing the program, identify unit champions to promote the need to evaluate the appropriateness of urinary catheter use
- Incorporate the following questions during nursing rounds:
  - Does the patient have a urinary catheter?
  - What is the reason for use?
- Provide feedback on performance to nurse managers related to prevalence of utilization
- If no improvement in utilization is seen, evaluate appropriateness of utilization (indications vs. non-indications)
- The long term goal is for the patient care nurses to own the process of evaluation of urinary catheter need
Additional Areas to Address

- Leadership support is crucial
- Define barriers to implementation
- Obtain physician and nursing buy-in
- Provide alternatives to the “Foley” catheter
- Look closely at the emergency department and intensive care units. Both areas utilize a high number of urinary catheters
- Learn from defects and continue to improve process

Forbid yourself to be deterred by poor odds just because your mind has calculated that the opposition is too great. If it were easy, everyone would do it.
References

4. CDC.gov/pdf/cauti/cautiguidelines2009
7. BT Conner, TJ Kelechi, LS Nemeth, M Mueller, BJ Edlund, SL Krein Exploring factors associated with nurses’ adoption of an evidence-based practice to reduce duration of catheterization Journal of Nursing Care Quality, October/December 2013, 28(4), pages 319-326
10. Fakih et al, Urinary catheters in the emergency department: Very elderly women are at high risk for unnecessary utilization Am J Infect Control 2010;38:683-8
14. MG Fakih, C George, B Edison, C Goeschel, S Saint Implementing a National Program to Reduce Catheter-Associated Urinary Tract Infection: A Quality Improvement Collaboration of State Hospital Associations, Academic Medical Centers, Professional Societies, and Governmental Agencies Infection Control and Hospital Epidemiology, October 2013, 34(10), pages 1048-1054