



APSIC GUIDE FOR PREVENTION OF CATHETER ASSOCIATED URINARY TRACT INFECTIONS (CAUTIs)

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Table of Contents

Abbreviations	5
Chapter 1 Introduction	6
Pathogenesis.....	6
Risk factors	7
Recommendations	8
References.....	8
Chapter 2 Diagnosis of catheter associated urinary tract infection (CAUTI)	10
Collection of urine specimen.....	15
Recommendations	15
References.....	15
Chapter 3 Development of a catheter associated urinary tract infection (CAUTI) prevention program	17
Recommendations	17
References.....	18
Chapter 4 Surveillance.....	19
Performance measures.....	20
A. Process measures	21
B. Outcome measures.....	22
Recommendations	23
References.....	23
Chapter 5 Implementing a catheter associated urinary tract infection (CAUTI) prevention program	25
Recommendations	25
References.....	26
Appendix 1.....	27
Appendix 2.....	28
Appendix 3.....	29
Appendix 4.....	31
Appendix 5.....	47

Abbreviations

ABBREVIATIONS	MEANING
UTI	Urinary Tract Infection
CAUTI	Catheter-associated urinary tract infection
HAI	Healthcare associated infection
IDSA	Infectious Diseases Society of America
CDC	Centers for Disease Control and Prevention
CDC, NHSN	Centers for Disease Control and Prevention, National Healthcare Safety Network
IPC	Infection Prevention and Control
CUSP	Comprehensive Unit-based Safety Program
PDSA	Plan-Do-Study-Act

Chapter 1 Introduction

Among urinary tract infections (UTIs) acquired in the hospital, 75% are associated with the use of a urinary catheter [1], and are called catheter-associated UTIs (CAUTIs). It is estimated that more than 25% of hospitalized patients had urinary catheter placement during their hospital stay [1-2]. Catheter associated urinary tract infection (CAUTI) is the most common type of healthcare associated infections (HAI) in the United States [2] and is the second most common HAI in Southeast Asia [3]. Based on a systematic review from high-income versus low-income countries, the cumulative incidence of CAUTIs was estimated to be 4.1 versus 8.8 per 1000 catheter-days [4].

A biofilm (a collective of one or more types of microorganisms that adhere and grow on the surface of urinary catheters) can develop and result in persistent infection and resistance to antibiotic therapy.

The major determinant on the development of bacteriuria or candiduria is the duration of catheterization. Catheter associated urinary tract infections (CAUTI) can manifest as either asymptomatic or symptomatic bacteriuria[5]. Catheter associated urinary tract infections (CAUTIs) are the source of approximately 20% of healthcare associated bacteremia and the attribution for more than 50% of healthcare-associated pneumonia in nursing homes [5]. Urinary tract infections (UTIs) and catheter-associated UTIs (CAUTIs) are also considered one of the most important sources of multi-drug resistant pathogens in hospitals. Catheter associated urinary tract infections (CAUTIs) cause significant direct and indirect financial impact to hospitals globally[1,2,5]. Healthcare workers who care for patients with indwelling catheters should be aware of and engaged in processes that reduce the rate of CAUTIs.

Pathogenesis

The life cycle of a catheter begins with catheter placement, followed by catheter care,

catheter removal and catheter re-insertion [9]. Avoiding unnecessary catheter insertion is a crucial initial consideration [10]. During and after insertion, most microorganisms causing CAUTI originate from the patient's own colonic or perineal flora or from the hands of healthcare workers during catheter insertion or manipulation of the catheter collection system. Pathogenesis can therefore incorporate extraluminal and intraluminal routes. Extraluminal inoculation occurs early by direct contamination when the catheter is inserted, or later by organisms ascending the perineum by capillary action in the thin mucous film adjacent to the external catheter surface. Intraluminal contamination may occur as a result of inappropriate management of the urinary catheter e.g. failure to maintain a closed drainage system [7]. Catheter associated urinary tract infection (CAUTI) attributed to Gram-positive organisms (e.g. *Enterococcus* spp.) and yeast (e.g., *Candida* spp.) are commonly acquired via the extraluminal route, whilst those attributed to Gram-negative organisms (e.g., *Escherichia coli*, *Klebsiella pneumoniae*) are commonly acquired intraluminally by upward movement of bacteria from a contaminated catheter, drainage tube, or urine drainage bag [7]. Although CAUTI most frequently stem from organisms gaining access to the bladder extraluminally, both routes are important as a source of CAUTI. Understanding how bacteria access the bladder by either route helps identify opportunities for CAUTI prevention.

Risk factors

It is well recognized that catheterization and the duration of catheterization is a predictor for CAUTI. Other risk factors for CAUTIs include catheterization outside operating room, female sex, underlying illness, older age, microbial colonization of drainage bag, catheter and periurethral segment [7-8]. Antimicrobial therapy has been associated with reduction of CAUTIs for short-term catheterization but is generally not recommended as a prevention strategy due to the risk of selection of multi-drug resistant pathogenic bacteria [7-8].

In a CAUTI prevention program, risk factors are to be evaluated and appropriate measures implemented to mitigate risks. Risks include urinary catheters being inserted unnecessarily, catheters remaining in place for too long, poor aseptic technique during insertion and catheter maintenance, not maintaining a closed drainage system, obstructed urine flow and no or poor catheter securement.

Recommendations

1. It is important to understand the pathogenesis and risk factors for CAUTIs in order to develop and implement appropriate infection prevention measures. [IA]
(See Appendix 1)
2. Risk assessments and identification of modifiable risk factors for CAUTIs will lead to CAUTI reduction. [IA]

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Chapter 2 Diagnosis of catheter associated urinary tract infection (CAUTI)

Generally, the diagnosis of CAUTI is made based on the presence of bacteriuria with signs and symptoms consistent with UTI in a catheterized patient or in a patient who had the catheter removed within the past 48 hours.

Signs and symptoms compatible with CAUTI include new onset or worsening of fever, rigors, altered mental status, malaise or lethargy. Local symptoms are flank pain, costovertebral angle tenderness, acute hematuria, pelvic discomfort and in those whose catheters have been removed, dysuria, urgent or frequent urination, or suprapubic pain or tenderness may occur.

It is important to note that asymptomatic bacteriuria is very common among catheterized patient. However, routine screening and urine culture in catheterized patients are not recommended except in pregnant women and patients undergoing urologic procedure.

Bacteriological urine culture is essential for the diagnosis of CAUTI. Different thresholds for bacterial counts in the urine are used to define infection depending on whether they are used for surveillance definitions or in the context of clinical diagnosis. The Infectious Diseases Society of America (IDSA) guidelines uses a threshold of $\geq 10^3$ bacteria growth in urine for clinical diagnosis of UTI. Centers for Disease Control and Prevention (CDC), National Healthcare Safety Network (NHSN) guidelines, which is mainly used for surveillance purpose, has a higher threshold of bacterial counts $\geq 10^5$ cfu/mL with no more than two organism species. Urine cultures with > 2 organisms are regarded as contaminated samples and not considered for surveillance. Candida species or yeast like mold, dimorphic fungi are also not considered as significant organisms in the urine culture of catheterized patients in the CDC NHSN guideline. Candiduria in general is very common in patients with indwelling bladder

catheter, more often due to colonization rather than infection.

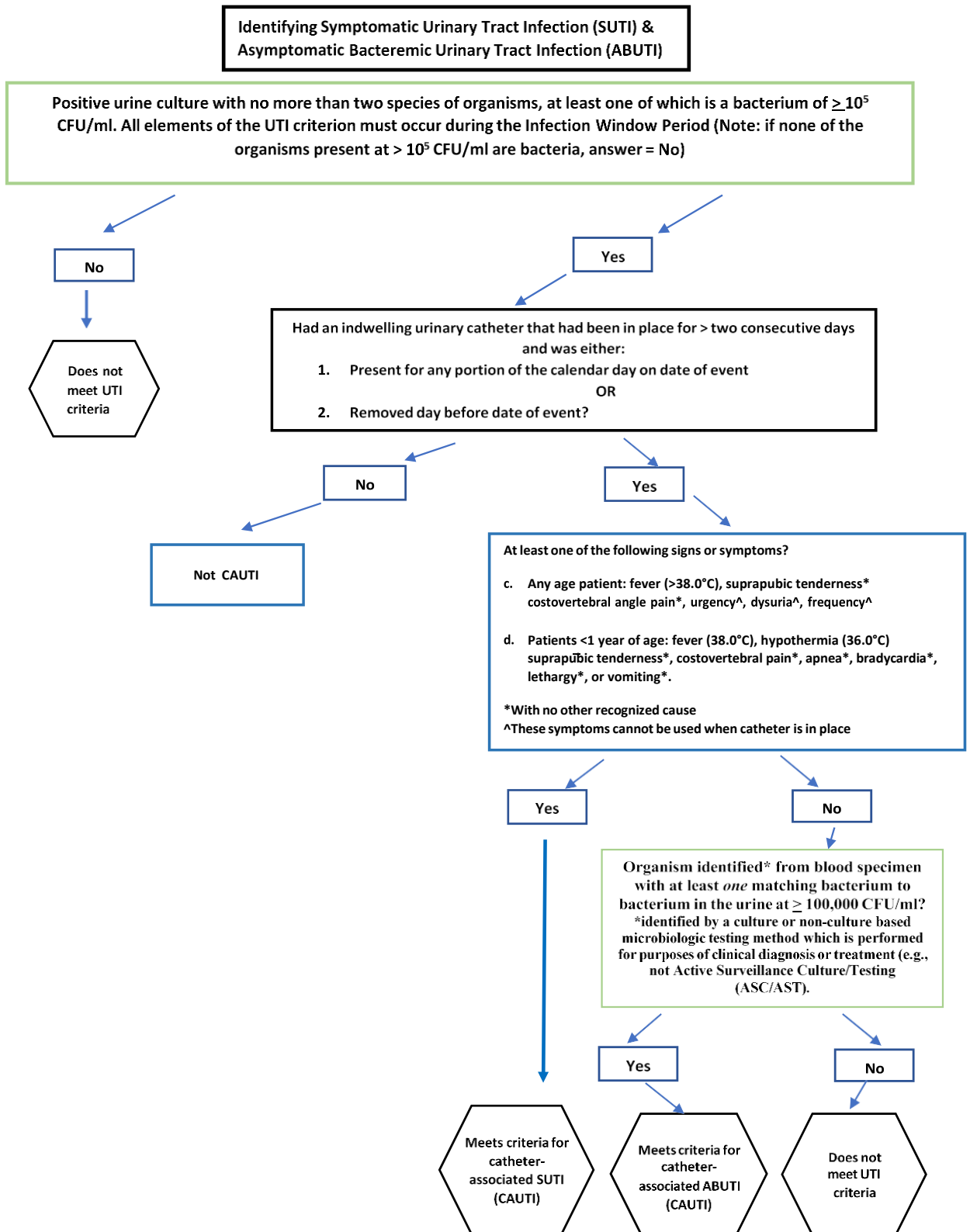
CAUTI is defined using Symptomatic Urinary Tract Infection criteria and Asymptomatic Bacteremia UTI criteria (Table 1) and flowchart in Figure 1.

Table 1: Urinary Tract Infection		
Symptomatic UTI (SUTI)		
Catheter-associated Urinary Tract Infection (CAUTI) - Any Age		
Patient must meet 1,2, and 3 below:		
Criteria	Yes	No
1. Patient had an indwelling urinary catheter (IUC) that had been place for more than 2 consecutive days in an inpatient location on the date of the event AND was either:		
<ul style="list-style-type: none"> Present for any portion of the calendar day on the day of the event OR 		
<ul style="list-style-type: none"> Removed the day before the event 		
2. Patient has at least one of the following signs or symptoms:		
<ul style="list-style-type: none"> Fever (> 38 °C): Reminder: To use fever patient >65 years of age, the IUC needs to be in place for more than 2 consecutive days in an inpatient location on date of event and is either still in place OR was removed the day before the date if event 		
<ul style="list-style-type: none"> Suprapubic tenderness* 		
<ul style="list-style-type: none"> Costovertebral angle pain or tenderness* 		
<ul style="list-style-type: none"> Urinary urgency^ 		
<ul style="list-style-type: none"> Urinary frequency^ 		

• Dysuria [^]		
3. Patient has a urine culture with no more than two species of organisms identified, at least one of which bacterium of $\geq 10^5$ CFU/ml. All elements of the SUTI criterion must occur during the infection window period (IWP)		
Comments/ Notes: [^] - denotes after removal of catheter.		
Asymptomatic Bacteremic Urinary Tract Infection (ABUTI)		
Catheter-associated ABUTI or Non- catheter-associated ABUTI ---Any Age		
Patient must meet 1,2, and 3 below:		
Criteria	Yes	No
1. Patient with* or without an indwelling urinary catheter has no signs or symptoms of SUTI 1 or 2 according to age (Note: Patients > 65 years of age with a non-catheter-associated ABUTI may a fever and still meet the ABUTI criterion)		
2. Patient has a urine culture with no more than two species of organisms identified, at least one of which bacterium of $\geq 10^5$ CFU/ml		
3. Patient has organisms identified ** from blood specimen with at least <u>one</u> matching bacterium to the bacterium identified in the urine specimen, OR meets LCBI criterion 2 (without fever) and matching common commensal(s) in the urine. All elements of the ABUTI criterion must occur during the IWP <u>Chapter 2 Identifying HAIs in NHSN).</u>		

<p>* Patient had an IUC in place for more than 2 consecutive days in an inpatient location on the date of event, and the IUC was in place on the date of event or the day before.</p> <p>** Organisms identified by a culture or non-culture based microbiologic testing method which is performed for purposes of clinical diagnosis or treatment (for example, not Active Surveillance Culture/ Testing (ASC/AST).</p>		
<p>Comments:</p> <p>“Mixed flora” is not available in the pathogen list within NHSN. Therefore, it cannot be reported as pathogen to meet the NHSN UTI criteria.</p> <p>Additionally, “mixed flora” represent at least two species of organisms. Therefore, an additional organism recovered from the same culture would be represent > 2 species of microorganisms. “Mixed flora” also cannot be used to meet the UTI criteria.</p> <p>The following excluded organisms cannot be used to meet the UTI definition:</p> <ul style="list-style-type: none"> • Any <i>Candida</i> species as well as a report of “yeast” that is not otherwise specified • Mold • Dimorphic fungi or • Parasites 		
Comments/ Notes:		

Figure 1: Identifying SUTI and ABUTI Flowchart



Collection of urine specimen

Urine collection for culture must be done using aseptic technique to avoid contamination and unnecessary antimicrobial treatment. Ideally urine samples for culture should be obtained by mid-stream collection after removal of the indwelling urine catheter.

In patients with a long-term indwelling catheter where removal is not possible, the preferred method of obtaining a urine specimen for culture is to replace the catheter and collect the specimen from the freshly placed catheter.

Alternatively, urine should be obtained from the catheter port in the drainage system. The collection port must be disinfected with appropriate disinfectant such as 70% alcohol and allow to dry for at least 30 seconds prior to accessing the port. Urine culture should not be taken directly from the drainage bag.

Recommendations

1. Microbiological confirmation of urine culture is needed for diagnosis of CAUTI. Urine culture must have no more than 2 species of organisms, at least one of which has a bacterium of $> 10^5$ CFU/ml. [IA]
2. Urine collection for culture must be done using aseptic technique to avoid contamination. [IA]

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Chapter 3 Development of a catheter associated urinary tract infection (CAUTI) prevention program

The primary outcomes for CAUTI prevention programs are to reduce unnecessary catheter placement and minimization of the duration catheters remaining in place. Organizations should develop CAUTI prevention programs that ensure:

- Provision of evidence-based guidelines for catheter use, insertion, and maintenance
- Staff education and periodic training in insertion and removal technique, maintenance procedures, complications, infection prevention and alternatives to indwelling urinary catheters
- Supervised practice and competency assessment of staff to ensure only trained, dedicated staff insert urinary catheters
- Adequate supplies and equipment to ensure aseptic technique during catheter insertion and maintenance requirements
- Documentation systems to record medical order for catheter placement, indications for catheter insertion, name of person inserting catheter, date, time, daily maintenance care and assessment of the ongoing need for catheter and planned date of removal
- Adequately trained staff to support surveillance and feedback of catheter use and outcomes
- Where surveillance identifies opportunities for improvement, support the implementation of evidence prevention strategies (process and/or outcome measures) with ongoing surveillance and feedback.

Recommendations

1. CAUTI prevention programs should be developed [IA]

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Chapter 4 Surveillance

Surveillance of CAUTI is important to monitor trends for detection of outbreaks and assessment on efficacy of CAUTI prevention strategies. Performing surveillance for CAUTI is best based on a facility's risk assessment and/or local regulatory requirements. The facility should consider identifying patient groups or units at risk for CAUTI through reviews on frequency of catheter use and other potential risk factors, such as genitourinary surgery, obstetrics, critical care to develop a targeted surveillance program.

Surveillance processes are:

1. Use standardized criteria or definitions to identify patients who have a CAUTI, such as CDC NHSN. These are numerator data for calculation of CAUTI rate.
2. Use surveillance methods for case finding that are documented to be valid and appropriate for the institution.
3. Collect information on catheter-days and patient days (denominator data) and indications for catheter insertion for all patients in the patient groups or units being monitored.

Examples of metrics that should be used for CAUTI surveillance include:

- Number of CAUTI per 1000 catheter-days
 - Number of bloodstream infections secondary to CAUTI per 1000 catheter-days
 - Catheter utilization ratio: (urinary catheter days/patient days) × 100
4. Calculate CAUTI rates and/or standardized infection ratio (SIR) for target populations for comparison.

5. Provide unit-specific feedback and reporting to the organization's quality improvement team and healthcare management.

Surveillance programs that monitor urine cultures through microbiology laboratory results are generally used to detect patients with potential UTIs. Patients with positive urine culture results are then evaluated for the presence of an indwelling urinary catheter and a CAUTI as defined by using specific surveillance criteria. Routine screening of catheterized patients for asymptomatic bacteriuria is not recommended in catheterized patients because the result often reflecting colonization by catheter biofilm and not CAUTI.

When performing surveillance for CAUTI, consider providing regular (e.g. quarterly) feedback of unit-specific CAUTI rates to unit heads and nursing staff along with other relevant clinical care staff. At the time surveillance for CAUTI is performed, ensure that there are sufficient trained personnel and technology resources to support surveillance for urinary catheter use and outcomes. The Infection Prevention and Control (IPC) team, the laboratory, and information technology departments are responsible for ensuring that systems are in place to support the surveillance program. Computerized assisted surveillance should be considered in facilities that have implemented use of electronic documentation.

Infection Prevention and Control (IPC) leadership is responsible for ensuring that an active program to identify HAIs is implemented, that HAI data are analyzed with timely feedback to those who can use the information to improve the quality of care (e.g., Heads of units, unit nursing staff, clinicians, and hospital administrators), and that evidence-based practices are incorporated into the program.

Performance measures

Performance measures are intended to support internal hospital quality improvement efforts. In general, performance measures include process and outcome measures with

reference to published strategies, guidelines and literature. Report both process and outcome measures to senior hospital leadership, nursing leadership and unit staff as well as physicians who care for patients at risk for CAUTI. Data can be used to track changes in patient care over time and evaluate the impact of interventions for quality improvement.

A. Process measures

Process measures are the parts or steps in a process that lead to an outcome. The prolonged use of indwelling urinary catheters is a significant risk factor for CAUTI. Catheters should be placed only when appropriate indications are present, and catheters that are no longer needed should be discontinued immediately. Tracking of appropriateness and prevalence of catheter use are process measures. Generally, bundle compliance strategies are also process measures.

Examples include:

- a) Compliance with documentation of catheter insertion and removal dates. Conducting random audits of selected units and calculating compliance rate:
 - Numerator: number of patients with urinary catheters in the unit with proper documentation of insertion and removal dates
 - Denominator: number of patients in the unit with a urinary catheter in place at any time during admission
 - Multiply by 100 so that the measure is expressed as a percentage.
- b) Compliance with documentation of indication for catheter placement. Conduct random audits of selected units and calculate compliance rate:

- Numerator: number of patients with urinary catheters in the unit with an appropriate indication for the catheter
- Denominator: number of patients in the unit with a urinary catheter in place
- Multiply by 100 so that the measure is expressed as a percentage.

Catheter appropriateness and prevalence can be tracked through daily ward rounding of the clinical team and evaluate the causes of CAUTI on the unit such as audits of aseptic insertion and maintenance bundle compliance (e.g., urinary drainage bag positioned below the patient's bladder, drainage bag tubing without kinks and loops, etc.).

B. Outcome measures

Identify the number of symptomatic CAUTIs attributable to selected units every month. By using the CDC, National Healthcare Safety Network (NHSN) definition of symptomatic CAUTI to identify and count cases on the unit, the team will be able to use CDC, NHSN data for benchmarking purposes. Outcome measures of CAUTI are rates of symptomatic CAUTI, stratified by risk factors (e.g., ward/Unit). Such measurement of rates allows an individual facility to gauge the impact of prevention strategies over time. Refer the appendix for the calculation of the metrics. (See Appendix 2)

CAUTI rate is one way to measure the outcomes of the care of patients' urinary needs which is an important metric used by individual units and hospital leaders. Documenting the interventions implemented by the unit on a graph of the catheter utilization and CAUTI rate allows the team to visualize the effects of their interventions.

Performance measures and audits are important information to facilitate improved patient safety. Quality improvement programs should be implemented as an active approach to identify when process and outcome measures are not being met.

Recommendations

1. Use standardized methodology for performing CAUTI surveillance [IA]
2. Routine screening of catheterized patients for asymptomatic bacteriuria is not recommended. [IIB]
3. When performing surveillance for CAUTI, consider providing regular feedback of unit specific CAUTI rates to nursing staff and clinical care staff. [IIB]
4. Reporting both process and outcome measures to senior administrative, medical, and nursing leadership and clinicians who care for patients at risk for CAUTI. [IIB]

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Lisa L. Maragakis, Jennifer Meddings, David A. Pegues, Ann Marie Pettis, Sanjay Saint, Deborah S. Yokoe, *Infection Control and Hospital Epidemiology*, Vol. 35, No. 5 (May 2014), pp. 464-479 <http://www.jstor.org/page/info/about/policies/terms.jsp>

Chapter 5 Implementing a catheter associated urinary tract infection (CAUTI) prevention program

Successful results have been seen when healthcare institutions adopt quality improvement approach to reduce healthcare associated infections (HAIs). The Comprehensive Unit-based Safety Program (CUSP) is one success example [1]. Multidisciplinary team comprising key stakeholders as team members work together in reviewing local issues and adopting a plan-do-study-act approach in address these issues [2]. The model for improvement recommended is described in the APSIC Guide for Prevention of Central Line Associated Bloodstream Infections (CLABSI) [3]. Changes are made in rapid Plan-Do-Study-Act (PDSA) cycles by a multidisciplinary team.

A checklist on the CAUTI insertion and maintenance bundles may be used to assess the process over a time period. (See Appendix 2). Immediate feedback on performance will ensure adjustments to practices and reduction in variation. Run charts plotted gives the team a visual guide on progress of improvements made.

A safety and quality improvement culture within the institution will help towards greater success as leaders and staff are accountable to ensure patient safety is observed at all times [4].

Recommendations

1. Implementation of the use of the CAUTI insertion and maintenance bundles is best done using a quality improvement approach with a multidisciplinary team. [IA]

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Appendix 1

Categories for Strength of Each Recommendation

Categories for strength of each recommendation	
CATEGORY	DEFINITION
A	Good evidence to support a recommendation for use.
B	Moderate evidence to support a recommendation for use.
C	Insufficient evidence to support a recommendation for or against use
D	Moderate evidence to support a recommendation against use.
E	Good evidence to support a recommendation against use.
Categories for quality of evidence on which recommendations are made	
GRADE	DEFINITION
I	Evidence from at least one properly randomized, controlled trial.
II	Evidence from at least one well-designed clinical trial without randomization, from cohort or case-controlled analytic studies, preferably from more than one centre, from multiple time series, or from dramatic results in uncontrolled experiments.
III	Evidence from opinions of respected authorities on the basis of clinical experience, descriptive studies, or reports of expert committees.

Appendix 2

Sample – Best Practice Bundle Checklist from Singapore General Hospital

Infection Prevention Audit Tool

(Indwelling Urinary Catheter Insertion and Maintenance Checklist)

Date of insertion : _____

Ward and Bed Location : _____

Patient's Initial : _____

S/N	Audit Components	Yes	No	NA	REMARKS
Insertion Bundle					
1	Urinary catheter is inserted with appropriate indication ^a				
2	Requisites for urinary catheter insertion are prepared prior to insertion - Disposable urinary catheterization set, - A pair of sterile gloves, - Single-use sachet of 0.05% Chlorhexidine solution - Single-use sachet of lubricant jelly - An appropriate size urinary catheter ^b for the procedure				
3	Surgical hand hygiene is performed before the procedure				
4	Aseptic technique is maintained throughout insertion procedure				
4.1	Proper cleansing of genitalia is being demonstrated				
Maintenance Bundle					
1	Daily review of patient's need for urinary catheter (Reference to HOUDINI criteria)				
	Nurse in charge removes urinary catheter if patient do not meet HOUDINI criteria. (Note: HOUDINI criteria is not applicable to patients under Urology and Geriatric medicine's care (NU-OPS-428)				
2	Hand hygiene is perform before and after -touching patient's catheter				
3	Maintain closed drainage system & unobstructed urine flow i.e. free of kinks				
4	Urinary drainage bag is kept below level of the bladder but above the floor at all times				
5	Empty collection bag i.e. when bag is half full and or before any procedures and activities (i.e. CXR, PT/OT sessions)				
6	Drainage port should be cleansed with 70% Isopropyl alcohol swab before and after draining of urine				
7	Secure the catheter to the lateral aspect of the patient's thigh to prevent urethral trauma				

.....
Auditor's name, designation and signature

a	Indication	
	H	Haematuria
	O	Obstruction
	U	Urologic surgery
	D	Decubitus ulcer
	I	Intake and output monitoring
	N	Nursing end of life
	I	Immobility
b	General guideline on urinary catheter size selection according to indications:	
	Size (Fr)	Indications
	12–14 Fr	Drainage of clear urine
	14–16 Fr	Urine containing debris or particles
	18 Fr or above	Haematuria or clots are present

Appendix 3

Outcome Measures

1. Assess rates of symptomatic CAUTI, stratified by risk factors (e.g. ward / unit).
 - Numerator: number of symptomatic CAUTI in each location monitored.
 - Denominators:
 - a. Total number of urinary catheter days for all patients in each location with an indwelling urinary catheter;
 - b. Total number of patient-days for all patients in each location monitored.
 - Multiply by 1,000 so that measure is expressed as cases per 1,000 catheter-days or by 10,000 to express as cases per 10,000 patient-days.
2. Rates of BSI attributable to CAUTI. When blood culture organism matches urine specimens and patient meets criteria for CAUTI.
 - Numerator: number of episodes of BSIs attributable to CAUTI.
 - Denominator: total number of urinary catheter days for all patients in each location monitored who have an indwelling urinary catheter in place.
 - Multiply by 1,000 so that the measure is expressed as cases per 1,000 catheter-days.
3. The Standardized Infection Ratio (SIR) is a summary measure used to track HAIs at a national, state, or facility level over time. SIR adjusts for the different types of patients in healthcare facilities.

- The ratio is calculated by dividing the observed number of CAUTIs by the predicted number of CAUTIs.
- The predicted number of infections is an estimated number of CAUTIs based on infections reported to NHSN during a baseline period (currently 2009 for CAUTI, risk adjusted for patient care location and facility characteristics).

Appendix 4

Sample: Urinary Catheter Insertion and Management Guideline

Urinary catheters

A urinary catheter is a hollow, flexible tube inserted through the urethra (opening where urine comes out) into the bladder that drains urine into an external drainage bag. Once the catheter has been inserted, a small balloon in the internal end is inflated with sterile water to keep it in place. The balloon is deflated when the catheter needs to be removed.

Indications for use

Indications for catheterization include:

- Bladder drainage
 1. Acute and chronic urinary retention
 2. Patients/residents with specific condition that affects the nerves that control the bladder, such as spina bifida, multiple sclerosis (MS), stroke or spinal injury
 3. Measuring and monitoring urine output
 4. Bladder outlet obstruction
 5. Management of incontinence to assist in healing open wounds/pressure ulcers in selected patients/residents.

Preparation for catheter insertion

It is recommended that two suitably qualified staff are involved in catheter insertion procedures (especially with female patients/residents). The assistant can help to prepare sterile equipment and maintain patient/resident position and comfort.

A. Catheter selection

Collect equipment – see box 1.

Box 1 – catheter selection

Catheter Type/Materials

Short Term

- Silicone Elastomer Coated Latex catheter

Long Term

- Can be made from silicone-elastomer coated latex and hydrophilic polymer coated latex, these materials are known to cause the least friction and tissue reaction

Latex Allergy

- 100% silicone

Catheter and Balloon Size

- Choose the smallest urinary catheter size possible to provide drainage. Too large a urinary catheter may cause urethral trauma and damage

Recommended catheter size

- As recommended by medical team/officer. Generally:

- Females: 12 – 14 FG
- Males: 14 - 16 FG

Catheter Balloon Volume

- Follow manufacturer's instructions.

I. Equipment for catheter insertion

Collect equipment – see Box 2.

Box 2 – equipment for catheter insertion

- Disposable catheter tray/pack
- Alcohol based hand rub
- 2 pairs of sterile gloves
- Sterile lubricant syringe
- Sterile drape
- For men:
 - Lignocaine 2% in introducer syringe
- For women:
 - Sterile water-based lubricant sachet or Lignocaine 2% in introducer syringe (if preferred)
- Sterile catheter of appropriate size, balloon size and type
- Note: a 2nd catheter should be readily available in the event the first catheter becomes contaminated or is introduced into the vagina in females

- Cleaning solution
 - Aqueous chlorhexidine 0.05% / Cetrimide 0.5% 30ml ampoule or normalsaline if antiseptic solution is not tolerated
- 10 ml syringe
- Sterile water for injection (to inflate the catheter balloon)
- Sterile urinary drainage bag
- Tape or strap to secure indwelling urinary catheter
- Drainage bag holder – i.e., bedside hanger, leg bag holder
- Waterproof bed protector
- Rubbish bag.

II. Prepare equipment

- Place the required equipment on a clean dressing trolley
- Open the catheter pack using an aseptic non-touch technique
- Add the following to the sterile field:
 - Catheter
 - Syringe for filling the balloon
 - Sterile lubricant syringe or contents of sterile water based lubricant sachet.

III. Prepare the patient/resident

- Explain the procedure to the patient/resident including the risks and reasons for catheterization and ensure consent has been obtained
- Check the patient/resident history for allergy i.e., latex, cleaning solutions such as Chlorhexidine and tapes

- Maintain patient/resident privacy
- Assist the patient/resident into a comfortable flat position with arms by their side away from where the sterile field will be created
- Positioning for the procedure
 - **Females** – If able to be tolerated a flat position with knees bent and both legs apart, fully exposing the perineal area and urethral meatus is best. In addition, a pillow under the hips may improve access to the urethral meatus
 - **Males** – If the resident can tolerate a flat position with legs extended is best
- Place a waterproof bed protector under the buttocks of the patient/resident to protect bed linen
- Have a good direct light source available (i.e., examination light).

B. Insertion of catheter

- Open the catheter pack using an aseptic non-touch technique
- Add the following to the sterile field:
 - Catheter
 - Syringe for filling the balloon
 - Sterile lubricant syringe or contents of sterile water based lubricant sachet
- Apply the cleaning solution to gauze

Pre-insertion cleaning in male patients

- Perform hand hygiene (wash hands or apply alcohol hand rub)
- Don non-sterile gloves

Female	Male
Wiping in a downwards direction clean one side of the outer labia minora (outer lips) followed by the other side using a new piece of gauze soaked in the cleaning solution. Repeat the process for the labia minora (inner lips) and urethra (bladder opening) wiping in one direction using separate (new) pieces of gauze that has been soaked in the cleaning solution	Retract foreskin where appropriate. If tightness of the foreskin is present it may be difficult to retract. <i>Do not force the foreskin back over the glans of the penis.</i>
On each occasion dispose gauze into the rubbish bin	Using gauze soaked in the cleaning solution clean the entire penis, starting with the meatus (urethral opening), glans of the penis, and scrotum
Do not place used gauze back onto the sterile field	Dispose gauze into rubbish bag
	Do not place used gauze back onto the sterile field

- Remove gloves and perform hand hygiene

Procedure for insertion

- Don sterile gloves
- Prepare the sterile lubricant gel or Lignocaine 2% in introducer syringe
- Lubricate the tip of the catheter and first 10cm of catheter with lubricant
- Fill the syringe for the catheter balloon with the required volume of sterile water
- Lay the drape between the patient/resident legs creating a sterile field to work within
- Place the tray of the sterile pack containing the catheter, lignocaine syringe and syringe of sterile water onto the sterile field close to the patient/resident.

I. Female

1. Separate the labia and identify the urethral meatus (bladder opening) with your non-dominant gloved hand.
2. If using the pre-filled lignocaine lubricant syringe, gently insert the nozzle into the urethral meatus (bladder opening) and gently inject the gel while holding the labia open with your non-dominant hand. Allow 3-5 minutes for the anesthetic to take effect.
3. Using sterile gauze hold the pre-lubricated catheter and insert it slowly inward to approximately 8-10cm in an upward, forward motion and wait for urine to flow
4. If no urine appears, the catheter may be in the vagina. Leaving the catheter in place and using a new pre-lubricated catheter try to reinsert the catheter into the urethral meatus (bladder opening) paying particular attention to the vulvar anatomy (Box 2). Once successfully inserted, remove the catheter from the vagina.
5. Ensure urine is draining from the catheter prior to inflation of balloon. The balloon is inflated by instilling sterile water for injection into the balloon port of the catheter, according to the volume indicated on the catheter. Once filled to the manufacturer's recommendations withdraw the catheter gently until slight resistance is met.

Note: Any pain on inflation of the balloon with sterile water for injection may indicate the balloon is in the urethra and ***not in the bladder.***

6. Connect catheter to the sterile drainage bag using aseptic non-touch technique.
7. If a catheter is unable to be inserted report and seek medical advice immediately.

II. Male

1. With non-dominant hand hold the penis at right angles to the body. Encourage the patient/resident to relax, breathe slowly, and keep their hands by their side
2. Using your dominant hand insert the lignocaine gel into the urethra opening. Apply gentle pressure to the tip of the penis to prevent outflow of lubricant. Allow 3-5 minutes for the anesthetic to take effect
3. Hold the pre-lubricated catheter using the sterile gauze and slowly advance catheter 17 to 22.5 cm or until urine flows from catheter. Ask patient to bear down gently (as if to void) and slowly insert catheter through urethral meatus (opening). Maintain gentle pressure and encourage the patient/resident to relax, keep their hands by their side, deep breath, cough and bear down as if trying to void.
4. Do not force the catheter

Note: If the patient experiences an erection at any time, stop the procedure until the erection subsides

5. Ensure urine is draining prior to inflation of the catheter balloon. The balloon is inflated by instilling sterile water for injection into the balloon port of the catheter, according to the volume indicated on the catheter. Once filled to the manufacturer's recommendations withdraw the catheter gently until slight resistance is met.
6. After the balloon is inflated gently pull on the catheter until resistance is felt and ease the foreskin back into position

7. Connect catheter to the sterile drainage bag using aseptic non-touch technique.
8. If a catheter is unable to be inserted report and seek medical advice immediately.

C. Secure catheter and catheter drainage bag

1. Secure catheter with securing devices or specifically designed straps and secure bag to an appropriate urine bag holder. Ensure the catheter is always firmly secure to prevent in and out movement and urethral traction to decrease catheter dislodgement and meatal erosion.
2. Remove gloves and perform hand hygiene.
3. Return the resident to a comfortable position.
4. Dispose of used waste as per the facility waste segregation guidelines and perform hand hygiene.
5. Complete organization documentation requirements in the patient/resident including date and time of catheter insertion, type of catheter used, volume of sterile water inserted into the urinary catheter balloon and the name of the person inserting the catheter.

D. Maintaining a closed drainage system

Daily review	Once inserted, indwelling urinary catheters should be reviewed regularly for removal or continuing need
Fluid intake	Encourage fluid intake to at least 1.5 L per day unless otherwise indicated by medical officer

Hand hygiene	<p>Strict adherence to hand hygiene (hand wash or application of alcohol hand rub) before and after <u>any</u> manipulation of the catheter or drainage system</p> <p>After hand hygiene don non-sterile gloves before handling the catheter or drainage system</p> <p>Change gloves and perform hand hygiene between each patient/resident to prevent cross contamination</p>
Anchor/secure catheter	<p>The catheter should always be secured to the thigh to prevent in and out movement and urethral pulling to decrease the risk of catheter dislodgement avoiding trauma to the bladder neck and erosion of the urethral meatus</p> <p>If using tape, the skin beneath it should be monitored regularly. The anchor should be changed from left thigh to right thigh regularly</p>
Catheter hygiene	<p>The urethral meatus and catheter require cleansing daily, after continent patients/residents open their bowels, and if there is any fecal incontinence. The urethral opening should be examined regularly so that any abnormalities can be reported and treated, as necessary.</p>
Drainage	<p>Urinary catheters are attached to a drainage bag, and this creates a closed drainage system. Catheter drainage bag and tubing should be positioned off the floor and below bladder height to prevent reflux of urine and facilitate drainage of urine from the bladder.</p> <p>Do not allow the drainage bag to overfill.</p>

Self-care and ambulant patients/residents	Educate patients and caregivers about safety and hygiene management of urinary catheters and drainage bags
Closed system	Maintain a sterile, closed system always. If breaks in the closed system are noted (i.e., prolonged disconnection, cracked tubing) replace the catheter and drainage bag.
Kinking of catheter or drainage bag tubing	Prevent kinking to ensure unobstructed flow of urine
Disconnection	If unintentional disconnection occurs, review further the need for the indwelling urinary catheter. If still required, reconnect to a new sterile bag after cleansing with 70% alcohol swab. If disconnection is prolonged, or there is gross contamination, change the urinary catheter and drainage bag.
Blockage	<p>If blockage of the urinary catheter is suspected, check for kinks in tubing, fluid intake and bowel movements. If blockage is likely, use a bladder scanner in the first instance to assess if urine is retained in bladder.</p> <p>If urinary catheter is blocked notify the patient/resident medical officer immediately</p>
Bag changes	Leg bags should be changed in line with manufacturer's recommendations, generally every 5-7 days. If a bag becomes disconnected from the catheter, a new bag should be attached.

	<p>Large urinary drainage bags are to be changed as per the manufacturer's instructions.</p> <p>The date of the bag change should be recorded.</p>
Balloon inflation	<p>Do not inflate the catheter balloon with additional water after insertion, or deflate unless removing</p>
Emptying drainage bags	<p>Empty drainage bag when 2/3 full, and leg bags when half full.</p> <p>Ensure non-sterile gloves and eye protection are worn. Empty urine into a clean container, such as a sanitized urinal bottle, each time.</p> <p>Wipe the urinary drainage bag spout with a 70% alcohol swab before and after emptying.</p>

Bacteria enter the bladder of a catheterized resident in two ways:

- where bacteria travel up the drainage system via the catheter to the bladder, this is caused by breaks in the closed system
- where bacteria travel up into the bladder along the catheter in the urethra (opening where the urine comes out)

Maintaining a continuously closed urinary drainage system is necessary and breaks such as unnecessary emptying of the urinary drainage bag or disconnecting the drainage bag from the catheter to take a urine sample increases the risk of infection.

C. Changing long term urethral catheters/drainage bags

- The length of time a catheter will remain functional is variable

- There is limited evidence on how often to change catheter bags. The catheter function, encrustation degree, frequency of blockages and patient comfort must be taken into consideration
- Changing indwelling catheters and catheter bags at routine, fixed intervals is not recommended. Rather it is suggested to change catheters and drainage bags based on clinical indications, such as infection, obstruction, or when the closed system is compromised (damaged, contaminated)
- Follow the manufacturers' recommendations and medical officer instructions
- Maintain a record of when catheters/drainage bags have been changed.

Maintenance requirements - urinary catheter and closed drainage system

Long term catheters - washouts

- Catheter washout with sodium chloride 0.9% should not be used routinely to reduce catheter associated bacteriuria, catheter associate urinary tract infection or obstruction in patients/residents with long-term indwelling catheterization. Bladder irrigation and washouts do not prevent catheter associated infection.
- Routine washouts of the bladder with antimicrobials are not recommended.
- Washouts should only be performed if there is a clinical indication for doing so and this should be clearly document in the patient/resident medical record and reviewed by the medical officer on a routine regular basis.

E. Removal of a urinary catheter

I. Equipment

- Non-sterile gloves

- Waterproof *bed protector*
- Syringe - check the balloon volume prior to removal
- Rubbish bag

II. Prepare the patient/resident and procedure

1. Ensure privacy and explain procedure to the patient/resident.
2. Place a waterproof bed protector under the buttocks of the patient/resident to protect the linen.
3. Perform hand hygiene and don non-sterile gloves.
4. Remove drainage bag from leg or fastenings.
5. Place syringe tip in the balloon port of the urinary catheter and allow the balloon to passively deflate filling the syringe with water until it stops filling. Gently withdraw any other remaining fluid until slight resistance is felt.
6. Gently slide the catheter out – do not use force to remove catheter.
7. Dispose of the urinary catheter and drainage bag in rubbish bin.
8. Complete procedure documentation requirement in the patient/resident medical record.
9. Observe patient for complications post removal, such as retention of urine (i.e., no urine output since removal), pain, or discomfort when urinating, abdominal pain or distension and urinary tract infection (fever, confusion, dysuria, cloudy and odorous urine)

B. Problem solving

Issue	Possible causes	Preventive action
Urine is not draining	Anuria which means the person is not passing urine. This can be caused by failure in the function of kidneys or obstruction	Seek medical advice Check catheter is in the bladder Do a bladder scan
	Fecal impaction	Aperients and dietary fiber
	Catheter or drainage tube are blocked	Check tubing and ensure bag is below the bladder
Blood in the urine	Infection	Seek medical advice
	Trauma from the procedure or a poorly secured catheter	
	Enlarged prostate	
	Urinary calculi which can be crystal-forming substances or kidney stones	
Bypass of urine around the catheter	Incorrect positioning of the drainage bag (i.e., not below the bladder) or kinking of catheter or tubing	Correctly position the drainage bag Check catheter is secured correctly Check catheter drainage bag is below the level of the bladder

Issue	Possible causes	Preventive action
		Check catheter and drainage bag tubing is not kinked
	Presence of infection	Seek medical advice
	Constipation	Correct constipation and seek medical advice
Pain	Infection	Seek medical advice
	Incorrectly sited catheter	Deflate the balloon and insert a new catheter
	Occlusion	Seek medical advice

Appendix 5

Sample - Surveillance Data Collection Template

SAMPLE - SURVEILLANCE DATA COLLECTION TOOL
CATHETER ASSOCIATED URINARY TRACT (CAUTI)

MEDICAL RECORD NO:
SURNAME:
GIVEN NAME:
DATE OF Birth:
SEX: Male / Female

DATE OF ADMISSION: __/__/__

DATE OF INDWELLING URINARY CATHETER INSERTION: __/__/__

SYMPTOMATIC URINARY TRACT INFECTION must meet the following criteria:

MUST MEET 1, 2 AND 3 OF THE FOLLOWING CRITERIA:

1. The patient had an indwelling catheter that had been in place for more than 2 consecutive days in an inpatient location on the date of event and was either:
 - Present for any portion of the calendar day on the date of the event _____ ☐
 - OR
 - Removed the day before the date of the event _____ ☐
2. Patient has at least ONE of the following signs and symptoms
 - o Fever (>38.0°C)
 - o Suprapubic tenderness
 - o Costovertebral angle pain or tenderness
 - o Urinary urgency (CANNOT BE USED when a catheter is in place)
 - o Urinary frequency (CANNOT BE USED when a catheter is in place)
 - o Dysuria (CANNOT BE USED when a catheter is in place)
3. Patient has A URINE CULTURE WITH NO MORE THAN TWO SPECIES OF ORGANISM IDENTIFIED, AT LEAST ONE OF WHICH IS A BACTERIUM OF $\geq 10^5$ CFU/ML.

ORGANISMS

Urine Specimen: Organism/s Identified: YES ☐ NO ☐

If YES name of organisms:

NOTE: "Mixed flora" cannot be used to meet urine symptomatic urinary tract infection criteria

SYMPTOMATIC URINARY TRACT INFECTION

Meets all SYMPTOMATIC URINARY TRACT INFECTION criteria: YES ☐ NO ☐

SIGNED: DATE INVESTIGATION COMPLETED: __/__/__

RULES WHEN REPORTING SYMPTOMATIC URINARY TRACT INFECTION

- Urinary tract infection cannot be considered secondary to another site of infection
- Indwelling urinary catheters that are used for intermittent or continuous irrigation are included in CAUTI surveillance
- Condoms or straight in-and-out catheters are not included nor are nephrostomy tubes, ileoconduits, or suprapubic catheters unless an indwelling urinary catheter is also present.