Preventing Catheter-Associated Urinary Tract Infections in Acute Care Settings
Laurie Conway, Columbia University School of Nursing
A Webber Training Teleclass

Objectives
- List essential strategies for preventing CAUTI in adults in acute care settings
- Compare and contrast CAUTI prevention guidelines
- Describe gaps in the current evidence base
- Identify challenges in conducting CAUTI surveillance
- Relate CAUTI incidence to antimicrobial resistance

Content
1. Incidence and Importance
2. Definitions of CAUTI
3. Pathogenesis
4. Guidelines
5. Strategies for Prevention
6. Challenges in Surveillance
7. Gaps in Evidence

Incidence
- Widely considered the most common healthcare-associated infection (HAI) in hospitals
  - Estimated UTI rates in US hospitals 1990-2002
    - >560,000 UTI per year
    - 3.38% of adults and children in ICUs will develop UTI
  - UTI comprise 34% of all HAI
  - 80% are catheter-associated
  - 25% of patients have a urinary catheter placed at some time during their hospital stay

Newer Prevalence Study

- 9 hospitals in the state of Florida
- UTI 2nd most common HAI
- Comprise 15.5% of all HAI in US hospitals
- Reduction may be because asymptomatic bacteriuria was excluded from the National Healthcare Safety Network (NHSN) definition of CAUTI in 2009

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Latest NHSN Report – 2011

- Pooled mean CAUTI rates 0 to >4 per 1,000 catheter days
  - Neurosurgical ICUs (4.5)
  - Burn ICUs (4.1) and wards (4.8)
  - Long-term rehab units (7.1)
- Pooled mean device utilization ratio 3% to >70%
  - Medical-surgical ICUs (54-69%)
  - Neurologic and neurosurgical ICUs (71% and 70%)
  - Trauma ICUs (79%)
  - Long term rehab units (7%)

SUTI Rates: ICU vs. Ward
- CAUTI rates in step-down units and wards were similar to ICUs
- CAUTI rates in rehab units were especially high
- Non-catheter associated UTI comprised 27.8% of all UTI

International CAUTI Rates

- International Nosocomial Infection Control Consortium (INICC)
- Data for 2004 – 2009 from 422 ICUs in 36 countries
- Pooled mean 6.3 CAUTI per 1,000 catheter-days
- Compared to US at that time:
  - Similar device utilization ratios (DUR)
  - CAUTI rates significantly higher in INICC
  - More antimicrobial resistance in INICC
  - Methicillin-resistant S. aureus (MRSA)
  - Extended-spectrum β-lactamase producers
  - P. aeruginosa resistant to fluoroquinolones
  - Less vancomycin-resistant enterococci

Recent Reduction in INICC Hospitals

- Interventional study of hospitals in 40 cities in 15 countries
  - Multidimensional CAUTI prevention strategy included a bundle of measures, education, and surveillance with feedback
  - CAUTI rates declined from 7.86 to 4.95 per 1,000 catheter days (RR=0.63, 95% CI 0.55-0.72)

Temporal Trends in US Hospitals

- 1990-2007 NNIS/NHSN data
  - ICUs: Med-surg, medical, surgical, cardiac, cardiothoracic
  - CAUTI rates declined significantly across most ICUs
  - 19-67% declines in symptomatic UTI in all types of units
  - 18-35% between 2000-2007 in all types of units except CT
  - 29-72% decline in asymptomatic bacteriuria (ASB) in all types of units
  - DUR unchanged

Morbidity and Cost

- Excess length of stay (LOS)
  - 1 to 2 days extra LOS for symptomatic CAUTI patients
  - 12 days crude excess LOS for ICU patients with CAUTI
- Secondary bacteremia
  - Incidence varies from 4% to 0.4%
- Cost
  - 2009 estimate per CAUTI: US $862 – $1,007
  - 2000 estimate per bacteremic UTI: US $2,836


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Mortality

- Estimated >13,000 associated deaths/year in the US
- Crude unadjusted excess mortality for patients with CAUTI in INICC was 7.3% (95% CI 5.7 – 9.1)
- Mortality among hospitalized patients with CAUTI OR=2.8 (95%CI 1.5-5.1) after adjusting for age, severity of illness, duration of catheterization and other factors
- Mortality due to nosocomial bacteremic UTI 12.7%

Antimicrobial Resistance

- Large reservoir of multi-drug resistant organisms creates a risk for cross-infection
- CAUTI and ASB promote inappropriate use of antimicrobials

Quality Indicator

- Joint Commission 2012 National Patient Safety Goal 07.06.01 obliges hospitals to implement evidence based practices to prevent CAUTI
- DHHS Action Plan to Prevent HAI 2009 includes a 5-year goal to reduce CAUTI by 25%
- CMS will begin public reporting of CAUTI rates in 2014 through its Hospital Inpatient Quality Reporting Program based on data gathered in accordance with NHSN criteria
- Non-payment for CAUTI has had little financial impact on hospitals

Effect of Nonpayment for Preventable Infections in U.S. Hospitals
Lee GR et al. NEJM 2012; 367:1428-1437

- 398 hospitals participating in NHIN
- Interrupted time-series analysis
- Compared the rate of change of CAUTI before and after the policy implementation (Jan 2006-Oct 2008 versus Nov 2008 – Mar 2011)
- Used VAP as a negative control since VAP was not a CMS-targeted infection
- Decreasing rates of CAUTI were observed well before the CMS policy was implemented
- No evidence that the CMS non-reimbursement policy had any measurable effect on infection rates
- Authors’ interpretation:
  - Attention was already focused on HAI prevention before the CMS disincentives
  - Financial stake was low

CAUTI are Nurse Sensitive Outcomes

- Thought to be more highly related to the quantity and quality of nursing care than to medical care or institutional characteristics
- Endorsed as a nursing-sensitive outcome by the National Quality Forum
- Association with nurse burnout
  - Pennsylvania hospitals
  - Incidence of UTI 8.6/1,000 patients
  - 10% decrease in a hospital’s composition of high-burnout nurses was associated with a decrease of 0.82 UTI per 1,000 patients (p<0.03), after controlling for nursing, nurse characteristics, and hospital characteristics

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### Asymptomatic Bacteriuria (ASB)

- **Prevalence**
  - Women of childbearing age: 2% \(^1\)
  - Elderly: men 6%, women 18% \(^2\)
  - Institutionalized elders: men 15-25%, women 25-50% \(^3\)
  - Patients with catheters: 8% per day during the first week \(^4\) virtually 100% by 30 days
- \(>90\%\) of patients with ‘CAUTI’ are asymptomatic \(^5\)
- No association of fever and/or leukocytosis with bacteriuria in trauma ICU patients \(^6\)

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### ASB Screening and Treatment

- Routine screening and treatment for ASB not recommended except
  - Pregnant women
  - Unlikely procedures/surgery \(^7\)
- Treatment of ASB in catheterized patients is not recommended except
  - Women with ASB that persists 48h after catheter removal \(^7\)
  - Non-treatment of ASB has been suggested as a national quality performance measure \(^8\)
- In 2009, NHSN removed asymptomatic bacteriuria from its definition of CAUTI

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### Symptomatic UTI Continued

Current NHSN definition for adults includes:

- Healthcare-associated
  - All elements of the infection criteria were first present together on or after hospital day 3
- Catheter-associated
  - Indwelling urethral catheter
  - Not in catheterization, not suprapubic, not condom
  - Indwelling catheter was in place for \(>2\) calendar days when all elements of the UTI criteria were first present together AND the catheter was in place on the date of the event or the day before

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### Asymptomatic Bacteremic UTI (ABUTI)

- Current NHSN definition for adults \(^9\):  
  - NO fever, SP or CVA tenderness, urgency, frequency, or dysuria
  - Urine culture \(\geq10^5\) CFU/ml with \(\leq2\) species of microorganisms
  - Blood culture with \(\geq1\) matching uropathogen
- The logic of the NHSN designation ABUTI has been questioned \(^10\)
  - Scant evidence that patients with ASB develop secondary BSIs
  - It is possible that patients with BSI from another source (e.g., central line) will also have bacteria in their urine
- Need to capture bacteremic CAUTI in patients who cannot communicate their symptoms

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Biofilms

• Bacteria attach to and coat the catheter surface
  - Proteus
  - Pseudomonas spp.
• Bacteria secrete an extracellular matrix
• Host urinary proteins and salts become incorporated into the matrix
• Bacteria within the biofilm grow more slowly than planktonic bacteria
• Bacterial cultures of planktonic bacteria may or may not reflect what is growing in the biofilm
• The presence of biofilm inhibits the activity of antimicrobials and host defenses

Two Paths

Periurethral (extraluminal)
- Mechanism of infection for majority of bacteriuria episodes in women
- Fecal flora colonize the periurethral area and enter the urinary tract
- At insertion or by capillary action
- Periurethral colonization does not routinely lead to bacteriuria
  - Takes >72 hours

Intraluminal
- Mechanism of infection for majority of bacteriuria episodes in men
- Cross-contamination of the drainage system
- Bacteria in drainage bag can be found in the bladder after 24-48 hours
- Very common in patients not on antimicrobials
- In the bladder, the concentration of microorganisms quickly increases
  - 100-10,000 cfu/mL to >100,000 cfu/mL in <24 hours

Scanning Electron Microscopy of Biofilm

• Urethral catheters in place 3 – 83 days (mean 35 days)
• Biofilm on 44/50 catheters
• No relationship between duration of catheterization and the extent of biofilm formation
• Biofilms are thicker and more well developed on the inner surface of the catheter than on the outer surface
• Layers of bacterial cells up to about 400 cells deep in the matrix

Microorganisms

• In short-term catheterization mostly single organisms
• Common organisms in CAUTI; NHSN 2006-2007
  - E. coli 21%
  - C. albicans 14%
  - P. aeruginosa 10%
  - K. pneumoniae 8%
  - E. faecium 6%
• Hematogenous seeding of the urinary tract 2,3
  - Especially S. aureus and Candida spp.

Risk factors for CAUTI

• Duration of catheterization
• Female gender
• Absence of systemic antibiotics
• Positive urethral meatal culture results
• Microbial colonization of the drainage bag
• Catheter inserted outside the operating room
• Catheter care violations (system opened)
• Rapidly fatal underlying illness
• Older age
• Diabetes mellitus
• Elevated serum creatinine at the time of catheterization

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Evidence for Recommendations

- Many guidelines but little evidence
- In the SHEA/IDSA guideline, only 3 positive recommendations and 4 prescriptions are based on good evidence from >1 properly randomized, controlled trial
- In the HICPAC guideline, no 1A recommendations for acute care settings
- Unanimous recommendations across all guidelines:
  - Minimize catheter use and duration
  - Insert catheters using aseptic technique and sterile equipment
  - Maintain a closed, sterile drainage system

Adoption of Recommendations

- 250 (57%) of 441 US hospitals provided data on 415 ICUs
- No widely-used CAUTI prevention policy

Guidelines and More Guidelines


Newer and Divergent Recommendations

Newer Recommendations
- 2001; strategies to remove the catheter as soon as possible
- 2001; use portable bladder scanners to rule out retention
- 2008; use silver alloy catheters in select patients
- 2009; use antimicrobial-impregnated catheters in select patients
- 2009; use pre-connected catheter and collection system with sealed junctions

Divergent Recommendations
- Hydrophilic catheters for intermittent catheterization
- Moderately disapproved IDSA 2010
- Weakly recommended HICPAC 2010
- Meatal cleaning before insertion
- Antiseptic, CDC 1983
- No recommendations, HICPAC 2009
- If the closed system is violated
  - Replace the collection system using aseptic technique, CDS 1983, SHEA
  - Replace the catheter and collecting system, HICPAC 2009

Adoption of Recommendations

- Predictors of adopting at least 1 prevention policy (n=174 [42%])
  - >500 beds (OR 0.52; 95%CI 0.33-0.86)
  - IC Director always has access to key decision makers for planning (OR 2.41; 95% CI 1.56-3.72)
- Found no significant difference in mean CAUTI rates for ICUs with at least 1 policy in place compared with those with no policy (p=0.84)
- Unable to assess a possible association between compliance with CAUTI prevention policy and CAUTI rates

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Strategies for Preventing CAUTI

• Minimize catheter use and duration
• Insert catheters using aseptic technique and sterile equipment
• Maintain a closed, sterile drainage system
• Apply administrative controls

HICPAC Recommendation Scale

1A: a strong recommendation supported by high-quality to moderate-quality evidence suggesting net clinical benefits or harms
1B: a strong recommendation supported by low-quality evidence suggesting net clinical benefits or harms, or an accepted practice (e.g., aseptic technique) supported by low to very low quality evidence
1C: a strong recommendation required by state or federal regulations
2: a weak recommendation supported by any quality evidence suggesting a trade-off between clinical benefits and harms

*HICPAC priority

Minimize Catheter Use

Indications for use
• Acute urinary retention or obstruction
• Frequent, accurate measurement of urine output in critically ill patients
• Perioperative in select procedures
• Urologic surgery
• Prolonged duration of surgery
• Anticipated to receive large-volume infusions
• Intra-operative monitoring of urine output
• Sacral or perineal wound healing in incontinent patients
• Prolonged immobilization under conditions such as unstable spine or pelvic fracture
• Patient comfort at the end of life

Minimize Catheter Use

• Minimize urinary catheter use and duration of use in all patients, particularly those at higher risk for CAUTI or mortality from catheterization such as women, the elderly, and patients with impaired immunity (1B)
• Avoid use of catheters for management of incontinence (1B)*
• Use catheters in operative patients only as necessary (1B)

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Alternatives

- Condom catheters in cooperative male patients (2)
- Suprapubic (SP) catheters (Unresolved)
  - Cochran review and meta-analysis by Niël-Weise & van den Broek updated 2009
    - For short-term bladder drainage in adults in hospital
    - Compared to patients with an SP catheter, those with urethral catheters had
      - More bacteriuria (RR=2.60, 95% CI 2.12-3.18)
      - More frequent recatheterization (RR=4.12, 95% CI 2.94-7.56)
      - More discomfort (RR=2.98, 95% CI 2.31-3.85)
      - Little cost data

Minimize Duration of Use

- Remove the catheter ASAP post-op, preferably within 24 hours (1B)*
- It is not uncommon for physicians to be unaware that a patient is catheterized¹
  - On average, physicians were unaware of catheterization for 28% of catheterized patients, and 41% of inappropriately catheterized patients
  - Catheterization was more likely to be appropriate if respondents were aware of the catheter (OR=3.7; 95% CI 2.1-6.7, P <0.001)

Reminders

- Automatic stop orders
- Nurse-driven protocols for removal
- Clamping prior to removal is unnecessary (2)

Alternatives

- Intermittent “in/out” catheterization in patients with spinal cord injury or bladder emptying dysfunction (2)
  - Perform intermittent catheterization at regular intervals to prevent bladder overdistension (1B)
  - Use a portable ultrasound device to assess urine volume (2)
    - Establish indications for use
    - Train staff
    - Ensure equipment is properly cleaned and disinfected between patients (1B)
  - Cochran review and meta-analysis by Niël-Weise & van den Broek updated 2009
    - For short-term bladder drainage in adults in hospital
    - Compared to patients with an indwelling urethral catheter, those with intermittent catheterization had fewer cases of bacteriuria (RR 2.90, 95% CI 1.44-5.84)

Minimize Duration of Use

Cochran review by Griffiths & Fernandez updated 2009

- For adults with short-term indwelling urethral catheters
- Following a urological procedure or surgery, remove the catheter at midnight instead of in the morning
  - Longer times to first void
  - Larger volumes at first void
  - Shorter LOS
  - No difference in the need for recatheterization
- Removing the catheter sooner rather than later
  - Lower risk of infection
  - Shorter LOS
  - Higher risk of voiding problems
- Not enough evidence to assess the effects of clamping prior to removal
- Not enough evidence to assess the effects of prophylactic alpha adrenergic blockers on the incidence of recatheterization

Strategies for Preventing CAUTI

- Minimize catheter use and duration
- Insert catheters using aseptic technique and sterile equipment
- Maintain a closed, sterile drainage system
- Apply administrative controls

Insert Catheters Using Aseptic Technique and Sterile Equipment

- Use the smallest bore possible (2)
- Use antimicrobial/antiseptic-impregnated catheters if a comprehensive strategy to reduce CAUTI is not working (1B)
- Cochran review by Schumm & Lam updated 2010
  - For short-term catheterization of adults in acute care settings
    - Compared to standard catheters, silver alloy catheters significantly reduce the incidence of ASB
      - At 1 week RR=0.54, 95% CI 0.43-0.67
      - At 2 weeks RR=0.64, 95% CI 0.51-0.80
    - Compared to standard catheters, antibiotic impregnated catheters lower the rate of ASB at 1 week
      - Minocycline/daptomycin RR=0.36, 95% CI 0.18-0.73
      - Nitrofurazone RR=0.52, 95% CI 0.34-0.78

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Insert Catheters Using Aseptic Technique and Sterile Equipment

- Use aseptic technique (1B)*
- Use sterile equipment (1B)*
  - Sterile gloves, drape, sponges, lubricant (18)
  - Solutions antiseptic vs. sterile water (Unresolved)
- Secure to prevent movement and urethral traction (1B)

Strategies for Preventing CAUTI

- Minimize catheter use and duration
- Insert catheters using aseptic technique and sterile equipment

- Maintain a closed, sterile drainage system
  - Apply administrative controls

Closed and Sterile

- Maintain a closed drainage system (1B)*
  - Use pre-connected and sealed junctions (2)
  - If the system is disconnected, contaminated, or leaking, replace the catheter and collecting system (1B)
- Hand hygiene immediately before and after any manipulation of the catheter or apparatus (1B)
- Use standard precautions during any manipulation of the catheter or collecting system (1B)
- Sample urine aseptically (1B)
  - Small volumes from the sampling port (1B)
  - Large volumes from the drainage bag (1B)

Care and Maintenance

- Maintain an unobstructed flow of urine (1B)*
  - Keep collection bag below the level of the bladder
  - Do no allow collection bag to touch the floor
  - Avoid kinks and dependent loops in tubing
- Empty the drainage bag regularly (1B)
  - Use a separate container for each patient
  - Do not allow the spigot to touch the collecting container
- No special urethral meatal care (1B)
  - Only routine perineal cleansing during daily bath
  - Avoid routine irrigation (2)
  - Avoid routine catheter changes (2)
  - Change the catheter if obstructed (1B)
  - Do not routinely screen catheterized patients for ASB (2)

Antimicrobials

- Do not use systemic prophylaxis routinely (1B)
  - Methenamine for urinary antisepsis (Unresolved)
- Do not treat ASB routinely¹
  - Patients who are on antimicrobials for other reasons develop bacteriuria less frequently than those not on antimicrobials, but resistance quickly develops and/or bacteriuria recurs
  - Not recommended because of cost, resistance, C. difficile
- Exceptions
  - Pregnancy
  - Urological procedures/surgery
  - Renal transplantation
- Treat symptomatic UTI
- Change the catheter and take urine and blood cultures before commencing treatment
- Do not use antimicrobials in the drainage bag (2)

Antimicrobials

- For short-term catheterization of adults in hospital
- Compared to giving antibiotics when clinically indicated, giving prophylaxis reduced the incidence of symptomatic CAUTI (RR=0.20, 95%CI 0.06-0.66) in female patients after abdominal hysterectomy in 1 trial
- Compared to giving antibiotics when microbiologically indicated, giving prophylaxis reduced the incidence of bacteriuria among medical neurology patients in 2 trials (RR=0.22, 95%CI 0.13-0.39) and surgery patients (data from 3 trials not combined)


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Strategies for Preventing CAUTI

- Minimize catheter use and duration
- Insert catheters using aseptic technique and sterile equipment
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Education, Protocols and Supplies

- Ensure only properly trained persons insert and maintain catheters (1B)*
  - Periodic in-service training (1B)
  - Focus educational efforts on OR and ER1
    - Most catheters are inserted in the OR (62%) and ER (11%)
    - Catheters placed in the ER are maintained for a significantly longer duration than catheters placed in the OR
- Provide protocols for catheter use, insertion, maintenance, and removal (1B)
- Ensure that supplies are readily available for use (1B)

Quality Improvement Program

- Implement quality improvement programs (1B)
  - Assure appropriate utilization of catheters
  - Identify and remove catheters that are no longer needed
  - Ensure adherence to hand hygiene and proper care of catheters
- Consider surveillance for CAUTI (2)
  - Ensure that there are sufficient trained personnel and technology for surveillance (1B)
  - Use a standard surveillance methodology (1B)

Provide Feedback

Performance feedback to clinicians and administrators (2)*

- Processes
  - Device utilization ratio (catheter days/patient days)*100 (QI)
  - % catheters with an appropriate indication documented
  - % catheters with documented insertion and removal dates
  - % catheters removed within 48 hours of surgery stop time
- Outcomes
  - CAUTI rates per 1,000 catheter days (QI)
  - CAUTI rates per 100 patient days
  - CAUTI rates per 100 catheters inserted

Improve Guideline Adherence

Cochran review by Flodgren et al 2012

- Interventions to improve adherence to guidelines for prevention of CLABSI, VAP, CAUTI
- Insufficient evidence to determine anything with certainty
- Educational interventions consisting of >1 element, administered repeatedly
- Dedicated personnel

Institutional Characteristics Associated With Successful HAI Reduction

- Processes are hardwired into daily activities and data is fed back1
- Local data is used as one form of credible evidence to influence stakeholders2
- Strong professional relationships exist2
- A collective focus on patient safety and an affirming emotional context1
- Intrinsically motivated champions3
- Unambiguous guidelines3
  - Who is responsible for guideline adherence
  - What tasks need to be accomplished
  - What methods should be employed
  - What exceptions might be appropriate

### Key Leadership Behaviors

- Cultivate a culture of clinical excellence and effectively communicated it to staff
- Focus on overcoming barriers
- Deal directly with resistant staff or dysfunctional processes
- Inspire employees
- Think strategically while acting locally
- Politic before crucial committee votes
- Leverage personal prestige to move initiatives forward
- Form partnerships across disciplines

### Challenges in CAUTI Surveillance

- The Joint Commission allows for each organization to decide, based on its risk assessment (IC.01.03.01) whether CAUTI is a priority for surveillance
  - A comprehensive program to reduce inappropriate catheter use can be effective but resource intensive
  - A single CAUTI is not estimated to be as costly as a CLABSI, VAP or SSI
  - CAUTI rarely cause sentinel events
- House-wide versus targeted surveillance
  - Neurological patients
  - ICUs

### Numerator Matters

- Compared 3 metrics to identify HAI
  - Traditional surveillance by 6 experienced IPs
  - Using NHSN definitions and methods
  - Electronic surveillance system (ESS) MedMined Care Fusion
  - ICD-9-CM codes
- Denominator was HAI found by any of the 3 methods
  - i.e., not all HAI
  - 1,000 bed academic medical center
  - Gold standard: HAI as determined by 2 physician-authors
  - Traditional surveillance was superior in terms of sensitivity, positive predictive value, and rate estimation.

### Denominator Matters

- Paradoxical increase in CAUTI rates when programs successfully reduce catheter use
  - Device utilization decreased from 0.36 to 0.28 (p=0.001)
  - CAUTI decreased from 28.2 to 23.2 per 10,000 patient days (p=0.02)
  - CAUTI increased from 7.9 to 8.28 per 1,000 catheter days (p=0.47)
- Consider using a patient day denominator or number of catheters inserted

### Detecting CAUTI Using ESS

- Developed 7 algorithms
  1. UTI diagnosis (n=2,614) from ICD-9-CM codes 599.xx
  2. Urine culture result >10^5 cfu/mL organisms from a Clinical Data Warehouse
  3. Urine culture result 10^5-10^6 cfu/mL organisms and pyuria from CDW
  4. Either 2 or 3 (n=2773)
  5. Culture 10^5 cfu with fever from EHR
  6. Culture 10^6-10^9 cfu with fever
  7. Either 5 or 6 (n=1,125)
- Found ICD-9 symptom codes were infrequently used
  - <0.1% of cases had any single CAUTI symptom code
- The sensitivity of ICD-9 codes compared to criteria 7 was 55.6%
- Did not compare the algorithms to NHSN criteria

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Gaps in Evidence for CAUTI Prevention Strategies
• Utility of electronic data for CAUTI surveillance and reporting
• Studies targeting symptomatic CAUTI as outcome, rather than ASB
• Use of condom catheters in acute care
• Complications of SP catheter use for short-term urinary drainage
• Context in which automatic stop orders or nurse-directed protocols reduce inappropriate catheter use
• Antiseptic versus sterile water for peri-urethral cleansing during catheter insertion
• Use of bacterial interference with non-pathogenic strains
• Effects of spatial separation of patients with catheters and colonized urine

Review
Strategies for CAUTI prevention
• Minimize catheter use and duration
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Coming Soon
04 June (FREE Teleclass ... Broadcast live from CHICA-Canada Conference) GLOBAL PATIENT SAFETY
Speaker: Sir Liam Donaldson, World Health Organization
10 June (FREE Teleclass ... Broadcast live from APIC Conference) INFECTION CONTROL DURING DISASTERS
Speaker: Steven Bock, New York City Langone Medical Center, Mie Saijo, Japanese Red Cross Ishinomaki Hospital, Japan
11 June (British Teleclass) EU DIRECTIVE ON THE PREVENTION OF SHARPS INJURIES IN THE HEALTHCARE SECTOR – GETTING THE POINT ACROSS
Speaker: David Halicki, IOSH Manchester & NW Districts Branch
12 June (South Pacific Teleclass) QUALITY AND SAFETY AND INFECTION PREVENTION AND CONTROL
Speaker: Dr Sally Roberts, Auckland Hospital, New Zealand

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