

SAFE PRACTICES *in Patient Care*

Helping to promote a culture of safety

Between 15% and 25% of hospitalized patients may receive short-term indwelling urinary catheters. Patients who have indwelling urinary catheters will develop bacteria in their urine. It is estimated that the daily risk for bacteruria is 3% to 10%, and after 30 days, 100% of patients will develop bacteria in their urine. Catheter-associated urinary tract infections (CAUTIs) are the most common type of healthcare-associated infection, accounting for more than 30% of infections reported by acute care hospitals. CAUTI has been associated with increased morbidity, mortality, hospital cost, and length of stay.

In addition to CAUTIs, patients with indwelling catheters can suffer other complications. Keeping the catheter secure is beneficial to the patient and caregiver in multiple ways including: reduced pain, risk of infection, skin damage and caregiver time, as well as prevention of catheter replacement. In this article and panel discussion, wound care and urology experts provide their perspectives on the prevention of infections and complications and help tie together the best practices to manage the urinary catheter for the bedside nurse.

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Tying it all Together: Preventing Infection and Complications with Urinary Catheters

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Until the year 2008, when the Centers for Medicaid & Medicare Services (CMS) discontinued reimbursement for hospital-acquired catheter-associated urinary tract infections (CAUTIs), these infections were treated like the “Rodney Dangerfield” of healthcare-associated infections (HAIs)—getting little to no respect. Due to limited resources for conducting surveillance, consensus among infection prevention experts was to focus on those HAIs with higher cost as well as higher morbidity and mortality rates.¹ Although it is true that morbidity attributed to a single episode of urinary catheter-

ization is comparatively less than infections like ventilator-associated pneumonia (see Table 1), the preponderance of catheters in hospitalized patients leads to a substantial cumulative burden.^{1,2}

The use of urinary catheters is associated with a myriad of potential negative outcomes including impairment of mobility, urethral strictures, mechanical trauma and nonbacterial inflammation of the urethra. Genitourinary trauma is reported to occur in 1.5% of catheter days. Infection however is the most significant adverse outcome associated with urinary catheter use. Once a

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Table 1. Healthcare-Associated Infections and their Financial Impact on the U.S. Healthcare System

Infection	Cost/Infection	Attributable LOS	Total Annual Cost (Billions)	Total Annual Cases
SSI	\$20,785	11.2d	3.30	158,369
CLABSI	\$45,814	10.4d	1.85	40,411
CAUTI	\$896	not available	0.28	77,079
VAP	\$40,144	13.1d	3.09	31,130
C. difficile	\$11,285	3.3d	1.51	133,657

Total cost = \$10.03 billion per year

SSI = surgical site infection; CLABSI = central line-associated bloodstream infection; CAUTI = catheter-associated urinary tract infection; VAP = ventilator-associated pneumonia; C. difficile = Clostridium difficile.

From Ref. 1: Zimlichman E, Henderson D, Tamir O, et al. Health Care-Associated Infections: A Meta-analysis of Costs and Financial Impact on the US Health Care System. JAMA Intern Med. 2013 Sep 2. [Epub ahead of print]

Panel Discussion

Preventing Catheter Associated Urinary Tract Infection and Complications

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Panelists: Shannon Oriola, BSN, CIC

Vicki Haugen, RN, MPH, CWOCN, OCN

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In July of 2013 the Centers for Disease Control and Prevention (CDC) and National Health Safety Network (NHSN) amended their protocol for diagnosing and treating CAUTI. How does that affect clinical practice and my facility's policies concerning prevention of CAUTI?

Oriola: The change in definition of CAUTI was really more of a clarification. It didn't result in a change in identifying CAUTI's as much as the clarifying statement issued by NHSN.

Although surveillance of CAUTI has led to a heightened awareness of this healthcare-associated infection and the improvement in the care of our patients with indwelling urinary catheters, there have been instances where a CAUTI met the surveillance definition and not a clinical definition. This is because a patient in the ICU with an indwelling urinary catheter who develops a fever is considered to have acquired a CAUTI even if the fever could be attributed to neurologic instability, pneumonia or some other cause. Our nurses have worked very hard to reduce CAUTI by employing multiple interventions. To attribute a CAUTI to their unit SIR, which meets surveillance definition and is not considered preventable because the fever may have been attributed to a cause unrelated to a urinary tract infection is very difficult to present to nursing. In an

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- Haugen -

article published in the December 2013 issue of the American Journal of Infection Control, NHSN reported a 35.5% discordance in surveillance definition vs clinical diagnosis by an infectious disease physician.¹ NHSN announced in a newsletter that a panel made up of subject matter experts will evaluate the definitions and protocol and propose a new working definition in 2014.² The group will review issues such as the role of yeast in CAUTI, the role of fever in the face of other possible infections, and variations in laboratory reporting methods.

Haugen: New standards for diagnosis and treatment of CAUTI along with the increased reporting of adverse health events in hospitals have of-

fered heightened opportunity to review urinary catheter policy and procedures for in-patient care. Centers for Medicare and Medicaid Services (CMS) include hospital acquired CAUTI as one of conditions in which the hospital will not receive additional reimbursement.³ The July 2013 CDC and NHSN guidelines for diagnosing and treating CAUTI, along with the CMS present on admission criteria, is a prime example of a previously common condition which can be impacted by tighter and more appropriate use of indwelling urinary catheters and the care of these devices. The greatest emphasis should be on decreasing the non-essential usage of indwelling catheters in order to aid in the prevention of CAUTI. Hospital policy must be amended to reflect these new guidelines. Mandatory learning modules offer a method of disseminating the new guidelines as well as the facility specific policy and procedural changes.

Meddings: The CDC NHSN amended protocols in 2013 regarding CAUTI (<http://www.cdc.gov/nhsn/pdf/pscmanual/protocol-clarification.pdf>) involve specific clarifications for infection control teams to apply for identifying a positive urine culture as a healthcare-associated, catheter-associated, and symptomatic urinary tract infection. NHSN protocols do not address treatment of CAUTI; they only provide instructions on identifying positive urine cultures as reportable CAUTI events. In brief, CAUTIs cannot be identified as healthcare-associated if occurring within the first 2 days of hospitalization and UTIs cannot be identified as catheter-associated if the indwelling urinary catheter has not been in place for more than 2 days. There is also a clarification that fever counts

A. Examples of Appropriate Indications for Indwelling Urethral Catheter Use

- Patient has acute urinary retention or bladder outlet obstruction
- Need for accurate measurements of urinary output in critically injured patients
- Perioperative use for selected surgical procedures:
 - Patients undergoing urologic surgery or other surgery on contiguous structures of the genitourinary tract
 - Anticipated prolonged duration of surgery (catheters inserted for this reason should be removed in PACU)
 - Patients anticipated to receive large-volume infusions or diuretics during surgery
 - Need for intraoperative monitoring of urinary output
- To assist in healing of open sacral or perineal wounds in incontinent patients
- Patient requires prolonged immobilization (e.g. potentially unstable thoracic or lumbar spine, multiple traumatic injuries such as pelvic fractures)
- To improve comfort for end of life care if needed

B. Examples of Inappropriate Uses of Indwelling Catheters

- As a substitute for nursing care of the patient or resident with incontinence
- As a means of obtaining urine for culture or other diagnostic tests when the patient can voluntarily void
- For prolonged postoperative duration without appropriate indications (e.g. structural repair of urethra or contiguous structures, prolonged effect of epidural anesthesia, etc.)

Note: These indications are based primarily on expert consensus.

as a qualifying symptom of CAUTI regardless of whether there is another recognized cause of the fever. Also, the individual elements of symptoms, signs and laboratory data being used to qualify a diagnosis of CAUTI need to appear within a 1-day calendar time frame.

It is widely recognized that NHSN criteria for identification or surveillance of CAUTI for public reporting do not match criteria applied by clinicians for diagnosing and treating CAUTIs.⁴ By definition, surveillance definitions^{5,6} are different than clinical definitions because the former are generated to establish uniform criteria (including as much objective data as possible) to report a disease for analyzing population-based data affecting public health. They should not be used as the sole criteria for establishing clinical diagnoses for treatment.

In contrast, clinical definitions are specific to a patient, which may incorporate additional data beyond the surveillance criteria. There are pros and cons to the idea of potentially modifying the NHSN surveillance CAUTI definition to more closely match the clinical definition; for example, a clinical definition may be more challenging to apply uniformly, yet a clinical definition may be more representative of the healthcare-associated events that should be the target of prevention efforts.

Appropriate catheter use has been identified as a priority for preventing CAUTI. How does your facility ensure they are using indwelling catheters only when appropriate?

Oriola: In our facility, the implementation by nursing of the Urinary

Catheter Insertion & Maintenance Form—known as the UCIM form—was successful in ensuring the appropriate use of urinary catheters. This form requires the nurse to evaluate the necessity of the indwelling urinary catheter daily and audit practices such as securement of the urinary catheter, intactness of the seal, perineal care etc.

The UCIM form includes the indications for appropriate urinary catheter use as identified by CDC HICPAC criteria (see table). If the patient does not meet criteria, the nurse may discontinue the urinary catheter. Nurse driven protocols have demonstrated reductions in catheter-associated urinary tract infections.

Haugen: New hospital policy to decrease medically unnecessary use of indwelling catheters to aid in the prevention of hospital acquired CAUTI has included multiple measures:

Remove inclusion of indwelling urinary catheters from standing orders for any condition of non-essential use.

Review individual patient cases for use of urinary catheters as it relates to appropriate medical need with the primary care provider on a routine basis to evaluate continued need. Daily patient rounding including this review is a way to facilitate this assessment.

Discontinue all non-essential indwelling catheter use, and institute other bladder management practices such as external catheters, prompted or scheduled voiding, or containment devices.

Meddings: Indwelling urinary catheters must be ordered by providers (defined as physicians, physician-assistants, or nurse practitioners), and providers must identify an ap-

appropriate indication for placement of an indwelling urinary catheter in the urinary catheter order. Also, the electronic order set for indwelling urinary catheters includes orders for (and provides education about) alternatives to indwelling urinary catheters such as external “condom” catheters and intermittent straight catheterization. Requiring these orders does not guarantee that all urinary catheters ordered are for appropriate reasons, nor that catheters that were appropriate on day 1 of placement have continued to remain appropriate. Nurses at the University of Michigan Hospitals are empowered to assess urinary catheter necessity and remove if an appropriate indication is not apparent.

Is one type of indwelling catheter better than another? Should we be using antimicrobial or silver coated urinary catheters?

Oriola: To determine if a hospital should be using an antimicrobial or silver coated-urinary catheter, an evaluation of the hospital’s CAUTI rates should be completed.

HICPAC states in its guideline “If the CAUTI rate is not decreasing after implementing a comprehensive strategy to reduce rates of CAUTI, consider using antimicrobial/antiseptic impregnated catheters. The comprehensive strategy should include at a minimum, the high priority recommendations for urinary catheter use, aseptic insertion and maintenance (Category 1B).”⁷ The document goes on to state that further research is needed in this area.

Many hospitals throughout the United States, however have employed antimicrobial/antiseptic impregnated catheters as a strategy to prevent CAUTI due to the fact that CMS does not reimburse hospitals

Patients requiring indwelling catheters for short term use may benefit from silicone or silver coated catheters.

- Haugen -

for certain infections that are not present on admission, CAUTI being one of the conditions/infections. Ideally, if the hospital’s data suggest its rate of CAUTI is not decreasing despite implementing comprehensive interventions known to reduce CAUTI, linking the CMS present-on-admission reimbursement rule may justify the necessity of employing additional measures such as antimicrobial/antiseptic impregnated catheters.

Haugen: Most patients can be managed with nonsilver or nonsilicone catheters as long as sterile insertion, closed system with gravity bags, and routine cleansing of the perineal tissue is done. Patients requiring indwelling catheters for short term use may benefit from silicone or silver coated catheters.⁸

Meddings: Different options in catheter coatings (such as hydrophilic-coated, antiseptic or antibiotic impregnated) and materials (latex, PVC, silicone) have been studied. Prior systematic reviews suggesting either insufficient evidence for recommendation⁹ or no evidence UTI rates are impacted by these options; the CDC systematic review and guideline¹⁰ suggested antimicrobial/aseptic catheters may be useful if CAUTI rates were not decreasing with other strategies, based on evidence available in 2010. However, in November 2012, a

long-awaited multicenter RCT demonstrated a lack of effectiveness of antimicrobial catheters (including silver-alloy and nitrofurazone-releasing catheters) to provide significant and clinically important reductions in symptomatic CAUTIs.¹¹

Does a catheter securement device reduce the risk of CAUTI?

Oriola: To determine if catheter securement devices reduce the risk of CAUTI, the CDC states that further studies are needed. However, the CDC guideline recommends to properly secure indwelling catheters after insertion to prevent urinary traction (Category 1B). Many urinary catheter insertion kits now contain a securement device inside the kit for nursing convenience and to serve as a reminder to place the securement device upon insertion. Patient comfort and prevention of irritation from friction from non-securement are often cited benefits.

Haugen: Catheter movement in the bladder, urethra, and meatus can inflame or lead to tissue trauma thus adding to the risk for CAUTI. Catheter usage over 30 days is associated with high content of bacteria in the urine.¹² When tissues are inflamed or eroded there is greater potential for the bacterial colonization to progress to the level of infection.

Does catheter securement protect patients in other ways? (e.g., preventing traumatic catheter removal, reducing risk of erosion in patients with long-term indwelling catheters, reduction in caregiver time, etc.)

Haugen: Catheter securement minimizes unwanted catheter movement and aides in the prevention of tissue trauma such as erosion, irritation, or

tearing of the external urinary meatus, or the urethra. A proper securement device can also prevent bladder spasm and pain. The securement device can prevent both unwanted catheter removal and catheter migration into the bladder. The securement device can also minimize unwanted kinking of the tubing thus preventing urine retention.^{13,14}

What types of securement devices are available and how do you select the best device for an individual patient?

Oriola: There are many catheter securement devices on the market today: Velcro® hook and loop, adhesive, and anchoring devices. I've observed that most hospital product selection committees work closely with nursing to evaluate and test devices prior to making a product selection. When evaluating catheter securement devices, consideration should be given to ease of application, patient comfort, length of time the device remains secured to the patient and evaluation of any skin integrity issues related to the securement device.

Haugen: Catheter securement devices are primarily devised as either an adhesive material strip to be placed on the patient's skin, or a strap to be placed around the patient's leg or abdomen. Types of catheter securing devices with adhesive methods must be assessed carefully to avoid skin damage from stripping or irritation. Older methods of using strong medical adhesive tapes against the skin often caused skin stripping with removal.

Currently manufacturers have adhesive strip products that allow multi-purpose tube securement to the skin with a soft or hard attachment piece that holds the tube. Skin that is fragile or bleeds easily is more

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- Oriola -

susceptible to skin stripping. Devices with a hard plastic tube clamp on the adhesive strip require frequent assessment to avoid pressure or other skin injury from the plastic clamp exerting pressure against nearby skin. Different hospital departments may require different securement devices. For example a firm plastic attachment on an adhesive strip may be useful for the operating room or intensive care where the patient is immobile and not likely to change position independently and risk undue tension on the catheter or skin pressure injury from the plastic piece. Ambulatory patients may prefer a soft more easily adjustable strip so nurses can make changes in the catheter tension. The location for applying the adhesive strip should be evaluated based on reason for catheter usage. For example, the anterior thigh is used for most strips, but the male abdomen can be useful for put-

ting tension on the catheter.

When using a soft nonlatex strap the location must secure the catheter to the lower leg or thigh but not compress the skin or blood flow so as to avoid device-related pressure ulcers or undue compression to the blood flow of a patient with any lower extremity vascular compromise. There are also Velcro bands that secure catheters to the abdomen for the male patient. It is most beneficial if the band devices are latex free and made of a soft noninjurious material.¹⁵

Individual patient risk should always be assessed in choosing a securement device. The bariatric patient should have the device attached on a surface outside skin folds so as to avoid abrasion or pressure injury from the strip or the upper clamp-like piece. Infant, baby, and small child devices are available and must be selected to avoid skin damage to the even more fragile skin of the very young. Older adults are also at risk for skin injury with aging skin changes leading to increased fragility. The use of a skin sealant applied prior to an adhesive strip can offer added skin protection. Whether using the skin adhesive strap or the Velcro band type of securement devices, the manufacturer guidelines should be followed in order to protect the patient with accurate application.

Prevention from skin damage and minimization of the risk of CAUTI is facilitated with the proper use of catheter securement. Nursing knowledge of CAUTI diagnosis and treatment guidelines along with knowledge of factors that diminish risk for CAUTI should compel nurses to be an active participant in the facility's choice of devices as well as procedures to enhance quality patient care.

Meddings: Proper securing indwell-

ing catheters after insertion is recommended to decrease movement and urethral trauma, and has been studied as part of a urinary catheter care bundle¹⁶ in the rehabilitation setting. The use of a specific stabilization device (was studied in the spinal cord injury acute-care setting with a marked reduction (without meeting statistical significance) in symptomatic CAUTI rates¹⁷ compared to patients with indwelling catheters (transurethral and suprapubic types) secured by more traditional materials of tape, Velcro and a different devices called Cath-Secure Plus®/Cath-Secure®. The implications of this study have been mixed with some interpreting as evidence for supporting use of this type of catheter securing device, and other reviews¹⁰ interpreting as lack of evidence for using these devices given no significant difference in CAUTI or meatal erosion. A practical review of the rationale and evidence regarding use of urinary catheter securement devices was published in 2008 in the American Journal of Nursing.¹³ Gray described the various types of catheter securement devices including “improvised devices” such as the use of adhesive tape, safety pins or sutures, “adhesive-backed devices”, and “nonadhesive devices” such as leg bands or straps with Velcro. The choice of securement device depends on patient characteristics such as skin fragility, anticipated duration of catheter use, concerns about vascular compression for the lower extremity, and the reason for catheter placement.

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Tying it all Together: Preventing Infection and Complications with Urinary Catheters—Continued

patient develops a CAUTI they are then at risk for going on to develop a blood stream infection (BSI). In fact, in one report from 61 hospitals in Quebec over a 3-year period, 21% of all BSIs identified 48 hours or more after admission came from a urinary source. The associated mortality with secondary bacteremia is 10%. Patients at increased risk for a secondary bacteremia are those with neutropenia, renal disease and male sex.^{3,4}

An association with increased mortality with CAUTI has been reported in the literature. However, it is possible that the association may be a result of clinical variables yet unmeasured. For example, the high incidence of inappropriately treated catheter-associated asymptomatic bacteriuria, leads to both antimicrobial resistance and an increase in the

rate of healthcare-associated *Clostridium difficile* infection.^{5,6} CAUTI is the leading cause of secondary BSI; 17% of hospital-acquired BSIs are due to UTIs and the associated mortality is 10%.⁷

Risk Factors

Knowing which patients are at greater risk for developing CAUTI helps target and refine prevention strategies. Unfortunately the risk factors for pediatric patients are not well defined. In adults, the risk factors include female sex, advanced age, impaired immunity, presence of a catheter which was inserted outside the ICU and interruption of the closed drainage system. However, the most important risk factor for CAUTI is the length of time that the catheter remains in the patient. Therefore, reducing unnecessary catheter replacement and minimizing the length of time catheters remain in place, are priority strategies for CAUTI prevention.^{7,8}

Box 3. Clinical Problems Resulting From Lack Of Proper Indwelling Urinary Catheter Securement

- Unintended catheter dislodgement
- Pain, discomfort, and bladder spasms from the catheter moving and poking the bladder and urethra
- Urinary retention and obstruction of urinary flow either from kinked tubing or trauma to the anatomical structures
- Linear pressure ulcers on the thighs or buttocks caused by lying on nonsecured catheter tubing
- Meatal tears and penile erosion when unsecured tubing is stepped on or caught in hospital equipment (i.e. side rails, wheelchairs)
- Infection
- Time and money to replace catheters and treat pain, infection, and wounds

Appropriate Catheter Use

Important first steps include staff education related to appropriate catheter use. Urinary catheters should only be inserted for appropriate indications (listed in Box 1) which are clearly defined by the Centers for Disease Control (CDC). CAUTI prevention mandates awareness related to alternative strategies which include frequent toileting, external (i.e. condom) catheters, absorbent briefs and underpads, intermittent catheterization, and use of bladder scanners. Before employing bladder scanners however, indications for use must be written, nurses must be adequately trained in their use, and procedures for cleaning and disinfecting the scanner between each patient must be in place. External (condom) catheters should only be considered in the absence of obstruction and urinary retention.⁹

For many years, there has been debate about which urinary cath-

Box 2. Prevention of CAUTI Intervention Bundle: Core and Supplemental Measures

Core Measures

- Insert by trained staff and leave catheter in only as long as indicated
- Use aseptic technique as well as hand hygiene and standard precautions for insertion
- Use the smallest catheter possible
- Secure the catheter properly
- Maintain a closed system (tamper evident seal is helpful for auditing compliance)
- Remove the catheter as soon as possible (i.e. 24 hours for most surgical procedures)
- Do not allow the tubing to kink; keep off the floor and below the level of the bladder
- Empty the collection bag regularly with a separate measuring device

Supplemental Measures (these can be considered in addition to core measures if further CAUTI reduction is needed)

- Consider alternatives to indwelling catheterization
- Use portable ultrasound devices to assess urine volume to reduce unnecessary catheterization
- Use antimicrobial/antiseptic impregnated catheters after first implementing core measures

From Ref. 13: Gould CV. Catheter-associated Urinary Tract Infection (CAUTI) Toolkit. Centers for Disease Control and Prevention (CDC), 2012.

eter material leads to lower CAUTI rates. In the 2009 CDC HICPAC CAUTI Prevention guidelines, using an antiseptic catheter is listed as a “supplemental” strategy to consider if CAUTI rates have not decreased after implementation of a comprehensive strategy.⁷ The SHEA Compendium for CAUTI Prevention reviews meta-analyses of silver coated and other antibacterial urinary catheters to conclude that “evidence does not support a recommendation for the uniform use of such devices.”¹⁰ The document states that silver alloy catheters may decrease bacteriuria but have not been shown to decrease symptomatic infection.

One thing that all experts can agree on is that evidence based bundles should be implemented and that compliance with these preventative strategies must be rigorously monitored.¹⁰⁻¹² In 2009, the CDC pre-

When evaluating a product for effectiveness or failure, it is critical to first ensure that the product is used correctly and according to the manufacturer’s instructions.

vention guidelines were revised to include core and supplemental strategies. Core strategies refer to those with robust scientific evidence which have been demonstrated to be feasible for implementation. Supplemental strategies have limited scientific evidence and may not always be feasible to implement. Therefore, depend-

ing on each facility’s specific situation, supplemental strategies may or may not be implemented.⁷ Box 2 contains CDC recommendations that are strongly recommended for implementation and supported by some experimental, clinical, or epidemiologic studies and a strong theoretical rationale; or an acceptable practice supported by limited evidence.¹³

Catheter Securement

Most prevention strategies listed in Box 2 are straightforward and clearly defined in the literature, however, there appears to be confusion around indwelling urinary catheter securement resulting in frequent omission of the intervention.^{14, 15} Confusion may stem from lack of knowledge related to the consequences of omitting the intervention as well as appropriate product selection and use as products on the market proliferate.

Table 2. Features and Considerations of Various Indwelling Urinary Catheter Securement Products

Features	Considerations
Adhesive products	<ul style="list-style-type: none"> Strong adhesives may cause skin damage with inappropriate application or removal technique Weak adhesive products can fall off and cause catheter tension or dislodgement Some adhesive products will stretch slightly to help reduce the incidence of post op tension and edema blisters Determine if the adhesive is a waterproof or water resistant skin barrier product or tape. Some products can be wiped clean if soiled or wet while others will need to be changed Some adhesive products can fall off and cause catheter tension or dislodgement if the skin is not properly prepped Some adhesive products include a skin protectant prep to correct of adhesive challenges and improve compliance with it's use
Nonadhesive straps	<ul style="list-style-type: none"> Critical to apply with the appropriate amount of tension Straps too tight can damage skin and impair circulation through venous compression Straps too loose can lead to unintended catheter dislodgement Must adjusted and readjust in the presence of edema, to accommodate changes in leg size Could cause venous compression and edema if too tight Important option for individuals with known sensitivities to adhesives Some nonadhesive products can be washed and reused (attractive in settings where less frequent reorders and payments are desired while less attractive in the presence of poor hygiene, inadequately contained feces, or frequently lost or misplaced supplies)
Single use or indications for use	<ul style="list-style-type: none"> Follow manufacturer's instructions to determine if multiple tubes or catheters are included in the multiple uses i.e. urinary catheters, jejunostomy tubes, subclavian lines
Closure method for catheter holder	<ul style="list-style-type: none"> Devices attach the catheter with adhesive tabs, hook-and-loop fasteners (e.g. Velcro®), or clamps. Hook-and-loop fasteners or clamps can be released and reattached without changing the adhesive that is attached to the skin Some clamps better accommodate a variation of tubing sizes Some clamps can collapse tubing if adjusted too tight Clamps require more finger dexterity and strength to use than other closures
Instruction for use	<ul style="list-style-type: none"> Instructions for use may be printed words and/or pictorials located on the package, on an insert inside the package, or on the device itself Instructions printed on the device are generally not inclusive and intended as a supplement to instructions contained within or on package Instructions printed on the package or on the adhesive backing that gets peeled away may end up in the trash without being read or without a possibility of future review Devices indicated for multiple catheter use may require multiple sets of instructions Some devices that contain instructions to include a skin protectant prep are packaged with a prep to improve compliance with use

The link between CAUTI and urinary catheter securement is thought to be related to lack of stabilization leading to excessive catheter movement, pulling, poking, and subsequent trauma to the bladder and urethral wall leaving that open mucosa vulnerable to bacterial invasion. Darouich and colleagues (2006) conducted a prospective randomized multicenter trial with 127 patients with spinal cord injury and multiple sclerosis.¹⁶ The researchers measured UTI rates with and without adequate catheter securement and showed a 45% decrease in patients with catheters that were properly secured. The study was too small to demonstrate statistical significance, however, 45% fewer UTIs may be of clinical significance to patients and caregivers confronted with the effects of UTIs. Two more recent studies examined the effects of indwelling urinary catheter securement as part of a bundle of interventions to decrease the incidence of CAUTI. Both took place in com-

munity hospitals and both showed statistically significant reductions in CAUTI.^{17,18}

Despite the limited evidence, multiple respected health organizations accept proper catheter stabilization as best practice for the prevention of CAUTI.^{7,8,10,19-23} As if that is not convincing enough, Box 3 lists a multitude of clinical problems that can occur when urinary catheters are not secured properly.²⁴ Additionally, urinary catheter securement has been found useful after transurethral resection of the prostate or open prostatectomy by: 1) supporting the surgical anastomosis of the urethra to the bladder neck by preventing inadvertent traction or 2) reducing bleeding by facilitating a little traction to the bladder neck.²⁵

Securement Device Selection

Studies suggest that nurses indeed believe in the importance of proper catheter stabilization in the prevention of CAUTI yet many indwelling urinary catheters go unsecured.^{14,15} At least one study suggests that compliance with and effectiveness of catheter securement improves when products are carefully selected and staff is trained in proper removal and application of the securement product.¹⁵ Box 1 lists factors to consider in selecting a product for indwelling urinary catheter securement. Many of the factors considered for product selection will depend on the features and components of the various devices (Table 2).

When evaluating a product for effectiveness or failure, it is critical to first ensure that the product is used correctly and according to the manufacturer's instructions. For example, it would be inaccurate to conclude that a particular device failed to be effective if the skin was not prepped according to the manufacturer's in-



Figure 1. Example of a Procedure for Catheter Securement

structions or if the product was not replaced at the frequency the manufacturer recommended.

Application and Removal

Figure 1 shows an example of how a selected catheter securement device is applied. If using an adhesive product,

Box 3. Clinical Problems Resulting From Lack Of Proper Indwelling Urinary Catheter Securement

- Unintended catheter dislodgement
- Pain, discomfort, and bladder spasms from the catheter moving and poking the bladder and urethra
- Urinary retention and obstruction of urinary flow either from kinked tubing or trauma to the anatomical structures
- Linear pressure ulcers on the thighs or buttocks from lying on nonsecured catheter tubing
- Meatal tears and penile erosion when unsecured tubing is stepped on or caught in hospital equipment (i.e. side rails, wheelchairs)
- Infection
- Time and money to replace catheters and treat pain, infection, and wounds

Box 4. Factors To Consider In Selecting A Product To Secure An Indwelling Urinary Catheter

- Patient population
 - products are available in pediatric and bariatric sizes
 - see example shown in Figure 2
- Effectiveness
- Reliable wear time
- Skin reactions
 - i.e. latex or adhesive allergies
 - immature skin is at higher risk for sensitivities to ingredients and adhesives
- Ease of use, including
 - amount of time required to perform the procedure
 - ease of understanding instructions and packaging
- Extent of education or training required for appropriate use
- Staff acceptance of product
- Cost and contracts

hair may need to be removed first. Skin can be prepped and protected with protectant films. When allowed adequate time to dry on the skin, protectant films serve as a barrier between the epidermis and the adhesive so during the removal, the adhesive removes the clear film product rather

Box 5. Tips for Adhesive Removal

- With the fingers of the opposite hand, push the skin down and away from the adhesive.
- Remove the adhesive product low and slow back over itself in the direction of hair growth, keeping it horizontal and close to the skin surface.
- As the product is removed, continue moving fingers of the opposite hand as necessary to support newly exposed skin.
- Use medical adhesive remover if needed to loosen the adhesive bond
- Consider using lotion, petrolatum, or mineral oil if not reapplying an adhesive product to the same area.



Figure 2. Example of Pediatric Indwelling Urinary Catheter Securement Device

er than the thin layer of epidermis it's trying to protect. Skin protectant films can also repel moisture and cover the oils on the skin that have potential to threaten wear time by impairing the adhesion of the product.²⁶ Many securement devices are prepackaged with a skin protectant prep. Unless the manufacturer states that a skin protectant should not be used with their product, it is desirable to package a skin protectant with the securement device together to facilitate skin protection and wear time reliability while saving time gathering supplies.

Once the skin protectant is dry (if applicable) the paper is peeled off the adhesive and the device is anchored to the thigh or abdomen. Suprapubic catheters should be secured to the abdomen. Indwelling urethral catheters should be secured to the upper anterior or inner thigh for women and ambulating men. Men are encouraged to secure their catheters to their lower abdomen during sleep to decrease the potential for necrosis and urethral erosion of the penile shaft. In the presence of obesity, it may be necessary to secure the catheter high on anterior thigh or abdomen but away from skin folds to help prevent tubes from falling into the skin folds contributing to pressure ulcer formation.²²

The tab designed to hold the catheter is then affixed to the part of the catheter that is large enough to en-

sure a snug, stable fit and stiff enough to prevent collapse. Frequency of product change is dependent on the manufacturers recommendations. The device must be changed sooner if it appears loose, permanently soiled, or signs of skin irritation is detected upon daily skin inspections.²² Tips for safe adhesive removal are provided in Box 5.^{26,27} The exact location of the securement device should be rotated when the device is changed to reduce the risk of skin irritation.²²

All securement devices require staff education. The extent and method of education required to ensure efficacy and safety varies by the intended user and the product selected for use. Education should include appropriate techniques for skin inspection and preparation, product application, product removal, frequency of change and documentation requirements. As stated earlier, staff that is knowledgeable about the indications for catheter securement and its role in CAUTI prevention bundles are likely to perceive its importance.^{14,15} Staff input related to product selection may be instrumental in the rate of compliance with and success of the intervention.¹⁵

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Upon completion of this offering, the learner will be able to:

Objectives

1. List at least 3 approved indications for inserting an indwelling urinary catheter
2. Describe the components of urinary catheter insertion and maintenance bundles in the prevention of CAUTIs
3. Discuss factors to consider for appropriate securement of the urinary catheter

To earn continuing education credit, do the following:

1. Read both articles.
2. Complete the posttest for the article. (You may make copies of the answer form.) Mark your answers clearly with an "X" in the box next to the correct answer.
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6. Your results will be sent within four weeks after forms are received.
7. Answer forms must be postmarked by Mar. 30, 2015.
8. Faculty disclosure: No conflicts were disclosed. Nurse planner (Ms. Caffery) disclosed no conflicts of interest.
9. No off-label products were mentioned in this program.

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1. All of the following are appropriate indications for urinary catheter placement except
 - A. Acute urinary retention or bladder outlet obstruction
 - B. Need for accurate measurement of urine output in critically ill patients
 - C. Potential for sacral pressure ulcers in incontinent patients
 - D. To improve comfort for end of life care if needed
2. Which intervention should be implemented to reduce the incidence of CAUTI?
 - A. Use aseptic technique
 - B. Use the smallest catheter possible
 - C. Maintain a closed system
 - D. All of the above
3. Urinary catheter securement helps reduce CAUTI by
 - A. Preventing catheter dislodgement
 - B. Minimizing catheter movement against the urethra or bladder wall creating an opening for bacteria to invade
 - C. Reducing bladder spasms
 - D. Decreasing pressure ulcers on the thighs or buttocks
4. When selecting an indwelling urinary catheter securement method, it is important to consider
 - A. creative techniques for adapting and fixing products so they can be used on children, neonates, and adults
 - B. skin protection because all products contain some concentration of latex
 - C. effectiveness and ease of use
 - D. Both A and B
5. Which statement about nonadhesive indwelling urinary catheter securement strap is False?
 - A. Straps applied too tight can damage skin and impair circulation through venous compression
 - B. Straps applied too loose can lead to unintended catheter dislodgement
 - C. Is an important option for individuals with known sensitivities to adhesives
 - D. Is the only latex free option on the market
6. Which statement about skin protectant preps is True?
 - A. All skin protectant preps contain alcohol
 - B. Skin protectant preps must be given adequate time to dry in order to be effective
 - C. Securement devices are always packaged with skin protectant preps
 - D. Skin protectant preps generally make the skin oily and impair adhesion of the securement device
7. Changes made by the Centers for Disease Control and Prevention and National Hospital Safety Network concerning diagnosis of a healthcare-associated, symptomatic catheter associated urinary tract infection is diagnosed when:
 - A. urinalysis demonstrates pyuria and bacteriuria.
 - B. cloudy urine and a positive urine culture occur within 12 hours of catheter insertion.
 - C. a positive urine culture with a single species of bacteria is accompanied by a fever.
 - D. urinalysis demonstrates pyuria and bacteriuria within 30 days of indwelling catheterization persisting for 2 days or more.
8. Which of the following is an appropriate indication for insertion of an indwelling catheter in an acute care facility.
 - A. Admission to a critical care unit when closely monitoring intake and output.
 - B. Promote healing a stage 3 sacral pressure ulcer in a patient with urinary incontinence.
 - C. Family preference in a patient with double urinary and fecal incontinence.
 - D. Intractable urinary incontinence in a frail elderly patient.
9. Although supporting evidence is mixed, which of the following catheter substrates may be considered when CAUTI incidence is not decreasing despite an evidence based facility-wide prevention program?
 - A. All silicone catheter.
 - B. Silicone coated latex catheter.
 - C. Teflon coated polyurethane catheter.
 - D. Silver impregnated lubricious coated catheter.
10. What is the primary purpose of placing a catheter securement device?
 - A. Reduce the risk of self-removal in a confused patient.
 - B. Ensure optimal urinary drainage into the leg or bedside bag.
 - C. Minimize catheter movement and traction acting on the bladder neck and urethral mucosa.
 - D. Prevent migration of bacteria or other pathogens from urethral meatus to the bladder vesicle.

Participant's Evaluation		Mark your answers with an X in the box identifying the correct answer(s).																																																																																																																																																										
<p>What is the highest degree you have earned? (circle one) 1. Certificate 2. Associate 3. Bachelor's 4. Master's 5. Doctorate</p> <p>Indicate to what degree did this program meet the objectives: Using 1 = strongly disagree to 6 = strongly agree rating scale, please circle the number that best reflects the extent of your agreement with each statement.</p> <p>At the end of the session the participant will be able to: Strongly Disagree Strongly Agree</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 80%;">1. List at least 3 approved indications for inserting an indwelling urinary catheter</td> <td style="text-align: center;">1</td> <td style="text-align: center;">2</td> <td style="text-align: center;">3</td> <td style="text-align: center;">4</td> <td style="text-align: center;">5</td> <td style="text-align: center;">6</td> </tr> <tr> <td>2. 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2. Describe the components of urinary catheter insertion and maintenance bundles in the prevention of CAUTIs	1	2	3	4	5	6																																																																																																																																																						
3. Discuss factors to consider for appropriate securement of the urinary catheter	1	2	3	4	5	6																																																																																																																																																						
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