CAUTI Prevention Bundles: Improving Best Practices within Western Health for Continued Success

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ABSTRACT

***Background*:** Persons in acute care settings who have indwelling urethral catheters are at higher risk of acquiring a urinary tract infection (UTI). Other complications related to prolonged indwelling urinary catheters include decreased mobility, damage to the meatus and/or urethra, increase use of antibiotics, increased length of stay, and pain. UTIs in acute care settings account for 30 to 40% of all health care associated infections (HAIs). Of these, 80% are catheter associated UTIs (CAUTIs).

***Purpose*:** To utilized the CDC (2009) bundle approach for CAUTI prevention and create a program which supports a multimodal method to improving urinary catheter use, maintenance, and removal, including a continuing competency program where role expansion is anticipated.

***Methods*:** A comprehensive review of the literature was conducted. Physicians were consulted through a power point presentation followed by a letter explaining the project, a questionnaire, and two selections of relevant literature. Nursing staff and allied health professionals from the target units of 3A and 3B medicine attended one of two lunch and learns. They were presented the project via a power point presentation and the same questionnaire as distributed to physicians.

***Results*:** Five e-learning modules, a revised policy, and clinical pathway have been developed to support staff with best practice knowledge transfer.

***Conclusion*:** Behaviour changes need to be approached with a framework, extensive consultation, and education. Sustainability of any practice change cannot occur without having completed the background work to ensure staff have access to tools to support the change.

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Background

The Canadian Patient Safety Institute website states each year in Canada, health care associated infections (HAIs) are responsible for 8,000 deaths and another likely 220,000 HAIs (CPSI, 2014). It is estimated that urinary tract infections account for 40% of all HAIs (Gokula et al., 2012; Willson et al., 2009). Of these, 80% are related to indwelling urinary catheters (catheter associated urinary tract infections -CAUTI) (Loeb et al., 2008). Meddings, Rogers, Macy and Saint (2010) state " the greatest risk factor for CAUTI is prolonged catheterization" (p. 550).Other complications related to prolonged indwelling urinary catheters include decreased mobility, damage to the meatus and/or urethra, increase use of antibiotics, increased length of stay, and pain (Salamon, 2009).

Implementation of the bundle approach with reminder systems for early removal has shown a reduction of catheter days and CAUTIs. The bundle approach was implemented by infection prevention and control at Western Health in 2013 utilizing the Center for Disease Control and Prevention (CDC) methodology and electronic documentation with built in reminders for early catheter removal. Infection prevention and control practitioners embarked on an education blitz on the patient units with front line nurses. These education sessions were comprised of five power point slides highlighting the importance of daily assessment of appropriate indication, early removal, daily cleansing of the meatus with soap and water by qualified staff, maintaining a closed system, using a clean collection container for draining urine for each patient, and maintaining the drainage bag below the level of the bladder at all times. Nursing staff were educated when 'no identifiable reason' was the only choice for urinary catheter indication, they were to discuss discontinuation with the physicians. Infection prevention

and control staff also reviewed the electronic documentation bundle for the intervention. No further follow up or education had been provided.

Early results showed a decrease in CAUTIs by 50%. As time has passed, CAUTIs within Western Health have risen. This has prompted research related to CAUTI and missed opportunities for CAUTI prevention. Current evidence recommends a multimodal approach including appropriate selection, maintenance, and early removal; engaging multidisciplinary teams; reminder systems; automated stop orders; a nursing protocol for urinary catheter removal; and nurse champions to effectively implement sustained improvements for CAUTI reduction. The current CAUTI bundle at Western Health did not include interventions related to nurse-protocol removal, multidisciplinary teams, or automated stop orders. The original intent for this project was implementation and evaluation of urinary technologists as champions for urinary catheter use, maintenance, and removal. Discussion with my course professor concluded a change from implementation and evaluation to program development was necessary. The practicum objectives were adjusted to reflect the revised goal.

Practicum Objectives

1. Identification of the new role of urology technicians.
2. Identification of the new role of the multidisciplinary teams for CAUTI prevention.
3. Identify learning needs for best practices of front line staff.
4. Develop an educational program to facilitate learning of best practices.
5. Demonstrate advanced practice competencies as per the Canadian Nurses Association (CNA).

Methods

An integrative literature review was conducted and revised to include role expansion of health care professionals (Appendix A). Formal and informal consultations with physicians, nurses, urology technologists, managers, and directors of Western Health occurred throughout the practicum project (Appendix B) and were instrumental in the development of the education tool resource and clinical pathway for CAUTI prevention (Appendix C). The Health Research Ethics Authority (HREA) Screening Tool was completed for this project and indicated that ethics board review as not needed. The following sections provide a summary of each of the appendices.

Summary of the Literature

The purpose of this literature review was to review and critique practice recommendations for CAUTI prevention and to propose methods to improve and sustain Western Health's CAUTI initiative, including approaches to overcome barriers for implementation and role expansion of the urology technologist. A search of PubMed, the Cochrane Library, and CINAHL was completed using terms related to the phenomenon of interest. Urinary tract infection, catheter associated urinary tract infection, UTI, CAUTI, interventions, nursing role expansion, professional practice, role redesign, scope of practice expansion, and urinary technologist were terms used to find articles. These terms were entered singly and then delimited by using "AND" and "OR" in multiple combinations. Other articles were found from reviewing selected articles reference lists and several others were found in my work folder related to the CAUTI bundle implemented at Western Health. Articles chosen had interventions or experiments which included constructs of the CDC CAUTI bundle; were evaluating nurse led removal and/or

automatic stop orders; were related to staff education and asymptomatic bacteriuria, UTI, or CAUTI; or examined barriers to implementation.

Research Results

The systematic review of randomized or non-randomized trials is the highest level in the hierarch for quantitative research followed by single randomized control trial (Polit and Beck, 2012). Two systematic reviews and one randomized control trial was found in the literature search. All three gave consistent evidence to support the hypotheses that early catheter removal using automatic stop orders or reminder systems has a positive impact on catheter days and subsequent CAUTI rates. Although most of the studies included in the integrative reviews were quasi-experimental pre-test post-test designs without a control group, the statistically significant meta-analysis increased the strength of the evidence to a moderate to high category and was consistent with results of systematic review.

Further studies used in this review which tested other indicators for CAUTI reduction consisted of non-controlled pre-test post-test design. Quasi-experimental designs are beneficial in that they can be readily implemented in the clinical setting. However, one must be aware of the limitations and potential bias that can occur. Quasi-experimental designs which have a comparison unit have a stronger design (Polit and Beck, 2012).

CAUTI Prevention Bundles

The literature review unveiled a complex, multi-factorial problem related to urinary catheter use and CAUTI. Adherence to specific protocols aimed at CAUTI reduction, such as the CDC (2009) CAUTI prevention bundle, will decrease inappropriate

catheter use which will translate to fewer CAUTIs (Gokula et al., 2012; Rosenthal et al., 2012). The CDC bundle recommendations include: 1) appropriate urinary catheter use – urologic surgery, level III or IV sacral ulcers, end of life care, strict output monitoring, limiting the length of time catheters are used; 2) proper techniques for urinary catheter insertion - hand hygiene, sterile drape, single use sterile lubricating gel; 3) proper techniques for urinary catheter maintenance - hand hygiene prior to manipulation or emptying drainage bag, keeping drainage bag below the level of the bladder but do not allow it to rest on the floor, a separate collection container for each catheter; 4) quality improvement programs – education and training, supplies, policies or guidelines, documentation systems; and 5) surveillance – standardized definition, standardized denominator (preferably catheter days), and regular feedback to unit.

Much of the literature partially or fully utilized the CDC recommendations in their interventions with positive outcomes. Interventions which included early catheter removal through reminder systems or nurse led removal protocols had statistically significant improvements. Automatic stop orders analyzed through meta-analysis reduced the rate of CAUTI by 41% (rate ratio, 0.59; 95% confidence interval [CI], 0.45 to 0.74; $p < 0.001$) (Meddings et al., 2010). Similarly in Medding's et al. (2014) integrative review and update of the meta-analysis, the stop order or reminder system reduced CAUTI by 53% (rate ratio 0.47; 95% CI 0.30 to 0.64, $p< 0.001$).

Education

The CDC (2009) bundle indicates education of staff related to the bundle approach is an important step. Most of the studies reviewed had an extensive multifaceted education component which utilized e-learning, posters, power point presentations, face

to face education, and/or reinforcement during unit interdisciplinary rounds or catheter rounds (Fakih et al., 2012; Gokula et al., 2012; Leblebicioglu et al., 2013; Lo et al. 2014; Marra et al., 2011; Mori, 2014; Rosenthal et al., 2012; Saint et al., 2009; Salamon, 2009). Multiple tools exist to aid organizations with education including commercially available resources from manufactures and clinical pathway such as the one created by the American Nurses Association.

Role Expansion

Implementing a new CAUTI prevention program grounded in evidence based best practices requires a review of professional practice specialty competencies and role expansion of the professional. To extend the role of a profession/health care provider, the onus is on the discipline to provide documentation proving education and/or certification, policies and procedures, maintenance of competency, and support for the new role.

Theory and Framework

Role expansion supported by continuing competency education and utilization of a framework for implementation of knowledge transfer is important. The Canadian Institute for Health Information adopted the Knowledge to Action framework which is cyclic and fluid (Thomas et al., 2014). When planning a new quality improvement initiative which has a staff education component, incorporating a behaviour change theory will assist with positive outcomes. Positive deviance is a problem solving paradigm that follows the philosophy of action research (Ribeiro de Macedo et. al., 2012). Positive deviance is a "bottom up" approach to problem solving. It empowers front line staff to identify problems in their work environment and collaborate together to find unique solutions. Positive deviance combined with Safer Healthcare Now's plan- do-study-act

(PDSA) cyclical participatory process, participants create change by planning the intervention, trying the intervention, observing the results, and acting on what is learned (Safer Healthcare Now, 2008). This action provides the participants with the knowledge required to continue with lasting change.

The knowledge to action process has similar principles and promotes successful knowledge translation from evidence-based best practices to clinical practice. The planning stage of the PDSA cycle complements the first three processes of the Knowledge to Action framework (identify the problem, adapt knowledge, assess barriers); the do stage is similar to the create and implement interventions and monitor knowledge of Knowledge to Action framework; the study section of PDSA overlaps two sections of Knowledge to Action framework with monitor knowledge and evaluate outcomes; and the act section relates to sustaining knowledge and re-evaluating any new problems. Combining these two processes will achieve a tangible education program and knowledge transfer.

Conclusion

There is sufficient evidence to support the statement that early removal of a urinary catheter has a positive effect on the outcomes of CAUTI. Evidence suggests the bundled approach works as a whole to reduce CAUTI.

Summary of Consultations

Extensive consultation occurred during the first half of the practicum. Front line clinicians including registered nurses, licensed practical nurses, nurse managers, nurse educator, urology technologist, allied health professionals, and physicians who primarily worked on the two medical units (3A 3B) at Western Memorial Regional Hospital were

the focus for the consultations. An invitation was extended to other units in Western Memorial Hospital. Information technology specialists were consulted to create an electronic report of urinary catheter days and urinary catheter use. Employees were invited to attend one of two lunch and learns sponsored by Infection Prevention and Control which was followed up with a survey. Physicians did not attend the lunch and learn, however, they were sent an information package with a survey as recommended by LMAC.

A total of 118 surveys were distributed to physicians (N=90) and multidisciplinary staff (N=28). 19% of surveys were returned (physicians= 6%; multidisciplinary staff = 57%). The results of the survey were supportive of implementing a urology technologist catheter removal protocol and to pilot this project on the medical units of 3A and 3B with 100% of returned surveys indicating yes to both questions.

Descriptive statistics was used to analyze the data obtained from the surveys. The analysis was used to create a list of indicators for urinary catheter use and to gather information to prioritize future education for front line staff. Open ended questions in the survey and discussions during the lunch and learn were analyzed through content analysis.

Based on the best practice recommendation and the survey results, five e-Learning modules will need to be developed to aid nurses and the multidisciplinary team members understand the processes and rationales for best practices related to indwelling urinary catheters. The creation of a clinical pathway and posters with the pathway placed in the nursing unit will aid nurses and other disciplines with the behavior changes required to achieve best practices.

Resource Summary

Five interactive e-learning modules were created. They were developed to aid multidisciplinary staff with their specific client/patient/resident interactions and education needs. All five modules will need to be completed by any staff member who assesses urinary catheter need and are currently competent for urinary catheter insertion. Other disciplines are only required to complete the modules which pertain to their specific interactions with persons who have an indwelling urinary catheter.

Module one is a review of anatomy and physiology of the urinary system and a review of the current urinary catheter products available through Western Health. All staff members who work with clients/patients/residents who have a urinary catheter are expected to complete this module.

Module two includes an explanation of the appropriate indications for urinary catheter insertion, which resulted from best practice evidence and the consultation process during the first half of the practicum. This module is aimed at registered nurses, licensed practical nurses, urology technologists, nurse practitioners, and physicians.

The third module reviews best practices related to urinary catheter insertion including aseptic technique. This module includes re-enforcement of appropriate indication for catheterization, reminder for peri-care prior to meatal cleansing, aseptic technique, and important moments for hand hygiene. It includes a link to the Bard® education video which addresses proper insertion, securing the device, correct procedure for draining the urinary catheter bag, proper technique for urine sampling from the port, and the importance of early removal. This module is intended for persons who insert urinary catheters.

During the multidisciplinary lunch and learn, a knowledge gap was identified related to the CDC best practice approach for urinary catheter maintenance. The fourth module is a review of the CDC (2009) bundle maintenance addresses the knowledge gap identified during the consultations. It is intended for any person who will interact with a client/patient/resident who currently has an indwelling urinary catheter.

The final module teaches staff how to properly use non-invasive techniques to assess for bladder fullness and retention. It includes a video on how to use the current model of bladder scanner available at Western Health and an explanation of how to use the clinical pathway to aid with assessment for in and out catheterization and for re-insertion of the urinary catheter.

Advanced Nursing Competencies

The Canadian Nurses Association has developed a framework to guide practitioners to understand the expectations of an advanced practice nurse. By definition "advanced nursing practice is an umbrella term describing an advanced level of clinical nursing practice that maximizes the use of graduate educational preparation, in-depth nursing knowledge and expertise in meeting the health need of individuals, families, groups, communities and populations" (CNA, 2008, p.9). Advanced practice nursing competencies include clinical, research, leadership, and consultation and collaboration abilities. Reduction of urinary catheter use utilizes all four advanced nursing competencies as outlined in the CNA Advanced nursing framework.

Research. Advanced practice nurses are able to:

> identify and implement research-based innovations for improving client care, organizations, or systems; … conduct and support research that enhances or benefits nursing practice; evaluate current practice at individual and system levels

> in light of research findings; collect data on, and evaluate the outcomes of, advanced nursing practice for clients, the nursing profession and the health-care system; critique, interpret, apply and disseminate evidence-based findings; and contribute to nursing and the health-care system….(CNA, 2008, p. 23-24).

Throughout the first practicum I completed research related to best practices for urinary catheter use, maintenance, and removal; methods to transfer knowledge into actions and behaviour changes; and professional role expansion.

Consultation and Collaboration. Consultation and collaboration competencies of the advanced practice nurse include his or her ability to:

> initiate timely and appropriate consultation, referrals and collaboration with other health-care providers; consult and collaborate with members of the health-care team to develop quality-improvement and risk-management strategies; … practice collaboratively and build effective coalitions… (CNA, 2008, p. 26).

I have conducted extensive consultation with multidisciplinary team members. I was invited to present my project to the physician group and was requested by the attendees to create a short information package with two pieces of relevant literature and a questionnaire for feedback. Informal discussions with the urology technicians and their manager occurred throughout the two practicums including feedback on the developed educational resource. I collaborated with front line staff to identify educational needs through a lunch and learn venue from which I received valuable input for the educational resource, clinical pathway, and revised policy. Senior leaders were consulted prior to commencing this project and during the policy development.

Clinical competency. Comprehensive knowledge is integral to and advanced practice nurse. The ability of the advanced practice nurse to integrate practice with theory, research and in-depth knowledge to:

> … use qualitative and quantitative data from multiple sources when making clinical decisions and initiating and managing change; … guide decision-making in complex clinical situations; … generate and incorporate new nursing knowledge and develop new standards of care, programs, and policies; … plan, initiate, coordinate, and conduct educational programs based on needs, priorities and organizational resources; manage a wide range of patient responses to actual and potential health problems (CNA, 2008, p. 22-23).

Utilizing the clinical evidence found in the literature review, analyzing the data from the questionnaires, and incorporating feedback from the multidisciplinary consultations, I created five educational e-learning modules, a new clinical pathway to aid staff with decision making, and revised the urinary catheter policy.

Leadership competency: Advanced practice nurses continually seek best practices and work to improve care delivery which benefits the public and the health organization. Advanced practice nursing leadership is demonstrated by:

> … mentoring and coaching nursing colleagues, other members of the health care team, and students;… contributing to and advocating for organizational culture that support professional growth, continuous learning and collaborative practice; … evaluating programs in the organization and the community and developing innovative approaches to complex issues; understanding and integrating the principles of resource allocation and cost-effectiveness in organizational and system-level decision-making; identifying problems and initiating change to address challenges at the individual, organizational or system levels…(CNA, 2008, p. 24-25).

Urinary catheter use in health care facilities is ubiquitous. Reduction of urinary catheter use and knowledge of best practice recommendations to prevent CAUTIs requires front line nurses to understand the importance of appropriate indications, early removal, and

best practices for maintenance of the urinary catheter. As a leader for CAUTI prevention, I have developed a flexible education program for clinicians which provides advanced competency for clinicians caring for people with indwelling urinary catheters. The infection prevention and control team will provide support to front line staff with this newly developed program to ensure behaviour change. As well, during the national meeting for the Canadian Nosocomial Infection Surveillance Program (CNISP) from February 22-24, 2016 I advocated for the membership to commence surveillance related to health care associated urinary tract infections and CAUTIs. Due to my passion for the project and convincing arguments related to the burden of disease, increase use of antimicrobials, and lack of Canadian data related to CAUTIs, the members agreed to do a pilot project with CNISP hospitals to collect data on health care associated urinary tract infections and CAUTIs. An action plan for data collection was created during the meetings and should be finalized by the next annual meeting scheduled for the fall of 2016.

Next Steps

The revised CAUTI prevention policy has been approved and will be uploaded to the intranet by April. The five e-learning modules have been sent to the organizational development office where the power point presentations will be converted to e-learning and will be incorporated into the Western Health e-learning management system. When they are uploaded to the system, staff of the two medical units will complete the modules required for their position. A pilot of nurse led and urology technician led urinary catheter removal and evaluation is not part of the practicum, however my goal is to trial the program on the two medical units and evaluate the project upon completion of the pilot.

Outcome measures including surveillance on CAUTIs and data collection on the number of patients with nurse or urology technician catheter removal who fail a trial of voiding and have to have the catheter re-inserted will be important for broader implementation. If successful, this project will expand throughout the organization including long term care. When completed, a similar program will be created for asymptomatic bacteriuria management, thus creating a holistic approach to urinary tract infection management.

Conclusion

This project has highlighted the importance of infection prevention in health care. Many nurses have treated urinary catheters as a normal part of care, when in fact, they should be viewed as a device which can cause multiple health related issues. During the consultation process, multidisciplinary staff recognized the impact improper care of indwelling catheters can have on a patient and were eager to improve practices.

Since the commencement of the project and sharing information on best practices with physicians and surgeons, it has been stated to me by nurses who work in the surgical units that many more post-operative patients are no longer ordered indwelling urinary catheters, and the use of in and out catheters seems to have increased. Intensivists have also been discontinuing urinary catheters prior to patient transfer from the intensive care unit to the medical or surgical wards.

Behaviour changes need to be approached with a framework, extensive consultation, and education. Sustainability of any practice change cannot occur without having completed the background work to ensure staff have access to tools to support the change.

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Appendix A

CAUTI Prevention Bundles: Improving Best Practices within Western Health for Continued Success

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Abstract

Persons in acute care settings who have indwelling urethral catheters are at higher risk of acquiring a urinary tract infection (UTI). Other complications related to prolonged indwelling urinary catheters include decreased mobility, damage to the meatus and/or urethra, increase use of antibiotics, increased length of stay, and pain. UTIs in acute care settings account for 30 to 40% of all health care associated infections (HAIs). Of these, 80% are catheter associated UTIs (CAUTIs). The Centers for Disease Control (CDC) has created a best practice bundle approach to assist with the elimination of CAUTIs. This approach uses key indicators for appropriate catheter use and reminder systems for early removal. The Canadian Institute for Health Information reports CAUTIs as an adverse nursing outcome for patients. Front line nurses have the resources to assess catheter use on a daily basis and capacity to consult with physicians to encourage early removal of the catheters. In addition to the bundle, the literature supports utilization of a champion and nurse led protocols for early catheter removal. Nurse led removal protocols require role expansion. Expanding roles of professions has both barriers and facilitators to change, however a multimodal approach which includes specific education and continuing competency has been successfully implemented in many facilities across the United States. This paper discusses the CDC bundle approach and reviews methods to create a program which support a multimodal approach to improving urinary catheter use, maintenance, and role expansion.

Persons admitted to acute care hospitals expect outcomes to be positive. They do not expect to incur further illness as a result of health care. The Canadian Patient Safety Institute website states each year in Canada, health care associated infections (HAIs) are responsible for 8,000 deaths and another likely 220,000 HAIs (Canadian Patient Safety Institute, 2014). It is estimated that urinary tract infections account for 40% of all HAIs (Gokula et al., 2012; Wilson et al., 2009). Of these, 80% are related to indwelling urinary catheters (catheter associated urinary tract infections -CAUTI) (Loeb et al., 2008). Meddings, Rogers, Macy and Saint (2010) stated "the greatest risk factor for CAUTI is prolonged catheterization" (p. 550). Other complications related to prolonged indwelling urinary catheters include decreased mobility, damage to the meatus and/or urethra, increase use of antibiotics, increased length of stay, and pain (Salamon, 2009).

Background

The Canadian Institute for Health Information reports CAUTIs as an adverse nursing outcome for patients. The life cycle of a urinary catheter has multiple points for interventions by nurses which can decrease a person's risk for acquiring a CAUTI. Various associations have developed best practice guidelines which bundle approaches to assist with the reduction of CAUTIs. Some examples include the United States Centers for Disease Control and Prevention (CDC), the Joanna Briggs Institute in Australia, the Infectious Diseases Society of America, and the International Consultation on Incontinence research group. The bundle approach uses key indicators for appropriate catheter use, insertion, and maintenance; recommendations for alternate suggestions to catheterization; and reminder systems for early removal. Recent integrative review and

meta-analysis indicate, in addition to the bundle approach, automated stop orders, nurse lead removal, and champions, alone or in combination, have proven success for early removal with substantive reductions in CAUTI (Meddings et al., 2010; Meddings et al., 2014).

The bundle approach was implemented by infection prevention and control at Western Health in 2013 utilizing the CDC's methodology and electronic documentation with built in reminders for early catheter removal. Infection prevention and control practitioners embarked on an education blitz on the patient units with front line nurses. These education sessions were comprised of five power point slides highlighting the importance of daily assessment of appropriate indication, early removal, daily cleansing of the meatus with soap and water by qualified staff, maintaining a closed system, using a clean collection container for draining urine for each patient, and maintaining the drainage bag below the level of the bladder at all times. Infection prevention and control also reviewed the electronic documentation bundle for the intervention and provided a CAUTI prevention pamphlet. No further follow up or education has been provided.

Early results showed a decrease in CAUTIs. As time has passed, CAUTIs within Western Health are rising. This has prompted research related to CAUTI and missed opportunities for CAUTI prevention. The evidence recommends a multimodal approach including appropriate selection, maintenance, and early removal; engaging multidisciplinary teams; reminder systems; automated stop orders; and nurse champions to effectively implement sustained improvements for CAUTI reduction (Meddings et al, 2010; Meddings et al, 2014). The current CAUTI bundle at Western Health does not

include interventions related to nurse-ordered removal or automated stop orders, and it does not include a behaviour change model.

Multiple tools exist to assist front line staff with CAUTI prevention including paper charting forms with bundle interventions, posters, information pamphlets, electronic documentation forms, and catheter insertion trays which promote best practices for catheter insertion. In addition to the bundle, as stated above, the literature supports utilization of a champion and nurse led protocol for early catheter removal. Nurse led removal protocols require role expansion of registered nurses, licensed practical nurses and urology technicians. Expanding roles of professions has both barriers and facilitators to change, however a multimodal approach which includes specific education and continuing competency has been successfully implemented in many facilities across the United States. A champion is usually someone who is respected within the unit and has the ability to foster behaviour change. Urology technicians at Western Health are licensed practical nurses who have completed additional education and certification related to urology and is proficient with insertion, maintenance, assessment, and removal of multiple types of indwelling urinary catheters. The urology technicians are eager to aid with the bundle and are respected members of the health care team and are an appropriate choice to utilize as catheter bundle champions and trial of a nurse led protocol in Western Health.

A second consideration which must be included in the review for further CAUTI prevention at Western Health includes understanding of the population at risk. In Western Memorial Hospital, 32 (16%) inpatient beds on two units are dedicated to alternate level of care patients who have multiple comorbidities and are awaiting long term care.

Reviews of the inpatient roster for Western Memorial Regional Hospital on October 5, 2015 showed a total of 126 inpatients (58%) were over the age of 65. Of the126 acute care inpatients, sixty-eight were designated as alternate level of care awaiting long term care. This age population has specific risks which predisposes them to UTIs and CAUTIs. Leduc (2014) notes persons in long term care facilities have decreased thirst, suffer from dehydration, incontinence, and incomplete bladder emptying. They also may present differently with a UTI than persons of a younger age with less comorbidities. Knowing there were differences in presentation of infection in the elderly, McGeer et al. (1991) produced a document used to aid long term care facilities with surveillance of nosocomial infections. In 2012, the Society for Healthcare Epidemiology of America and the CDC developed a position statement updating the original definitions of nosocomial infection in long term care based on McGeer et al. (1991) criteria to include new evidence and improved access to diagnostics in long term care facilities (Stone et al., 2012).

Elderly persons are also more likely to suffer from asymptomatic bacteriuria. Asymptomatic bacteriuria is noted when there are bacteria in the urine but it is not causing infection. Prevalence in persons in long term care facilities is noted to be 40% to 50% (Leduc, 2014). Unfortunately, many clinicians do not understand the differences between asymptomatic bacteriuria and a UTI or CAUTI. As such, this population is often misdiagnosed and unnecessarily treated for CAUTI or UTI. Education of front line staff related to understanding this population's risks and alternate choices for intervention such as rehydration should be included in the education bundle. Given the prevalence of persons in acute care who are elderly and/or are awaiting long term care, this information

is relevant to any project aimed at reduction of UTI and CAUTI in acute care settings within Western Health (see Appendix A for definitions for UTI and CAUTI).

The purpose of this paper is to review and critique the literature as it relates to best practice recommendations for CAUTI prevention and to propose methods to improve and sustain Western Health's CAUTI initiative, including approaches to overcome barriers for implementation and role expansion of the urology technologist. In addition, educating front line clinicians on appropriate identification, management, and treatment of asymptomatic bacteriuria, UTI, and CAUTI in the elderly population will have significant outcome benefits for the patients.

Methods

A search of PubMed, the Cochrane Library, and CINAHL was completed using terms related to the phenomenon of interest. Urinary tract infection, catheter associated urinary tract infection, UTI, CAUTI, interventions, nursing role expansion, professional practice, role redesign, scope of practice expansion, and urinary technologist were terms used to find articles. These terms were entered singly and then delimited by using "AND" and "OR" in multiple combinations. Other articles were found from reviewing selected articles reference lists and several others were found in my work folder related to the CAUTI bundle implemented at Western Health. Articles chosen had interventions or experiments which included constructs of the CDC CAUTI bundle; were evaluating nurse led removal and/or automatic stop orders; were related to staff education and asymptomatic bacteriuria, UTI, or CAUTI; or examined barriers to implementation.

Research Results

The systematic review of randomized or non-randomized trials is the highest level in the hierarch for quantitative research followed by single randomized control trial (Polit and Beck, 2012). Two systematic reviews and one randomized control trial was found in the literature search. All three gave consistent evidence to support the hypotheses that early catheter removal using automatic stop orders or reminder systems has a positive impact on catheter days and subsequent CAUTI rates. Although most of the studies included in the integrative reviews were quasi-experimental pre-test post-test designs without a control group, the statistically significant meta-analysis increased the strength of the evidence to a moderate to high category and was consistent with results of systematic review.

Further studies used in this review which tested other indicators for CAUTI reduction consisted of non-controlled pre-test post-test design. Quasi-experimental designs are beneficial in that they can be readily implemented in the clinical setting. However, one must be aware of the limitations and potential bias that can occur. Quasi-experimental designs which have a comparison unit have a stronger design (Polit and Beck, 2012).

Literature Review

HAIs are a significant problem in hospitals. It is estimated in the United States, costs associated with CAUTIs are between $749-1007 USD per admission (Meddings et al, 2014). Canadian data specifically related to CAUTIs was not found in the literature, however, the Canadian Patient Safety Institute notes HAIs in 2004 cost $82 million with an estimated $129 million for 2010 (Canadian Patient Safety Institute, 2015). As of 2008, the Centers for Medicare and Medicaid Service in the United States of America no longer

pay for costs associated with health care associated infections related to CAUTIs as they are seen as a preventable event and now fall into the category of a "never event" (Meddings et al, 2014, p.277). This act has prompted a significant effort by health care facilities and government agencies in the United States to implement ways to avoid urinary catheters and subsequent CAUTIs.

A review of the literature has unveiled complex, multi-factorial problem related to urinary catheter use and CAUTI. Adherence to specific protocols aimed at CAUTI reduction will decrease inappropriate catheter uses which will translate to fewer CAUTIs (Gokula et al., 2012; Rosenthal et al., 2012). Two meta-analysis have shown significant reduction of both catheter use and CAUTIs when automatic stop orders or reminder systems for discontinuation is implemented. Education of front line staff is important to any successful practice change initiative. A review of recommendations related to staff education which focuses behaviour management and knowledge transfer theories will be conducted and incorporated into the revised CAUTI intervention program for Western Health.

CDC Bundle Approach

Numerous studies have been completed related to the CDC bundle approach of CAUTI reductions strategies. The CDC bundle recommendations include: 1) appropriate urinary catheter use – urologic surgery, level III or IV sacral ulcers, end of life care, strict output monitoring, limiting the length of time catheters are used; 2) proper techniques for urinary catheter insertion - hand hygiene, sterile drape, single use sterile lubricating gel; 3) proper techniques for urinary catheter maintenance - hand hygiene prior to manipulation or emptying drainage bag, keeping drainage bag below the level of the

bladder but do not allow it to rest on the floor, a separate collection container for each catheter; 4) quality improvement programs – education and training, supplies, policies or guidelines, documentation systems; and 5) surveillance – standardized definition, standardized denominator (preferably catheter days), regular feedback to unit. Evidence to support each of these bundled recommendations is diverse, with some interventions having strong evidence and others with limited or no evidence. The CDC's Guideline for Prevention of Catheter-associated Urinary Tract Infections (2009) rates the available evidence using a modified Healthcare Infection Control Practices Advisory Committee categorization scheme for recommendations (see Appendix B for explanation). Using this method, the CDC has rated the available evidence with the majority of interventions rated as a IB category signifying there is limited evidence to support the statements. Many other interventions are rated a category II indicating there is weak or no evidence.

It is challenging to find evidence to support each of the initiatives individually as many of the articles have multiple interventions and could not differentiate which specific intervention had the greatest effects on CAUTI reduction. However, evidence suggests the CDC bundle is effective. Rosenthal et al. (2012) implemented the CDC recommendations in a before-after prospective cohort study conducted over a period of 12 years in 57 adult intensive care units with 56,429 hospitalized patients in 15 developing countries. The study was conducted in two phases. Phase one was active surveillance which gathered baseline data over four months. Phase two was the intervention period lasting an average of 22.5 months which included "(1) bundle of infection control interventions, (2) education, (3) outcome surveillance, (4) process surveillance, (5) feedback of CAUTI rates, and (6) performance feedback of infection control practices"

(Rosenthal et. al, 2012, p. 520). The overall effect on CAUTI rates was a reduction from 7.86 to 4.95per 1,000 urinary catheter days. Utilizing the same study criteria Leblebicioglu et al. (2013) decreased CAUTIs from 10.63 per 1000 urinary catheter days to 5.65 per 1000 urinary catheter days (RR 0.53; 95% CI: 0.4-0.7; $p = 0.001$). Both studies obtained large sample sizes with standardized data collection, education, and implementation; however, there is a lack of generalizability related to the fact both studies were conducted within intensive care units.

Gokula et al. (2012) implemented process changes throughout a 319 bed acute care facility in the United States which included maintaining a closed system, hand hygiene and glove use prior to emptying the drainage bag, securing the device, peri-urethral care, staff education, new catheter order sheet, and a removal reminder system. Their pre-intervention rate was 2.21 CAUTIs per 1,000 patient days with a post intervention rate of 0.435 CAUTIs per 1,000 patient days. What is different with this study, process evaluation, revisions, and implementation of revisions occurred throughout the project which lasted from 2007 to 2011.

Early Catheter Removal

One aspect of the bundle approach that has been reviewed extensively with individual analysis is related to early catheter removal. A review by the Cochrane Collaboration (2009) indicated the best approach to CAUTI reduction is to reduce the number of unnecessary catheterizations and/or to remove the catheter as soon as possible. Loeb et al. (2008) indicated that bacteriuria develops in 50% of patients by day five, and hypothesized early removal may decrease urinary tract infections. This randomized control trial which included 692 hospitalized patients in a Canadian hospital was not able

to prove the hypothesis as there was no statistically significant difference between the intervention and control group with CAUTIs (CAUTI 19% of intervention group vs. 20.2% in control group - RR 0.94 [95%CI, 0.66 to 1.33] $p = 0.71$). Bias may have occurred within the nursing staff as they may have unknowingly applied learned knowledge of early catheter removal to the control group because they cared for patients in both the intervention and control groups. The Hawthorn effect may have impacted early catheter removal may have influenced the outcome of CAUTI.

Meddings et al. (2010) noted the "greatest risk factor for CAUTI is prolonged catheterization" (p. 550). It is suggested that up to 50% of catheterized patients do not have an appropriate indication for the catheter and that a significant number of patients have prolonged catheterization simply because the physician forgets the patient has one or they were not aware of the insertion in the first place (Meddings et al., 2014; Oman et al., 2012). Medding et al. (2010) findings estimate that facilities whose CAUTI baseline rates are high would benefit with early removal by eliminating up to 10 CAUTI events for every 1,000 catheter days. Likewise, facilities with low rates would further reduce CAUTIs by approximately three infections per 1,000 catheter days. To put a dollar figure to the prevention of CAUTI, it is estimated one CAUTI costs about $750.00 US dollars per episode (Parry, Grant, and Sestovic, 2013). A reduction of 10 CAUTIs equates a savings of $7500.00 US dollars.

Reduction of Catheter Use

Methods to reduce catheter use consists of daily reminder systems where staff must assess the need for the catheter based on pre-set criteria; automatic stop orders where physicians must review catheter need within a pre-set time such as 24 or 72 hours;

and nurse removal protocol where nurses assess catheter need and automatically remove the catheter without a physician order if the patient does not meet the predetermined indication for a catheter. The CDC recommends catheters are needed for strict output monitoring, end of life comfort measures, urologic surgeries or blockages, and level III and IV sacral ulcer management in incontinent patients. Persons not meeting these requirements should have the catheter removed as soon as it is no longer clinically indicated.

Reminder systems. Salamon (2009) discussed issues with nursing priorities for patient care. When patient care is overwhelming, the task of getting an indwelling catheter removed can easily slip to the bottom of the list and be forgotten. Implementing reminder systems by requiring nursing staff to chart on daily assessment of need is helpful to increased awareness of the catheter existence. Reminder systems are part of a bundle approach and can be implemented through paper charting forms, stickers placed on patient charts, and electronic documentation. At Western Health, our reminder system included daily charting in the electronic record related to assessment of appropriate indication for urinary catheter followed by a section which requires the nurse to document physician notification if "no identified indication" was selected. If the physician does not discontinue the catheter, there is a space provided for nurses to chart the reason given by the physician to maintain the urinary catheter (Appendix C). Fakih et al. (2012) implemented a statewide education project from 2007 to 2010 aimed at nursing daily assessment of need and notification of physicians when there was no appropriate indication for the catheter. The outcome measures for this project was catheter use as opposed to CAUTIs, however, evidence suggests by decreasing urinary catheter use,

CAUTIs will also reduce. The findings show a decrease in catheter use from a baseline of 18.1% (95%CI, 16.8%-19.6%; p< 0.001) to 13.8 % (95%CI, 12.9%-14.8%; p< 0.001) after two years. Meddings et al. (2010) completed a meta-analysis related to different methods of early catheter removal. They noted reminder systems was associated with the reduction of CAUTI by 56% (rate ratio, 0.44; 95% CI, 0.13 to 0.74; p = 0.005).

Automated stop orders. Automated stop orders for catheters either require the physician to review the need for a catheter after 24 to 72 hours of insertion and that to discontinue or reorder the catheter. This intervention analyzed through meta-analysis reduced the rate of CAUTI by 41% (rate ratio, 0.59; 95% confidence interval [CI], 0.45 to 0.74; p < 0.001) (Meddings et al., 2010). Similarly in Medding's et al. (2014) integrative review and update of the meta-analysis, the stop order or reminder system reduced CAUTI by 53% (rate ratio 0.47; 95% CI 0.30 to 0.64, p< 0.001).

Nurse removal protocol. Roser, Piercy, and Altpeter (2014) implemented and evaluated a multi-interventional strategy for CAUTI reduction in five coronary care units in Kentucky between 2011 and 2013 which included a physician approved nurse discontinuation protocol. This multi-intervention showed a reduction of the base line catheter days from 9,643 in 2010 to 4,017 days in 2013. Unfortunately, they did not indicate the effect these interventions had on CAUTIs, however, they did state their overall CAUTI rate was decreased by 60%. Similarly, Parry et al. (2013) implemented a nurse discontinuation protocol in a 300 bed teaching hospital in Connecticut over 36 months and 181,785 patient days which was attributed to a 50% reduction in catheter days (which was equivalent to a 4.1% decrease per month) and a 3.3% reduction in CAUTIs per month. Mori (2014) implemented a nurse driven removal protocol in a 150

bed acute care facility in Ohio with CAUTI incidence of 0.77% pre-intervention and 0.35% post intervention. A point prevalence audit at the one year anniversary of the project of patients who had indwelling urinary catheters with correct indication improved from 12.5% pre-intervention to 100% during the audit.

Education

Education of the front line staff has significant benefits to patient outcomes as it relates to CAUTI and UTI. Having front line staff engaged and aware is an important first step to success for any new approach or change in "the old way". Understanding how people learn will also aid with improved education strategies. Knowledge transfer is "the exchange, synthesis and ethically sound application of knowledge to improve health and provide more effective health service" (Thomas, Menon, Boruff, Rodriguez, and Ahmed, 2014, p. 2). When implementing a new program grounded in evidence based best practices, utilization of a framework for implementation of knowledge transfer is important. The Canadian Institute for Health Information adopted the Knowledge to Action framework which is cyclic and fluid (Thomas et al., 2014). This framework is similar to the positive deviance behaviour change theory which will be discussed later in this paper.

The CDC (2009) bundle indicates education of staff related to the bundle approach is an important step. Most of the studies reviewed had an extensive multifaceted education component which utilized e-learning, posters, power point presentations, face to face education, and/or reinforcement during unit interdisciplinary rounds or catheter rounds (Fakih et al., 2012; Gokula et al., 2012; Leblebicioglu et al., 2013; Lo et al. 2014; Marra et al., 2011; Mori, 2014; Rosenthal et al., 2012; Saint et al., 2009; Salamon, 2009).

Some studies have measurable outcomes with education of front line staff. Schneider (2012) designed a staff education intervention using the Johns Hopkins Model for Evidence-Based Practice. A pre-test post-test design was used to evaluate the staff's uptake of knowledge. An improvement from 3.35 pre-test scores to 6.72 post-test scores showed a statistically significant improvement. The number of patients to evaluate for CAUTI was too small to be statistically significant, however, in the pre-test phase there were two CAUTIs in 14 patients (in 30 days), and in the post-test phase, CAUTIs were reduced to zero in 10 patients (in 30 days). Fakih, Rey, Pena, Szpunar, and Saravolatz (2013) looked at a five year trend in CAUTI reduction. Outcomes of the study showed 97.8% of the nurses viewed themselves as the person responsible for evaluation of catheter necessity while approximately 75% were confident in their skills and knowledge. Gokula et al. (2012) implemented a quality improvement initiative from 2007 to 2011. The education part of the initiative occurred in 2009 and 2010. It included a power point presentation; methods to decrease urinary catheter use; maintenance of urinary catheters; supplemental literature on the units; and a required return demonstration for catheter insertion technique. In 2009 they compared knowledge of CAUTI prevention pre and post education scores with both an intervention and control group. The intervention group pretest – post test scores were 68.4% and 74.3% while the control group was 66.1% and 69.8%. In 2010, they noted a lack of use of the documentation forms. Reasons were explored and the result was simplified redesigned forms and repeated education. The results this time were 70.49% on the pretest with an increase to 77.24% on the post-test scores. No control group was available as the program had been implemented since 2009

and all staff received the original education. None of the studies reviewed discussed ongoing competency evaluation.

Educational Resources

Commercially available tools. Manufacturers of urinary catheter devices and collection systems have multiple educational tools available. For instance, Bard® has created a CAUTI prevention package which facilitates adherence to the CDC bundle approach. The package includes the urinary catheter and drainage system with tamper seal at the connection; hand hygiene products; catheter securement device; labels with reminder to reassess; and patient information sheet. Their website has posters and insertion demonstration videos for end users to understand the best practices with urinary catheter insertion, maintenance, and removal. These tools are helpful for facilities when trying to ensure everyone has access to the same education and training.

Clinical pathways. Clinical pathways or 'tools' are written documents with flow charts for decision making which help clinicians ensure patients have the optimal treatment for their illness. The American Nurses Association has created a clinical pathway related to CAUTI prevention (Appendix D). Public Health Ontario in collaboration with the provincial infectious disease advisory committee has also created resources for long term care facility staff to follow to aid in determining if a resident has a UTI, CAUTI or asymptomatic bacteriuria. It includes a section which describes assessment findings that are not signs or symptoms of a UTI. For instance, foul smelling or cloudy urine are not indicators of a UTI. It is interesting to note, in the elderly a fever means an oral temperature greater than 37.9˚C, or 1.1˚ C above baseline on 2 consecutive occasions within 12 hours (Provincial Infectious Diseases Advisory Committee, 2014).

For example, if the resident's oral temperature is averaging around 35.9˚ C, then two consecutive oral temperatures in 12 hours of 37˚C would indicate that resident has a fever. Leduc (2014) created a clinical pathway for long term care homes to aid front line staff with determining if a resident has clinical signs and symptoms of UTI and gives direction to the staff to ensure adequate hydration, symptom management, and urine collection best practices and appropriate testing. Implementation of clinical pathways similar to the American Nurses Association CAUTI prevention or the Leduc (2014) tool requires organizations to review policies and competencies for the identified end users. In some instances, this will require a review of professional practice specialty competencies and role expansion of the professional.

Role Expansion

Role expansion or role redesign is occurring within health professions. The literature indicates reasons for role expansion or transfer of task to other professions include a shortage of health care providers, consumer demand, government agenda, and chronic disease management (King, Nancarrow, Borthwick, and Grace, 2015).

Governance models have an effect on the implementation of role change or expansion. This can occur in the form of legislation, regulation, or oversight (Maier, 2015). Maier (2015) completed an international review of governance models used in relation to NP/APNs scope of practice. She noted in Canada, NP/APN falls under a decentralized regulation model which can be both a barrier and a facilitator to practice. This decentralized model in Canada has benefits to those who which to increase scope of practice as it can be implemented at the provincial or local level. Many health disciplines are governed by an external body which is responsible for the standard scope of practice

and advanced clinical competencies. In Newfoundland Labrador, registered nurses are governed by the Association of Registered Nurses of Newfoundland Labrador and Licensed Practical Nurses are governed by the College of Licensed Practical Nurses of Newfoundland Labrador. Processes to extend scope of practice for the profession require a collaborative effort within the health authority and in some instances with the governing body for the discipline. Within Western Health, there is a policy related to specialty competencies and role expansion. To extend the role of a profession/health care provider, the onus is on the discipline to provide documentation proving education and/or certification, policies and procedures, maintenance of competency, and support for the new role.

A shift in how health care is managed is also part of the role changes. Previously, physicians were the primary care provider for many individuals. With the trend in health care switching to inter-professional practice model which focuses on a team based approach to health care services, professionals who would have traditionally provided the sole care for the individual has now shifted to team work (Neves, Reynen, and Bechard, 2014). This shift has forced other health care providers to relinquish claims on certain "tasks" pushing the boundaries of the extended team members to their full education and certification potential (King et al., 2015).

King et al. (2015) systematic review of the literature identified three themes underpinning role expansion or boundary expansion. These include diversification, specialization, and role substitution. King et al. (2015) explains diversification as a "new approach to practice that has previously been claimed and 'owned' by another profession" (p. 2). They explain it could be a newly created task or a new methodology to performing

the task which results in role expansion. Specialization is dependent on the care provider increasing their level of expertise and training in a specific area. For example, a registered nurse becomes a nurse practitioner or a licensed practical nurse becomes a urology technician. It is noteworthy that "specialization is more successful at post-registration level" (King et al., 2015, p. 2). Role substitution occurs when a profession takes on roles previously completed by other professions. This occurs vertically or horizontally. Vertical substitution occurs when there is a hierarchy relationship between two professions such as when a registered nurse assumes roles traditionally enacted by physicians such as nurse led urinary catheter removal protocols (King et al., 2015). Horizontal substitution occurs when two professions are similar in level of expertise and training and one takes on roles traditionally assumed by the other (King et al, 2015). For example, prior to the expansion of the scope of practice of licensed practical nurses, their education prepared them for basic patient care and tasks. Personal care attendants now have similar training and have absorbed the role of basic patient care into their profession.

Barriers and Facilitators to Role Expansion

A common theme in the literature related to barriers included macro-level resistances from professional associations and professionals. Their fight to protect their boundaries has been evident in multiple studies (King et al., 2015). The professions tried to discredit the encroaching professions capacity to do an effective job. It was noted however, in each of the cases discussed, this tactic only served as a delay. A significant barrier noted by Neves et al. (2014) was related to "lack of role clarity, conflicting expectations and vague job descriptions" (p.2). This can be smoothed by ensuring defined scope of practice which is supported with policy, continuing competency, and regulation.

Governance has been identified in the literature as both a barrier and a facilitator. “Regulation was identified as a potential barrier if of restrictive nature or an enabler to advanced practice if up-to-date with education al competencies” (Maier, 2015, p.4).

Nurse ordered catheter removal is more effective and has greater sustainability; it is not without its challenges (Medding et al. 2014; Parry et al., 2013). Nurse empowered initiatives may not be well received by the nurses. Some do not have the confidence in their abilities, while in other situations obtaining support from the senior managers for this change is difficult.

A study by Gokula et al (2012) indicated a lack of adherence to reminders for catheter removal by physicians and changing the process to be nurse driven (nurse reminded physicians for removal when not indicated) had greater success in compliance. Understanding these issues within and between disciplines will aid the planning and implementation processes.

Proposed Strategies for Role Expansion in Western Health

Shifting the role of urinary catheter removal from the physician to the nurse and/or urology technician can be accomplished. As noted in the literature, specialization including advanced knowledge or role substitution via a vertical change can be effective ways to implement role expansion for professionals. A nurse led catheter removal protocol includes extensive consultation with key stakeholders to identify local indicators for urinary catheter use (patient with epidural catheter) and urinary catheter best practices. Further consultation with front line staff to define the educational components which addresses critical assessment and decision making; a return demonstration of catheter insertion technique; and continued surveillance and auditing of evidence based best

practice will ensure sustained transfer of best practices to clinical practice. Creating a policy which guides who can implement the protocol including responsibilities for education, demonstration, and auditing will aid with this practice change.

In a discussion with Catherine McDonald, VP of Professional Practice and Chief Nursing Officer for Western Health, she stated it is also possible to implement a clinical pathway or nurse led catheter removal by multidisciplinary consultation and obtaining a "Medical Directive" (personal communication, October 9, 2015). The medical directive is signed by the chief of the discipline (ie, surgery, medicine, or family practice) which allows nursing autonomy with clinical decision making within a predetermined set of criteria.

Theory and Framework

When planning a new quality improvement initiative which has a staff education component, incorporating a behaviour change theory will assist with positive outcomes. Positive deviance is a problem solving paradigm that follows the philosophy of action research (Ribeiro de Macedo et. al., 2012). Positive deviance is a "bottom up" approach to problem solving. It empowers front line staff to identify problems in their work environment and collaborate together to find unique solutions. Positive deviance combined with Safer Healthcare Now's plan- do-study-act (PDSA) cyclical participatory process, participants create change by planning the intervention, trying the intervention, observing the results, and acting on what is learned (Safer Healthcare Now, 2008). This action provides the participants with the knowledge required to continue with lasting change. The knowledge to action process has similar principles and promotes successful knowledge translation from evidence based best practices to clinical practice. The

planning stage of the PDSA cycle complements the first three processes of the Knowledge to Action framework (identify the problem, adapt knowledge, assess barriers); the do stage is similar to the create and implement interventions and monitor knowledge of Knowledge to Action framework; the study section of PDSA overlaps two sections of Knowledge to Action framework with monitor knowledge and evaluate outcomes; and the act section relates to sustaining knowledge and re-evaluating any new problems. Combining these two processes will achieve a tangible education program and knowledge transfer.

Safer healthcare now has an infection prevention and control collaborative that utilizes positive deviance and liberating structures to influence hand hygiene rates and decrease infections. Western Health was part of this initiative and noted outcome improvements in hand hygiene rates, increased alcohol based hand rub consumption, improved accessibility to alcohol based hand rub at the point of care, and sustained decreased transmission of methicillin resistant *Staphylococcus Aureus* (MRSA) on the specific unit involved. This methodology can be adapted to facilitate behaviour change for other infection prevention and control initiatives such as UTI prevention.

Positive Deviance

Positive deviance is a social behavioral change theory which can be effectively used in two distinct ways. First, when applied in a population health approach, this theory uses uncommon approaches used in communities or populations which produce positive outcomes (Marsh, Schroeder, Dearden, Sternin, and Sternin, 2009). “Such behaviors are likely to be affordable, acceptable, and sustainable because they are already practiced by at risk people, they do not conflict with local culture, and they work” (Marsh

et al., 2009, p.1177). Second, when adapting the design to health care, the researcher looks for health care facilities with the positive outcomes and reviews their practices to determine the uncommon practices that promote the change.

Positive deviance theory includes four basics steps adapted from the population health approach used in communities. These steps included: "1) defining the problem and establishing a measurable outcome goal; 2) determining if there are certain groups of people, positive deviants, who are achieving better outcomes than is the norm; 3) discovering the behaviors and strategies that enabled the positive deviants to achieve the better outcomes; and 4) design a process for people to practice positive deviance practices and behaviors" (Lindberg, Norstrand, Munger, DeMarico, and Buscell, 2009, p. 61).

Utilization of positive deviance behaviour change theory in conjunction with the clinical pathways created by Leduc (2014) and the provincial infectious diseases advisory committee should provide staff with some of the necessary tools to aid in clinical decisions related to CAUTI, UTI, and asymptomatic bacteriuria in our large elderly population who reside in both acute and long term care facilities. Positive deviance strategy has been utilized by infection prevention and control in previous initiatives with measurable and sustainable success.

Discussion

Urinary catheter use is ubiquitous in health care. Patients sometimes request to have one so they do not have to get up at night. Others are inserted for valid reasons then forgotten. By the time someone questions "why does that patient have a catheter?" multiple risks and or incidences have occurred. Patients move less, become deconditioned, and are effectively restrained by the catheter and bag. Engaging front line

staff to understand the risks associated with prolonged catheter uses is a first positive step toward CAUTI reduction. Creating education for mandatory e-learning with return demonstrations which address correct insertion techniques, appropriate urine collection techniques, and assessment for CAUTI will be an important piece for supportive reinforcement of newly learned behavior.

The CDC has provided examples of tools to aid staff with documentation and to create reminder systems within the documentation. Infection prevention and control at Western Health implemented a documentation tool for patients with urinary catheters. When our clinical online documentation was created, infection prevention and control worked with the information technology group to develop the CAUTI bundle documentation included daily assessment for clinical indication. This served as our reminder system for early removal. Meddings et al. (2014) noted that reminder systems are easy to ignore. The question remains of how to ensure the reminders work? With electronic documentation, it is possible to make certain fields mandatory. Western Health opted not to make the fields mandatory. A recent chart audit related to catheter assessment has shown that many staff do not add the bundle intervention when a patient is ordered a catheter. When it was added, some patients who had appropriate indications for catheter use, did not always have an accurate assessment. To aid in compliance to bundled criteria, the addition of a nurse champion has shown promise. A champion is usually someone who is respected within the unit and has the ability to foster behaviour change. For Western Health, I suggest the unit manager include a review of appropriate catheter indication during the weekly bullet rounds. This action should serve as a positive reinforcement for the staff to get the catheters out as soon as clinically indicated. As well,

urology technicians at Western Health are licensed practical nurses who have completed additional education and certification related to urology and is proficient with insertion, maintenance, assessment, and removal of multiple types of indwelling urinary catheters. The urology technicians are eager to aid with the bundle and are respected members of the health care team. They are routinely consulted for catheter insertion, catheter changes for specialty catheters such a coudé tip, and catheter irrigations of post-operative urologic patients (personal communication, Darlene Mahar, September 14, 2015). The additional knowledge and experience with best practice recommendations of urology issues place the urology technicians in an optimal position to assess urinary catheter need based on the CDC criteria and individual patient assessments.

A second positive outcome includes the empowerment of nursing staff in their assessments of catheters and appropriate placement. There is strong evidence to support nurse directed removal which will be the long term outcome of this project. A concentrated effort will be placed on engaging the staff to create their own strategies for sustained behaviour change using the positive deviance methodology including nurse directed catheter removal.

There is sufficient evidence to support the statement that early removal of a urinary catheter has a positive effect on the outcomes of CAUTI. Evidence suggests the bundled approach works as a whole to reduce CAUTI. A gap in the research exists as it applies to the individual pieces of the bundle approach. Further evidence is needed to effectively state which of the individual interventions has the greatest impact on the reduction of the risks associated with indwelling urinary catheters.

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Appendix A

URINATRY TRACT INFECTION (UTI)

Urinary tract infections (UTI) are defined using symptomatic urinary tract infection (SUTI) criteria or Asymptomatic Bacteremic UTI (ABUTI) criteria.

Catheter-associated urinary tract infections (CAUTI) are defined as a UTI where an indwelling urinary catheter was in place for > 2 calendar days on the date of event, with day of device placement being Day 1

And

And indwelling urinary catheter was in place on the date of event or the day before. If an indwelling urinary catheter was in place for > 2 calendar days and then removed, the UTI criteria must be fully met on the day of discontinuation or the next day.

****Only includes indwelling Foley Catheters***

Symptomatic Urinary Tract Infection (SUTI)

Symptomatic Urinary Tract Infection (SUTI) must meet at least **one** of the following criteria:

Criterion 1a: Patient had an indwelling urinary catheter in place for > 2 calendar days, with day of device placement being Day 1, and catheter was in place on the date of event

and

at least **one** of the following signs or symptoms with no other recognized cause:

- fever (>38°C),
- suprapubic tenderness
- costovertebral angle pain or tenderness

and

a positive urine culture of $\geq 10^5$ colony-forming units (CFU)/ml with no more than 2 species of microorganisms. Elements of the criterion must occur within a timeframe that does not exceed a gap of 1 calendar day between two adjacent elements

OR

Patient had indwelling urinary catheter in place for > 2 calendar days and had it removed the day of or the day before the date of event

and

at least **one** of the following signs or symptoms with no other recognized cause:

- fever (>38°C),
- urgency
- frequency,
- dysuria,
- suprapubic tenderness
- costovertebral angle pain or tenderness

and

a positive urine culture of $\geq 10^5$ colony-forming units (CFU)/ml with no more than 2 species of microorganisms. Elements of the criterion must occur within a timeframe that does not exceed a gap of 1 calendar day between two adjacent elements

Criterion1b: Patient did <u>not</u> have an indwelling urinary catheter that had been in place for > 2 calendar days and in place at the time of or the day before the date of event

and

has at least **one** of the following signs or symptoms with no other recognized cause:

- fever (>38°C) in a patient that is ≤65 years of age,

- urgency
- frequency
- dysuria
- suprapubic tenderness
- costovertebral angle pain or tenderness

and

a positive urine culture of $\geq 10^5$ CFU/ml with no more than 2 species of microorganisms. Elements of the criterion must occur within a timeframe that does not exceed a gap of 1 calendar day between two adjacent elements

Criterion 2a: Patient had an indwelling urinary catheter in place for > 2 calendar days, with day of device placement being Day 1, and catheter was in place on the date of event

and

at least **one** of the following signs or symptoms with no other recognized cause:

- fever (>38°C)
- suprapubic tenderness
- costovertebral angle pain or tenderness

and

a positive urinalysis demonstrated by at least **one** of the following findings:

- positive dipstick for leukocyte esterase and/or nitrite
- pyuria (urine specimen with ≥10 white blood cells [WBC]/mm^3 or ≥3 WBC/high power field of unspun urine)
- microorganisms seen on Gram stain of unspun urine

and

a positive urine culture of $\geq 10^3$ and $<10^5$ CFU/ml with no more than 2 species of microorganisms. Elements of the criterion must occur within a timeframe that does not exceed a gap of 1 calendar day between two adjacent elements

OR

Patient had indwelling urinary catheter for > 2 calendar days and had it removed the day of or the day before the date of event

and

at least **one** of the following signs or symptoms with no other recognized cause:

1. Fever (>38°C),
2. urgency,
3. frequency,
4. dysuria,
5. suprapubic tenderness,
6. or costovertebral angle pain or tenderness

and

a positive urinalysis demonstrated by at least **one** of the following findings:

- positive dipstick for leukocyte esterase and/or nitrite
- pyuria (urine specimen with ≥10 WBC/mm^3)
- microorganisms seen on Gram stain of unspun urine or ≥3 WBC/high power field of unspun urine)

and

a positive urine culture of ≥10^3 and <10^5 CFU/ml with no more than 2 species of microorganisms. Elements of the criterion must occur within a timeframe that does not exceed a gap of 1 calendar day between two adjacent elements

Criterion 2b: Patient did <u>not</u> have an indwelling urinary catheter that had been in place for > 2 calendar days and in place at the time of or the day before the date of event

And

has at least **one** of the following signs or symptoms with no other recognized cause:

- fever (>38°C) in a patient that is ≤65 years of age,
- urgency,
- frequency,
- dysuria,
- suprapubic tenderness,
- costovertebral angle pain or tenderness

and

a positive urinalysis demonstrated by at least **one** of the following findings:

- positive dipstick for leukocyte esterase and/or nitrite
- pyuria (urine specimen with ≥10 WBC/mm^3
- microorganisms seen on Gram stain of unspun urine or ≥3 WBC/high power field of unspun urine)

and

a positive urine culture of ≥10^3 and <10^5 CFU/ml with no more than 2 species of microorganisms. Elements of the criterion must occur within a timeframe that does not exceed a gap of 1 calendar day between two adjacent elements

Criterion 3: Patient ≤1 year of age with or without an indwelling urinary catheter has at least **one** of the following signs or symptoms with no other recognized cause:

- fever (>38°C core)
- hypothermia (<36°C core)
- apnea
- bradycardia
- dysuria
- lethargy
- vomiting

and

a positive urine culture of ≥10^5 CFU/ml with no more than 2 species of microorganisms. Elements of the criterion must occur within a timeframe that does not exceed a gap of 1 calendar day between two adjacent elements

Criterion 4: Patient ≤1 year of age with or without an indwelling urinary catheter has at least **one** of the following signs or symptoms with no other recognized cause:

- fever (>38°C core)
- hypothermia (<36°C core)
- apnea
- bradycardia
- dysuria
- lethargy
- vomiting

and

a positive urinalysis demonstrated by at least **one** of the following findings:

- positive dipstick for leukocyte esterase and/or nitrite
- pyuria (urine specimen with ≥10 WBC/mm^3)
- microorganisms seen on Gram's stain of unspun urine or ≥3 WBC/high power field of unspun urine

and

a positive urine culture of between $\geq 10^3$ and $<10^5$ CFU/ml with no more than two species of microorganisms. Elements of the criterion must occur within a timeframe that does not exceed a gap of 1 calendar day between two adjacent elements

Asymptomatic Bacteremic Urinary Tract Infection (ABUTI)

Criterion: Patient with an indwelling urinary catheter in place for > 2 calendar days, (with day of device placement being Day 1), and catheter was in place on the date of event or without an indwelling urinary catheter has no signs or symptoms (i.e., no fever (>38°C) for patients ≤ 65 years of age*); and for any age patient, no urgency, frequency, dysuria, suprapubic tenderness, or costovertebral angle pain or tenderness

OR

for a patient ≤1 year of age, no and fever (>38°C core), hypothermia (<36°C core), apnea, bradycardia, dysuria, lethargy, or vomiting)

and

a positive urine culture of $>10^5$ CFU/ml with no more than 2 species of uropathogen microorganisms**

and

a positive blood culture with at least 1 matching uropathogen microorganism to the urine culture.

* Fever is not diagnostic for UTI in the elderly (> 65 years of age) and therefore fever in this age group does not disqualify from meeting the criteria of an ABUTI. * For ABUTI, report only isolate(s) in both blood and urine specimens.

* * Uropathogen microorganisms are: Gram-negative bacilli, *Staphylococcus* spp., yeasts, beta-hemolytic *Streptococcus* spp., *Enterococcus* spp., G. *vaginalis*, *Aerococcus urinae*, and *Corynebacterium* (urease positive).

Comments:

Laboratory cultures reported as “mixed flora” represent at least 2 species of organisms. Therefore and additional organism recovered from the same culture, would represent > 2 species of microorganisms. Such a specimen cannot be used to meet the UTI criteria. Urinary catheter tips should not be cultured and are not acceptable for the diagnosis of a urinary tract infection.

Urine cultures must be obtained using appropriate technique, such as clean catch collection or catheterization. Specimens from indwelling catheters should be aspirated

through the disinfected sampling ports. Change the catheter prior to collection if it is in place greater than 7 days.

In infants, urine cultures should be obtained by bladder catheterization or suprapubic aspiration; positive urine cultures from bag specimens are unreliable and should be confirmed by specimens aseptically obtained by catheterization or suprapubic aspiration.

LONG TERM CARE

URINARY TRACT INFECTION

Urinary tract infection includes only symptomatic urinary tract infections. Surveillance for asymptomatic bacteriuria (defined as the presence of a positive urine culture in the absence of new signs and symptoms of urinary tract infection) is not recommended, as this represents baseline status for many residents.

Symptomatic urinary tract infection

Indwelling catheter NOT present
Both of the following criteria must be met:

2) The resident has *at least one* of the following signs and symptoms:
   - Acute dysuria or acute pain, swelling, or tenderness of the testes, epididymis, or prostate

   OR

   Fever or leukocytosis (see Box, above) and *at least one* of the following:
   i. acute costovertebral angle pain or tenderness
   ii. suprapubic pain
   iii. gross hematuria
   iv. new or marked increase in incontinence
   v. new or marked increase in urgency
   vi. new or marked increase in frequency

   OR
   - In the absence of fever or leukocytosis, *two or more* of the following are present:
     i. suprapubic pain

ii. gross haematuria
iii. new or marked increase in incontinence
iv. new or marked increase in urgency
v. new or marked increase in frequency

AND

3) The resident has *one* of the following microbiologic criteria:
   a) At least 105 cfu/mL of no more than two species of microorganisms in a voided urine sample

OR

- At least 102 cfu/mL of any number of organisms in a specimen collected by in-and-out catheter

Indwelling catheter present
Both of the following criteria must be met:

4) The resident has *at least one* of the following signs or symptoms:
   a) Fever, rigors, or new onset hypotension, with no alternate site of infection
   b) Either acute change in mental status or acute functional decline, with no alternate diagnosis, and leukocytosis (see box, Section A.III)
   c) New onset suprapubic pain or costovertebral angle pain or tenderness
   d) Purulent discharge from around the catheter or acute pain, swelling, or tenderness of the testes, epididymis, or prostate

AND

5) The resident has a urinary catheter specimen culture with at least 105 cfu/mL of any organism

Comments:

UTI should be diagnosed when there are localizing genitourinary signs and symptoms and a positive urine culture result. A diagnosis of UTI can be made without localizing symptoms if a blood culture isolate is the same as the organism isolated from the urine and there is no alternate site of infection. In the absence of a clear alternate source of infection, fever or rigors with a positive urine culture result in the noncatheterized resident or acute confusion in the catheterized resident will often be treated as UTI.

However, evidence suggests that most of these episodes are likely not due to infection of a urinary source.

Urine specimens for culture should be processed as soon as possible, preferably within one to two hours after collection. If urine specimens cannot be processed within 30 minutes of collection, they should be refrigerated. Refrigerated specimens should be cultured within 24 hours.

Recent catheter trauma, catheter obstruction, or new onset haematuria are useful localizing signs that are consistent with UTI but are not necessary for diagnosis.

Urinary catheter specimens for culture should be collected following replacement of the catheter if the current catheter has been in place for more than 14 days

Appendix B

Table 1. Modified HICPAC Categorization Scheme for Recommendations	
Category IA	A strong recommendation supported by high to moderate quality† evidence suggesting net clinical benefits or harms
Category IB	A strong recommendation supported by low quality evidence suggesting net clinical benefits or harms or an acceptable practice (e.g., aseptic technique) supported by low to very low quality evidence.
Category IC	Strong recommendation required by state or federal regulation.
Category II	A weak recommendation supported by any quality evidence suggesting a trade off between clinical benefits and harms
No recommendation/ unresolved issue	Unresolved issue for which there is low to very low quality evidence with uncertain trade offs between benefits and harms

* Please refer to Methods (p.32) for implications of Category designations †Please refer to Methods (p. 29-30) for process used to grade quality of evidence

Grading of Evidence

First, the quality of each study was assessed using scales adapted from existing methodology checklists, and scores were recorded in the evidence tables. Appendix 3 includes the sets of questions we used to assess the quality of each of the major study designs. Next, the quality of the evidence base was assessed using methods adapted from the GRADE Working Group. Briefly, GRADE tables were developed for each of the interventions or questions addressed within the evidence tables. Included in the GRADE tables were the intervention of interest, any outcomes listed in the evidence tables that were judged to be clinically important, the quantity and type of evidence for each outcome, the relevant findings, and the GRADE of evidence for each outcome, as well as an overall GRADE of the evidence base for the given intervention or question. The initial

GRADE of evidence for each outcome was deemed high if the evidence base included a randomized controlled trial (RCT) or a systematic review of RCTs, low if the evidence base included only observational studies, or very low if the evidence base consisted only of uncontrolled studies. The initial GRADE could then be modified by eight criteria. Criteria which could decrease the GRADE of an evidence base included quality, consistency, directness, precision, and publication bias. Criteria that could increase the GRADE included a large magnitude of effect, a dose-response gradient, or inclusion of unmeasured confounders that would increase the magnitude of effect (Table 3). GRADE definitions are as follows:

1. High - further research is very unlikely to change confidence in the estimate of effect
2. Moderate - further research is likely to affect confidence in the estimate of effect and may change the estimate
3. Low - further research is very likely to affect confidence in the estimate of effect and is likely to change the estimate
4. Very low - any estimate of effect is very uncertain 29

After determining the GRADE of the evidence base for each outcome of a given intervention or question, we calculated the overall GRADE of the evidence base for that intervention or question. The overall GRADE was based on the lowest GRADE for the outcomes deemed critical to making a recommendation.

Table 3. Rating the Quality of Evidence Using the GRADE Approach

Table 3. Rating the Quality of Evidence Using the GRADE Approach

Type of Evidence	Initial Grade	Criteria to Decrease Grade	Criteria to Increase Grade	Overall Quality Grade
RCT	High	Quality Serious (-1 grade) or very serious (-2 grades) limitation to study quality	Strong association Strong (+1 grade) or very strong evidence of association (+2 grades)	High Moderate Low
Observational study	Low	Consistency Important inconsistency (-1 grade)	Dose-response Evidence of a dose-response gradient (+1 grade)	Very low
Any other evidence (e.g., expert opinion)	Very Low	Directness Some (-1 grade) or major (-2 grades) uncertainty about directness Precision Imprecise or sparse data (-1 grade) Publication bias High risk of bias (-1 grade)	Unmeasured Confounders Inclusion of unmeasured confounders increases the magnitude of the effect (+1 grade)	

Formulating Recommendations

Narrative evidence summaries were then drafted by the working group using the evidence and GRADE tables. One summary was written for each theme that emerged under each key question. The working group then used the narrative evidence summaries to develop guideline recommendations. Factors determining the strength of a recommendation included 1) the values and preferences used to determine which outcomes were "critical," 2) the harms and benefits that result from weighing the "critical" outcomes, and 3) the overall GRADE of the evidence base for the given intervention or question (Table 4). If weighing the "critical outcomes" for a given intervention or question resulted in a "net

benefit" or a "net harm," then a "Category I Recommendation" was formulated to strongly recommend for or against the given intervention respectively. If weighing the "critical outcomes" for a given intervention or question resulted in a "trade off" between benefits and harms, then a "Category II Recommendation" was formulated to recommend that providers or institutions consider the intervention when deemed appropriate. If weighing the "critical outcomes" for a given intervention or question resulted in 30 an "uncertain trade off" between benefits and harms, then a "No Recommendation" was formulated to reflect this uncertainty.

Table 4. Formulating Recommendations

HICPAC Recommendation	**Weighing Benefits and Harms for Critical Outcomes**	**Quality of Evidence**
STRONG (I)	Interventions with net benefits or net harms	IA – High to Moderate IB – Low or Very Low (Accepted Practice) IC – High to Very Low (Regulatory)
Weak (II)	Interventions with trade offs between benefits and harms	High to Very Low
No recommendation/ unresolved issue	Uncertain trade offs between benefits and harms	Low to Very Low

For Category I recommendations, levels A and B represent the quality of the evidence underlying the recommendation, with A representing high to moderate quality evidence and B representing low quality evidence or, in the case of an established standard (e.g., aseptic technique, education and training), very low quality to no evidence based on our literature review. For IB recommendations, although there may be low to very low quality or even no available evidence directly supporting the benefits of the intervention, the theoretical benefits are clear, and the theoretical risks are marginal. Level C represents

practices required by state or federal regulation, regardless of the quality of evidence. It is important to note that the strength of a Category IA recommendation is equivalent to that of a Category IB or IC recommendation; it is only the quality of the evidence underlying the IA recommendation that makes it different from a IB.

In some instances, multiple recommendations emerged from a single narrative evidence summary. The new HICPAC categorization scheme for recommendations is provided in Table 1.

Category I recommendations are defined as strong recommendations with the following implications:

1. For patients: Most people in the patient's situation would want the recommended course of action and only a small proportion would not; request discussion if the intervention is not offered.
2. For clinicians: Most patients should receive the recommended course of action.
3. For policymakers: The recommendation may be adopted as a policy.

Category II recommendations are defined as weak recommendations with the following implications:

1. For patients: Most people in the patient's situation would want the recommended course of action, but many would not.
2. For clinicians: Different choices will be appropriate for different patients, and clinicians must help each patient to arrive at a management decision consistent with her or his values and preferences.
3. For policymakers: Policy making will require substantial debate and involvement of many stakeholders.

It should be noted that Category II recommendations are discretionary for the individual institution and are not intended to be enforced.

The wording of each recommendation was carefully selected to reflect the recommendation's strength. In most cases, we used the active voice when writing Category I recommendations - the strong recommendations. Phrases like "do" or "do not" and verbs without auxiliaries or conditionals were used to convey certainty. We used a more passive voice when writing Category II recommendations - the weak recommendations. Words like "consider" and phrases like "is preferable," "is suggested," "is not suggested," or "is not recommended" were chosen to reflect the lesser certainty of the Category II recommendations. Rather than a simple statement of fact, each recommendation is actionable, describing precisely a proposed action to take.

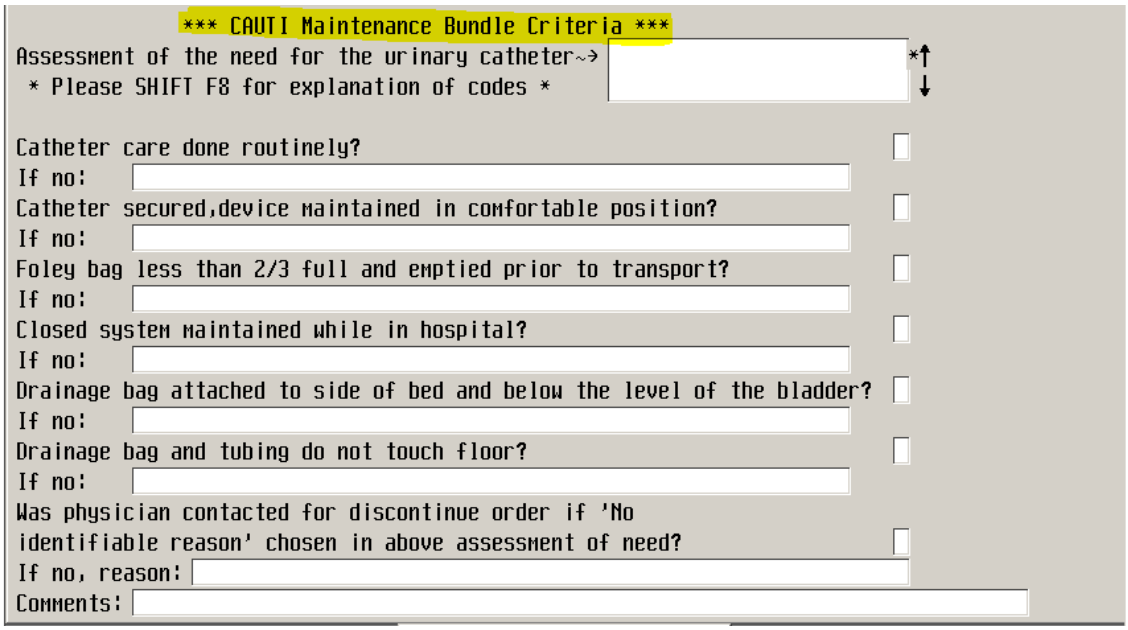
The category "No recommendation/unresolved issue" was most commonly applied to situations where either 1) the overall quality of the evidence base for a given intervention was low to very low and there was no consensus on the benefit of the intervention or 2) there was no published evidence on outcomes deemed critical to weighing the risks and benefits of a given intervention. If the latter was the case, those critical outcomes will be noted at the end of the relevant evidence summary.

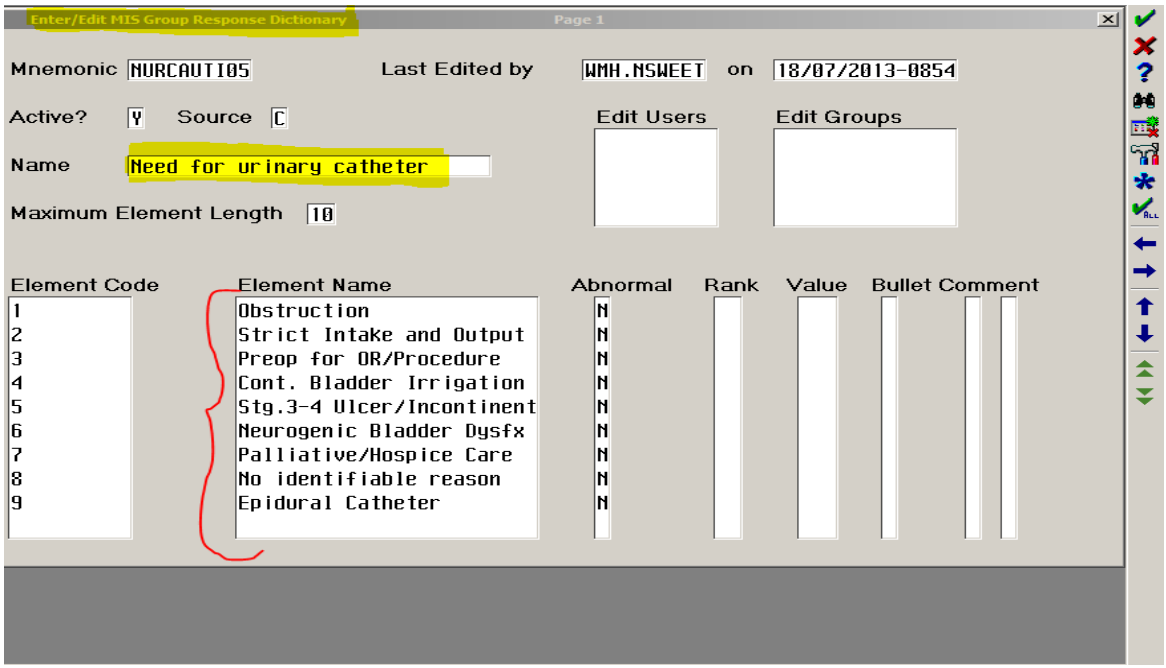
Our evidence-based recommendations were cross-checked with those from guidelines identified in our original systematic search. Recommendations from previous guidelines for topics not directly addressed by our systematic review of the evidence were included in our "Summary of Recommendations" if they were deemed critical to the target users of this guideline. Unlike recommendations informed by our literature search, these recommendations are not linked to a key question. These recommendations were agreed

upon by expert consensus and are designated either IB if they represent a strong recommendation based on accepted practices (e.g., aseptic technique) or II if they are a suggestion based on a probable net benefit despite limited evidence. All recommendations were approved by HICPAC. Recommendations focused only on efficacy, effectiveness, and safety. The optimal use of these guidelines should include a consideration of the costs relevant to the local setting of guideline users.

Appendix C

Screen shots of electronic documentation for urinary catheter at Western Health





Appendix D

Streamlined Evidence-Based RN Tool: Catheter Associated Urinary Tract Infection (CAUTI) Prevention

Nurse-Driven CAUTI Prevention: Saving Lives, Preventing Harm and Lowering Cost.

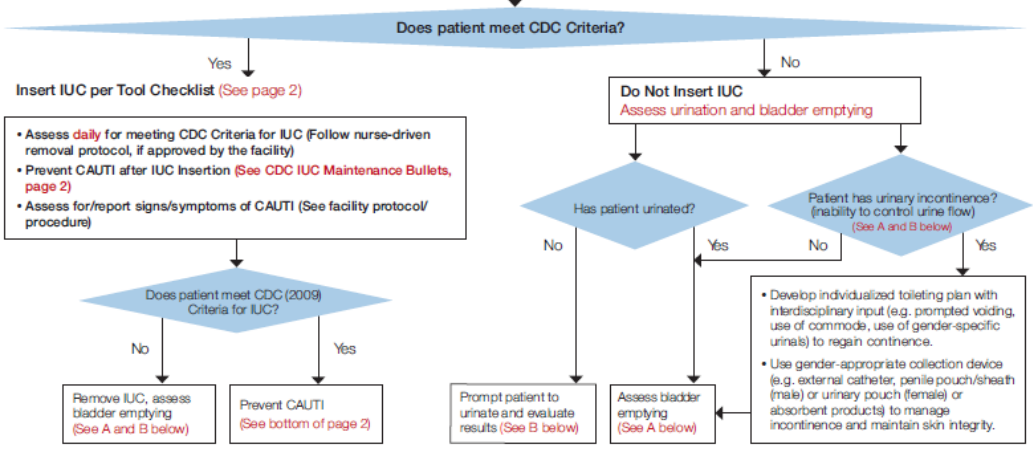
Key Practice Strategies to Reduce CAUTI: 1) Fewer Catheters Used, 2) Timely Removal and 3) Insertion, Maintenance and Post-Removal Care.

Informed by Guidelines for Prevention of Catheter-Associated Urinary Tract Infections (CDC, 2009).

BOX 1

CDC (2009) Criteria for Indwelling Urinary Catheter (IUC) Insertion:

Acute urinary retention (sudden and painful inability to urinate (SUNA, 2008)) or bladder outlet obstruction
To improve comfort for end-of-life care if needed
Critically ill and need for accurate measurements of I&O (e.g., hourly monitoring)
Selected surgical procedures (GU surgery/colorectal surgery)
To assist in healing open sacral or perineal wound in the incontinent patient
Need for intraoperative monitoring of urinary output during surgery or large volumes of fluid or diuretics anticipated
Prolonged immobilization (potentially unstable thoracic or lumbar spine, multiple traumatic injuries such as pelvic fractures)



Assess for Adequate Bladder Emptying

A. If Patient **HAS** urinated (voided) within 4-6 hours follow these guidelines:

- If minimum urinated volume ≤ 180 ml in 4-6 hours or urinary incontinence present, confirm bladder emptying.
  - Prompt patient to urinate/check for spontaneous urination within 2 hours if post-void residual (PVR) < 300-500 ml
    - Recheck PVR within 2 hours.*
  - Perform straight catheterization for PVR per scan ≥ 300-500 ml.
    - Repeat scan within 4-6 hours and determine need for straight catheterization.
    - Report to provider if retention persists ≥ 300-500ml.
    - Perform ongoing straight catheterization per facility protocol to prevent bladder overdistension and renal dysfunction (CDC, 2009), usually every 4-6 hours.
- If urinated >180 ml in 4-6 hours (adequate bladder emptying), use individual plan to promote/maintain normal urination pattern.

B. If Patient **HAS NOT** urinated within 4-6 hours and/or complains of bladder fullness, then determine presence of incomplete bladder emptying.*

- Prompt patient to urinate. If urination volume ≤ 180 ml, perform bladder scan.*

*Perform bladder scan (CDC, 2009) to determine PVR. If no scanner available, perform straight catheterization.

Indwelling Urinary Catheter (IUC) Insertion Checklist to Prevent CAUTI in the Adult Hospitalized Patient: Important Evidence-Based Steps.	Yes	Yes with Reminder	Comments
Before IUC insertion:			
1) **Determine if IUC is appropriate per the CDC Guidelines** (CDC, 2009) (See page 1, Box 1).			
2) **Select smallest appropriate IUC** (14 Fr., 5ml or 10 ml balloon is usually appropriate unless ordered otherwise).			
3) **Obtain assistance PRN** (e.g., 2-person insertion, mechanical aids) **to facilitate appropriate visualization/insertion technique.**			
4) **Perform hand hygiene.**			
Patient Preparation/Insertion of IUC:			
1) **Perform peri-care**, then, **re-perform hand hygiene.**			
2) **Maintain strict aseptic technique throughout the actual IUC insertion procedure, re-perform hand hygiene upon completion.** • Use sterile gloves and equipment and establish/maintain sterile field. • Do not pre-inflate the balloon to test it, as this is not recommended.			
3) **Insert IUC to appropriate length and check urine flow before balloon inflation to prevent urethral trauma.** • In males, insert fully to the IUC "y" connection, or in females, advance ~1 inch or 2.5 cm beyond point of urine flow.			
4) **Inflate IUC balloon correctly**: Inflate to 10 ml for catheters labeled 5 ml or 10 ml per manufacturer's instructions.			
After IUC insertion completion:			
1) Perform **Triple Action for IUC/Drainage System:** • **Secure IUC** to prevent urethral irritation. • **Position drainage bag below the bladder** (but not resting on the floor). • **Check system for closed connections and no obstructions/kinks.**			

Note: Refer to Expert Nurse for consults (e.g., urology, WOC, infection control, geriatrics, rehabilitation) and other team members per facility protocol to reduce iuc use and days and to manage complex care (e.g., incontinence, immobility).

BOX 2

Maintenance of IUC/Drainage System and Other Patient Care to Prevent CAUTI (CDC 2009)

- **Maintain appropriate catheter securement** per facility protocol/procedure and the drainage bag below the level of the bladder at all times (but not on the floor, even when emptying).
- **Empty the drainage bag regularly** using a separate, clean collecting container for each patient; avoid splashing, and prevent contact of the drainage spout.
- **Maintain unobstructed urine flow** by keeping the catheter and tube free from kinking.
- **Maintain a closed drainage system.**
- **If breaks in the closed system are noted** (e.g., disconnection, cracked tubing), replace the catheter and collecting system following above IUC insertion checklist.
- **Perform perineal hygiene** at a minimum, daily per facility protocol/procedure and PRN.
- **Use timely fecal containment device when appropriate for fecal incontinence.**
- **Teach nursing assistants and patient/family iuc maintenance.**

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Appendix E

Author	Design	Sample	Intervention	Results	Strengths and Limitations	Conclusions
Loeb et al. (2008)	Randomized Control Trial	N= 692 hospitalized patients admitted to Canadian Hospital with urinary catheters inserted for at least 24 hours.	Prewritten "stop orders" in the catheterized patient's charts for nurse to discontinue without written order based on pre-set criteria.	Fewer UC use in intervention group vs. control group: difference -1.69 [95%CI -1.23 to -2.15] $p<0.001$ and -1.34 days [95%CI, -0.64 to -2.05 days] $p<0.001$ respectively. CAUTI 19% of intervention group vs. 20.2% in control group. RR 0.94 (95%CI, 0.66 to 1.33) $p = 0.71$	**Strengths:** RCT Appropriate sample size. Similar characteristics of intervention and control groups. Appropriate statistics. **Limitations:** Not blinded (nurse educator knew who was in which group) No control for learned behavior of nurses for the intervention and control group. The nurse could have cared for both a patient	Decrease in UC use but not in CAUTI between two groups. The analysis of the data and research findings are presented logically with discussion addressing issues with urinary sampling methods and learned behaviour of staff for early catheter removal **Rate: Strong/Medium**

Author	Design	Sample	Intervention	Results	Strengths and Limitations	Conclusions
					with the intervention and one in the usual care group.	
Meddings et al. (2010)	Meta-Analysis	N= 14 articles: 1RCT; 1Nonramdomized cross-over trial; 3 pre/post intervention with control subjects multiple countries. 9 quasi-experimental	meta-analysis of stop orders or reminder systems for UC removal	7 studies CAUTI per 1000 CD: **reminder systems** CAUTI reduced by 56% (rate ratio, 0.44; 95%CI, 0.13-0.74; p= 0.005); **stop order** reduced CAUTI by 41% (rate ratio, 0.59; 95%CI, 0.45-.073; p<0.001); **both** reduced by 52% (rate ratio, 0.48; 95%CI, 0.28-.068; p<0.001	**Strengths:** Appropriate statistics. Extensive literature review. Direct evidence. **Limitations:** Only one RCT.	Meta-analysis show decrease in CAUTI with either stop order or reminder. **Rate: Strong/high**
Meddings et al. (2014)	Integrative review and Meta-	N= 30 studies for review; 11 used tor meta-	Reviewed and synthetized data from	Stop orders or reminders reduced CAUTI by	**Strengths:** Appropriate statistics. Extensive literature	Updated review re-confirms that stop orders

Author	Design	Sample	Intervention	Results	Strengths and Limitations	Conclusions
	analysis	analysis	studies which included CAUTI as an outcome measure. Pooled data related to reminder systems and/or automated stop orders/nurse lead removal.	53% (rate ratio 0.47; 95%CI, 0.30 to 0.64, p<0.001).	review. Direct evidence. Further supported previous meta-analysis **Limitations:** Only one RCT.	and/or reminders are effective with CAUTI reduction. **Rate: Strong/High**
Olson-Sitki et al. (2015)	Quantitative	Convenience Sample N=91 of potential 750 RNs responded to survey Illinoi, USA	Evaluate nurses perceptions of the nurse lead removal protocol related to job satisfaction; empowerment; and job ease.	53% of respondents used the protocol. Job ease higher in those who used the protocol vs. those who did not (71% vs. 29%; x^2=13.33, *df* = 1, p<0.001). No statistical significant effect on job satisfactio	**Strengths:** Appropriate statistics. **Limitations:** Small sample size. Not randomized. Bias in nurse respondents by age.	Nurse led protocol increases job ease but does not affect empowerment or job satisfaction. **Rate: Low**

Author	Design	Sample	Intervention	Results	Strengths and Limitations	Conclusions
				n (x^2 = 1.94, *df* = 2, *ns*) or empowerment (x^2 = 0.19, *df* = 1, *ns*)		
Fakih et al. (2013)	Descriptive	5 years catheter prevalence in Michigan N= 22,633 catheter days; N= 158,77 patient days Health care workers perceptions for responsibility- N=257 or 402 staff (64%)	Evaluation of three interventions: nurse removal protocol; appropriate placement; staff views of responsibility	Linear regression used. UC use decreased from 17.3% to 12.7% over 5 years. R^2 0.61 (P<.001) 97.8% of bedside nurses felt responsible for assessment and removal of catheters	**Strengths:** Large sample size. Appropriate statistics. **Limitations:** Single facility- limits generalizability. No control group. No chart audit of compliance.	Evaluation of this project shows sustained reduction of UC use. Staff has ownership of responsibility for UC use. **Rate: High**
Fakih et al. (2012)	Uncontrolled before and after (UCBA)	Michigan state wide intervention. N=163 patient units in 71 hospitals 194,162 patient-days.	Education of nursing and leadership on appropriate indications for UC use and promoting daily	UC use decreased from 18.1 (95%CI, 16.8 to 19.6) to 13.8 (95%CI, 12.9-14.8) *p*<.001; Appropriate	**Strengths:** Large sample size; multiple hospitals throughout the state. Supports evidence from previous	Education and leadership support improve UC use which is sustainable over time. **Rate: Weak/High**

Author	Design	Sample	Intervention	Results	Strengths and Limitations	Conclusions
			assessment of UC use during daily rounds	indication increased from 44.3% (95%CI, 40.3-48.4) to 57.6% (95%CI, 51.7-63.4) p = .005)	pilot trial. **Limitations:** Not all facilities participated with the same level of commitment. This reduces external validity.	
Leblebicioglu et al. (2013)	UCBA	N= 4,231 adult patients in 13 ICUs in 10 hospitals in Turkey	CAUTI measured before and after intervention. Intervention was education on CDC (2009) bundle approach to CAUTI reduction including hand hygiene initiative.	Decrease in CAUTI from pre-intervention to post-intervention by 47% (CAUTI pre=10.63 per 1000 UC days to 5.65 per 1000 UC days (rr, 0.53;95% CI: 0.4-0.7; p = .0001).	**Strengths:** Large sample size, multiple facilities. Standardized data collection, education, and implementation. Part of a larger study. Similar results of other studies in developing countries. Similar patient characteris	A multidimensional approach is effective with sustained reduction of CAUTI in ICUs. **Rate: Weak/High**

Author	Design	Sample	Intervention	Results	Strengths and Limitations	Conclusions
					tics pre and post intervention. **Limitations:** Cannot be generalized outside of ICU No control group.	
Marra et al. (2011)	UCBA; two phases	Sao Paulo, Brazil. 138 bed med-surg ICU; two 20 bed SDU	Phase 1(June 2005-Dec. 2007): UC insertion technique, CDC maintenance, CAUTI outcome measure; Phase 2 (Jan 2008-July 2010): implemented CDC (2009) bundle, hand hygiene education	CAUTI rates ICU phase 1= 7.6 per 1000 UC days (95%CI, 6.6-8.6) phase 2= 5.0 per 1000 UC days (95%CI, 4.2-5.8) p<0.001 ; SDU phase 1 = 15.3 per 1000 UC days (95%CI, 13.9-16.6), phase 2=12.9 per 1000 UC days (95%CI,	**Strengths:** Large sample size. Consistent approach Appropriate statistics **Limitations:** No control group. One facility. Only audit data, no continuous data collection on outcomes or processes.	Introducing the CAUTI bundle had a positive effect on outcomes that were not previously met in phase 1 of the project. **Rate: Weak/Medium**

Author	Design	Sample	Intervention	Results	Strengths and Limitations	Conclusions
				11.6-14.2)*p* = 0.014		
Schneider, M. (2012)	UCBA	55 bed unit in an acute care hospital in York, PA Time frame= 10 weeks N=70 nurses of possible 80	Educational intervention of the CDC CAUTI bundle. Measured nurses' knowledge with pre/post-test during the education sessions. Measured CAUTI pre and post intervention	Used matched *t* tests. Mean scores improved from 3.35 to 6.72 *p*<0.001 CAUTI rates were too low in both pre and post reviews to show statistical significance	**Strengths:** Most staff received the education (70 of 80). 96% completed pre and post-test. Statistical significance for learning was noted. **Limitations:** Small sample size. Short time frame for evaluation of outcome of reduced CAUTI. Not generalizable outside of this unit.	Improved nursing knowledge and adherence to best practices post education. **Rate: Weak/Medium**
Mori, C. (2014)	UCBA	150 bed community hospital northern United	Developed nurse driven protocol for urinary	CAUTI rates pre: 0.77%; post: 0.35%	**Strengths:** Compliance audit of processes implement	Findings support nurse led removal. No

Author	Design	Sample	Intervention	Results	Strengths and Limitations	Conclusions
		States. Pre-intervention N= 389 patients with UCs in 3 months before intervention ; post intervention N=282 patients with UCs in the 3 months after intervention	catheter removal. Education on CAUTI bundle and best practices		ed. Simplified algorithm to aid nurses with decision making. Used a conceptual framework **Limitations:** Incorrect calculation of CAUTI. Denominator should have been catheter days as they had this data.	statistical analysis used. **Rate: Weak/Low**
Leduc, A (2014)	UCBA	182 bed Long term care facility on Vancouver Island, BC, Canada Number of persons educated not available.	Education sessions lasting 20-30 minutes related to UTI presentation in elderly persons, self-learning module and clinical pathway provided	Outcome measures were pre/post intervention on numbers of UTIs treated with antibiotics-198 pre and 127 post education. (36% reduction)	**Strengths:** Comprehensive clinical pathway. Reduction of UTIs Ongoing review and re-education. Has been implemented with other institutions **Limitatio**	Education of staff related to best practices of UTI management in LTC facilities with clinical pathways shows a reduction in raw data, no statistical

Author	Design	Sample	Intervention	Results	Strengths and Limitations	Conclusions
				Also reviewed number of UTIs treated based only on positive dipstick- pre-intervention 62% post intervention 38%.	**Limitations:** Unknown if improved recognition of ASB or treatment.	analysis completed. **Rate: Weak/Low**
Roser et al., (2014)	Interrupted time series	5 CCUs in Kentucky, USA 6 interventions introduced between 2011-2013	Data sharing of CAUTI; nurse led removal protocol; problem analysis; daily surveillance rounds; silver alloy urinary catheters; and anti-microbial cleansing	Catheter days decreased with the nurse led removal protocol 58% from 9,643 in 2010 to 4,017 in 2013 CAUTI decreased by 60% in 2013 from baseline	**Strengths:** Overall decrease of CAUTI **Limitations:** Multiple interventions used and unable to evaluate individually which worked best. Limited to CCU and not generalizable.	No statistical application; multiple interventions introduced over 2 years without evaluation. **Rate: Weak/Low**
Gokula et al. (2012)	Descriptive	319 bed acute care facility in Midwest, USA	Retrospective chart reviews for baseline data; Education;	Baseline CAUTI rates were 2.21/1000 PD decreased to	**Strengths:** Appropriate statistics. Evaluated each intervention	Positive improvement with staff knowledge and CAUTI reduced

Author	Design	Sample	Intervention	Results	Strengths and Limitations	Conclusions
			protocol implementation; evaluated protocol and revised it; information sharing	0.435/1000 PD; Education evaluated with pre-test/post-test design using descriptive statistics-final improvement 70.49 to 77.24 (t =-3.72; p =0.001)	individually. Process audits used **Limitations:** Not generalizable outside of the organization.	with significance. **Rate: High**
Rosenthal et al. (2011)	UCBA	57 adult ICUs in 15 countries from 1999-2011 N= 56,429 patients N= 360,667 PD N=253,122 UC-days	CAUTI measured before and after intervention. Intervention was education on CDC (2009) bundle approach to CAUTI reduction including hand hygiene initiative.	CAUTI decreased from 7.86 to 4.95 per 1000 UC days (RR 0.63;95% CI, 0.55-.072; p =0.0001)	**Strengths:** Large sample size, multiple facilities. Standardized data collection, education, and implementation. Part of a larger study. Similar results of other studies in developing countries. **Limitations:**	A multidimensional approach is effective with sustained reduction of CAUTI in ICUs. **Rate: Weak/High**

Author	Design	Sample	Intervention	Results	Strengths and Limitations	Conclusions
					Cannot be generalized outside of ICU No control group.	
Parry et al., (2013)	UCBA	300 bed teaching hospital in Connecticut, USA 36 months from January 2009-December 2011 N= 30,747 Catheter days N=181,785 patient days	Nurse led removal protocol; bundle charting	Linear regression-CAUTI decreased 50.2% from 0.223 to 0.112 catheters/patient day	**Strengths:** Large sample. Appropriate statistics. Measured catheter use and CAUTIs **Limitations:** Catheter day's validity dependent on nurse's correct documentation.	Writers attribute nurse led protocol as main influence on CAUTI reduction. Unsure of statistical data for CAUTI as it is only written catheters/patient day; no description of baseline number per patient day(ie, 1000, or 10,000) **Rate: Weak/Low**
Oman et al., (2012)	UCBA	University of Colorado Hospital, Aurora, Colorado Two medical/sur	Policy change; education on bundle and catheter insertion;	Streamlined products including silver alloy catheters, catheter securemen	**Strengths:** Wide range of care providers educated on bundle	**Rate: Weak/Moderate**

Author	Design	Sample	Intervention	Results	Strengths and Limitations	Conclusions
		gical inpatient units N=18 beds each	product evaluation	t devices, and metered drainage bags. Catheter days decreased from 3.01 to 2.2 (p=0.018) on surgical unit; and 3.53 to 2.7 (p=0.76) on the Medical unit. CAUTI rates too small for statistical significance	maintenance. Baseline data obtained. High uptake of training and education for insertion and maintenance of catheters. **Limitations:** Multiple strategies used- unable to determine which were effective individually.	

Appendix B

Memorial University of Newfoundland

School of Nursing

Master of Nursing Program

PRACTICUM: PLAN FOR CONSULTATION WITH COLLEAGUES

Student's Name: Paula Stagg Student ID #: 008865099

Course Names and Numbers: Nursing 6660 MN Practicum I

Supervisor: Dr. Fadi Khraim

Title: CAUTI Prevention Bundles: Improving Best Practices within Western Health for continued success

Date: December 2, 2015

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1. Brief overview of the project

The Canadian Institute for Health Information reported urinary tract infections (UTIs) as an adverse nursing outcome for patients. Patients in acute care settings who have had indwelling urethral catheters are at higher risk of acquiring a UTI. It was estimated that UTIs account for 40% of all health care associated infections (HAIs) (Gokula et al., 2012; Willson et al., 2009). Of these, 80% were related to indwelling urinary catheters (catheter associated urinary tract infections -CAUTI) (Loeb et al., 2008). Meddings, Rogers, Macy and Saint (2010) stated "the greatest risk factor for CAUTI is prolonged catheterization" (p. 550).Other complications related to prolonged indwelling

urinary catheters included decreased mobility, damage to the meatus and/or urethra, increase use of antibiotics, increased length of stay, and pain (Salamon, 2009).

Implementation of the bundle approach with reminder systems for early removal had shown a reduction of catheter days and CAUTIs. In 2013, infection prevention and control commenced a multimodal approach related to improvement of CAUTIs. These strategies had been infection prevention and control driven. Infection prevention and control had: 1) completed a pilot paper based project using the Center for Disease Prevention and Control (CDC) 2009 CAUTI guideline on 3B Medicine at Western Memorial Hospital and the medical unit at Sir Thomas Roddick Hospital; 2) educated front line nursing staff on the CAUTI bundle and electronic documentation; 3) implemented the CAUTI bundle in clinical online documentation including a reminder system for physician notification of unnecessary urinary catheters; 4) educated nurses on CAUTI bundle and documentation; and 5) created a CAUTI education pamphlet.

These efforts had shown improvement in CAUTIs within the organization. However, routine infection prevention and control surveillance of CAUTIs had uncovered an issue with the reminder system for removal of unnecessary catheters. In July of 2015, I reviewed 10 charts to determine if the patient met the National Healthcare Safety Network definition for CAUTI. Six of the 10 charts had “no identifiable reason” selected for urinary catheter use and two had selected “neurogenic bladder” in patients who clearly did not have conditions to support “neurogenic bladder”. In addition to the bundle, the literature supported utilization of a champion and nurse led protocols for early catheter removal. Nurse led removal protocols required role expansion. Expanding roles of professions had both barriers and facilitators to change, however a multimodal approach

which includes specific education and continuing competency had been successfully implemented in many facilities across the United States. A champion is usually someone who is respected within the unit and has the ability to foster behaviour change. Urology technicians at Western Health are licensed practical nurses who had completed additional education and certification related to urology and are proficient with insertion, maintenance, assessment, and removal of multiple types of indwelling urinary catheters. The urology technicians were eager to take part in implementing the bundle, are respected members of the health care team and are an appropriate choice to utilize as catheter bundle champions and trial of a nurse led removal protocol in Western Health. They have been routinely consulted for catheter insertion, catheter changes for specialty catheters such a coudé tip, and catheter irrigations of post-operative urologic patients (personal communication, Darlene Mahar, September 14, 2015). The additional knowledge and experience with best practice recommendations of urology issues placed the urology technicians in an optimal position to assess urinary catheter need based on the CDC criteria and individual patient assessments.

Research had shown utilization of nursing staff with policy support related to nursing protocol of urinary catheter removal had produced sustained improvements with urinary catheter best practices (Oman et al., 2012). Casual conversations with nurses who work on the urology ward were supportive of the urology technicians expanding their scope of practice and these nurses saw it as a multidisciplinary approach to a specialized area of care. Some nurses stated they felt this could be included as an education program for nurses and they too should be part of the removal protocol. Focus groups or formal interviews with nurses were needed to ensure nursing was aware of the project scope.

Consultations with acute care directors, the vice president of medical services (physicians), and two urologists had been supportive of this practicum. A presentation of this project on Monday, September 28, 2015 to physicians who are members of the LMAC recommended providing a briefing note, two research articles, and a survey to the physicians for input for a urology technician protocol for urinary catheter removal. They also recommended limiting implementation of the practicum area to the two medical units of 3A and 3B.

2. Specific objective(s) for the consultation

1. To identify awareness of current CAUTI bundle implementation plan.
2. To determine local criteria for urinary catheter insertion and ensure adherence to evidence based best practice recommendations obtained from the literature.
3. To determine support for a urology technologist catheter removal protocol.
4. To identify educational needs for front line clinicians related to urinary catheter insertion, continued assessment of need (registered nurses, licensed practical nurses, physicians, urology technologists, educators, managers) and maintenance (registered nurses, licensed practical nurses, physicians, urology technologists, personal care attendants, allied health professionals).
5. Obtain feedback for policy changes.
6. To seek feedback related to the creation of an electronic report for urinary catheter use and urinary catheter days.

3. Setting and Sample

The front line clinicians included registered nurses, licensed practical nurses, nurse managers, nurse educator, allied health professionals, and physicians who primarily worked on the two medical units (3AB) at Western Memorial Regional Hospital were the focus for the consultations. An invitation was extended to other units in Western Memorial Hospital. Information technology specialists were consulted to create an electronic report of urinary catheter days and urinary catheter use.

The medical units were chosen as the setting for the practicum project for urology technician urinary catheter removal protocol as the facility specific data from infection prevention and control showed a greater number of CAUTIs found in those medical units. Western Health had commenced utilization of standard patient order sets based on diagnosis and area for admission. The medical patient order sets recommend using catheters only when necessary and required review after 72 hours. They did not have automatic removal timelines of urinary catheters, however, the surgical ones did. For surgeries which did not have order sets at this time, automatic removal of urinary catheters is a practice which was established with the surgical patients. For example, physicians ordered “remove urinary catheter 2 days post op”.

The evidence recommended a multimodal approach to reducing urinary catheters as well as appropriate maintenance of the catheters (Meddings et al., 2014). Within the acute care medical units, multiple professionals collaborate to ensure a holistic approach to patient care. Registered nurses, licensed practical nurses, physicians, and allied health professionals including physiotherapists, occupational therapists, and respiratory therapists, work together bringing their expertise to the area. Registered nurses, licensed practical nurses, physiotherapists, and occupational therapists mobilize patients and aid in

their activities of daily living. This group of people must understand the maintenance pieces of the bundle approach and importance for early catheter removal. For example, when mobilizing a patient, the drainage bag and tubing should remain below the level of the waist. I have often witnessed professionals holding the bag or placing it on the top of a walker while assessing or aiding the patient with mobility impairments. Giving everyone the same information and opportunities for input has broaden the scope of knowledge of the professionals while it enhanced collaboration with reduction of urinary catheter use.

Employees who work on the targeted units were invited to attend one of two lunches and learns (focus groups) sponsored by infection prevention and control. This was arranged in consultation with the two nurse managers for medicine and the nurse educator and identified dates and times that would accommodate staff. The invitation was extended to all nursing staff on the two units. Consultation with the educator and nurse managers was used to identify allied health care professionals who work in the area. Those who were identified were invited to attend the lunch and learn.

Physicians were sent an information package with a survey as recommended by LMAC. As well, I was invited to present to the hospitalists at their next meeting. A copy of the power point presentation and package for physicians is available in appendix A.

Meetings with information technologists occurred in September. Identification of specific needs for catheter days were discussed and we have reviewed the COD documentation areas where the data will be mined. It is not known at this time if this report will be available for the project.

4. Data Collection

A list of physicians who work within Western Memorial Hospital was obtained from Western Health's medical services department. As requested by LMAC, a briefing note, literature, and survey were included in a package for them to complete. A letter that explained the proposed project and survey was included. This package was delivered to their internal mailboxes on November 16, 2015 at the hospital with a self-addressed return envelope for completed surveys (appendix A). This survey asked questions related to 1) staff knowledge of the current bundle approach implemented in 2013; 2) local indicators for urinary catheter use; 3) support for catheter removal if identified indicators not met; 4) nurse/urinary technician urinary catheter removal protocol and parameters for catheter re-insertion 5) bladder scanning; and 6) parameters for in and out catheter or urinary catheter re-insertion.

The lunch and learn provided information to staff about the project and reinforced the need for proper maintenance and early catheter removal. A separate survey was distributed at the end of the presentation with a self-addressed envelope for completed surveys (same survey as appendix A for physicians, except a different return deadline because of timing for the lunch and learns). The power point presentation for staff (available in appendix B) was different than the original power point shown to physicians. The original power point was shown to physicians in September and significant changes to the practicum had occurred.

Surveillance data for CAUTI and UTI continued throughout the project within the

usual practices established by the infection prevention and control team. This included daily review of positive urine cultures with review of those charts for evidence of a CAUTI or UTI. The National Healthcare Safety Network definition of a CAUTI and UTI continued to be utilized throughout the project (appendix C). The catheter line day report was not available and has not been validated for accuracy. Infection rates for CAUTI were not presented per 1000 line days, but were presented in raw numbers and per 1,000 patient days for the first part of this practicum. UTI data was presented in raw numbers as well as per 1000 patient care days.

5. Data Management and Analysis

Data collected during infection prevention and control surveillance was entered into the infection prevention and control excel data base which was secured on the infection prevention and control internal "J" drive and was only accessible to infection prevention and control staff. The rate of CAUTIs (regional) was determined per 1,000 patient care days. UTI data was presented in raw numbers (per facility) as well as per 1000 patient care days (regional).

Descriptive statistics was used to analyze the data. The analysis was used to create a list of indicators for urinary catheter use and to gather information to prioritize future education for front line staff. Open ended questions were analyzed through content analysis.

6. Ethical Considerations

In May of 2015 I was approached by Darlene Mahar to utilize the urology technicians to further support the CAUTI bundle and to increase their scope of practice to include autonomy for urinary catheter removal. I received permission from Barbra Ann Dunphy, Director Patient services, and Dr. Mamood, Urologist, and Brian Moores, Director of Health Protection (Infection Prevention and Control is under this umbrella) to achieve the requirements for my masters of nursing practicum project.

The Health Research Ethics Authority Screening Tool was completed for this project and indicated that ethics board review should not be needed (Appendix D). The overall goal of this project was to expand the role of the urology technicians and improve upon the CAUTI bundle previously implemented. If successful, this will be expanded to nursing.

Participation in the survey was voluntary. This was stated at the beginning of the lunch and learns and was written in the letter to physicians. A list of attendance was not be maintained nor were names included on the completed questionnaires. Data was secured on the IPAC specialist "J" drive which is secured access with two passwords. No one else had access to this account. The paper copies of the completed surveys were be kept in a locked filing cabinet in my office.

7. Consultation Results

A total of 118 surveys were distributed to physicians (N=90) and multidisciplinary staff (N=28). 19% of surveys were returned (physicians= 6%; multidisciplinary staff = 57%). The results of the survey were supportive of implementing a urology technologist catheter removal protocol and to pilot this project on the medical units of 3A and 3B with

100% of returned surveys indicating yes to both questions.

The questions surrounding appropriate indications for use were in line with current best practices. When analyzing the data, answers for strongly disagree and disagree were combined, as well as agree and strongly agree were combined. Do not know or no opinion was analyzed separately. Results of the survey for appropriate indication are shown in table 1.

Table 1

Appropriate Indicators for Urinary Catheter Survey Results as a Percentage

	Disagree	**Agree**	**No Opinion Don't know**
a. Acute urinary retention (sudden and painful inability to urinate)	5	90	5
b. Bladder outlet obstruction	0	86	14
c. Critically Ill for accurate measurement of I&O (eg. Hourly urinary output)	5	95	0
d. End of life care	32	63	5
e. Stage 3 or 4 Sacral or perianal ulcer in the incontinent patient	19	81	0
f. Prolonged immobilization (eg. Unstable thoracic lumbar spine; pelvic fracture)	18	77	5
g. Epidural Catheter	24	66	10
h. Acute neurogenic bladder	13	77	10
i. Patient request	95	0	5
j. Urinary Incontinence	90	10	0

	Disagree	Agree	No Opinion Don't know
k. Intubated and ventilated	27	68	5
l. Colorectal surgery	18	50	32
m. Urologic Surgeries	14	50	36

During the lunch and learns, five additional questions were asked of the groups. The questions were 1) how do you feel we can improve upon the current CAUTI bundle at Western Health; 2) Do you agree with trained staff having autonomy with removal of urinary catheters which are assessed as unnecessary without a physicians' order; 3) how do you feel with re-insertion without a physician's order based on your assessment of patient trial to void; 4) would you be comfortable if parameters were based on assessment and bladder scan results; and 5) what parameters do you feel need to be included in the project for catheter removal? Two themes emerged from the discussions. The first theme was related to communication between multidisciplinary teams. Nurses who were present felt better utilization of the patient information (PI) screen on the current electronic record was needed by all disciplines. Communication from physiotherapists related to mobility and assistance required for mobilization could be noted on the PI screen. This would aid nurses' knowledge of what was assessed and which method of elimination best suited the patient post removal of the catheter. For example, a person who is a two person assist may require a commode, whereas a person who has been assessed as independent or stand by assistance could go to the patient washroom. Some nurses suggested that the physicians write the original indication for urinary catheter on the physician's order sheet

when writing the order for the catheter, as many patients come to the unit from emergency with a catheter in place. Nurses noted they do not always know why it was done or if the patient came in from the community with the device in place. As well, nurses suggested the current electronic record for the catheter have a built in flag which pops up after the catheter has been in place for greater than 72 hours. This automated reminder works with other best practices currently in place to serve as a reminder to nurses this item requires an action.

The second theme revolved around educational needs. The first group of the four focus groups had a broader multidisciplinary attendance. The physiotherapists and occupational therapists indicated they did not feel they required the level of knowledge which nurses or urology technicians required to do their job while still maintaining urinary catheter maintenance best practices. They felt it was important for them to complete additional education related to the maintenance of urinary catheters, however, the assessment of need would be best decided by nursing as nurses often know reasons for the catheter which they may not be privy to. Nurses indicated their knowledge was deficient related to bladder scanners. Discussion around lack of education on the proper use and maintenance of the device was prevalent in all four focus groups. Nurses stated the devices “just showed up” on the units and they were left to figure out how to use them. One nurse stated she used the scanner to determine if a patient required a urinary catheter. The scanner indicated there was a residual of 800 cc of urine left after voiding. When the nurse completed the in and out catheter, there was only 200 cc of urine. This story prompted discussion about ascites and bladder scanning results. It was determined by the discussion if a patient has ascites, then utilization of the scanner would not give

accurate results. For these reasons, the attendees did not support having a protocol with bladder scanner results as the main indicator for catheter re-insertion. They indicated they would like to have proper training on the devices and have education related to assessment and alternate methods to aid with voiding other than urinary catheter if the patient fails to void and are uncomfortable.

The attendees were interested in a refresher or competency testing in urinary catheter insertion. They felt it was important to have ongoing education for best practices and would like to have an eLearning with a clinical component to ensure they were knowledgeable prior to making clinical decisions such as catheter removal and or re-insertion. They felt the eLearning were better if they were shorter in duration and different disciplines could be assigned only the sections that apply to their role.

8. Discussion

The results of the surveys were consistent with best practice guidelines for urinary catheter indication. It was notable that 32-36% staff had no opinion/did not know if urinary catheters should be included in urologic surgeries or colorectal surgeries. This may be related to the bias of the group being comprised of a large portion of registered nurses who have worked medicine for the majority of their career. Nurses on the 3A 3B medical units do not encounter fresh post-operative patients and would not know the latest recommendations for urinary catheters in this population.

Understanding the responsibility of different disciplines and their role in maintenance of urinary catheters will help direct the education process. The need for other disciplines to effectively communicate to nursing patient status and reasons for

urinary catheter are important for this behavior change to occur and be sustainable.

The development of a clinical pathway which aids nurses and urology technicians with decision making for urinary catheter removal will be an important tool to support new knowledge obtained from the education. A comprehensive education program will support staff with best practices and will be imperative to implementing a program which increases scope of practice and professional autonomy.

9. Conclusion

Based on the best practice recommendation and the survey results, the indication for urinary catheters currently used at Western Health will remain the same. The addition of eLearning divided into five modules will aid nurses and the multidisciplinary team members understand the processes and rationales for best practices related to indwelling urinary catheters. The creation of a clinical pathway and posters with the pathway placed in the nursing unit will aid nurses and other disciplines with the behavior changes required to achieve best practices. Improving communication and the current documentation system to include electronic reminders will also aid with this practicum project.

10. Reference

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infections. *American Journal of Infection Control,40*(6), 548-553. Doi:10.1016/j.ajic.2011.07.018; 10.1016/j.ajic.2011.07.018

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doi:10.1097/01.WON.0000347655.56851.04;

10.1097/01.WON.0000347655.56851.04

Appendix A

November 14, 2015

Dear Physicians:

I am Paula Stagg, RNBN, regional infection prevention and control (IPAC) specialist with Western Health. I am currently completing my practicum project to fulfill the requirements of Memorial University Masters of Nursing Degree. I have chosen to create a program with strategies to further improve Western Health's urinary catheter infection prevention bundle.

Enclosed is a copy of a briefing note, two evidence based articles (one of which is a meta-analysis), a short questionnaire, and addressed return envelope. Completing this survey is voluntary, however, you input is very valuable for the direction of the project and any proposed changes to current processes related to urinary catheter use, insertion, and removal.

I will require the surveys to be completed by November 23, 2015. Please return completed surveys to infection prevention and control in the self-addressed envelope via the internal mail system.

If you have any questions, please do not hesitate to contact me at 709-637-5434.

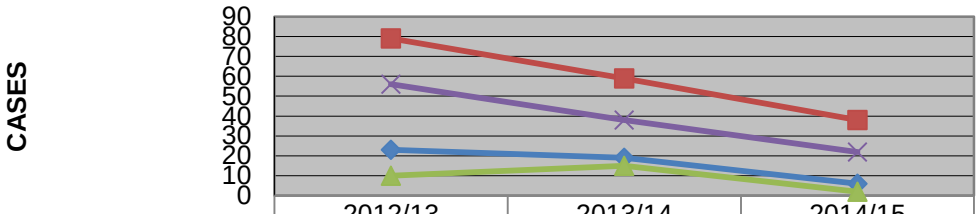
Regards,

Paula Stagg, RNBN

Regional Infection Prevention and Control Specialist

Proposal for Improvements to CAUTI bundle at Western Memorial Hospital

S	**Each year in Canada, health care associated infections (HAIs) are responsible for 8,000 deaths and another estimated 220,000 HAIs (Safer Healthcare Now, 2012). Patients in acute care settings who have indwelling urethral catheters are at higher risk of acquiring a urinary tract infection (UTI). UTIs in acute care settings account for 30 to 40% of all health care associated infections (HAIs). Of these, 80% are catheter associated UTIs (CAUTIs). Other complications related to prolonged indwelling urinary catheters include decreased mobility, damage to the meatus and/or urethra, increase use of antibiotics, increased length of stay, and pain. The Centers for Disease Control (CDC) has created a best practice bundle approach to assist with the elimination of CAUTIs.**
B	**In 2013, infection prevention and control (IPAC) commenced a multimodal approach to improvement of CAUTIs. These strategies have been IPAC driven. To date we have:** **1. Completed a pilot paper based project using the CDC 2009 CAUTI guideline on 3B at WMH and Medicine at STR** **2. Educated front line nursing staff on the bundle and electronic documentation.** **3. Implemented the CAUTI bundle in Clinical Online Documentation including a reminder system for physician notification of unnecessary urinary catheters.** **4. Created a CAUTI education pamphlet (enclosed)**

A	**Recent integrative review and meta-analysis indicate, in addition to the bundle approach, automated stop orders, nurse lead removal, and champions, alone or in combination, have proven success for early removal with substantive reductions in CAUTI (Meddings et al., 2010; Meddings et al., 2014).** **UTI and CAUTI** **WMH and STR Fiscal Year 2012-2015** **comparisons**  |	2012/13	2013/14	2014/15
---	---	---	---
UTI - STRH	23	19	6
UTI - WMRH	79	59	38
CAUTI - STRH	10	15	2
CAUTI - WMRH	56	38	22	 **Implementation of the bundle with reminders has been successful in Western Health with a 50% reduction in CAUTI from 2012 to 2015.** **However, there is room for improvement.**
R	**Proposed CAUTI Improvement Strategies** 1. **Consult with physicians, registered nurses, urology technicians, unit managers, and licensed practical nurses to develop criteria for appropriate use of urinary catheters.** 2. **Expand the role of urology technicians in acute care to become**

	champions of urinary catheter use and care based on the CDC 2009 CAUTI care bundle approach. **3. Develop a urology technician protocol for removal of urinary catheters.** **4. Develop an educational e-learning for front line staff on urinary catheter maintenance, insertion and appropriate indication.** **5. Discuss policy implications related to role expansion of nurses.**

Staff Survey for CAUTI bundle improvements in Acute Care settings

Patients in acute care settings who have indwelling urethral catheters are at higher risk of acquiring a urinary tract infection (UTI). UTIs in acute care settings account for 30 to 40% of all health care associated infections (HAIs). Of these, 80% are catheter associated UTIs (CAUTIs). Other complications related to prolonged indwelling urinary catheters include decreased mobility, damage to the meatus and/or urethra, increase use of antibiotics, increased length of stay, and pain.

1. **Which of the following best describes your profession:**

a. Physician	Yes	No
b. Registered Nurse (RN)	Yes	No
c. Licensed Practical Nurse (LPN)	Yes	No
d. Urology Technician/LPN	Yes	No
e. Allied Health Professional (OT/PT/RT)	Yes	No
f. Manager/Director	Yes	No
g. Other:		

2. Were you aware infection prevention and control (IPAC) implemented a CAUTI bundle approach to reducing urinary tract infections throughout Western Health in 2013?

Yes No

3. The CDC bundle approach lists specific indicators for urinary catheter use. Which of the following indicators do you feel are important to include as criteria for urinary <u>catheter insertion</u>?

1=Strongly Disagree
2=Disagree
3=Agree
4=Strongly Agree
5=No Opinion/Don't Know

	Strongly Disagree	**Disagree**	**Agree**	**Strongly Agree**	**No Opinion Don't know**
n. Acute urinary retention (sudden and painful inability to urinate)	1	2		4	5
o. Bladder outlet obstruction	1	2		4	5
p. Critically Ill for accurate measurement of I&O (eg. Hourly urinary output)	1	2		4	5
q. End of life care	1	2		4	5
r. Stage 3 or 4 Sacral or perianal ulcer in the incontinent patient	1	2		4	5
s. Prolonged immobilization (eg. Unstable thoracic lumbar spine; pelvic fracture)	1	2		4	5
t. Epidural Catheter	1	2		4	5
u. Acute neurogenic bladder	1	2		4	5

	Strongly Disagree	Disagree	Agree	Strongly Agree	No Opinion Don't know
v. Patient request	1	2		4	5
w. Urinary Incontinence	1	2		4	5
x. Intubated and ventilated	1	2		4	5
y. Colorectal surgery	1	2		4	5
z. Urologic Surgeries	1	2		4	5
Other indications (please list):					

4. **Do you feel if a patient does not meet the pre-set criteria, the catheter should be removed?**

   Yes No

5. **Would you support a 4 week pilot project on the medical units (3AB) at Western Memorial Regional Hospital for certified urology technician protocol for removal of urinary catheters that do not meet protocol criteria?**

   Yes No

6. **Would you support certified urology technicians re-inserting urinary catheter if patient is not successful with a trial of voiding without further physician input?**

   Yes No

Bladder scanning is a recommended practice prior to catheterization.

7. **Do agree with in and out catheterization prior to foley catheter insertion?**

   Yes
   No

8. **What urinary residual parameters do you recommend for in and out catheterization? (There is no documented evidence what the cut-off point is for urinary retention to recommend catheterization.)**

9. **What parameters do you recommend for insertion or re-insertion of foley catheters?**

Literature for physician review (paper copies included in package)

Meddings, J., Rogers, M. A., Krein, S. L., Fakih, M. G., Olmsted, R. N., & Saint, S. (2014). Reducing unnecessary urinary catheter use and other strategies to prevent catheter-associated urinary tract infection: An integrative review. *BMJ Quality & Safety, 23*(4), 277-289. doi:10.1136/bmjqs-2012-001774; 10.1136/bmjqs-2012-001774

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Western Health

CAUTI Prevention Bundles: Improving Best Practices within Western Health for Continued Success

Paula Stagg, RNBN IPAC Specialist

Goals

- Review CAUTI bundle implemented in 2013
- Discuss practicum goals and objectives
- Receive staff input related to requirements for urology technician protocol for urinary catheter removal

Western Health

Current CAUTI bundle

- The Canadian Patient Safety Institute (CPSI) website states each year in Canada, health care associated infections (HAIs) are responsible for 8,000 deaths and another likely 220,000 HAIs (CPSI, 2014). It is estimated that urinary tract infections account for 40% of all HAIs (Gokula et al., 2012; Willson et al., 2009). Of these, 80% are related to indwelling urinary catheters (Loeb et al., 2008). Meddings, Rogers, Macy and Saint (2010) state " the greatest risk factor for CAUTI is prolonged catheterization" (p. 550).Other complications related to prolonged indwelling urinary catheters include decreased mobility, damage to the meatus and/or urethra, increase use of antibiotics, increased length of stay, and pain (Salamon, 2009).

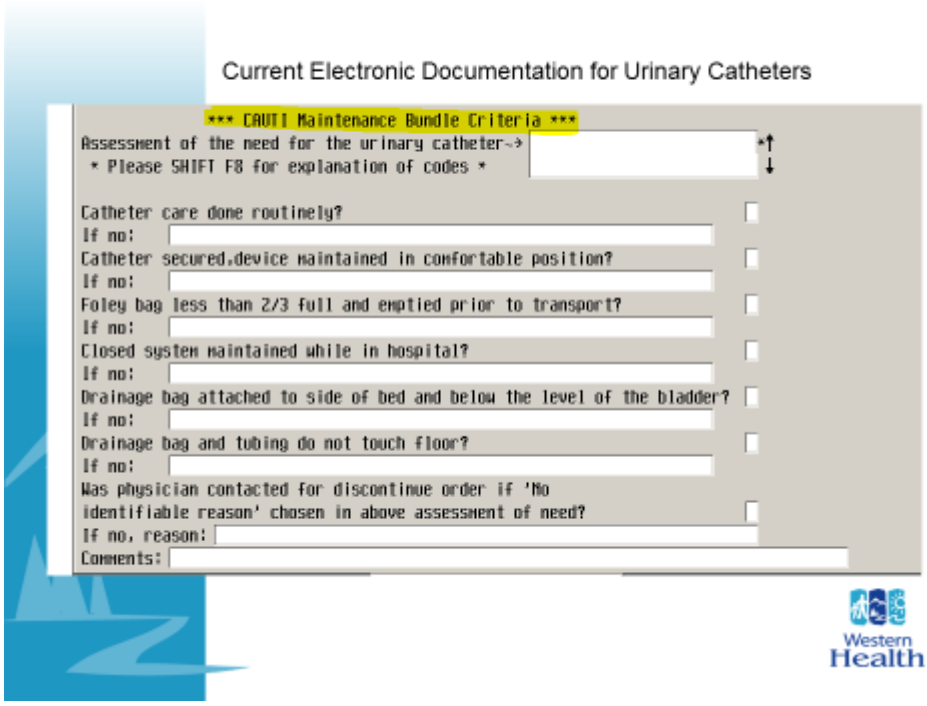
- Not only is CAUTI a challenge in acute care, the prevalence of catheters in Long Term Care, expands the need for effective clinical prevention programs across continuum

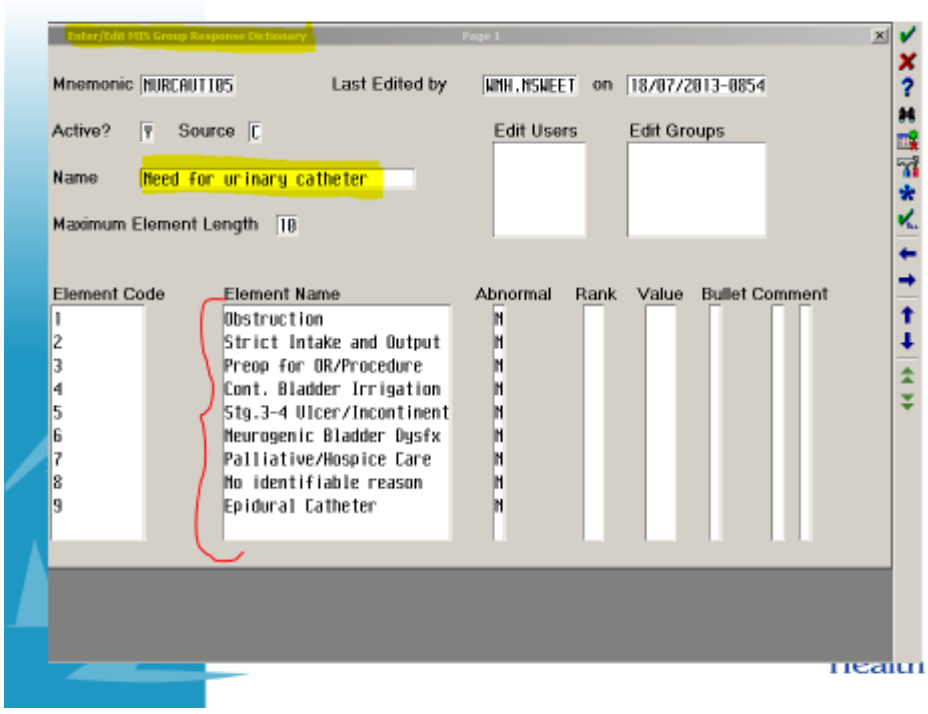
Western Health

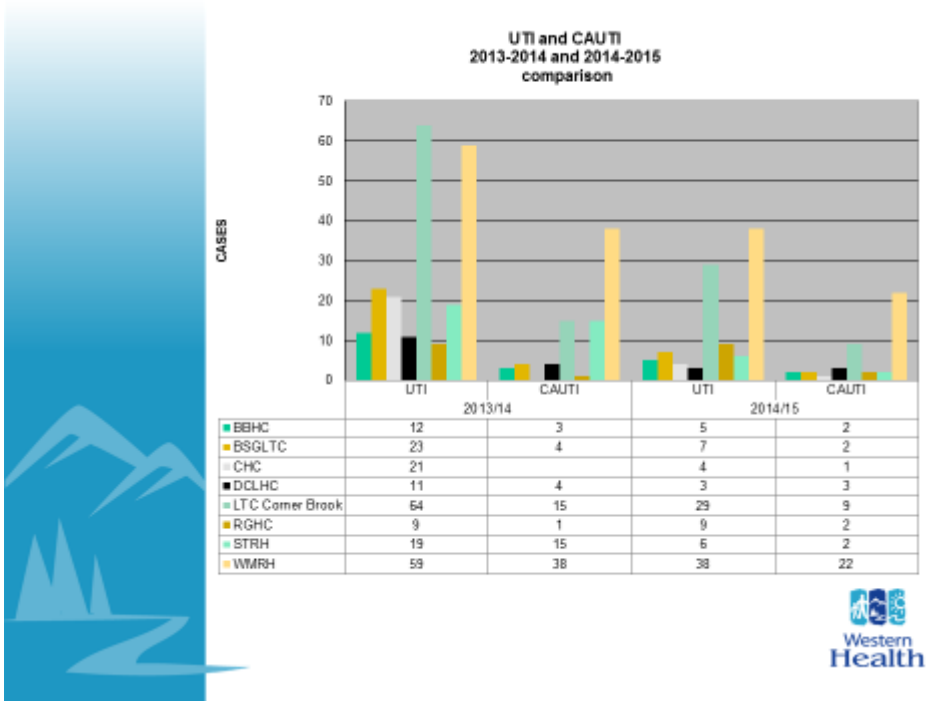
CAUTI Insertion bundle

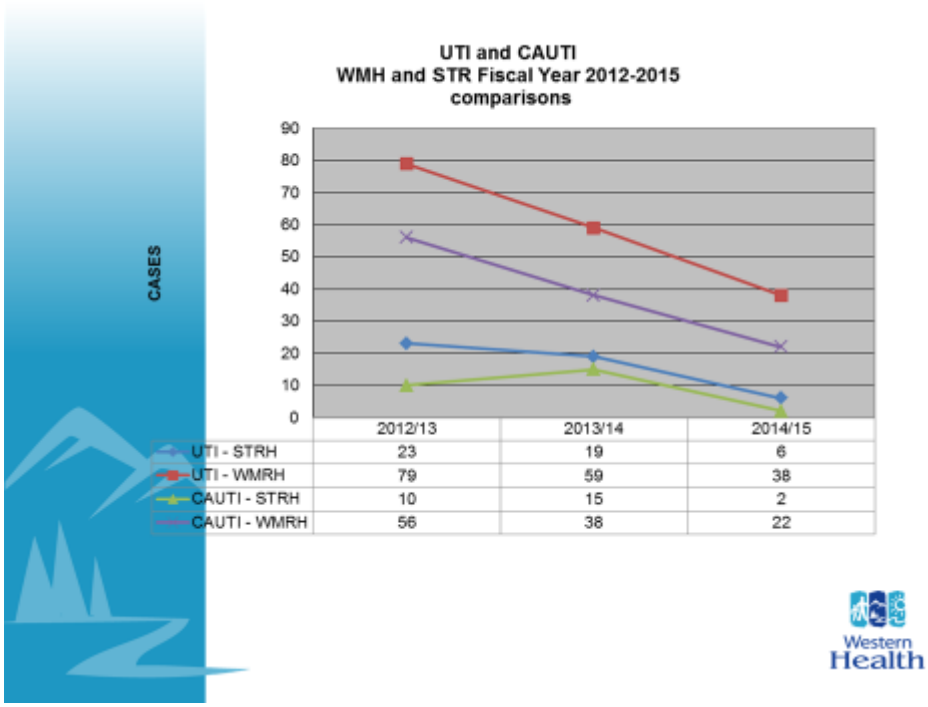
Verification of need prior to insertion	Insert urinary catheter Aseptic technique	Maintain urinary catheter based on guidelines
• Urinary Tract Retention • Urologic surgeries or studies • Urinary Retention • End of life care, hospice(patients request) • Perioperative – selected surgical procedures • Assisting with pressure ulcer healing for stage 3-4 with incontinent patients.	• Hand Hygiene • Catheter insertion kit with: sterile gloves, drape, cleaning supplies, sterile lubricant, sterile urinary catheter attached to a drainage bag.	• Secure catheter anchor to prevent irritation of the urethra. • Maintain an unobstructed flow. • Maintain the drainage bag below the level of the bladder and off the floor. • Perform hand hygiene before and after each patient contact. • Provide individual labeled collection container at the bedside. • Review urinary catheter necessity daily, • Remove catheter promptly when not needed.

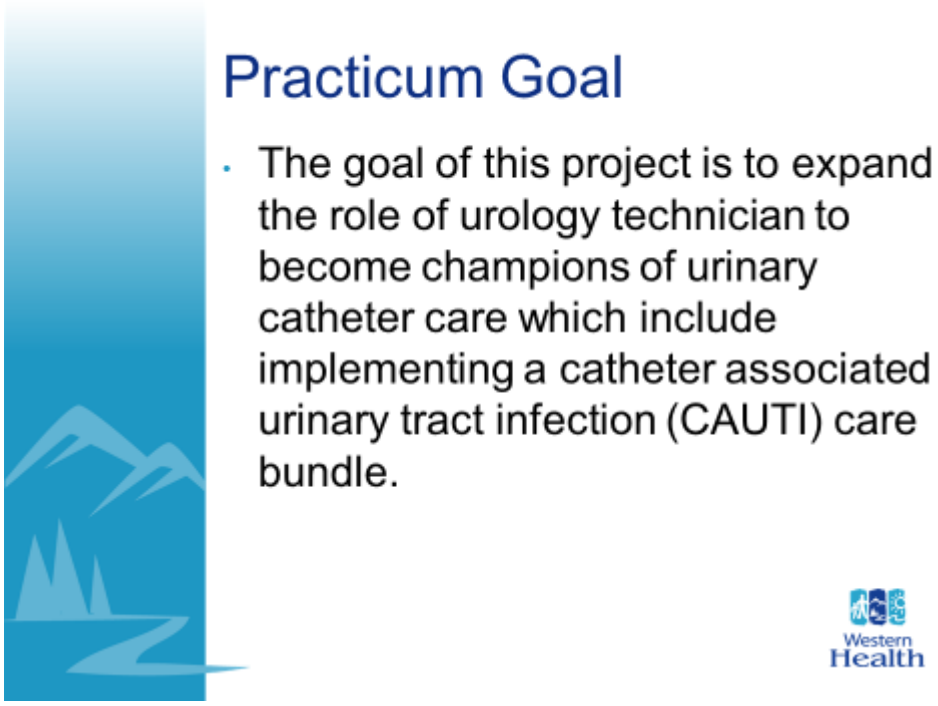
Western Health

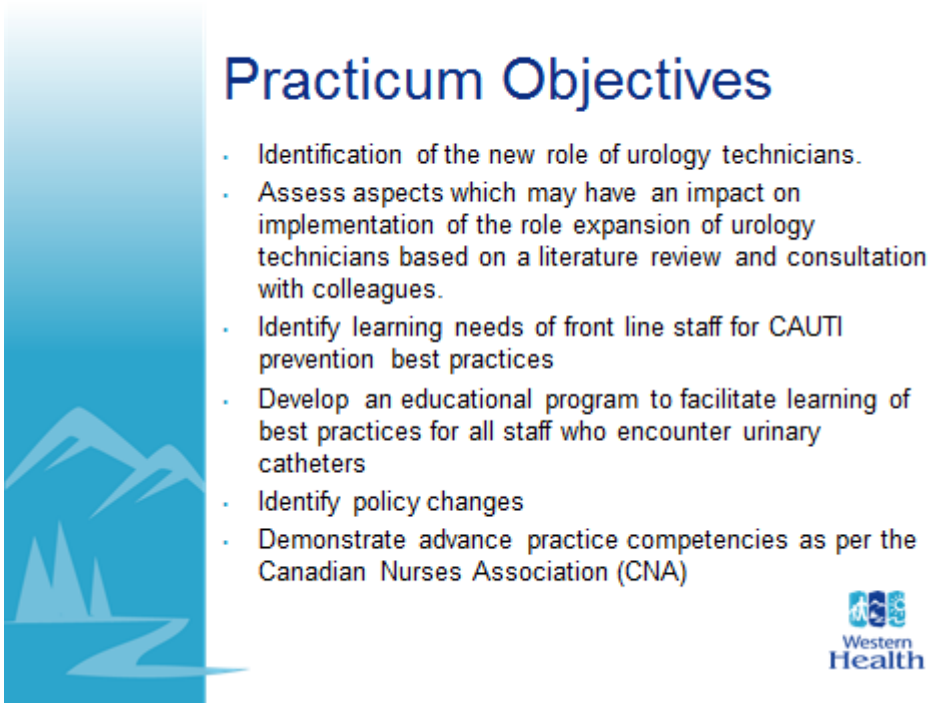

Current Electronic Documentation for Urinary Catheters
*** CAUTI Maintenance Bundle Criteria ***
Assessment of the need for the urinary catheter->
* Please SHIFT F8 for explanation of codes *
Catheter care done routinely?
If no:
Catheter secured,device maintained in comfortable position?
If no:
Foley bag less than 2/3 full and emptied prior to transport?
If no:
Closed system maintained while in hospital?
If no:
Drainage bag attached to side of bed and below the level of the bladder?
If no:
Drainage bag and tubing do not touch floor?
If no:
Was physician contacted for discontinue order if 'No identifiable reason' chosen in above assessment of need?
If no, reason:
Comments:
Western Health


Mnemonic NURCAUTI05
Last Edited by WMH.MSWEET on 18/07/2013-0854
Active? Y Source C
Edit Users
Edit Groups
Name Need for urinary catheter
Maximum Element Length 10
Element Code
Element Name
Abnormal
Rank
Value
Bullet Comment
1 Obstruction N
2 Strict Intake and Output N
3 Preop for OR/Procedure N
4 Cont. Bladder Irrigation N
5 Stg.3-4 Ulcer/Incontinent N
6 Neurogenic Bladder Dysfx N
7 Palliative/Hospice Care N
8 No identifiable reason N
9 Epidural Catheter N


UTI and CAUTI
2013-2014 and 2014-2015
comparison
CASES
70
60
50
40
30
20
10
0
UTI
CAUTI
UTI
CAUTI
2013/14
2014/15
BBHC 12 3 5 2
BSGLTC 23 4 7 2
CHC 21 4 1
DCLHC 11 4 3 3
LTC Corner Brook 64 15 29 9
RGHC 9 1 9 2
STRH 19 15 6 2
WMRH 59 38 38 22
Western Health


UTI and CAUTI
WMH and STR Fiscal Year 2012-2015
comparisons
CASES
90
80
70
60
50
40
30
20
10
0
2012/13
2013/14
2014/15
UTI - STRH 23 19 6
UTI - WMRH 79 59 38
CAUTI - STRH 10 15 2
CAUTI - WMRH 56 38 22
Western Health


Practicum Goal
The goal of this project is to expand the role of urology technician to become champions of urinary catheter care which include implementing a catheter associated urinary tract infection (CAUTI) care bundle.
Western Health


Practicum Objectives
Identification of the new role of urology technicians.
Assess aspects which may have an impact on implementation of the role expansion of urology technicians based on a literature review and consultation with colleagues.
Identify learning needs of front line staff for CAUTI prevention best practices
Develop an educational program to facilitate learning of best practices for all staff who encounter urinary catheters
Identify policy changes
Demonstrate advance practice competencies as per the Canadian Nurses Association (CNA)
Western Health

Staff Consultation

- How do you feel we can improve upon the current CAUTI bundle at Western Health?
- Do you agree with urology technicians having autonomy with removal of urinary catheters assessed as unnecessary without a physicians' order?
- If so, what parameters do you feel need to be included in the project for urology technician catheter removal?
- Do you agree with urology technicians being responsible for re-insertion of catheters removed by their assessment?

Western Health

Additional discussion

- Have you had experience with implementing a protocol whereby other health care workers could remove catheters with a protocol?
- How did you overcome barriers for implementation?

Western Health

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Canadian Patient Safety Institute (CPSI) (2014). *Sayonara to infections. April is Canadian hand hygiene audit month*. Retrieved from: http://www.patientsafetyinstitute.ca/en/NewsAlerts/News/Pages/Sayonara-to-infections!-April-is-Canadian-Hand-Hygiene-Audit-month.aspx September 23, 2015.

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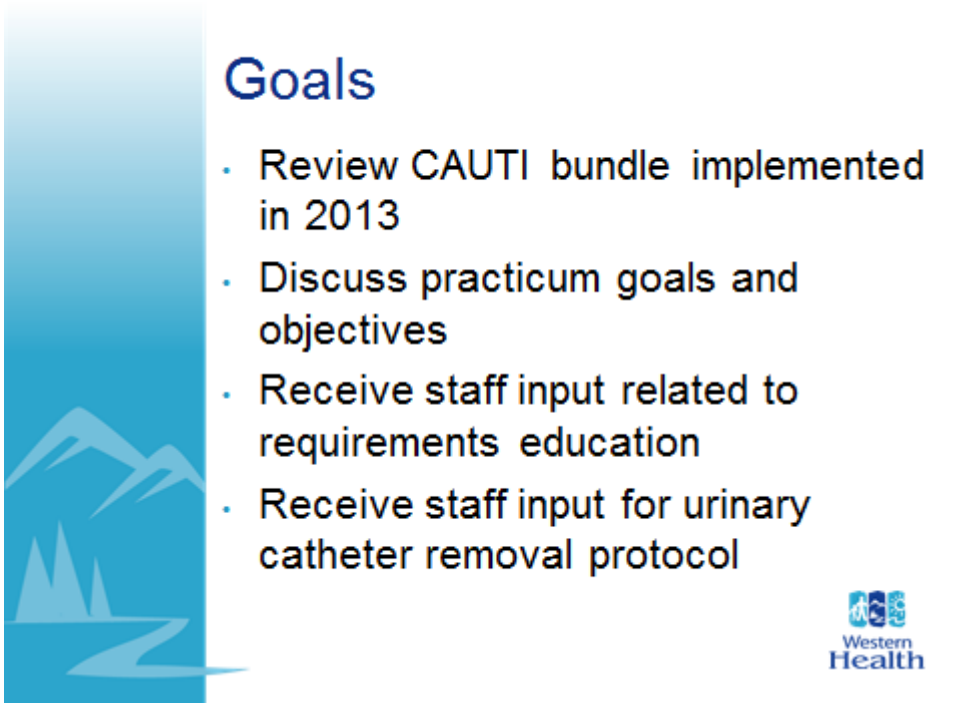
Wilson, M., Wilde, M., Webb, M. L., Thompson, D., Parker, D., Harwood, J., . . . Gray, M. (2009). Nursing interventions to reduce the risk of catheter-associated urinary tract infection: Part 2: Staff education, monitoring, and care techniques. *Journal of Wound, Ostomy and Continence Nursing : Official Publication of the Wound, Ostomy and Continence Nurses Society / WOCN*, 36(2), 137-154. doi:10.1097/01.WON.0000347655.56851.04; 10.1097/01.WON.0000347655.56851.04

Appendix B


Western Health
CAUTI Prevention Bundles: Improving Best Practices within Western Health for Continued Success
Paula Stagg, RNBN IPAC Specialist


Goals
Review CAUTI bundle implemented in 2013
Discuss practicum goals and objectives
Receive staff input related to requirements education
Receive staff input for urinary catheter removal protocol
Western Health

Current CAUTI bundle

- The Canadian Patient Safety Institute (CPSI) website states each year in Canada, health care associated infections (HAIs) are responsible for 8,000 deaths and another likely 220,000 HAIs (CPSI, 2014). It is estimated that urinary tract infections account for 40% of all HAIs (Gokula et al., 2012; Willson et al., 2009). Of these, 80% are related to indwelling urinary catheters (Loeb et al., 2008). Meddings, Rogers, Macy and Saint (2010) state "the greatest risk factor for CAUTI is prolonged catheterization" (p. 550). Other complications related to prolonged indwelling urinary catheters include decreased mobility, damage to the meatus and/or urethra, increase use of antibiotics, increased length of stay, and pain (Salamon, 2009).
- Not only is CAUTI a challenge in acute care, the prevalence of catheters in Long Term Care expands the need for effective clinical prevention programs across continuum

Western Health

CAUTI Insertion bundle

Verification of need prior to insertion	Insert urinary catheter Aseptic technique	Maintain urinary catheter based on guidelines
• Urinary Tract Retention • Urologic surgeries or studies • Urinary Retention • End of life care, hospice(patients request) • Perioperative – selected surgical procedures • Assisting with pressure ulcer healing for stage 3-4 with incontinent patients.	• Hand Hygiene • Catheter insertion kit with: sterile gloves, drape, cleaning supplies, sterile lubricant, sterile urinary catheter attached to a drainage bag.	• Secure catheter anchor to prevent irritation of the urethra. • Maintain an unobstructed flow. • Maintain the drainage bag below the level of the bladder and off the floor. • Perform hand hygiene before and after each patient contact. • Provide individual labeled collection container at the bedside. • Review urinary catheter necessity daily, • Remove catheter promptly when not needed.

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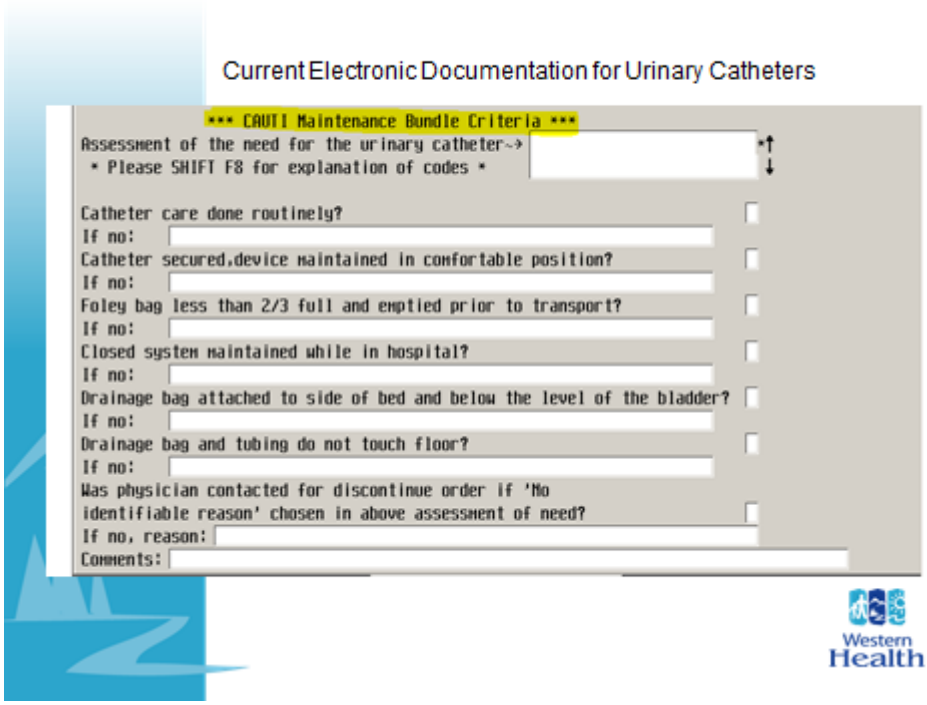
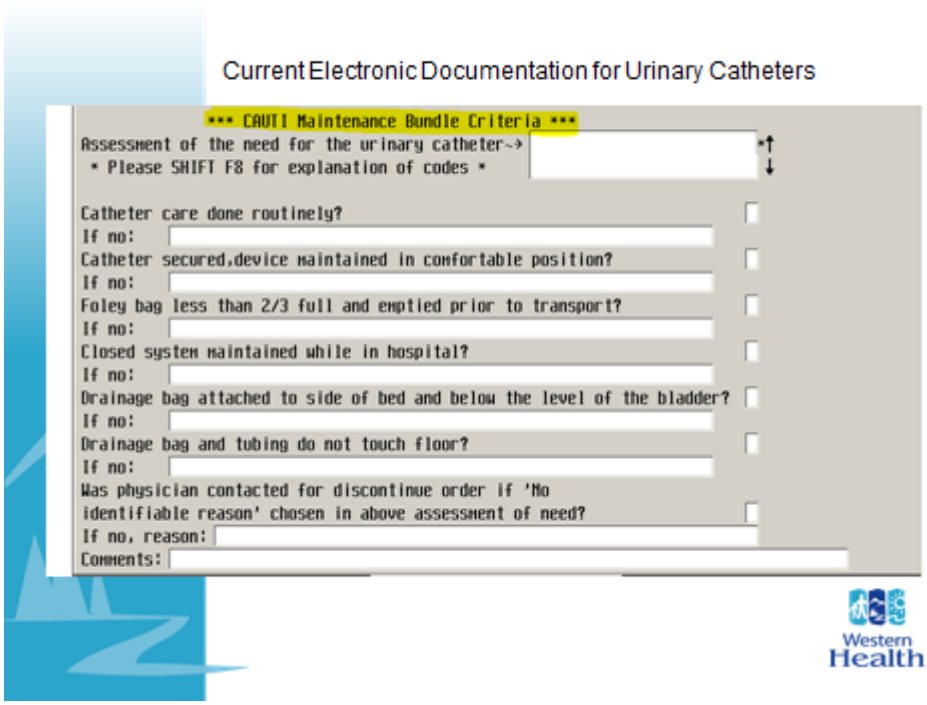

Current Electronic Documentation for Urinary Catheters
*** CAUTI Maintenance Bundle Criteria ***
Assessment of the need for the urinary catheter->
* Please SHIFT F8 for explanation of codes *
Catheter care done routinely?
If no:
Catheter secured,device maintained in comfortable position?
If no:
Foley bag less than 2/3 full and emptied prior to transport?
If no:
Closed system maintained while in hospital?
If no:
Drainage bag attached to side of bed and below the level of the bladder?
If no:
Drainage bag and tubing do not touch floor?
If no:
Was physician contacted for discontinue order if 'No identifiable reason' chosen in above assessment of need?
If no, reason:
Comments:
Western Health


Current Electronic Documentation for Urinary Catheters
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* Please SHIFT F8 for explanation of codes *
Catheter care done routinely?
If no:
Catheter secured,device maintained in comfortable position?
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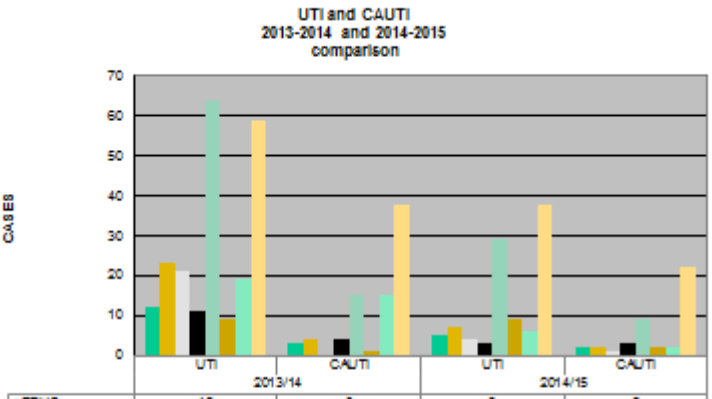
If no:
Drainage bag attached to side of bed and below the level of the bladder?
If no:
Drainage bag and tubing do not touch floor?
If no:
Was physician contacted for discontinue order if 'No identifiable reason' chosen in above assessment of need?
If no, reason:
Comments:
Western Health



	2013/14		2014/15	
	UTI	CAUTI	UTI	CAUTI
BBHC	12	3	5	2
BBGLTC	23	4	7	2
CHC	21		4	1
DCLHC	11	4	3	3
LTC Corner Brook	64	15	29	9
RGHC	9	1	9	2
STRH	19	15	6	2
WMRH	59	38	38	22

Western Health

Practicum Goal

- The goal of this project is to expand the role of urology technician to become champions of urinary catheter care which include implementing a catheter associated urinary tract infection (CAUTI) care bundle.
- To develop an education program and urinary catheter removal protocol

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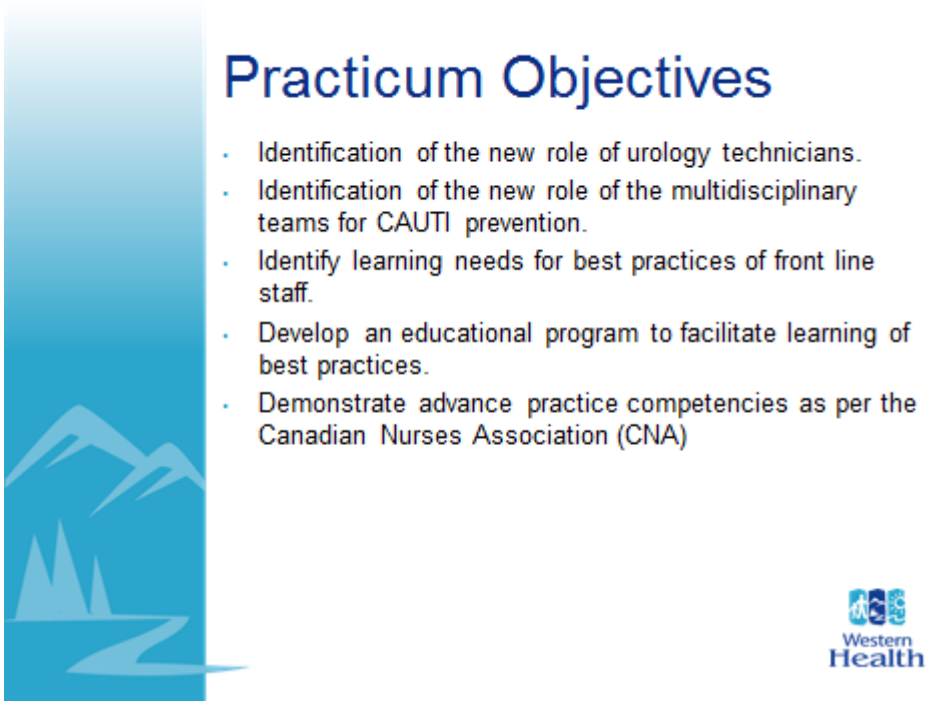
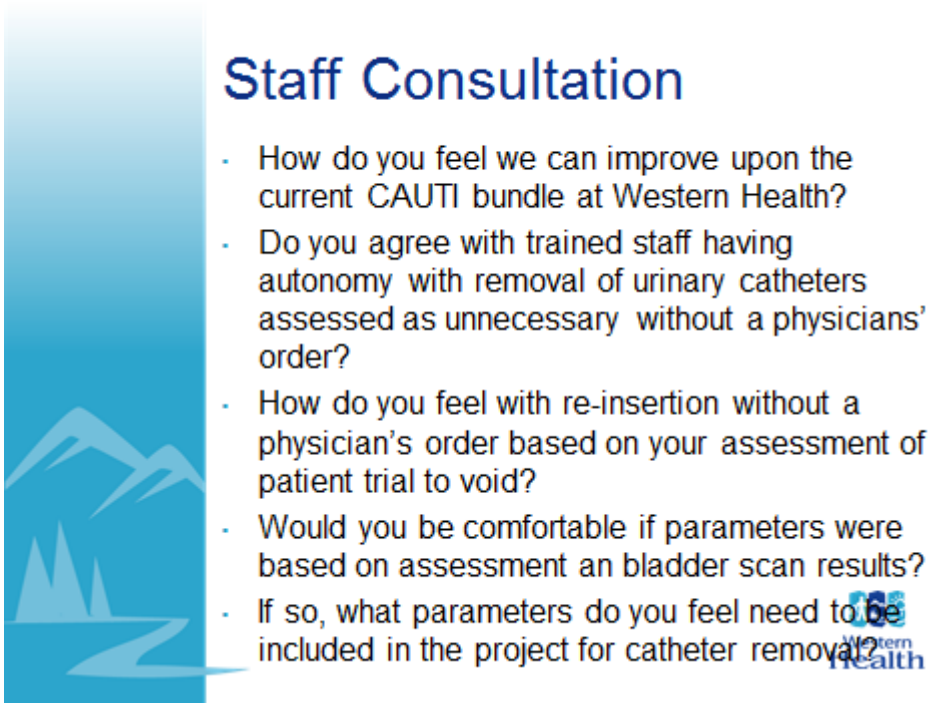

Practicum Objectives
Identification of the new role of urology technicians.
Identification of the new role of the multidisciplinary teams for CAUTI prevention.
Identify learning needs for best practices of front line staff.
Develop an educational program to facilitate learning of best practices.
Demonstrate advance practice competencies as per the Canadian Nurses Association (CNA)
Western Health


Staff Consultation
How do you feel we can improve upon the current CAUTI bundle at Western Health?
Do you agree with trained staff having autonomy with removal of urinary catheters assessed as unnecessary without a physicians' order?
How do you feel with re-insertion without a physician's order based on your assessment of patient trial to void?
Would you be comfortable if parameters were based on assessment an bladder scan results?
If so, what parameters do you feel need to be included in the project for catheter removal?
Western Health

Additional discussion

- Have you had experience with implementing a protocol whereby other health care workers could remove catheters with a protocol?
- How did you overcome barriers for implementation?

Western Health

References

Canadian Patient Safety Institute (CPSI) (2014). *Sayonara to Infections. April is Canadian hand hygiene audit month.* Retrieved from http://www.patientsafetyinstitute.ca/en/NewsAlerts/News/Pages/Sayonara-to-Infections-April-is-Canadian-Hand-Hygiene-Audit-month.aspx September 23, 2015.

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Western Health

Appendix C

URINATRY TRACT INFECTION (UTI)

Urinary tract infections (UTI) are defined using symptomatic urinary tract infection (SUTI) criteria or Asymptomatic Bacteremic UTI (ABUTI) criteria.

Catheter-associated urinary tract infections (CAUTI) are defined as a UTI where an indwelling urinary catheter was in place for > 2 calendar days on the date of event, with day of device placement being Day 1

And

And indwelling urinary catheter was in place on the date of event or the day before. If an indwelling urinary catheter was in place for > 2 calendar days and then removed, the UTI criteria must be fully met on the day of discontinuation or the next day.

****Only includes indwelling Foley Catheters***

Symptomatic Urinary Tract Infection (SUTI)

Symptomatic Urinary Tract Infection (SUTI) must meet at least **one** of the following criteria:

Criterion 1a: Patient had an indwelling urinary catheter in place for > 2 calendar days, with day of device placement being Day 1, and catheter was in place on the date of event

and

at least **one** of the following signs or symptoms with no other recognized cause:

- fever (>38°C),

- suprapubic tenderness
- costovertebral angle pain or tenderness

and

a positive urine culture of $\geq 10^5$ colony-forming units (CFU)/ml with no more than 2 species of microorganisms. Elements of the criterion must occur within a timeframe that does not exceed a gap of 1 calendar day between two adjacent elements

OR

Patient had indwelling urinary catheter in place for > 2 calendar days and had it removed the day of or the day before the date of event

and

at least **one** of the following signs or symptoms with no other recognized cause:

- fever (>38°C),
- urgency
- frequency,
- dysuria,
- suprapubic tenderness
- costovertebral angle pain or tenderness

and

a positive urine culture of $\geq 10^5$ colony-forming units (CFU)/ml with no more than 2 species of microorganisms. Elements of the criterion must occur within a timeframe that does not exceed a gap of 1 calendar day between two adjacent elements

Criterion1b: Patient did not have an indwelling urinary catheter that had been in place for > 2 calendar days and in place at the time of or the day before the date of event

And

has at least **one** of the following signs or symptoms with no other recognize cause:

- fever (>38°C) in a patient that is ≤65 years of age,
- urgency
- frequency
- dysuria
- suprapubic tenderness
- costovertebral angle pain or tenderness

and

a positive urine culture of $\geq 10^5$ CFU/ml with no more than 2 species of microorganisms. Elements of the criterion must occur within a timeframe that does not exceed a gap of 1 calendar day between two adjacent elements

Criterion 2a: Patient had an indwelling urinary catheter in place for > 2 calendar days, with day of device placement being Day 1, and catheter was in place on the date of event

and

at least **one** of the following signs or symptoms with no other recognized cause:

- fever (>38°C)
- suprapubic tenderness
- costovertebral angle pain or tenderness

and

a positive urinalysis demonstrated by at least **one** of the following findings:

- positive dipstick for leukocyte esterase and/or nitrite

- pyuria (urine specimen with ≥10 white blood cells [WBC]/mm^3 or ≥3 WBC/high power field of unspun urine)
- microorganisms seen on Gram stain of unspun urine

and

a positive urine culture of $\geq 10^3$ and $<10^5$ CFU/ml with no more than 2 species of microorganisms. Elements of the criterion must occur within a timeframe that does not exceed a gap of 1 calendar day between two adjacent elements

OR

Patient had indwelling urinary catheter for > 2 calendar days and had it removed the day of or the day before the date of event

and

at least **one** of the following signs or symptoms with no other recognized cause:

1. Fever (>38°C),
2. urgency,
3. frequency,
4. dysuria,
5. suprapubic tenderness,
6. or costovertebral angle pain or tenderness

and

a positive urinalysis demonstrated by at least **one** of the following findings:

- positive dipstick for leukocyte esterase and/or nitrite
- pyuria (urine specimen with ≥10 WBC/mm^3)

- microorganisms seen on Gram stain of unspun urine or ≥3 WBC/high power field of unspun urine)

and

a positive urine culture of $\geq 10^3$ and $<10^5$ CFU/ml with no more than 2 species of microorganisms. Elements of the criterion must occur within a timeframe that does not exceed a gap of 1 calendar day between two adjacent elements

Criterion 2b: Patient did <u>not</u> have an indwelling urinary catheter that had been in place for > 2 calendar days and in place at the time of or the day before the date of event

And

has at least **one** of the following signs or symptoms with no other recognized cause:

1. fever (>38°C) in a patient that is ≤65 years of age,
2. urgency,
3. frequency,
4. dysuria,
5. suprapubic tenderness,
6. costovertebral angle pain or tenderness

and

a positive urinalysis demonstrated by at least **one** of the following findings:

1. positive dipstick for leukocyte esterase and/or nitrite
2. pyuria (urine specimen with ≥10 WBC/mm^3
3. microorganisms seen on Gram stain of unspun urine or ≥3 WBC/high power field of unspun urine)

and

a positive urine culture of $\geq 10^3$ and $<10^5$ CFU/ml with no more than 2 species of microorganisms. Elements of the criterion must occur within a timeframe that does not exceed a gap of 1 calendar day between two adjacent elements

Criterion 3: Patient ≤1 year of age with or without an indwelling urinary catheter has at least **one** of the following signs or symptoms with no other recognized cause:

1. fever (>38°C core)
2. hypothermia (<36°C core)
3. apnea
4. bradycardia
5. dysuria
6. lethargy
7. vomiting

and

a positive urine culture of $\geq 10^5$ CFU/ml with no more than 2 species of microorganisms. Elements of the criterion must occur within a timeframe that does not exceed a gap of 1 calendar day between two adjacent elements

Criterion 4: Patient ≤1 year of age with or without an indwelling urinary catheter has at least **one** of the following signs or symptoms with no other recognized cause:

1. fever (>38°C core)
2. hypothermia (<36°C core)
3. apnea
4. bradycardia
5. dysuria
6. lethargy
7. vomiting

and

a positive urinalysis demonstrated by at least **one** of the following findings:

1. positive dipstick for leukocyte esterase and/or nitrite
2. pyuria (urine specimen with ≥10 WBC/mm^3)
3. microorganisms seen on Gram's stain of unspun urine or ≥3 WBC/high power field of unspun urine

and

a positive urine culture of between $\geq 10^3$ and $<10^5$ CFU/ml with no more than two species of microorganisms. Elements of the criterion must occur within a timeframe that does not exceed a gap of 1 calendar day between two adjacent elements

Asymptomatic Bacteremic Urinary Tract Infection (ABUTI)

Criterion: Patient with an indwelling urinary catheter in place for > 2 calendar days, (with day of device placement being Day 1), and catheter was in place on the date of event or without an indwelling urinary catheter has no signs or symptoms (i.e., no fever (>38°C) for patients ≤ 65 years of age*); and for any age patient, no urgency, frequency, dysuria, suprapubic tenderness, or costovertebral angle pain or tenderness

OR

for a patient ≤1 year of age, no and fever (>38°C core), hypothermia (<36°C core), apnea, bradycardia, dysuria, lethargy, or vomiting)

and

a positive urine culture of $>10^5$ CFU/ml with no more than 2 species of uropathogen microorganisms**

and

a positive blood culture with at least 1 matching uropathogen microorganism to the urine culture.

* Fever is not diagnostic for UTI in the elderly (> 65 years of age) and therefore fever in this age group does not disqualify from meeting the criteria of an ABUTI. * For ABUTI, report only isolate(s) in both blood and urine specimens.

* * Uropathogen microorganisms are: Gram-negative bacilli, *Staphylococcus* spp., yeasts, beta-hemolytic *Streptococcus* spp., *Enterococcus* spp., G. *vaginalis, Aerococcus urinae,* and *Corynebacterium* (urease positive).

Comments:

Laboratory cultures reported as "mixed flora" represent at least 2 species of organisms. Therefore and additional organism recovered from the same culture, would represent > 2 species of microorganisms. Such a specimen cannot be used to meet the UTI criteria.

Urinary catheter tips should not be cultured and are not acceptable for the diagnosis of a urinary tract infection.

Urine cultures must be obtained using appropriate technique, such as clean catch collection or catheterization. Specimens from indwelling catheters should be aspirated through the disinfected sampling ports. Change the catheter prior to collection if it is in place greater than 7 days.

In infants, urine cultures should be obtained by bladder catheterization or suprapubic aspiration; positive urine cultures from bag specimens are unreliable and should be confirmed by specimens aseptically obtained by catheterization or suprapubic aspiration.

LONG TERM CARE

URINARY TRACT INFECTION

Urinary tract infection includes only symptomatic urinary tract infections. Surveillance for asymptomatic bacteriuria (defined as the presence of a positive urine culture in the absence of new signs and symptoms of urinary tract infection) is not recommended, as this represents baseline status for many residents.

Symptomatic urinary tract infection

Indwelling catheter NOT present

Both of the following criteria must be met:

The resident has *at least one* of the following signs and symptoms:

A. Acute dysuria or acute pain, swelling, or tenderness of the testes, epididymis, or prostate

OR

- Fever or leukocytosis (see Box, above) and *at least one* of the following:
  - vii. acute costovertebral angle pain or tenderness
  - viii. suprapubic pain
  - ix. gross hematuria
  - x. new or marked increase in incontinence
  - xi. new or marked increase in urgency
  - xii. new or marked increase in frequency

OR

- In the absence of fever or leukocytosis, *two or more* of the following are present:
  - vi. suprapubic pain
  - vii. gross haematuria
  - viii. new or marked increase in incontinence
  - ix. new or marked increase in urgency
  - x. new or marked increase in frequency

AND

The resident has *one* of the following microbiologic criteria:

b) At least 105 cfu/mL of no more than two species of microorganisms in a voided urine sample

OR

- At least 102 cfu/mL of any number of organisms in a specimen collected by in-and-out catheter

Indwelling catheter present

Both of the following criteria must be met:

The resident has *at least one* of the following signs or symptoms:

e) Fever, rigors, or new onset hypotension, with no alternate site of infection
f) Either acute change in mental status or acute functional decline, with no alternate diagnosis, and leukocytosis (see box, Section A.III)
g) New onset suprapubic pain or costovertebral angle pain or tenderness
h) Purulent discharge from around the catheter or acute pain, swelling, or tenderness of the testes, epididymis, or prostate

AND

The resident has a urinary catheter specimen culture with at least 105 cfu/mL of any organism

Comments:

UTI should be diagnosed when there are localizing genitourinary signs and symptoms and a positive urine culture result. A diagnosis of UTI can be made without localizing symptoms if a blood culture isolate is the same as the organism isolated from the urine and there is no alternate site of infection. In the absence of a clear alternate source of infection, fever or rigors with a positive urine culture result in the noncatheterized resident or acute confusion in the catheterized resident will often be treated as UTI. However, evidence suggests that most of these episodes are likely not due to infection of a urinary source.

Urine specimens for culture should be processed as soon as possible, preferably within one to two hours after collection. If urine specimens cannot be processed within 30 minutes of collection, they should be refrigerated. Refrigerated specimens should be cultured within 24 hours. Recent catheter trauma, catheter obstruction, or new onset haematuria are useful localizing signs that are consistent with UTI but are not necessary for diagnosis.

Urinary catheter specimens for culture should be collected following replacement of the catheter if the current catheter has been in place for more than 14 days.

Appendix D

Health Research Ethics Authority Screening Tool

	Question	Yes	No
1.	Is the project funded by, or being submitted to, a research funding agency for a research grant or award that requires research ethics review	☐	☒
2.	Are there any local policies which require this project to undergo review by a Research Ethics Board?	☐	☒
	IF YES to either of the above, the project should be submitted to a Research Ethics Board.**IF NO** to both questions, continue to complete the checklist.	☐	☐
3.	Is the primary purpose of the project to contribute to the growing body of knowledge regarding health and/or health systems that are generally accessible through academic literature?	☐	☒
4.	Is the project designed to answer a specific research question or to test an explicit hypothesis?	☐	☒
5.	Does the project involve a comparison of multiple sites, control sites, and/or control groups?	☐	☒
6.	Is the project design and methodology adequate to support generalizations that go beyond the particular population the sample is being drawn from?	☐	☒
7.	Does the project impose any additional burdens on participants beyond what would be expected through a typically expected course of care or role expectations?	☐	☒
LINE A: SUBTOTAL Questions 3 through 7 = (Count the # of Yes responses)		**0**	

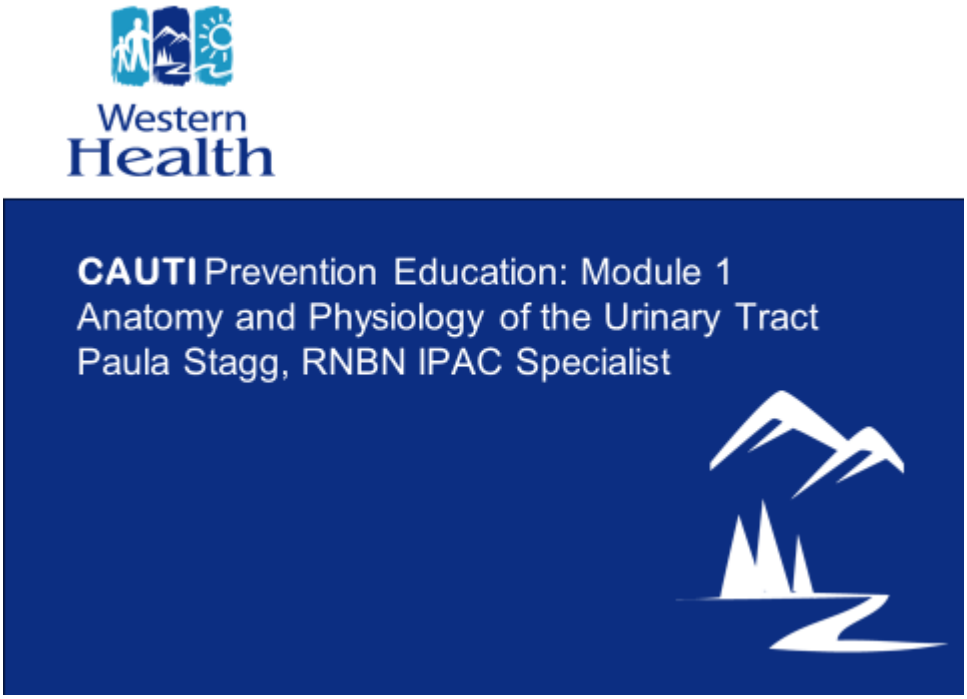
8.	Are many of the participants in the project also likely to be among those who might potentially benefit from the result of the project as it proceeds?	☒	☐
9.	Is the project intended to define a best practice within your organization or practice?	☒ ☐	☐
10.	Would the project still be done at your site, even if there were no opportunity to publish the results or if the results might not be applicable anywhere else?	☒	☐
11.	Does the statement of purpose of the project refer explicitly to the features of a particular program,Organization, or region, rather than using more general terminology such as rural vs. urban populations?	☒	☐
12.	Is the current project part of a continuous process of gathering or monitoring data within an organization?	☒	
LINE B: SUBTOTAL Questions 8 through 12 = (Count the # of Yes responses)		**5**	
	SUMMARY **See Interpretation Below**		

Interpretation:

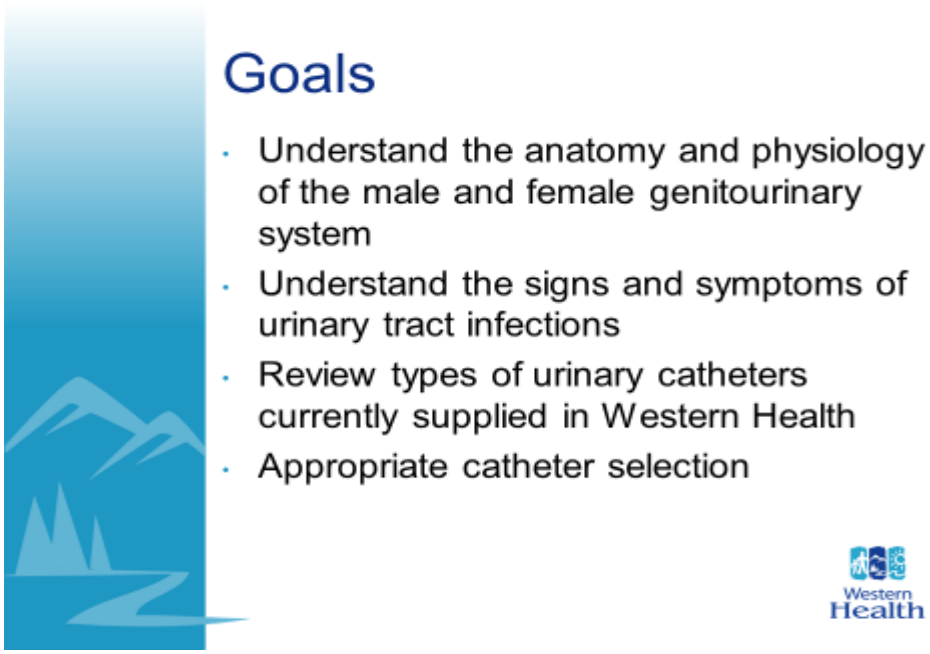
- If the sum of Line A is greater than Line B, the most probable purpose is **research**. The project should be submitted to an REB.
- If the sum of Line B is greater than Line A, the most probable purpose is **quality/evaluation**. Proceed with locally relevant process for ethics review (may not necessarily involve an REB).
- If the sums are equal, seek a second opinion to further explore whether the project should be classified as Research or as Quality and Evaluation.

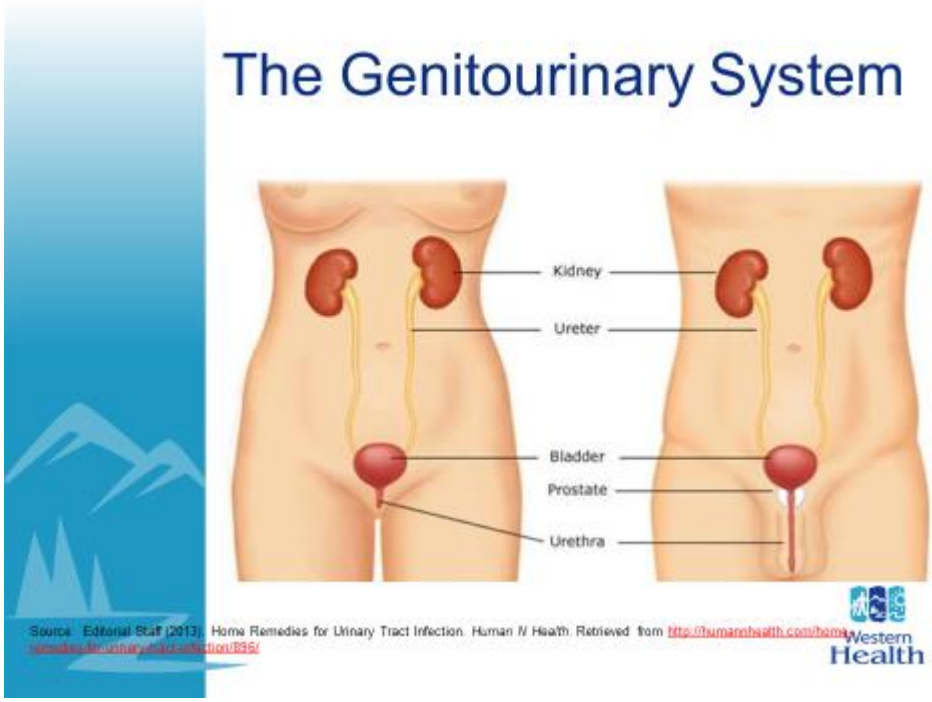
These guidelines are used at Memorial University of Newfoundland and were adapted from ALBERTA RESEARCH ETHICS COMMUNITY CONSENSUS INITIATIVE (ARECCI). Further information can be found at: http://www.hrea.ca/Ethics-Review-Required.aspx.

Appendix C



The first module will consist of an overview of the anatomy and physiology of the urinary system and will include education related to the types of indwelling urinary catheters currently supplied at Western Health.



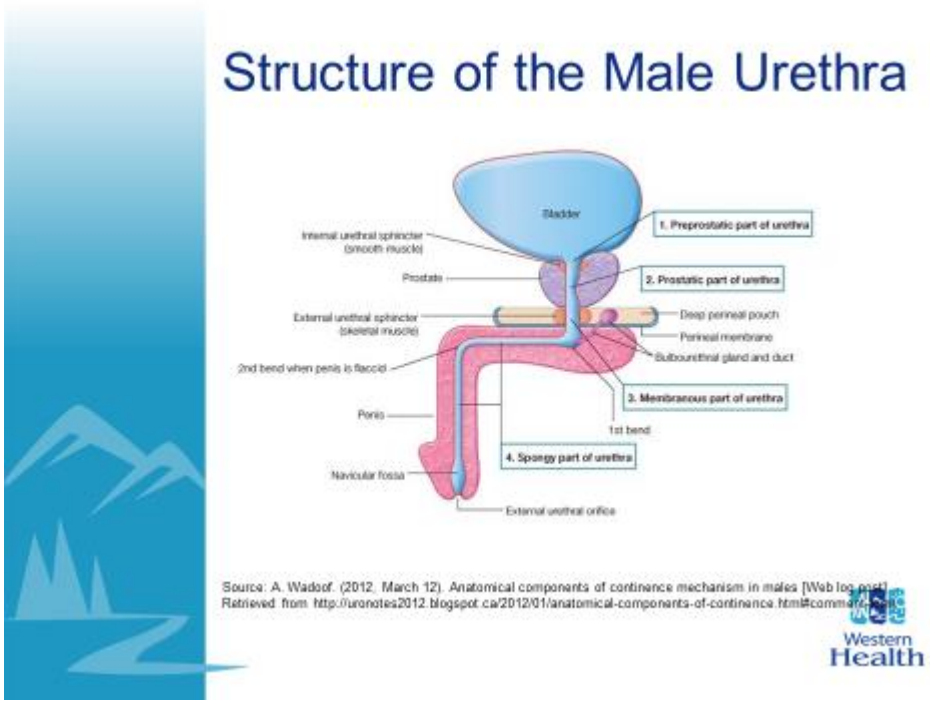


This diagram highlights a simplistic view of the male and female genitourinary system. **The kidneys** (*zoom in on kidney*) are located just below the ribcage on each side of the spine. They are approximately the size of a fist and their function is to filter blood brought through them via the renal arteries. They remove the end products of the bodies metabolism in the form of urine and plays a role in maintaining acid-base balance; sodium-water balance; and blood pressure regulation by the renin-angiotensin-aldosterone system (Marieb & Hoehn, 2010, Chapter 25)

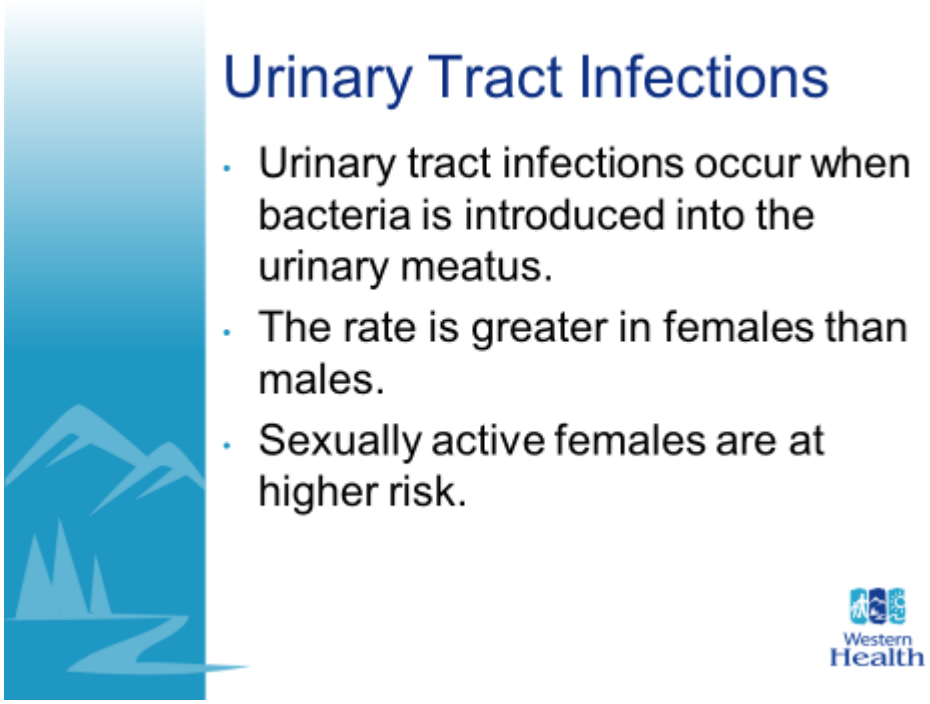
The ureters (*zoom in on ureter)* are about 25 cm long and carry the urine from the kidney to the bladder. This occurs mainly through a wave of contractions of the muscle layers of the urethral walls. This is called peristalsis. The ureters enter the bladder through a tunnel on the bladder wall on an angel to prevent reflux when the bladder contracts (Marieb & Hoehn, 2010, Chapter 25).

The bladder (*zoom in on bladder)* is located in the pelvis and is a hollow balloon shaped organ the expands as it collect and stores urine. The normal capacity of a bladder is about 500 ml, with maximum capacity of 800-1000 ml (Marieb & Hoehn, 2010, Chapter 25).

The Urethra *(zoom in on urethra)* During voiding, the bladder muscles contract opening the sphincters allowing the urine to travel out of the body via the urethra. In females the urethra is approximately four cm long; males approximately 20 cm long and is comprised of four sections (go to next slide) (Marieb & Hoehn, 2010, Chapter 25).

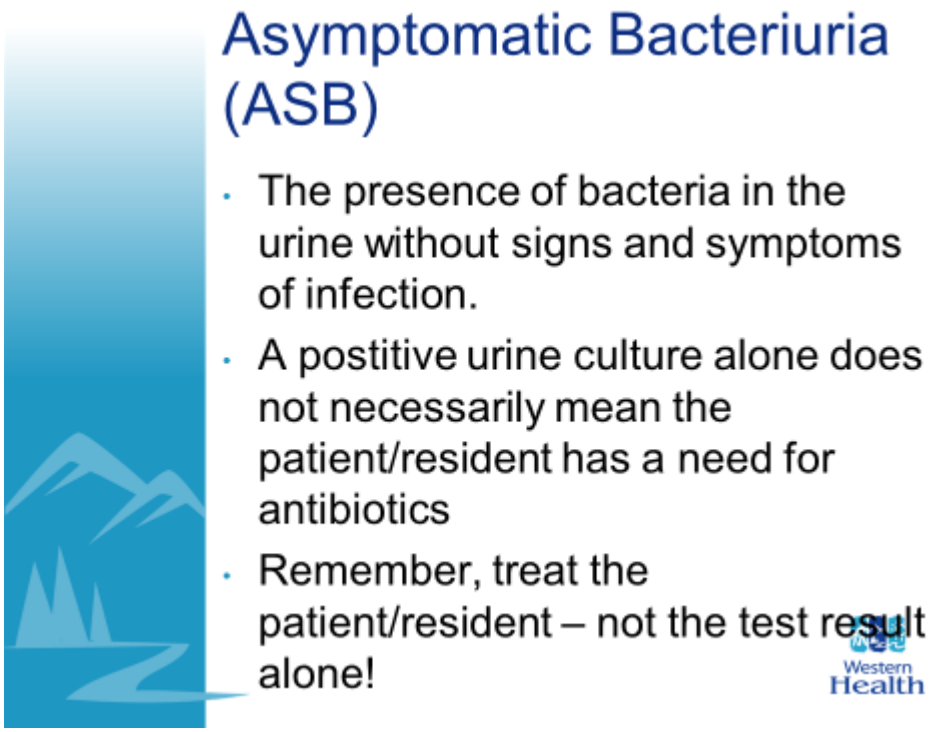


The four sections of the male urethra are the: 1) pre-prostatic urethra; 2) prostatic urethra; 3) membranous urethra; and 4) spongy urethra (Marieb & Hoehn, 2010, Chapter 25). In males, it is important to note the prostatic urethra passes through the prostate gland which may be enlarged causing a narrowing and difficulty passing the standard urinary catheter through to the bladder. You may need to use a coudé tip catheter (certification in coude tip insertion required-see catheter insertion module) or have a urology technician insert the catheter.

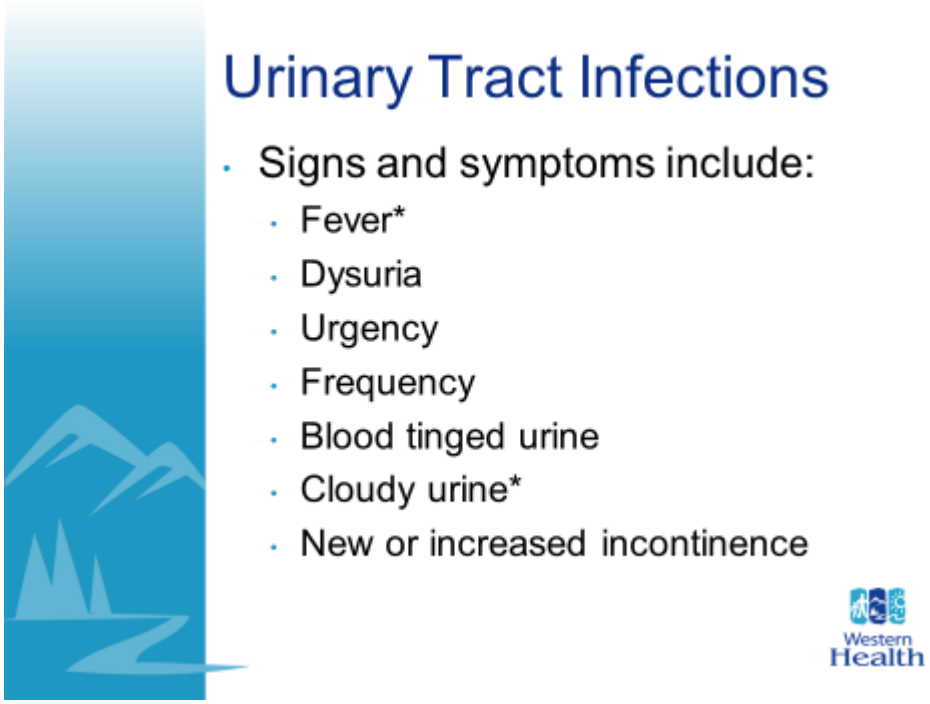


The urinary tract infection rate is higher in female than males because of the physical proximity of the external urethral orifice to the anal opening. Poor hygienic actions such as wiping from the anus to the urethra (back to front) introduces bacteria from the anus into the urethra (Marieb & Hoehn, 2010, Chapter 25).

Sexually active females are higher risk because bacteria from the vagina and external genital region are introduced near the urethra and intercourse drives the bacteria toward the bladder (Marieb & Hoehn, 2010, Chapter 25).



In elderly people, the incidence of bacteria in the urine which is not causing disease (known as asymptomatic bacteriuria) can be as high as "50 per cent in women and 40 per cent in men" (Leduc, 2014, p. 26). Treating people for a urinary tract infection without symptoms of infections is no longer best practice. In fact, it can be harmful as exposure to unnecessary antibiotics can cause antibiotic-associated resistances such as *Methicillin Resistant Staphylococcus Aurous (*MRSA) or *Clostridium Difficile Infections* (CDI). (Leduc, 2014). Be vigilant with your assessment of your patient/resident. Know the signs and symptoms of a urinary tract infection and ensure the patient/resident is well hydrated. Dehydration can complicate your assessment as the patient/resident may appear to have clinical signs of infection such as confusion or altered mental status, when in fact it is related to dehydration (Leduc, 2014).



Generally, signs and symptoms of a urinary tract infection include fever, dysuria (painful urination), urgency, frequency, blood or cloudiness noted in the urine (Marieb & Hoehn, 2010, Chapter 25).

Fever can be difficult to identify in persons over the age of 65 or in immunocompromised patients or residents as they have a lower baseline body temperature and may not present with a fever greater than the normal standard of 38°C. For this group of people, 1.5° C above their baseline temperature is generally accepted as a fever (Leduc, 2014, p. 26). For example, if a patient or resident has a baseline temperature of 35.5° C, a temperature of 37° C would be a fever. Infection control at Western Health uses the definition found in Stone et al (2012) for diagnosis of **Fever 65 years and older:**

Single oral temperature > 37.8°C

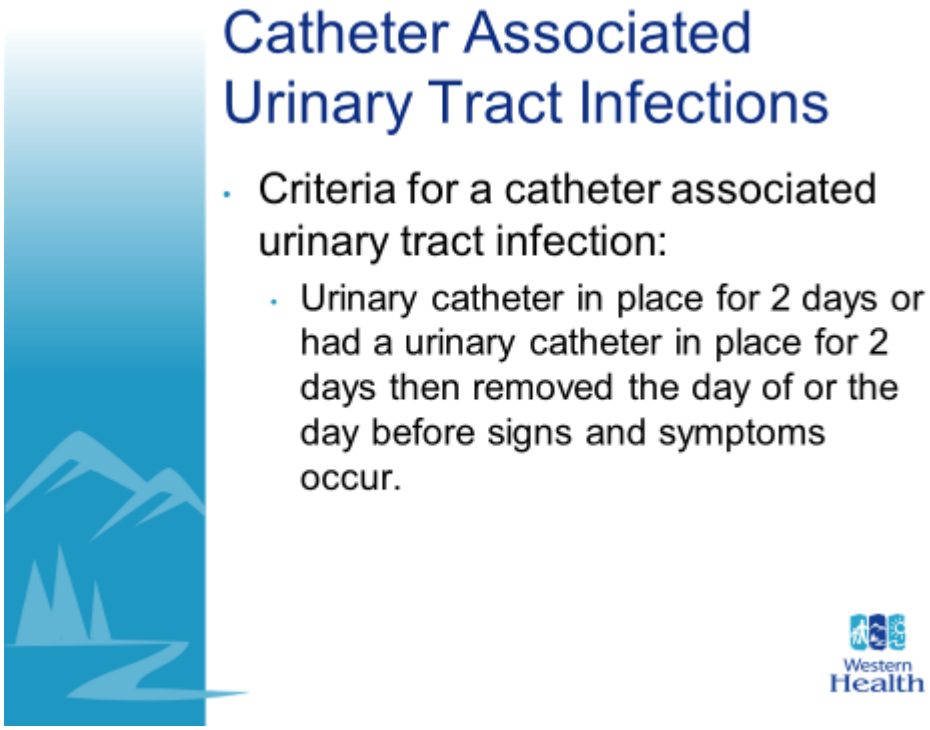
OR

Repeated oral temperatures >37.2°C or rectal temperatures >37.5°C

OR

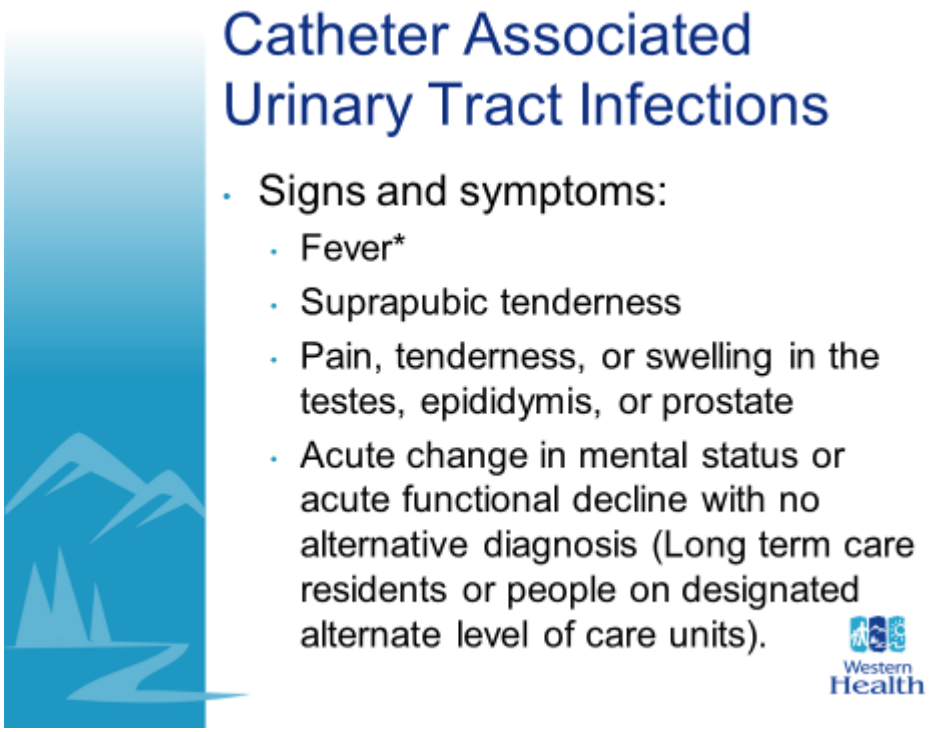
Single temperature >1.1°C over baseline from any site (oral, tympanic, axillary) (Stone et. all, 2012, p. 968)

Cloudy urine may be a sign of infection, however, it may also be a sign of dehydration (Leduc, 2014). Ensure the resident or patient is well hydrated. In elderly, new or worsening incontinence may also be a sign of infection.



Indwelling urinary catheters increase risk of acquiring an infection (CDC, 2009). As patients/residents do not void with the catheter in place, the signs and symptoms may be harder to ascertain. The next side reviews the difference symptoms between a regular urinary tract infection (UTI) and a catheter associated one (CAUTI).

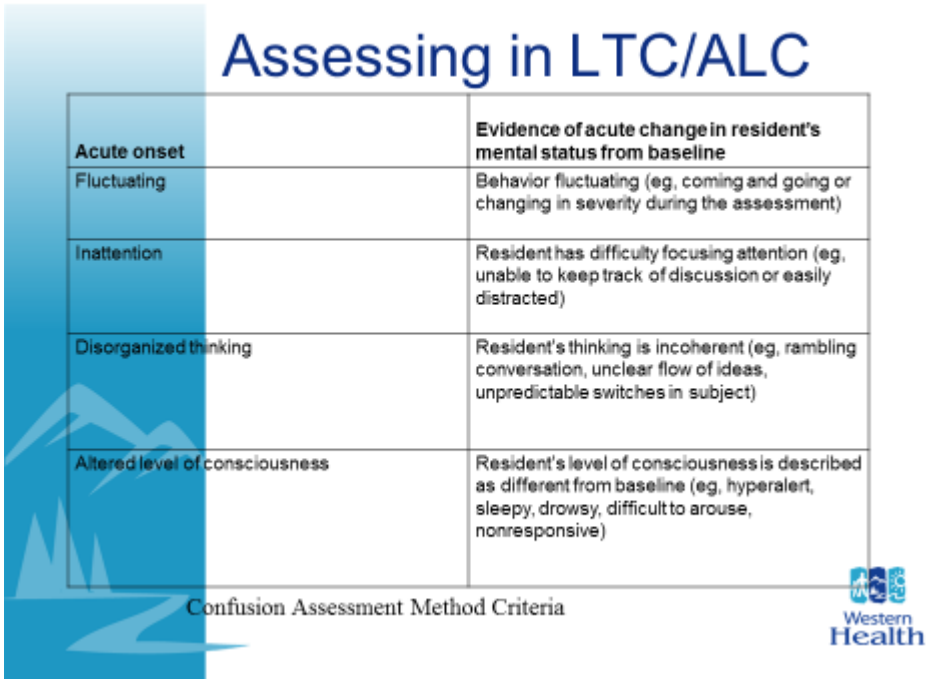
Please note, as a CAUTI can occur up to 2 days AFTER the catheter is removed, the signs and symptoms in the previous slide will need to be part of your assessment (National Healthcare Safety Network [NHSN], 2015). In other words, if a patient/resident has a urinary catheter removed and two days later complain of urgency, frequency or burning while voiding, they may have a urinary tract infection that was associate with the catheter.



Again, fever can be difficult to identify in persons over the age of 65 or in immunocompromised patients or residents as they have a lower baseline body temperature and may not present with a fever greater than the normal standard of 38°C.

Other signs and symptoms may include suprapubic tenderness; purulent discharge form around the catheter; or pain, tenderness, swelling of the testes, epididymis, or prostate (NHSN, 2015).

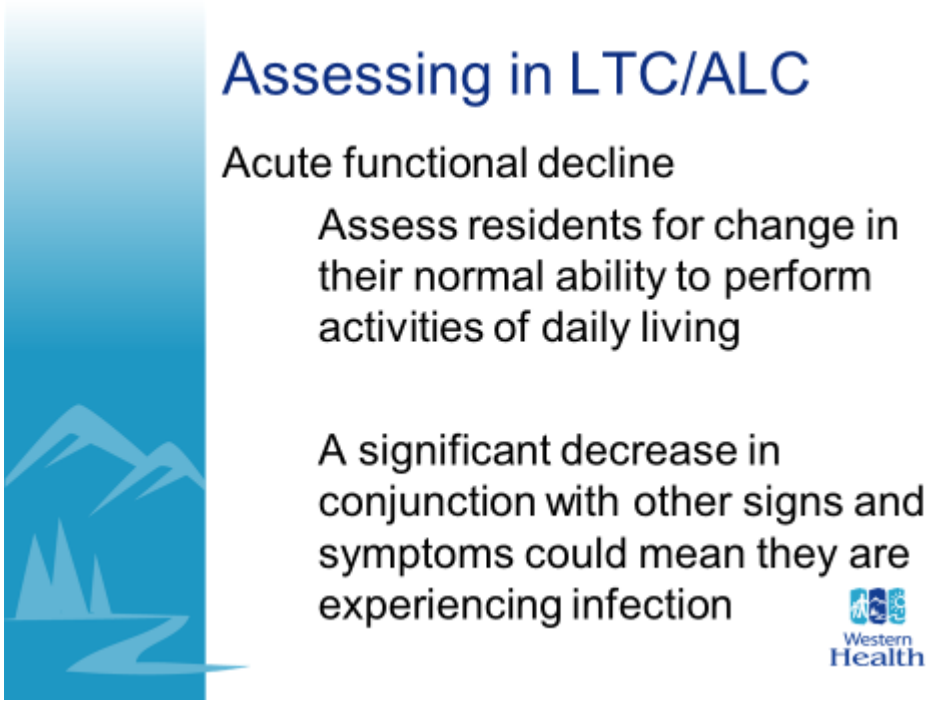
Assessment of change in mental status or acute functional decline is generally noted in the elderly or long term care resident and is not part of the acute care definitions used at western health (Stone et al, 2012). Staff who work in long term care facilities (LTC)or designated alternate level of care (ALC) units should understand how to assess acute changes in mental status and acute functional decline.



Long term care residents may have communication difficulties and are unable to describe what they are experiencing (Leduc, 2014) . This table guides clinicians in assessment for confusion in Long term care residents (Stone et al, 2012 p. 969).

(read table)

It is notable, some of the symptoms such as disorganized thinking, may be part of the residents “normal” behaviour related to their diagnosis or other comorbidities. Knowing your resident’s “normal” behavior and assessing for changes is important.



Acute functional decline is a change in ability to perform activities of daily living. The scoring for the different levels of function are described as:

0 **Independent**- No help or staff oversight – OR – Staff help/oversight provided only one or two times during the last seven days.

1 **Supervision** – Oversight, encouragement or cueing provided three or more times during last seven days – OR – supervision (3 or more times) plus physical assistance provided only one or two times during last seven days.

2 **Limited Assistance** – Resident highly involved in activity, received physical help in guided maneuvering of limbs or other non-weight-bearing assistance on three or more occasions- OR – limited assistance (3 or more times) plus more help provided only one or two times during last seven days.

3 **Extensive Assistance** – While the resident performed part of activity over last seven days, help of following type(s) was provided three or more times:

Weight-bearing support provided three or more times

Full staff performance of activity (3 or more times) during par (but not all) of last seven days

4 **Total dependence** – full staff performance of the activity during entire seven-day period. Complete non-participation by the resident in all aspects of the ADL definition.

Source: RAI assessment tool used in LTC at Western Health.

A new 3-point increase in total activities of daily living (ADL) score (range, 0–28) from baseline, based on the following 7 ADL items, is how we determine acute functional decline.

bed mobility

Transfer

Locomotion within LTCF

Dressing

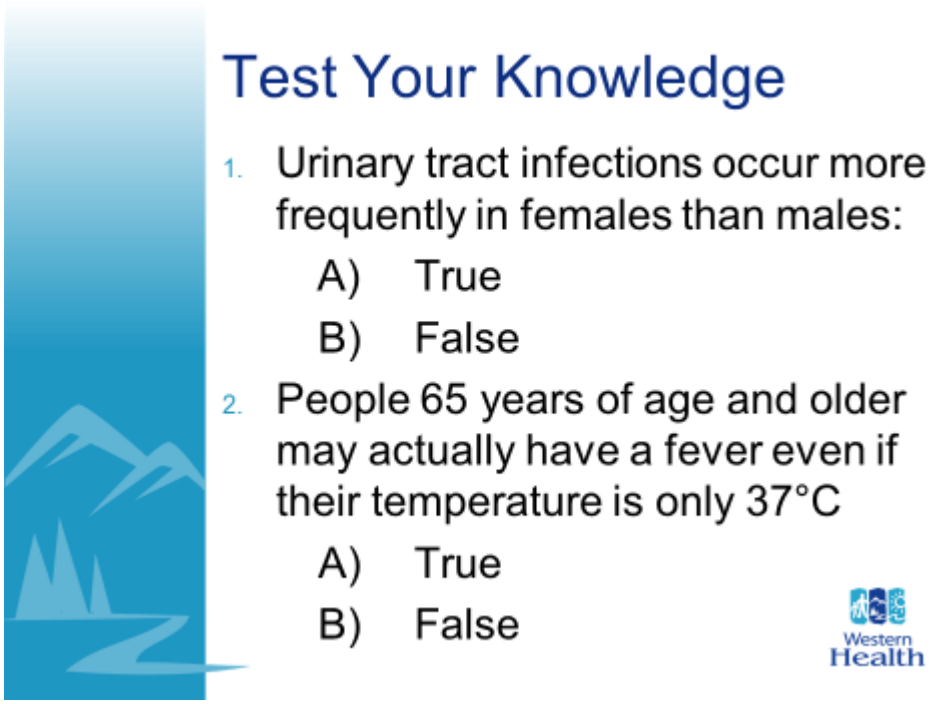
Toilet use

Personal hygiene

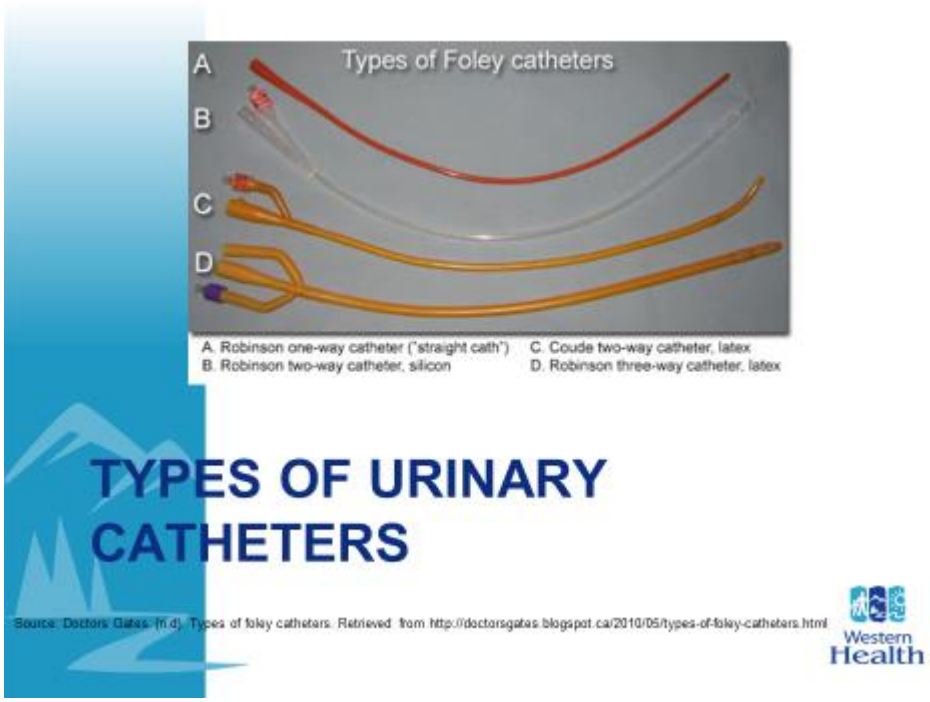
Eating

(Stone et al, 2012 p. 969)

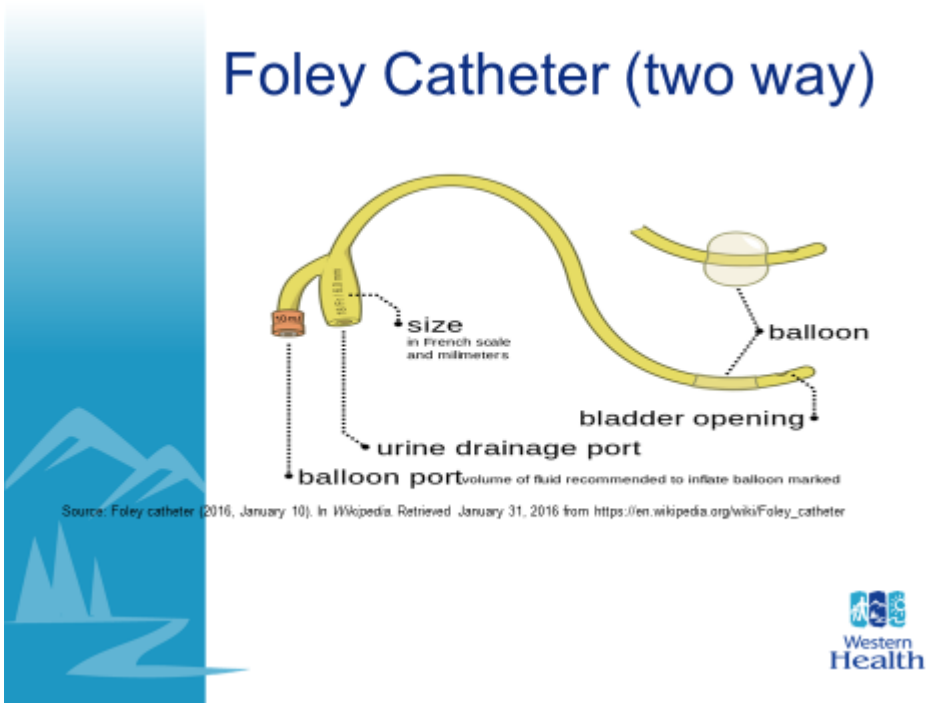
For example, a resident who previously dressed themselves, could feed themselves, and was continent (0 points on the scale) now requires supervision or cuing to dress, assistance with mobility, is incontinent (3-4 points on the scale) within 7 days would have acute functional decline.



(*Add interaction here so staff know they chose the correct answer*). Question 1 answer is True; question 2 answer is True- rational: measure temperature base on the patient/resident's previous normal. If it is 1.5°C above their baseline, it is considered a fever.

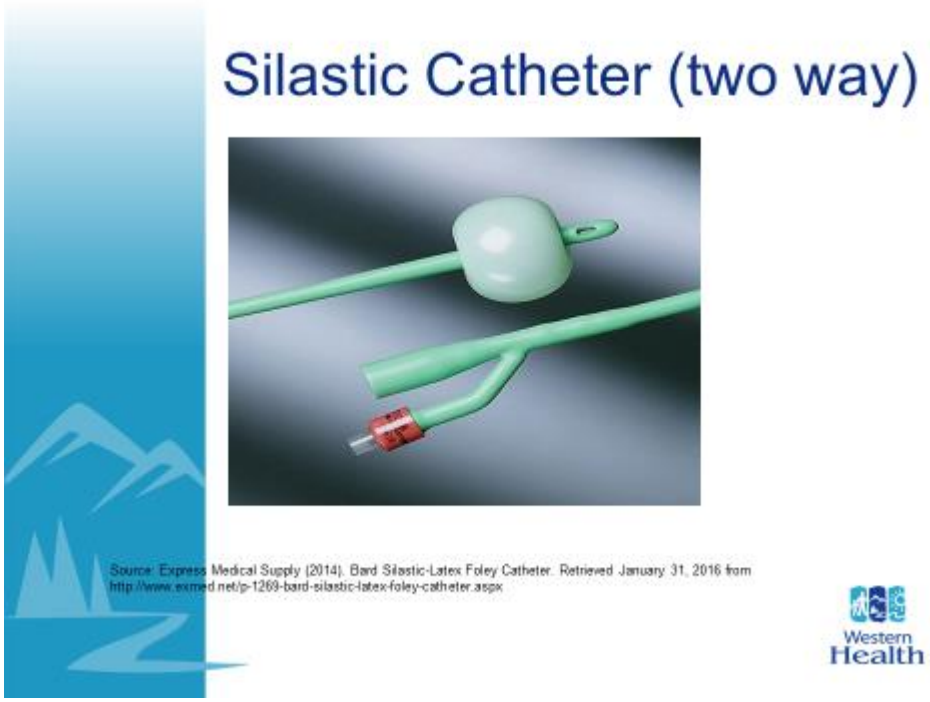


The following slides describe the types of urinary catheters available to nursing staff at Western Health. They come in a variety of sizes from an eight french up to 24 french. Size selection depends on the type of catheter selected and their indication for use. The 14 french is the most popular size currently used at Western Health. Remember it is best practice to select the smallest size possible for the indication for use. This will be further discussed in the module related to urinary catheter insertion. Please note, this module does not cover specialty urinary catheters which may be found in the urodynamic lab or in the operating room.

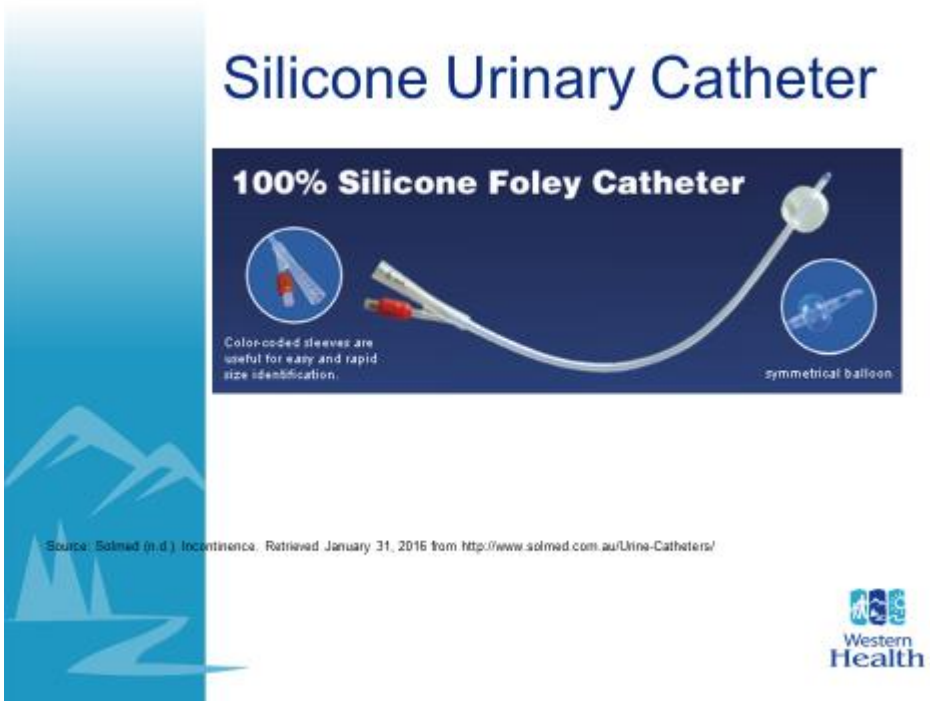


he foley catheter is generally uses for short term indication of urinary catheter need (refer to policy 15-04-70 and module 2 for discussion on appropriate indications both short and long term urinary catheters). Before insertion, ensure you patient does not have an allergy to latex as some manufactures still have latex in the regular foley catheter. This type of catheter should be used when catheterization is expected to be less than 14 to 30 days. Short term use catheters are usually yellow in colour. There is no standardized timeline for urinary catheter changes. This must occur based on assessment of appropriate indication (discussed in module 2), leaking, infection, or build up of biofilm causing obstruction (NHSN, 2015).

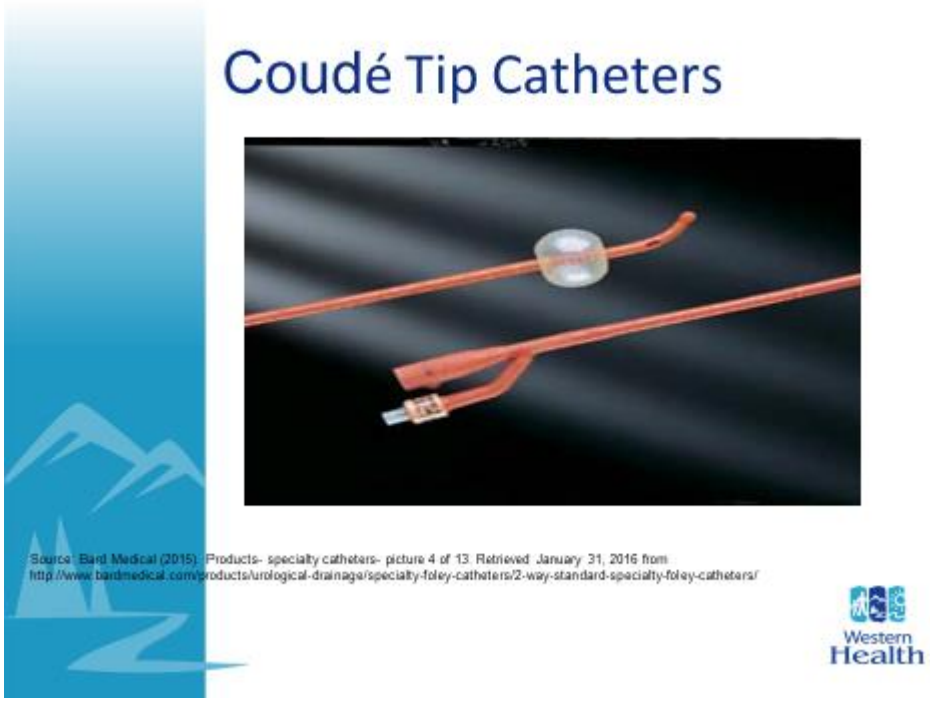
If sampling urine from a urinary catheter that has been in place for greater than seven days, it is recommended the catheter be replace prior to specimen collection as biofilms will be present and may give a false positive urine culture (CDC, 2009). As well, if not changed before urine collection and has been insitu for greater than seven days, a urinary catheter should be replace prior to commencing antibiotics to treat a UTI as antibiotics will not break down bacteria present in biofilm found on the catheter.



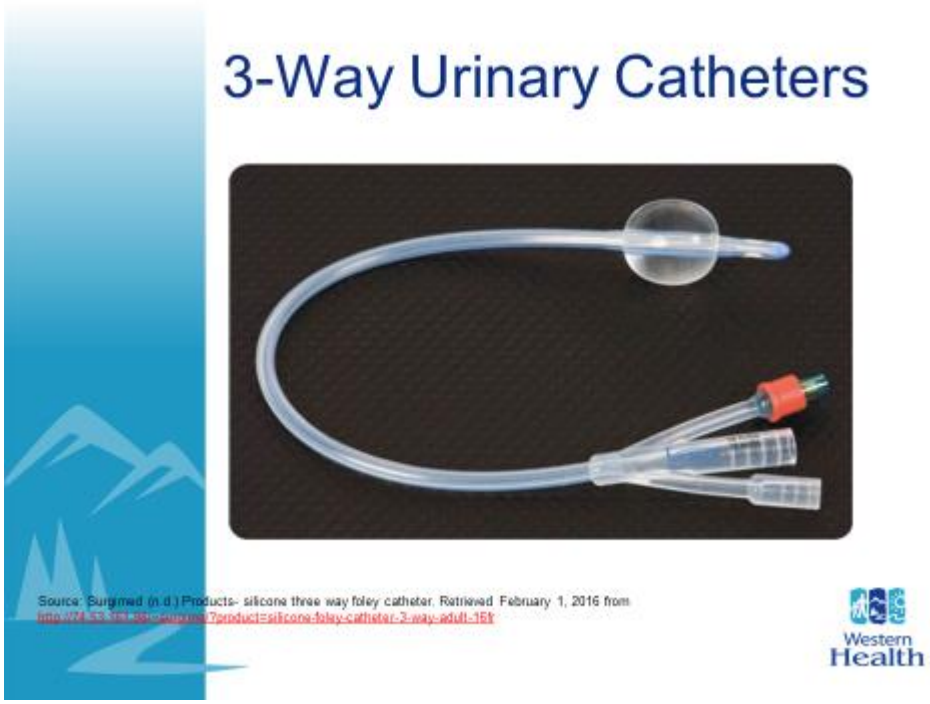
Silastic catheters are made with latex coated with a silicone exterior and are engineered for long term use (≥30 days [Bard®]). These catheters are usually light green in colour.



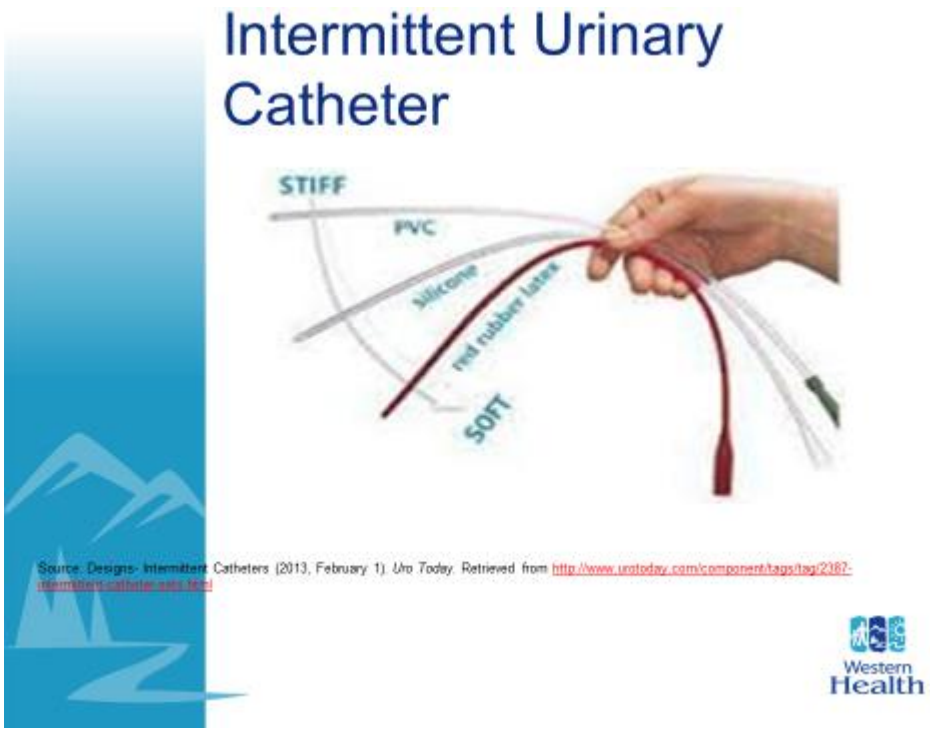
Silicone urinary catheters are made from silicone and are usually clear. These urinary catheters are recommended for long term use. Sol Med website state they can be in place for up to 60 days.



Coudé tip catheters are specialty catheters used in males with enlarged prostates (Bard®). They are usually red in colour and have a curved tip to aid with passing the urinary catheter through the prostate. If you patient/resident meets the criteria for long term urinary catheter and require a coudé tip catheter you will need to order a silastic or silicone version from your stores department. If you have never inserted a coudé tip catheter, it is recommended you consult the urology technicians to do so as there is a special technique and education required. It would be a great learning opportunity to insert this catheter with the guidance of the urology technician!

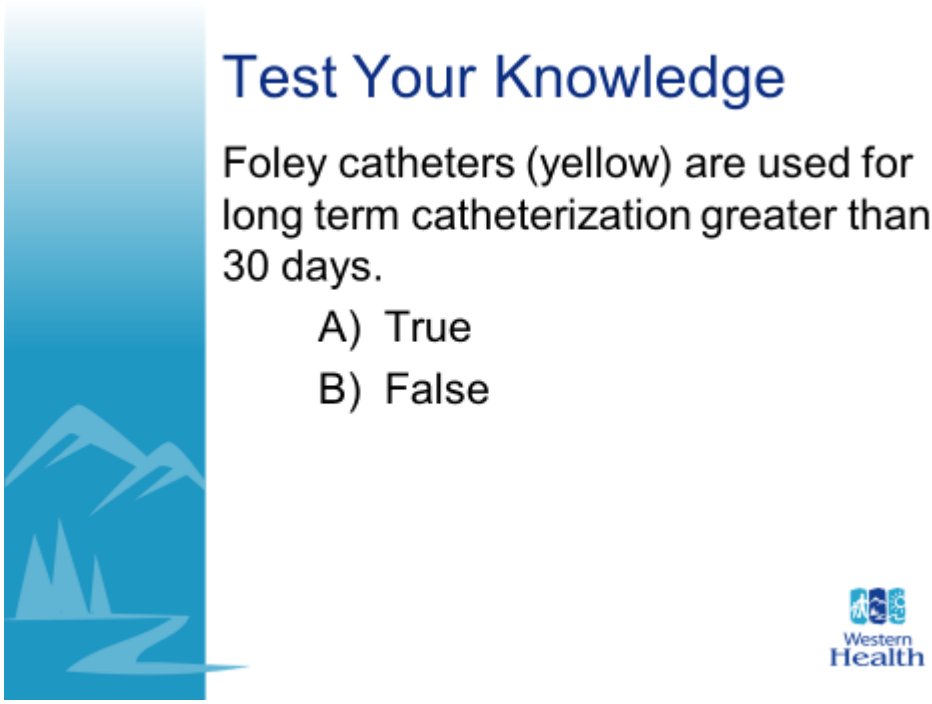


Three way urinary catheters are used when continuous bladder irrigation (CBI) is required (Nursing Procedures, 2013, p. 207 and 382) . Most of the three way catheters used in Western Health are either latex with a silatic coating or are clear and made from silicone as in the image shown here. Length of time for use would be determined by a physician, usually a urologist.

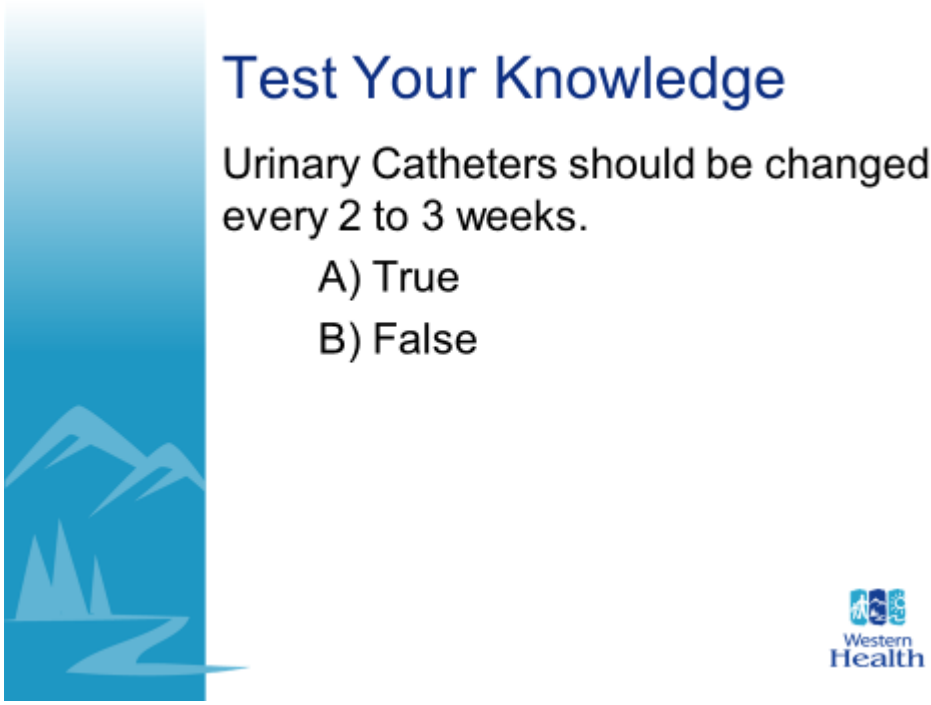


Intermittent urinary catheters come in a variety of types and sizes. They are usually used to relieve short term urinary retention, in place of long term catheters in persons with neurogenic bladder dysfunction such as patients with spinal cord injury, or in some cases for urinary specimen collection (Nursing Procedures, 2013, p.377). Intermittent urinary catheters do not have a balloon and cannot remain in place.

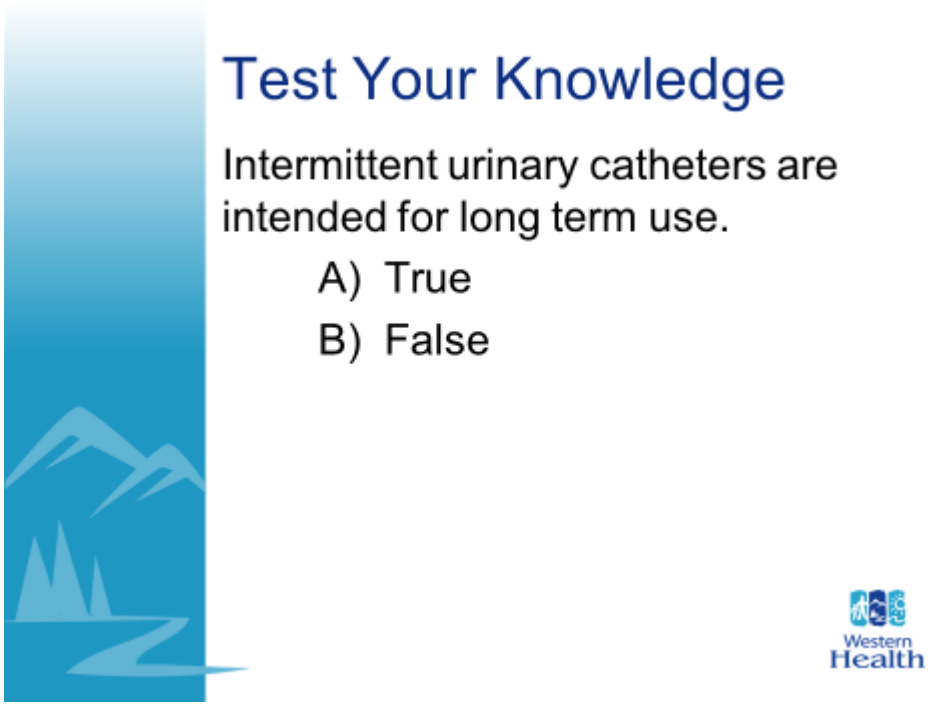
Condom or “texas” catheters are a non-invasive method of urinary management in males. They are useful for managing incontinence or for measuring urinary output, however, if there is retention or obstruction, they will not provide clinical improvement for the patient/resident.



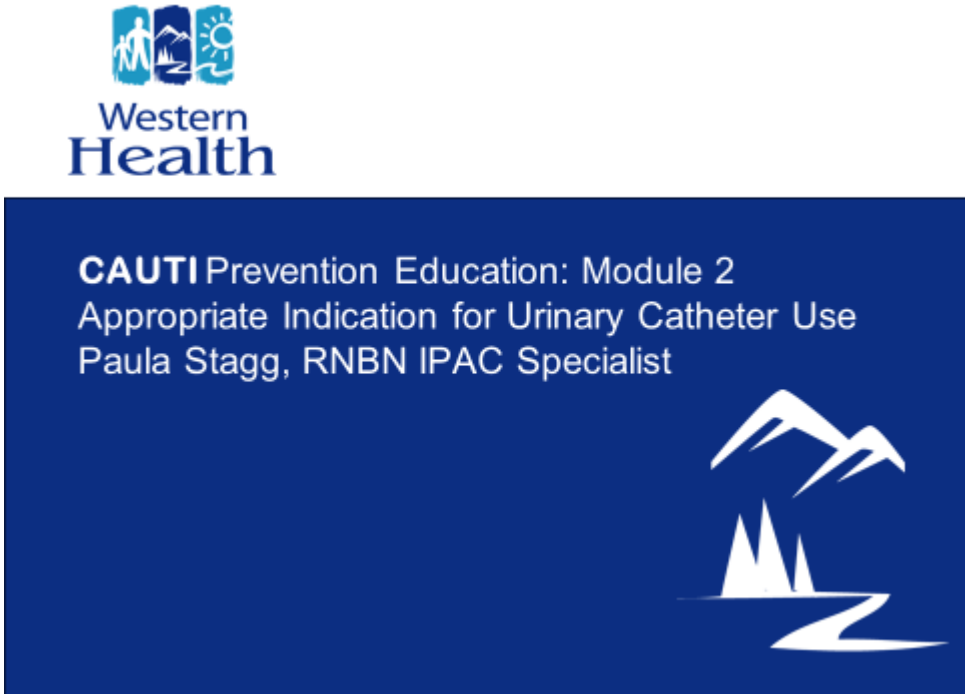
Answer: False. They are used for short term catheterization for no more than 14-30 days duration.



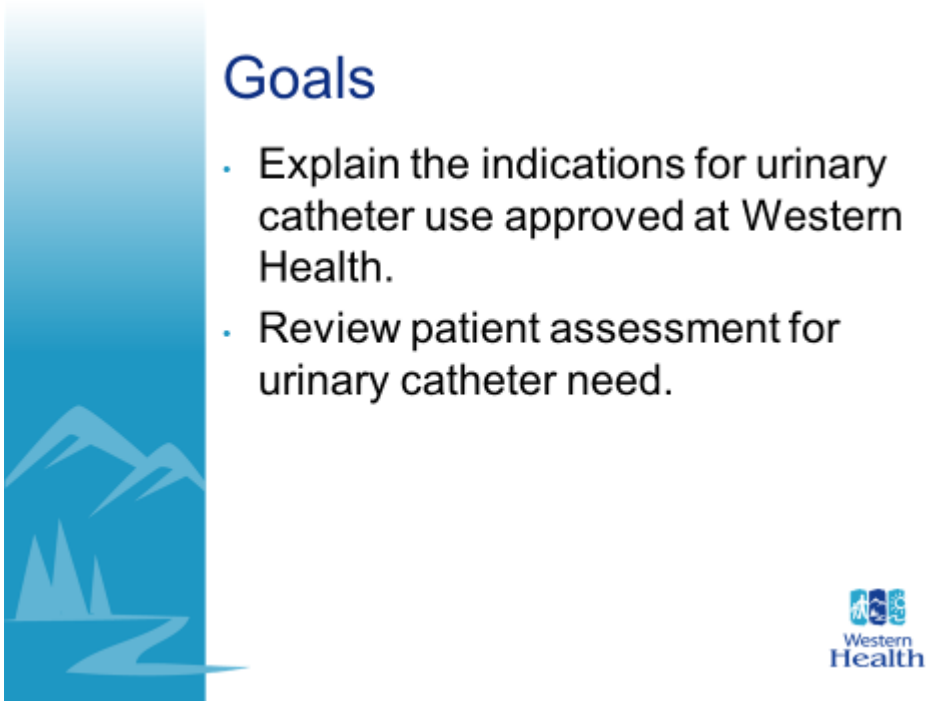
This is false. Changing urinary catheters should be done based on individual patient/resident assessment. Indications for changing catheters are blockage, leaking, prior to treatment of symptomatic urinary infection and/or prior to specimen collection in a patient/resident who's catheter has been in place for greater than 7 days



Answer is false. Intermittent urinary catheters do not have a balloon to anchor the device and are to be removed at the end of the procedure for which they were intended.

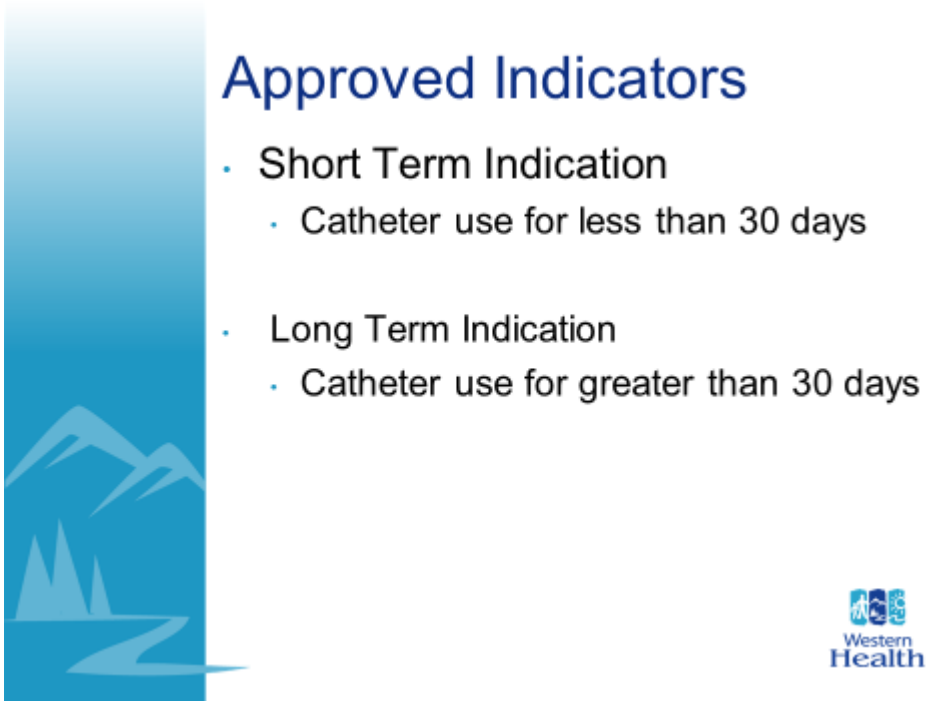


The second module will focus on assessment of the patient and provide rationales for the correct selection of indication to avoid inappropriate use of urinary catheters.

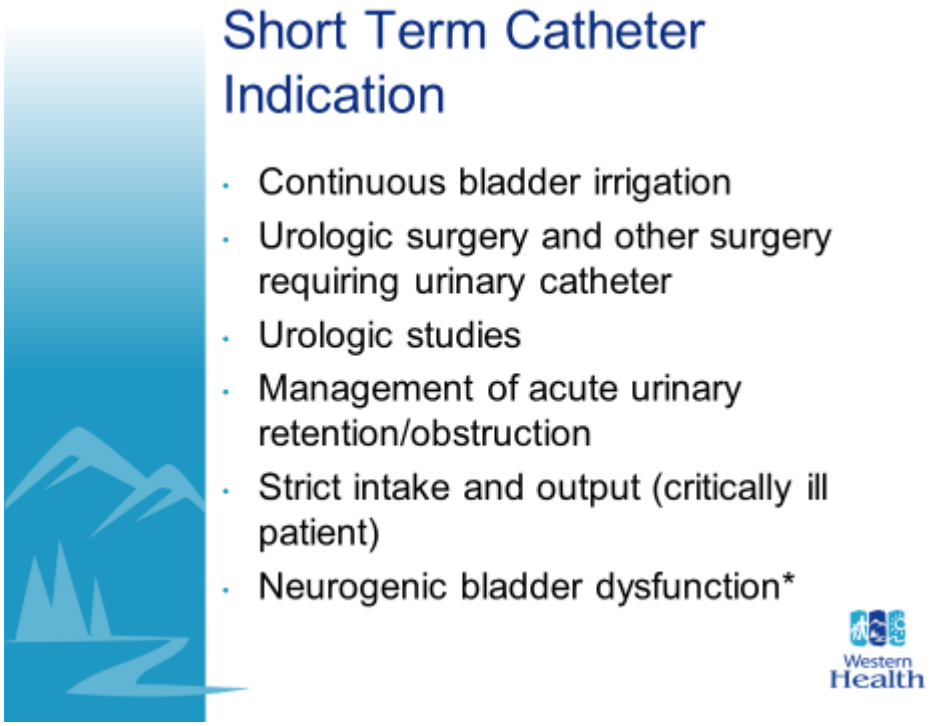


You may be wondering why there is a high focus by infection prevention and control to minimize use of urinary catheters. The Canadian Patient Safety Institute website states each year in Canada, health care associated infections (HAIs) are responsible for 8,000 deaths and another likely 220,000 HAIs (Canadian Patient Safety Institute, 2014). It is estimated that urinary tract infections account for 40% of all HAIs (Gokula et al., 2012; Wilson et al., 2009). Of these, 80% are related to indwelling urinary catheters (catheter associated urinary tract infections -CAUTI) (Loeb et al., 2008). That drills down to approximately 78,000 CAUTIs in Canada every year. Meddings, Rogers, Macy and Saint (2010) stated "the greatest risk factor for CAUTI is prolonged catheterization" (p. 550). Other complications related to prolonged indwelling urinary catheters include decreased mobility, damage to the meatus and/or urethra, increase use of antibiotics, increased length of stay, and pain (Salamon, 2009).

The Canadian Institute for Health Information reports CAUTIs as an adverse nursing outcome for patients. The life cycle of a urinary catheter has multiple points for interventions by nurses which can decrease a person's risk for acquiring a CAUTI. One intervention nursing can do is to assess the patient for need of urinary catheter and to evaluate that patient every day to ensure the indication for urinary catheter remains valid. Patients who no longer meet appropriate indication for urinary catheter use should have it removed.



Indications for urinary catheter use has been researched extensively. The Center for Disease Prevention and Control (CDC) has created a bundle approach to prevent CAUTI. Part of the bundle includes assessment for appropriate indication. Policy 15-04-70, Prevention of Catheter Associated Urinary Tract Infections, lists the approved indications for indwelling urethral urinary catheters. These indications are divided into two categories: short term use , less than 30 days; and long term use, greater than 30 days.



Short term indications for urinary catheter use include (bold out each section when you read it)

1) continuous bladder irrigation;

2) urologic surgery and other surgery requiring a catheter – this includes

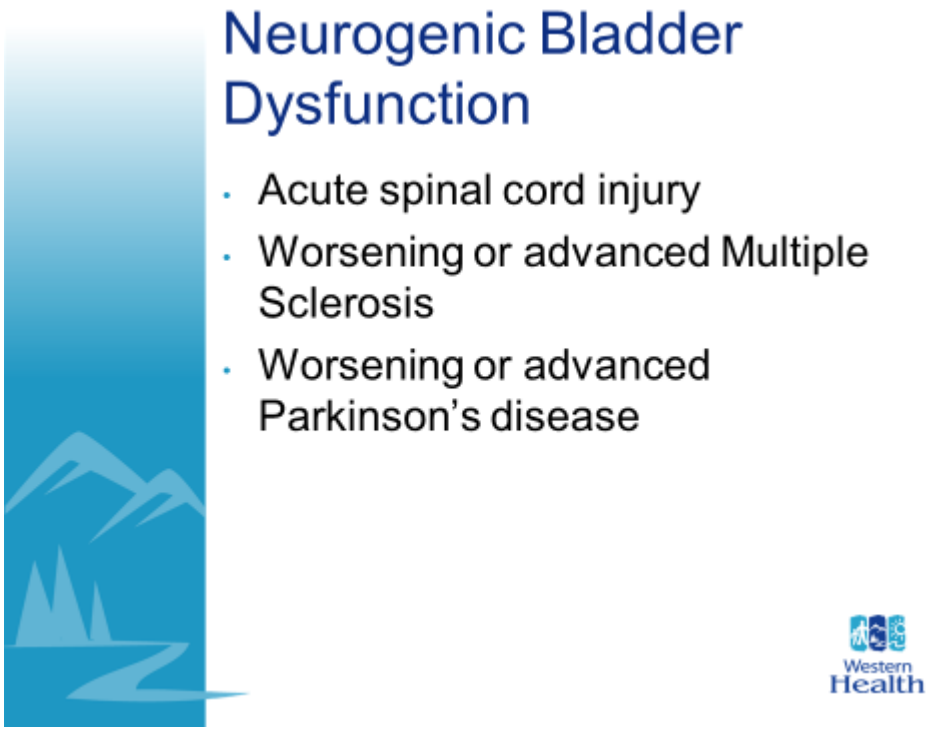
> " i) anticipated prolonged duration of surgery (catheters for this reason should be removed in the post anaesthesia care unit [PACU]),
>
> ii) patients anticipated to receive large-volume infusions or diuretics during surgery,
>
> iii) or need for intraoperative monitoring of urinary output" (CDC, 2009, p. 11);

3) urologic studies such as cystometry and measurement of a post void residual;

4) management of acute urinary retention or obstruction –acute retention may be related to analgesia. Try an in and out catheter if retention is assessed to be related to analgesia and follow up with bladder scanning (see bladder scanning module). Obstruction related to stricture or narrowing of the urethra is common in men who may have an enlarged prostate. If there is resistance with urinary catheter insertion, do not force as you may cause further damage. If you are certified in Coude tip insertion, try that, if not, call the urology department for further assistance. An obstruction may require further intervention by the urodynamic lab technologists or urologist.

5) Strict intake and/or output in the critically ill patient (usually limited to intensive care units);

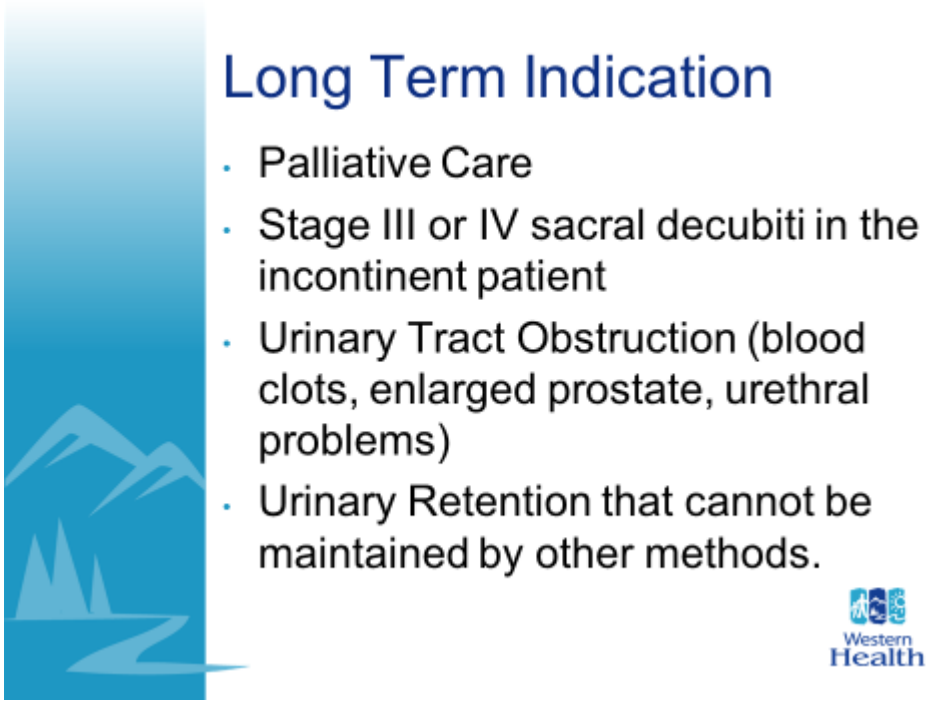
6) Neurogenic Bladder dysfunction. Since the introduction of the bladder bundle documentation in COD, neurogenic bladder dysfunction is the most incorrectly used patient indicator. Neurogenic Bladder Dysfunction is defined as a spastic or flaccid bladder caused by neurologic damage. Signs include incontinence from overflow, urgency, frequency, or retention (Shenot, 2014).



In cases where neurogenic bladder is the indication, please assess your patient well. During the acute phase of a spinal cord injury, an indwelling urinary catheter is appropriate. However, once the injury has stabilized, routine in and out catheterization to aid in prevention of urinary incontinence may be a more appropriate choice. Many

patients with spinal cord injury may be taught to self catheterize (CDC, 2009). Talk to you patient about their routine. If this is a new or worsening dysfunction, consult with urology to help create an individualized care plan which may help avoid long term catheter use.

Even though the patient's disease may be progressing, it is important to reassess daily for catheter need and to plan a trial to void with the urology team or family physician.



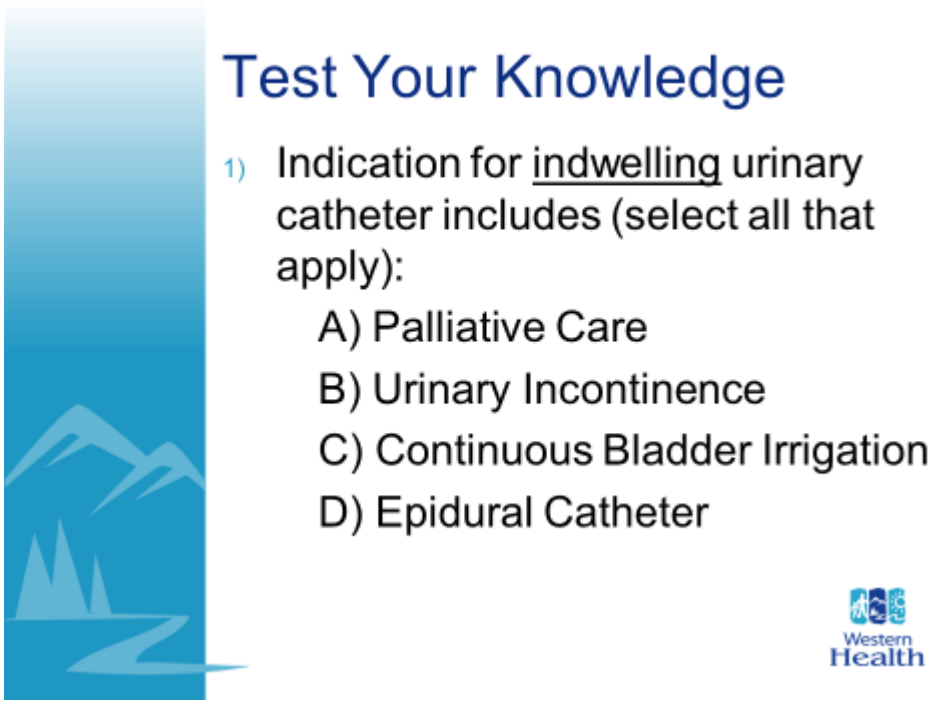
Palliative care patients who are near the end of life may require a urinary catheter for comfort measures. Although the duration may be less than 30 days, using a silastic or silicone catheter would be recommended because determining how long a person can survive a terminal illness is patient and disease specific. Utilizing a long term catheter will limit the need to change the catheter as they are designed for longer use, thus limiting the trauma of catheter changes.

Stage III or IV sacral decubiti in the incontinent patient/resident is recommended in the literature (CDC, 2009). However, this decision should not be made lightly. Remember, urinary catheters serve as a one point restraint for many patients/residents and may actually hinder healing as the patient/resident will not move as frequently, causing increased pressure on an already impeded area (Salamon, 2009). Alternate methods such as a condom catheter or frequent peri-care could improve patient/resident outcomes.

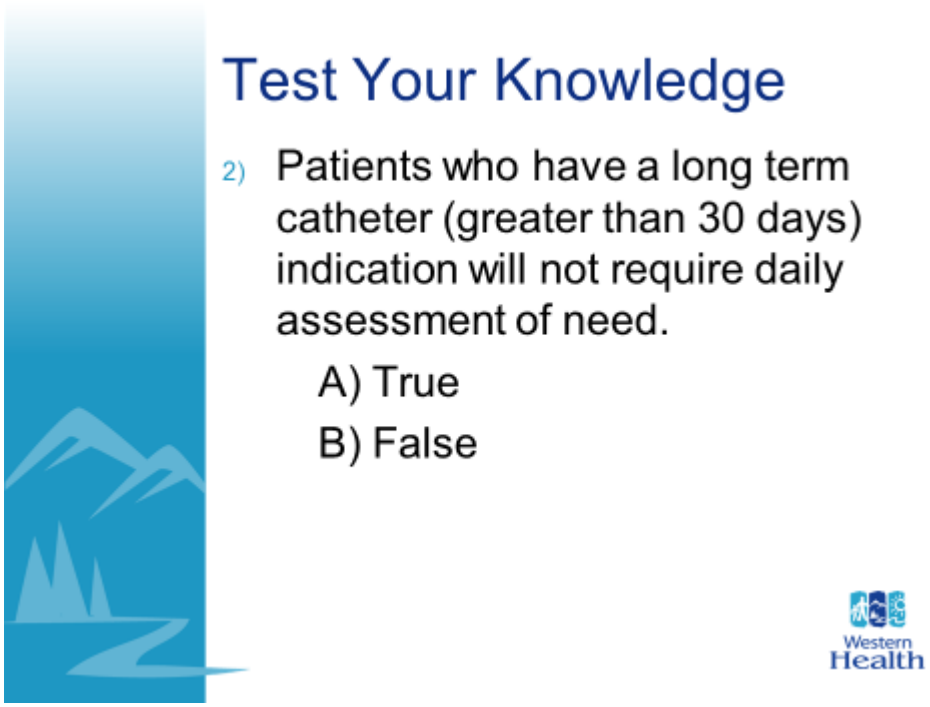
Urinary tract obstruction caused by blood clots , enlarged prostate, or other urethra problems or urinary retention not relieved with in and out catheterization should be indicated by the physician. In these cases, daily assessment of need is still required, however, consultation with the physician or urology is required prior to catheter removal.

So, you have a physician's order for urinary catheter insertion but your patient does not have an appropriate reason for urinary catheter use (ie, none of the previous indicators fit within you patient assessment). Do not insert the catheter. Talk to the physician to notify him or her why it has not been inserted. If the physician indicates he/she still want the catheter inserted, request a reason for catheter and write it in the CAUTI bundle documentation. Daily review of catheter need will still be required with prompt removal when no longer indicated.

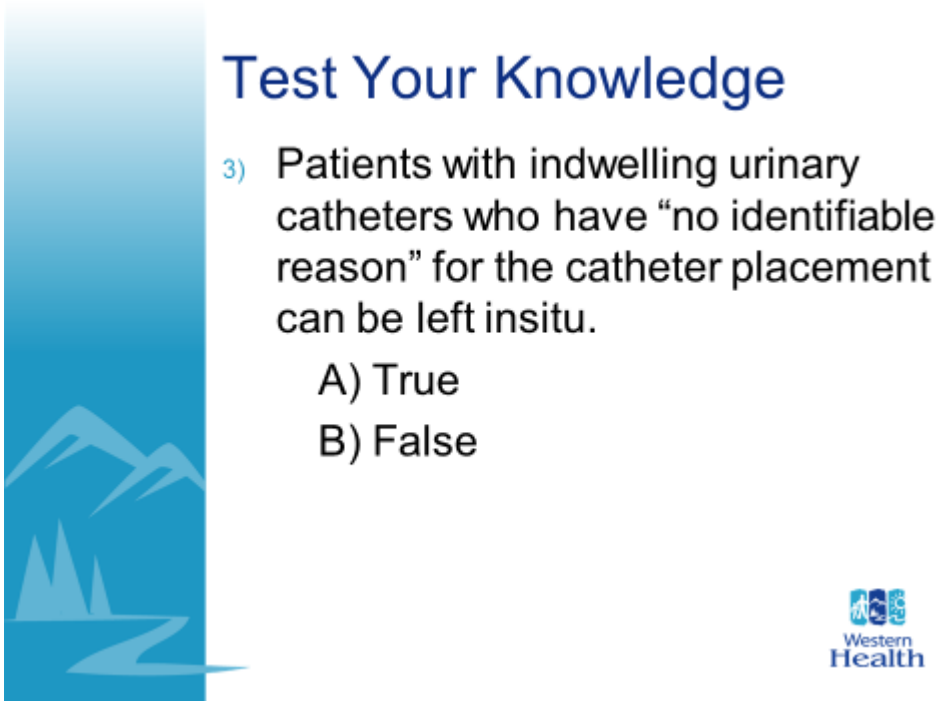
In the patient who previously required a urinary catheter and your current assessment does not identify a reason for the catheter, it is most likely no longer required. Selection of "no identifiable reason" should prompt you to get a removal order.



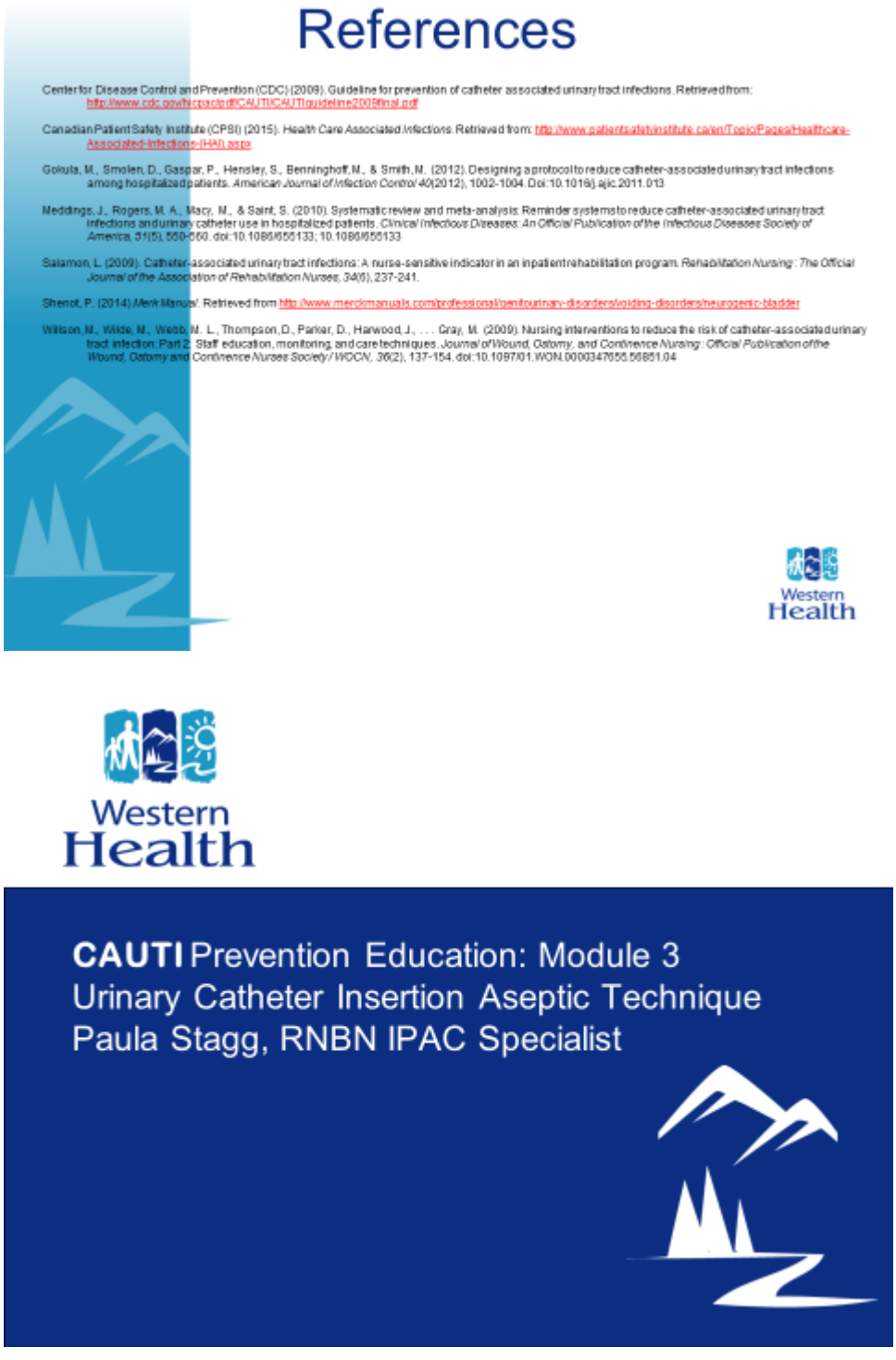
Answer: A and C are correct. Urinary incontinence alone is not an indication. Look for alternate methods of managing urinary incontinence such as a toileting regime or more frequent peri-care. Epidural catheter use is not a clinical indicator for indwelling urinary catheter use (CDC, 2009). If a patient has urinary retention related to the epidural, it is best practice to perform a bladder scan, and then do an in and out catheterization.



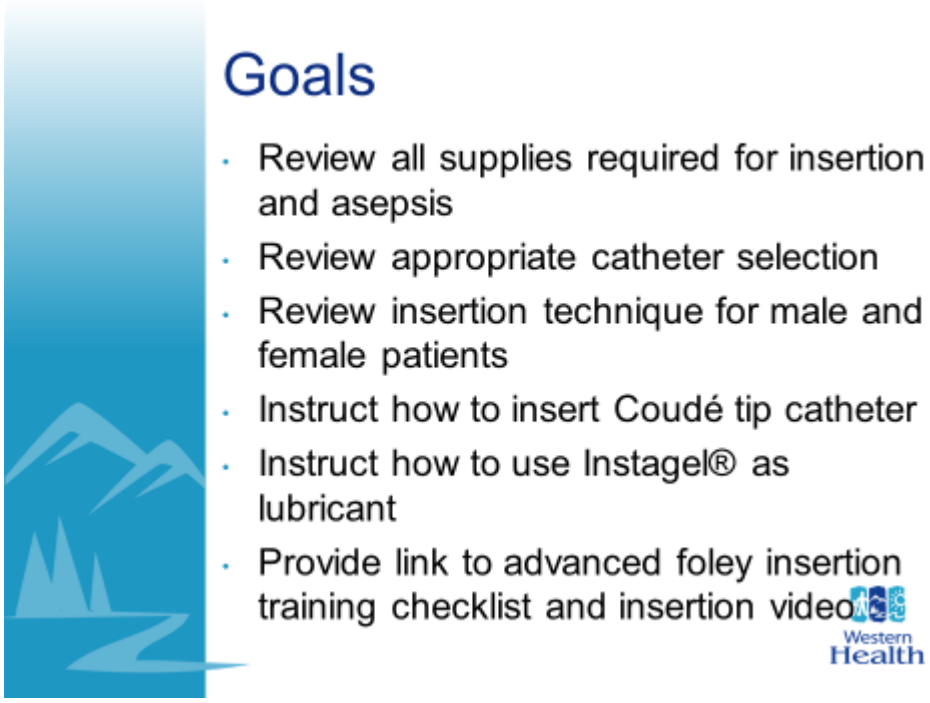
Answer: False. Assessment of daily need for indwelling urinary catheter must be assessed daily regardless of the original indication.

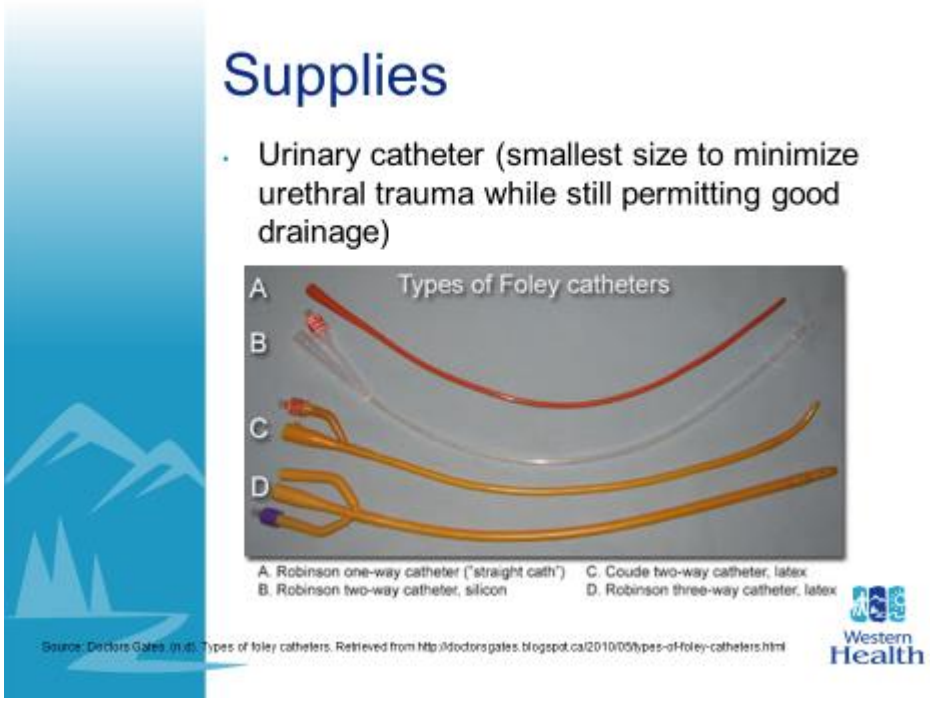


Answer is B: False. “no identifiable reason” serves as a reminder to nursing to get the urinary catheter removed.



This is the third of five modules and will focus on a review of urinary catheter insertion including maintaining aseptic technique. This module is aimed at staff who will insert urinary catheters within Western Health. Remember, the steps outlined are meant to serve as a guide for best practice. As long as you perform pre-cleansing of the genitalia with soap and water, maintain asepsis during set up and insertion, and perform hand hygiene at the appropriate moments you will be correct in your method. As you will see in the module, it is recommended to attach the urinary catheter to the drainage system prior to insertion. This step helps minimize risk of splash to your face during connection and eliminates gross contamination of the connection point thus limiting a medium for bacteria to grow.





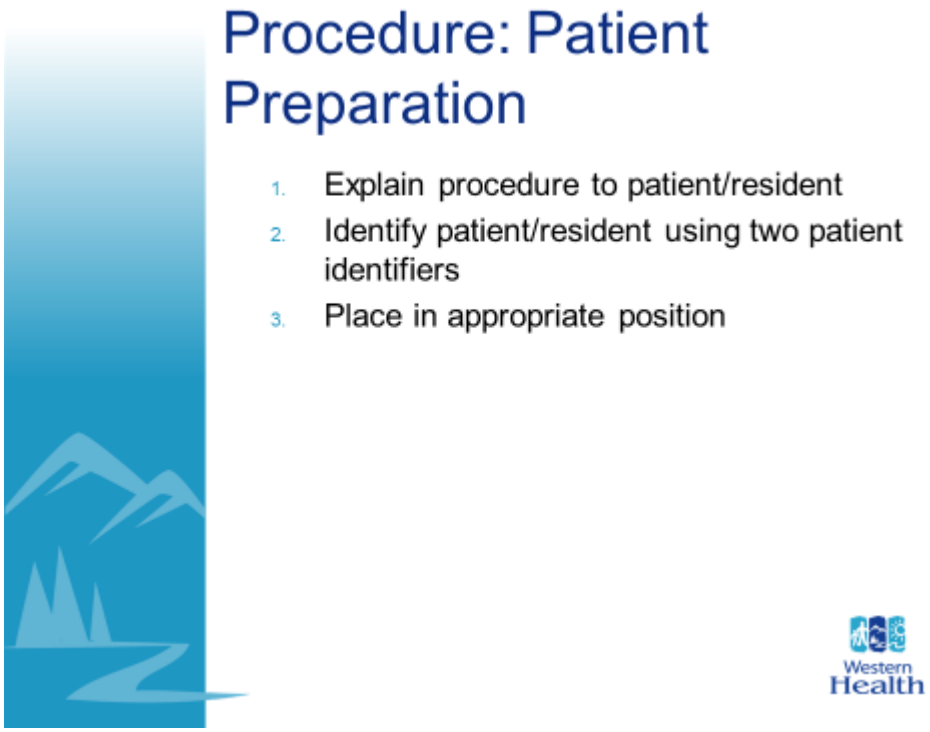
After you have determined your patient/resident meets an approved indication for urinary catheterization, you will need to collect all of the correct supplies prior to commencing the procedure. Urinary catheter choice will be dependent on your patient assessment. As you learned in modules one and two, a regular (yellow) foley catheter is selected for short term indication (CBI, urologic surgery or other surgery requiring urinary catheter, urologic studies, management of acute urinary retention, strict intake and output in the critically ill patient, or acute neurogenic bladder dysfunction- refer to module two for complete details). For long term indications where it is probable the urinary catheter will be in place for greater than 30 days (palliative care, stage III or IV sacral ulcer decubiti in the incontinent patient, urinary tract obstruction, or retension that cannot be maintained by other means) select a silastic (green) or silicone (clear) catheter. If there is known strictures or enlarged prostate select a Coudé tip (red) catheter. If you have never inserted a Coudé tip, find a co-worker who has or consult urology technicians for assistance. Sometimes an in and out urinary catheter will be the correct choice such as relieving retention in a patient with an epidural or when a clean urine specimen cannot be obtained by other means. The process and supplies (except for stabilization device and drainage bag) will be the same for in and out catheter as it is for indwelling urinary catheter.

Urinary catheter trays are sterile and come in a varity of styles. Some include the urinary catheter and drainage bag with the catheter connected to the drainage bag. Currently in Western Health, we use one supplied by Medline®. It includes a tray, lift out prep tray, absorbent balls, sterile gloves, fenestrated towel, under-pad, plastic transfer forceps, povidone iodine solution, sterile outer wrap, and lubricant pouch. We will be using the Instagel® product for lubricating, therefore you will not need the jelly included in the package.

There are currently three types of urinary drainage bags available at Western Health. The regular collection system (enlarge picture on the left) used for most patients, the urimeter (enlarge picture on the right) used for critical care or strict output observation, and the leg bag. The leg bag requires disconnecting the system and is not routinely recommended in hospitals as it increases risk of infection and will not be covered in these sessions.

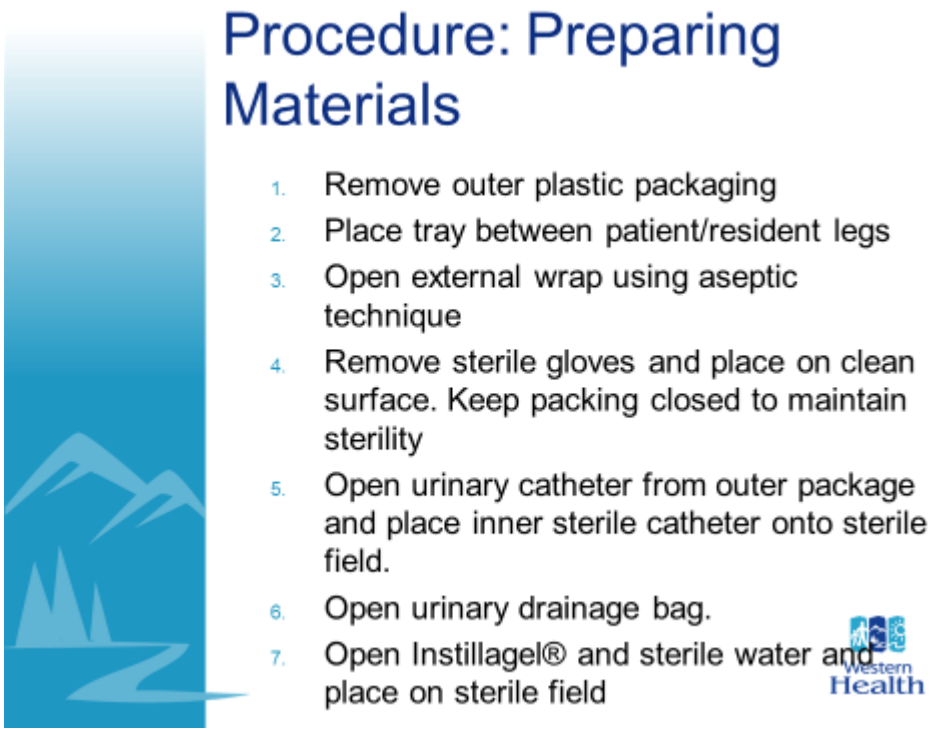
Alcohol based hand rub (ABHR) will be needed at the point of use. If one is not within arms reach of your workspace, bring one with you. A statloc stabilization device will also be used and is used to minimize trauma to the meatus by stopping the catheter from rubbing and pulling.

Instillagel® is used in place of the lubricant. It contains the local anaesthetic **lidocaine hydrochloride** and the antiseptic **chlorhexidine gluconate.** During your assessment, ensure your patient is not allergic to either of the ingredients. If they have a allergy to lidocaine or chlorhexidine, please use the lubricant included in the catheter insertion tray. You will also need clean gloves; peri-wipes or warm cloth with soap and a towel for pre-cleansing of the genitals; and a disposable linen saver to protect the bed linens.



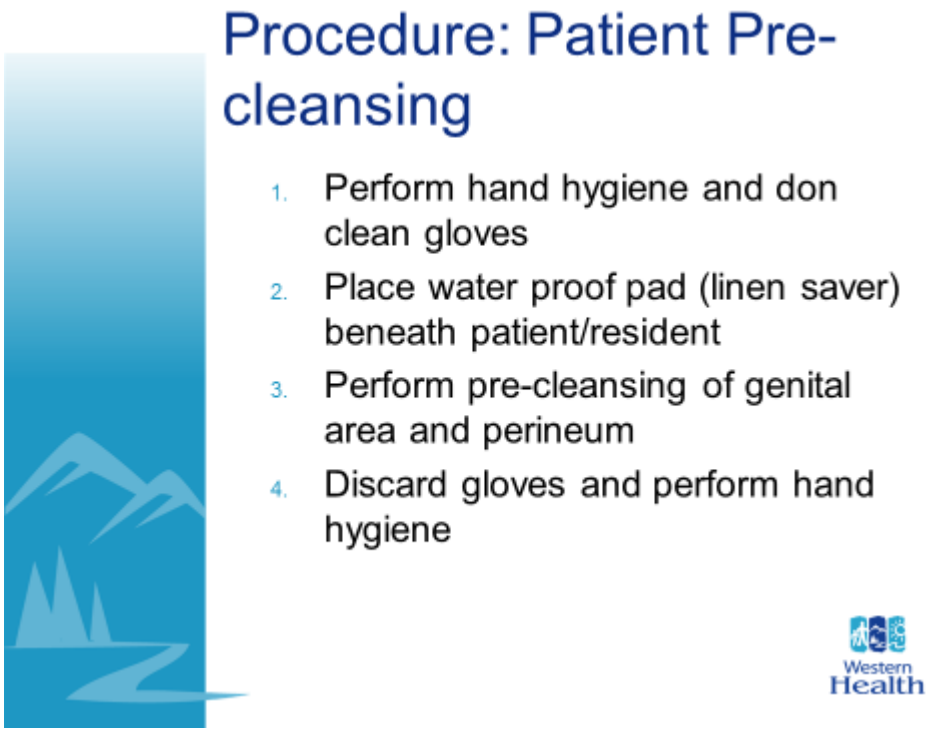
Now that you have all of your supplies you must identify yourself to the patient/resident and ensure you have the correct patient/resident by using two approved patient/resident identifiers. Explain the procedure ensuring they understand what a urinary catheter is and why they will be having one. It is a good idea to inform the patient/resident that the procedure may be uncomfortable but should not be painful. Ensure they are aware to let you know if it becomes painful. As well, since the procedure involves exposing the genitalia, many people are embarrassed and will need reassurance of their privacy.

Place the patient/resident in the appropriate position. For females, this is supine with the knees flexed and separated and feet flat on the bed about two inches apart. Alternatively, patients/residents with mobility challenges or severe contractures may be place on their side with knees draw up to the chest. Males will be supine with legs extended and flat on the bed (Nursing Procedures, 2013).



Open the outer plastic packaging, remove the wrapped tray and place between the patient/resident's legs. Open sterile wrap using aseptic technique. Remove the sterile gloves and place on a clean surface. Keep them in the package to maintain sterility. Open the sterile urinary catheter from the outer package, being careful not to contaminate the inner sterile wrap and place on sterile field. Open the urinary drainage bag and place on sterile field using aseptic technique. If the field is not large enough, keep the drainage bag in the opened wrapper close to your sterile field being careful not to contaminate the connection port. Remember you do not have on your sterile gloves yet. If you think you may contaminate your field, this step can be done later or by an assistant prior to insertion.

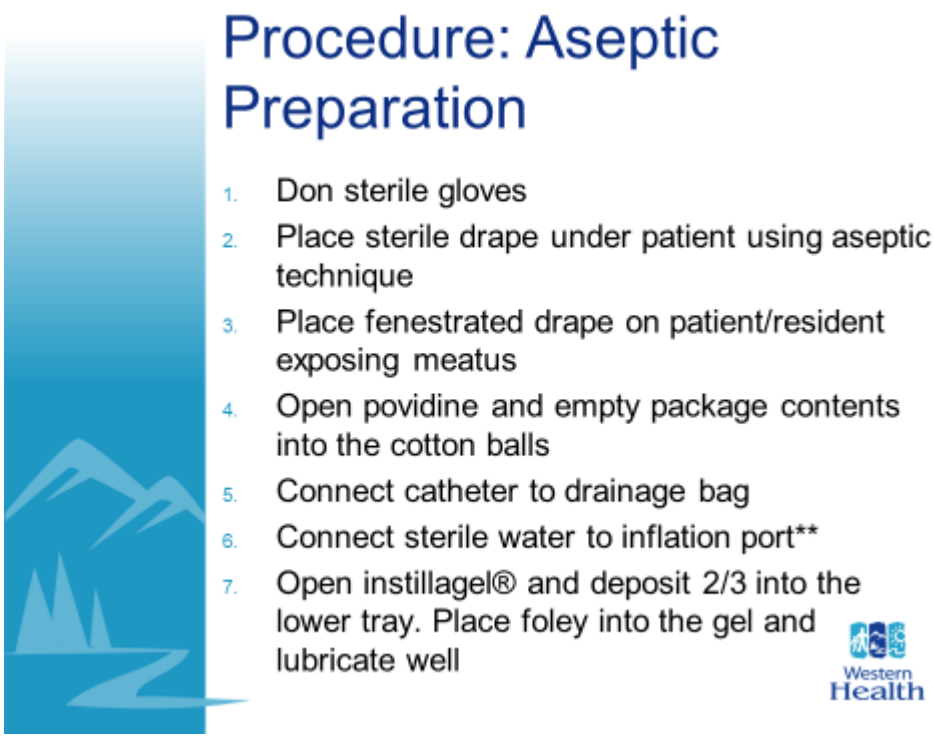
Open the instillagel and sterile water. Place both items on the sterile field using aseptic technique.



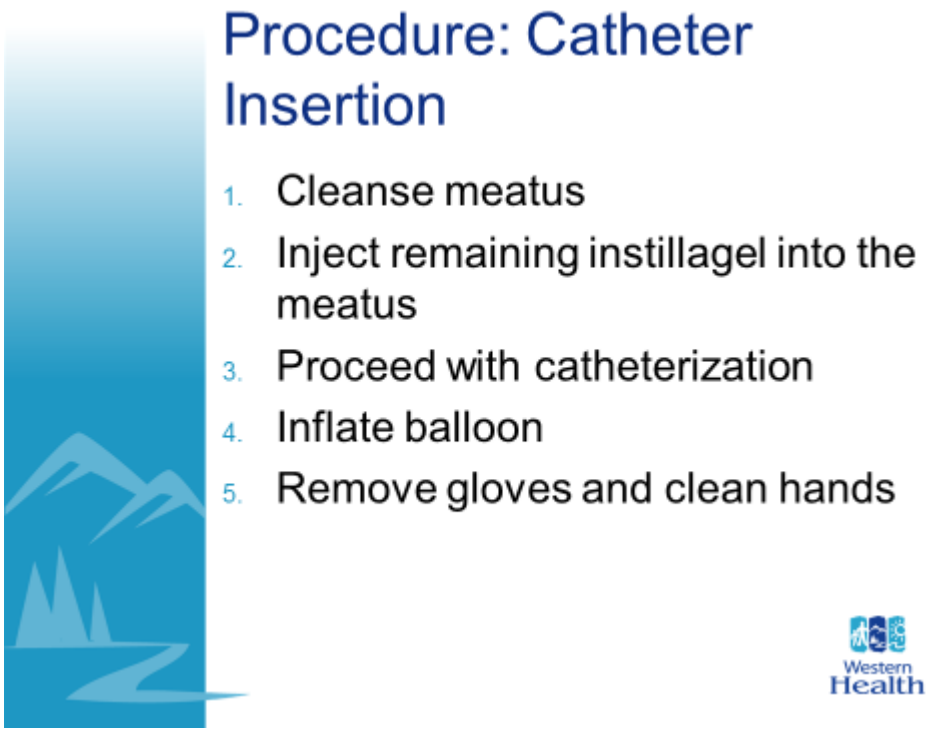
Perform hand hygiene and put on clean gloves. Place water proof pad under patient to protect linens. Using the pre-packaged peri-wipes or soap and water, cleanse the genital area and perineum using downward strokes from anterior to posterior. If using soap and water, rinse area with clean cloth and pat dry with a towel.

Discard gloves and perform hand hygiene with ABHR for 15 to 20 seconds.

**If you are concerned you or your patient may contaminate your set up, this pre-cleansing step can be done before opening your sterile supplies. However, if you choose to do the pre-cleansing step first, you will have a third moment for hand hygiene. This will be after opening external wrappers and before donning sterile gloves.



Now you are ready to prepare for catheter insertion. Don your sterile gloves using aseptic technique. Inside your catheter tray you will find the sterile underpad. Place this pad shiny side down under patient using aseptic technique. You now have an additional sterile field and may bring the set-up closer to your patient. There is a fenestrated drape included in the kit. Place this over the genitals, ensuring the meatus is exposed. Remove the lift out prep tray containing the absorbent balls. Open the povidine solution and pour over the balls, soaking them. Place forceps in the prep tray. Connect the urinary catheter to the drainage bag and you may also attach the sterile water to the inflation port. Do NOT test the balloon. The manufacture does not recommend pre-testing the balloon as it may cause microfractures in the catheter which could damage the urethra during insertion and increase risk of infection (Bard website education video). Open the Instillagel® and deposit about 2/3 of the product into the bottom tray. If the Instillagel® is contraindicated for your patient, use all of the lubricant included in the tray. Lubricate the urinary catheter well, ensuring product is covering at least half of the length.



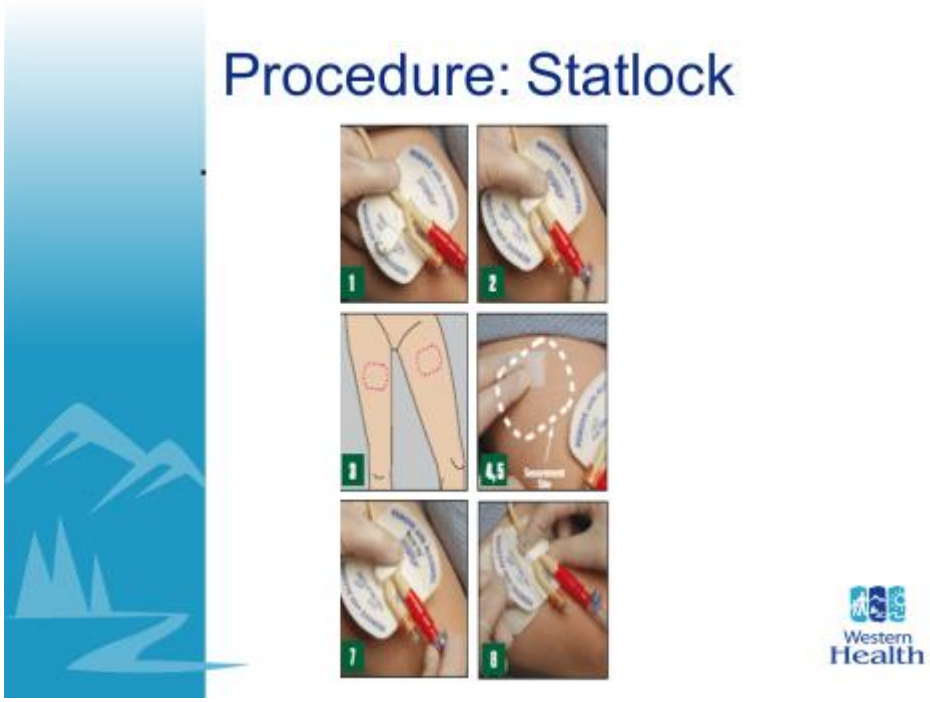
Male cleansing: Hold the penis with your non dominant hand. If the patient/resident is uncircumcised, retract the foreskin. Gently lift and stretch the penis to a 60-90 degree angle. Hold the penis this way throughout the procedure to straighten the urethra and maintain a sterile field. Cleans the penis in a circular motion starting at the urethral meatus and work outward using a clean cotton ball for each circle.

Female cleansing: With the non-dominant hand, hold the labia apart. With the dominant hand used downward strokes to cleanse the labia minora furthest from you and discard the cotton ball. Repeat for the labia minora closest to you. Use the last ball to cleanse the area between the labia minora.

If using Instillagel®, inject the remaining product into the urethra. This will help prevent trauma to the urethral lining as well as possible urinary tract infection.

Proceed with catheterization until urine is visible in the drainage tube. Advance the catheter two more inches (about 5 cm) in the female, or six to ten inches (almost to the bifurcation of the catheter) in the male patient.

Inflate the balloon using the amount of solution noted on the catheter port (5-10 ml). Once the balloon is inflated, ease the catheter back by gently pulling on the catheter until slight tension is detected indicating that the balloon is in place a the neck of the bladder. Remove debris, discard gloves and clean your hands.



Place Foley Catheter into retainer. Directional arrow should point towards catheter tip, and the balloon infiltration arm should be next to the clamp hinge.

Close lid by placing your fingers under the pad and pressing the grip markers at the end of the clamp with your thumb, being careful to avoid pinching the catheter.

Identify proper securement site by gently laying the Statlock® stabilization device straight on the front of the thigh, then back up one inch towards the insertion site. *make sure leg is fully extended.

Gently place the Statlock® stabilization device off to the side, away from the selected securement site.

Cleanse and degrease securement site with alcohol. Let skin dry. Be sure to clean area larger than securement site. **if patient has hair in the securement area, use clippers. Do NOT shave with a razor**

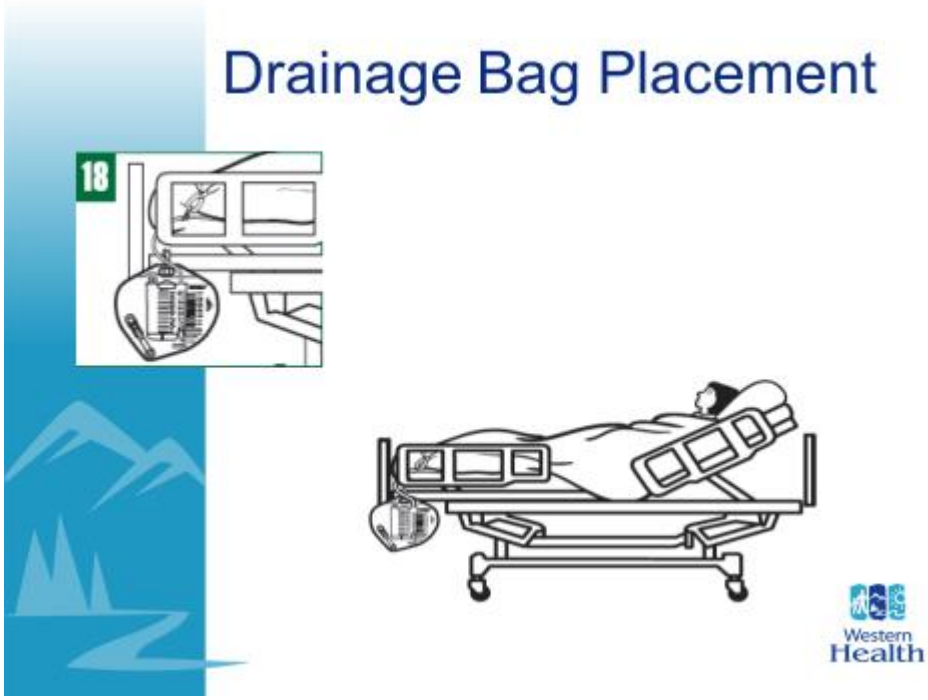
Apply skin protectant using both pads, in direction of hair growth, to area larger than securement site. Allow to dry completely (10-15 seconds).

Using permanent marker, write initials and date of application on Statlock® device anchor pad.

Align the Statlock® device over securement site leaving one inch of catheter slack between insertion site and the Statlock® device retainer. *Make sure leg is fully extended.

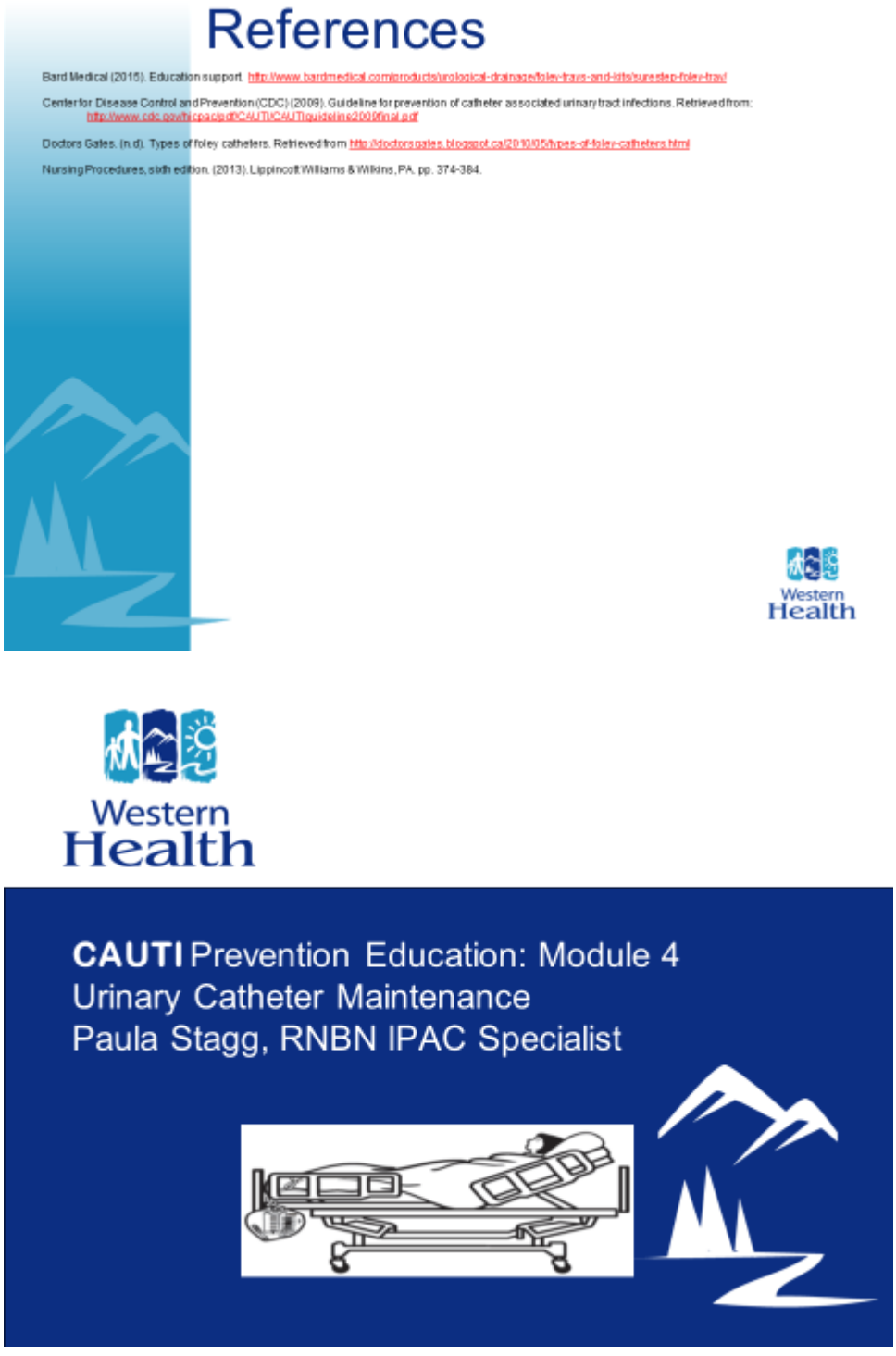
While holding the retainer to keep the pad in place, peel away paper backing, one side at a time, and place tension –free on skin.

Change when clinically indicated or every seven days*



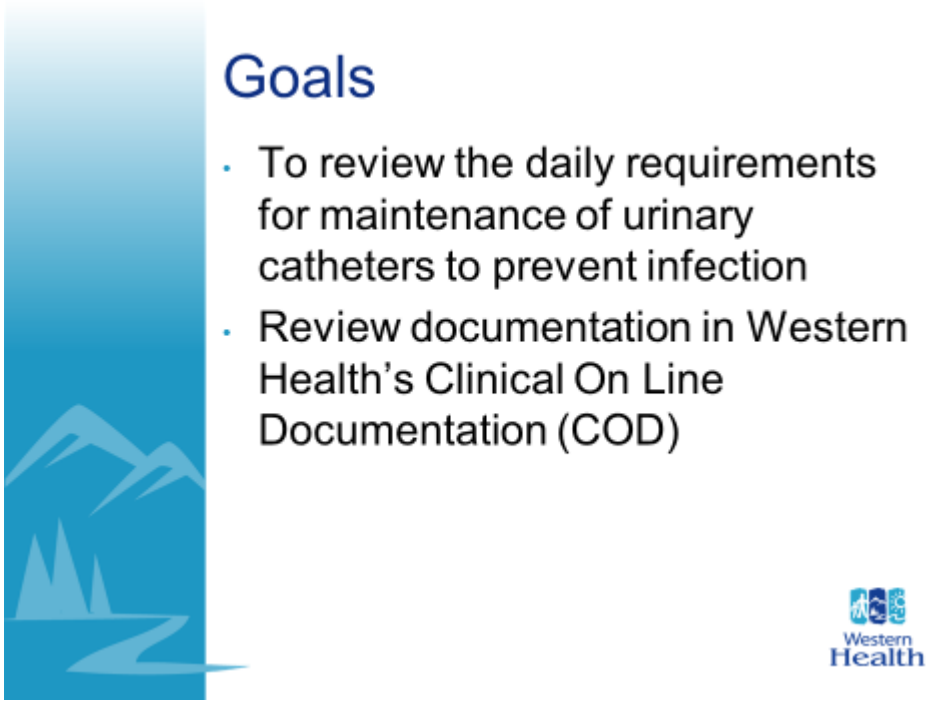
Position Hanger on bed rail at the foot of the bed and use sheeting clip to secure drainage tube to sheet, confirm tube is not kinked

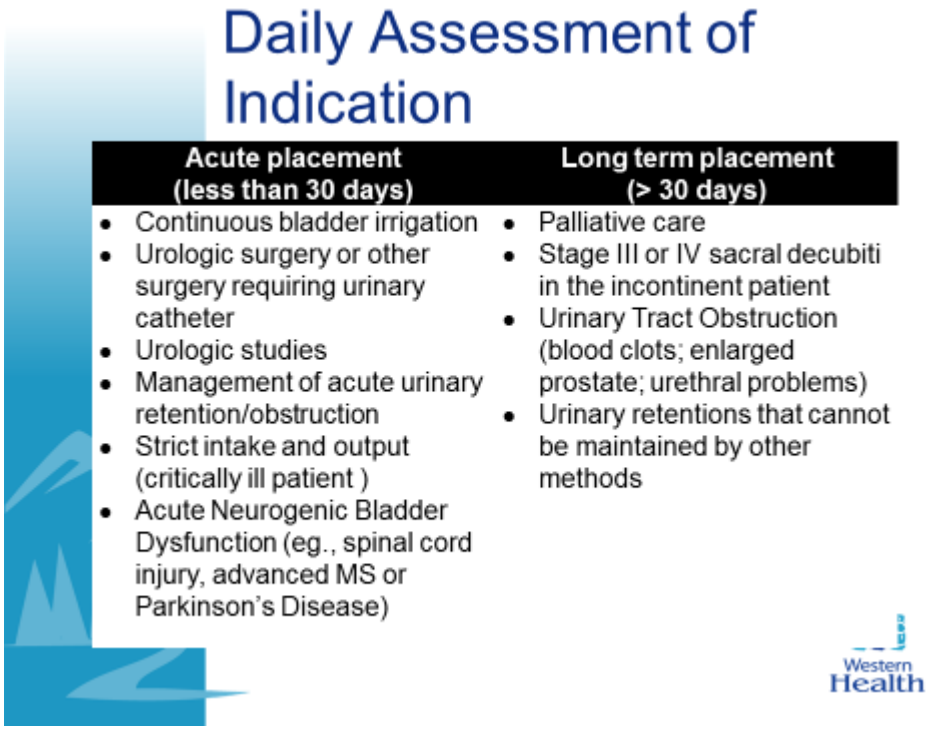
This video is approximately 20 minutes long and shows the steps for catheterization recommended by the CDC 2009 guidelines. It includes pre-cleansing, aseptic technique, catheter insertion, maintenance, stat lock application, urine specimen collection method, and proper maintenance of urinary catheter. Remember this is for a visual instruction supplement and we do not have this specific insertion tray. You will need to collect all supplies and assemble the pieces prior to insertion.



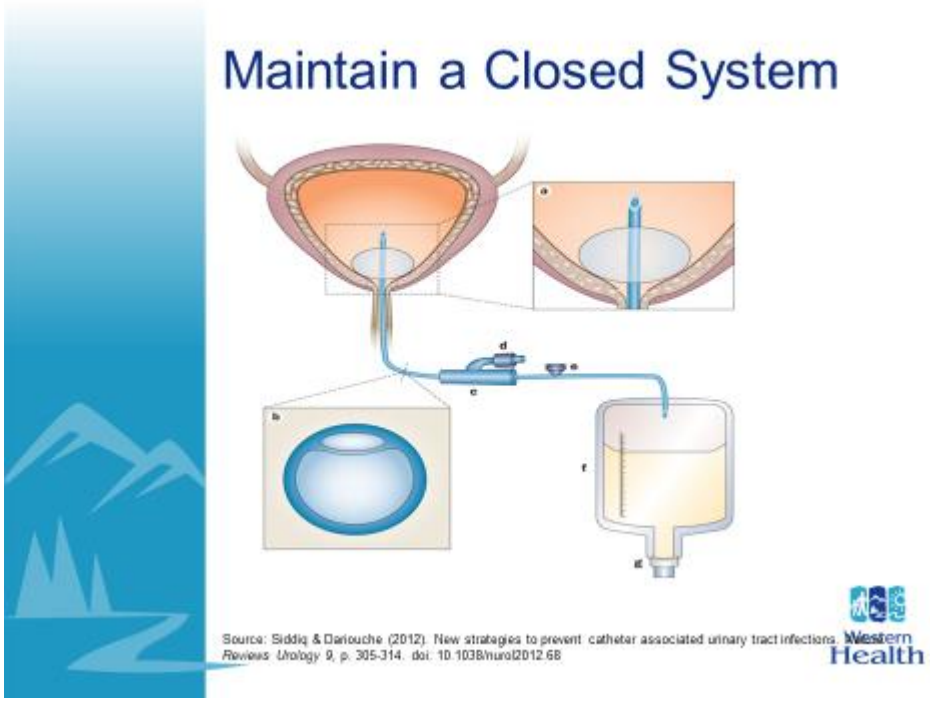
The fourth module is related to urinary catheter maintenance based on the CDC (2009) best practice guideline for prevention of catheter associated urinary tract infections and is

aimed toward any staff member who may have contact with patients/residents who have an indwelling urinary catheter

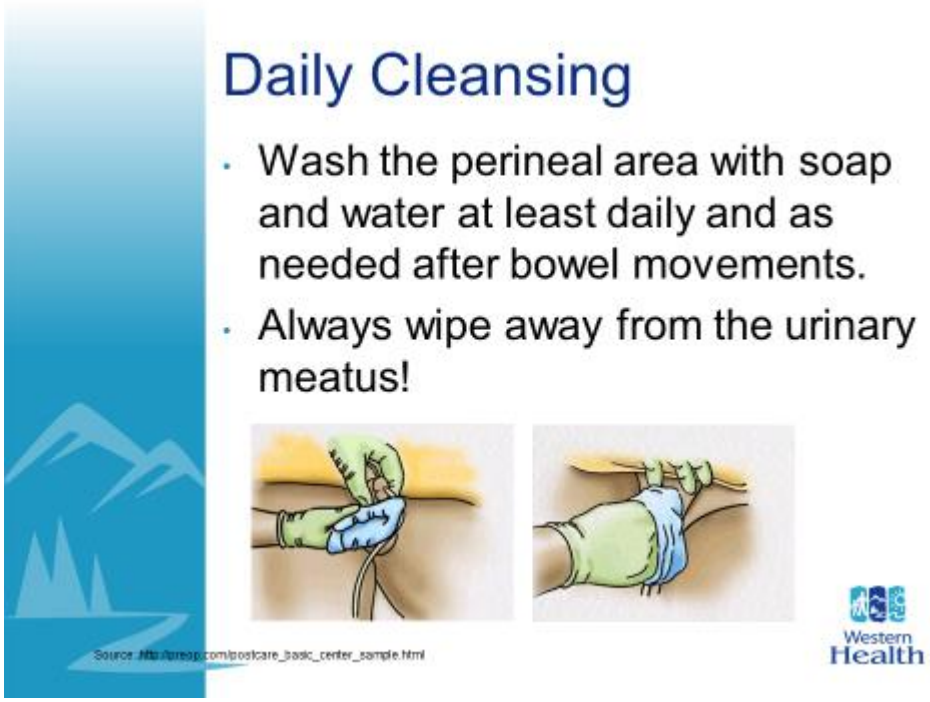




In module two we discussed appropriate indication for urinary catheter. As the patient/resident's nurse or physician, daily assessment of need is required. If the patient/resident no longer meets the criteria for indwelling urinary catheterization, it should be removed.



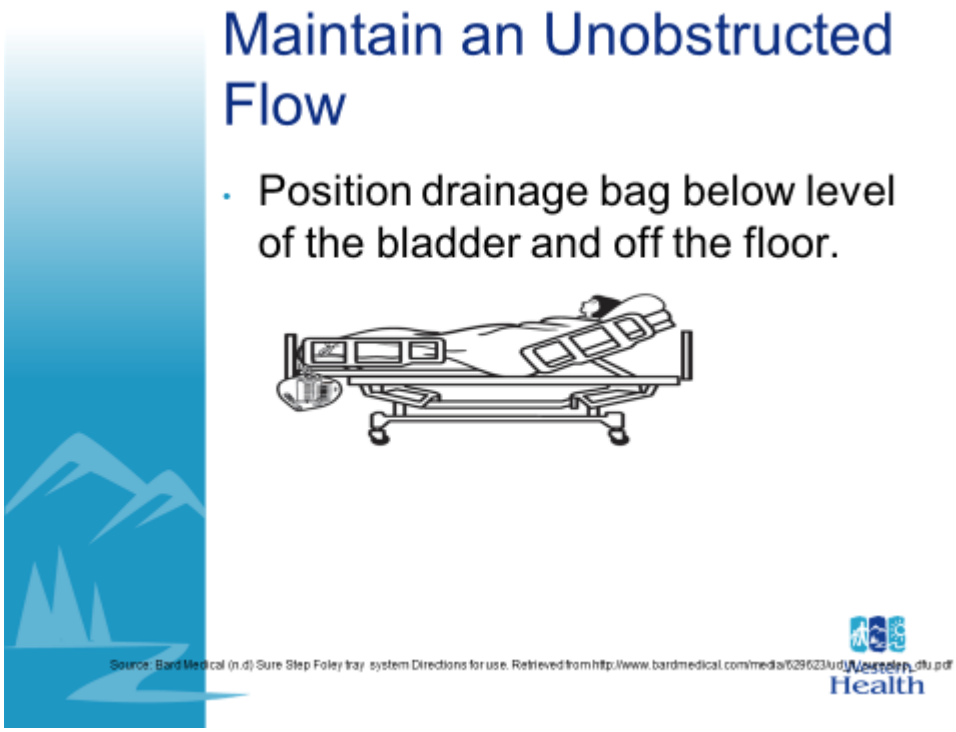
Once the urinary catheter in insitu, it is a "closed system". In other words, from the bladder to the drainage bag there is no breaks in the connection. It is not recommended to disconnect the catheter from the drainage bag unless absolutely necessary such as urinary catheter irrigation. If you need to disconnect the catheter from the drainage bag, ensure you use a clean technique. If you contaminate either end of the connection, cleans with an alcohol swab (70% alcohol) to decrease risk of bacteria growing at the connection site (Nursing Procedures, 2013).



Cleansing the urinary meatus and perineum is an important step to prevent infection. As with any procedure, begin with an effective hand cleansing with soap and water or alcohol based hand rub. If doing meatal cleansing during the bed bath, it is important to ensure you remove your gloves, clean your hands and don clean gloves to prevent introducing resident bacteria from other body parts into the bladder. Remember, the bladder is a sterile environment and should be maintained as clean as possible.

Use a clean cloth and soap and water. Starting at the meatus working outward, cleanse the perineum and urinary catheter. If the tubing has been contaminated, clean it as well with a clean cloth. Rinse with a clean wet cloth and dry well.

Some areas have begun to use the “M-Care” product by SAGE® which is created specifically for urinary catheter care. If the area you are working is using this product, continue to use as directed by the SAGE® representative.



The drainage system should be kept below the level of the bladder and off the floor at all times. If the patient/resident is in a “high-low” bed and is at the “low” position, it may be impossible to keep the bag from touching the floor. In this instance, some staff have been innovative by placing a clean linen saver under the bag to keep it as clean as possible.

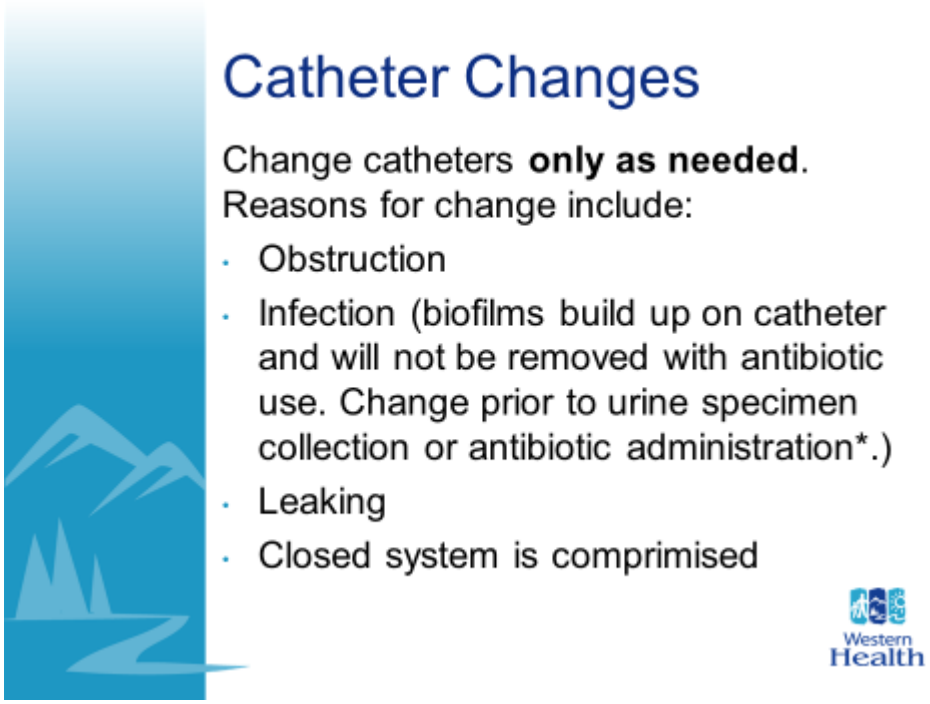
To aid with maintaining an unobstructed flow, ensure there are no kinks in the tubing. Utilization of the clip and bed sheeting to secure the drainage tube to the sheet will help keep the tubing in place.

Educate your patient on the principles of gravity drainage and the need to keep the drainage bag off the floor and below the level of the bladder (Nursing Procedures, 2013, p.381).

While mobilizing the patient, keep the drainage bag between the bladder and off the floor. If the drainage bag is more than 2/3 full, ask the patient’s nurse to empty the bag prior to mobilization as this will minimize risk of urine flowing back into the bladder and will make the bag easier to hold at the appropriate level while ambulating.

Supply each patient with a single patient/resident use labeled measuring device. Place a clean linen saver under the collection device. Drain the urine bag being careful not to touch the drainage port with your hands or with the collection container. Clean the measuring device after each use then disinfect the container with a Prevention disinfectant wipe. Allow the container to air dry to ensure sufficient contact time for disinfection to occur.

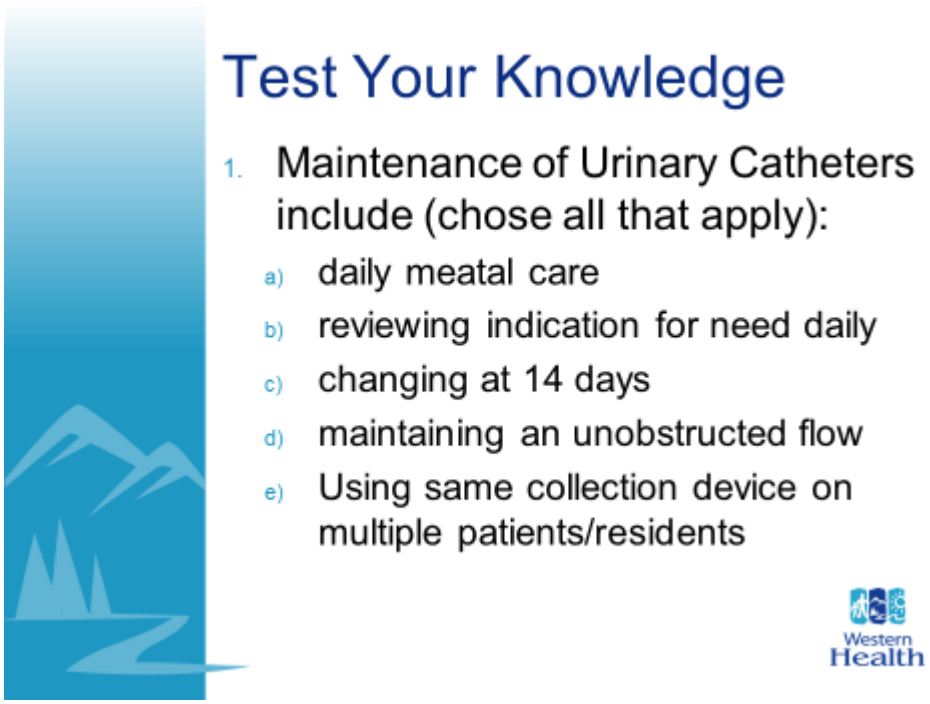
Drain the urine bag when it is about 2/3 full (CDC, 2009) or every three to six hours and prior to transport for testing, mobilization, or other procedures (Nursing Procedures, 2013).



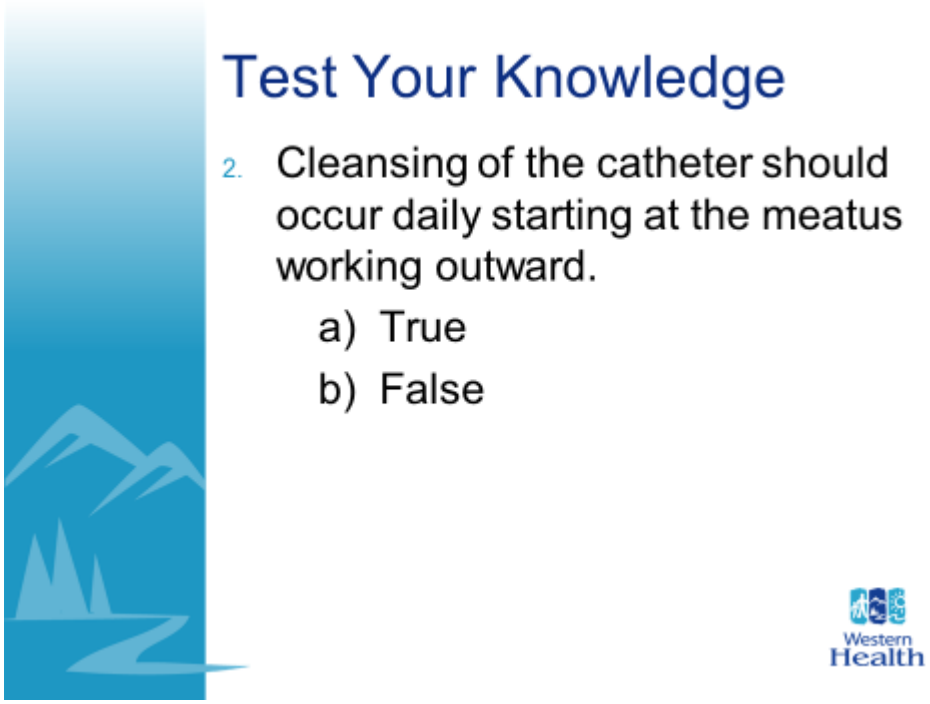
Routine catheter changes are not required. There is no standardized timeline for urinary catheter changes. This must occur based on assessment of appropriate indication (discussed in module 2), leaking, infection, or build up of biofilm causing obstruction (NHSN, 2015) or when a closed system is compromised (CDC, 2009).

If a urinary catheter has been in place for greater than 7 days and a urine culture specimen is required for confirmation of a suspect CAUTI, it is recommended to change the urinary catheter prior to specimen collection as the biofilm buildup may produce a false positive urine culture (Bard Medical (n.d.); CDC, 2009; NHSN, 2015). It is important to treat the patient/resident, not the urine culture result.

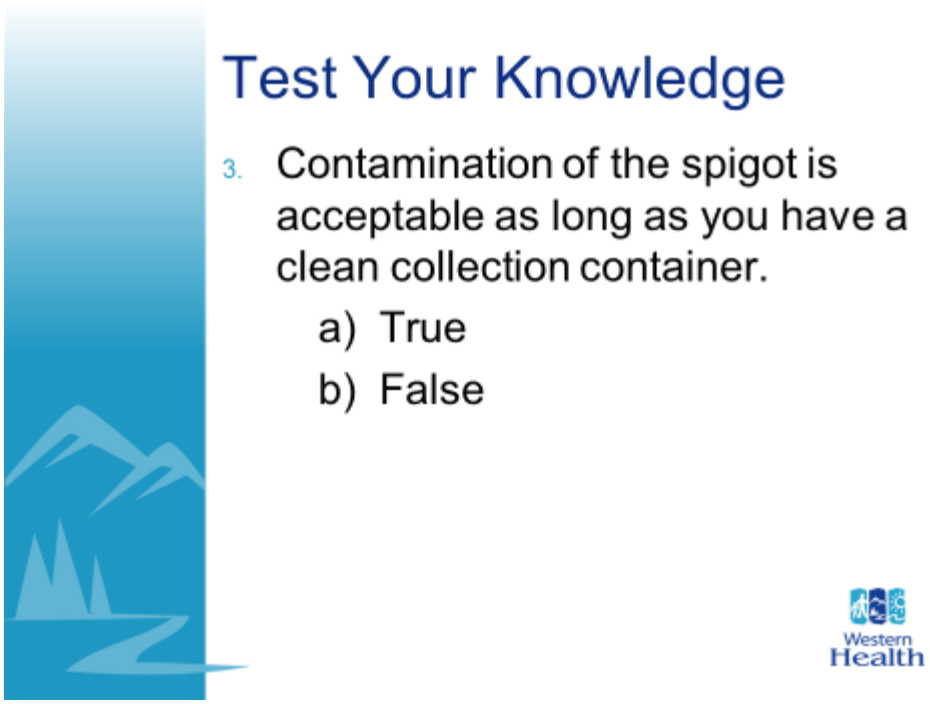
As well, if the urinary catheter was not changed before urine collection and has been insitu for greater than seven days, a urinary catheter should be replace prior to commencing antibiotics to treat a UTI as antibiotics will not break down bacteria present in biofilm found on the catheter.



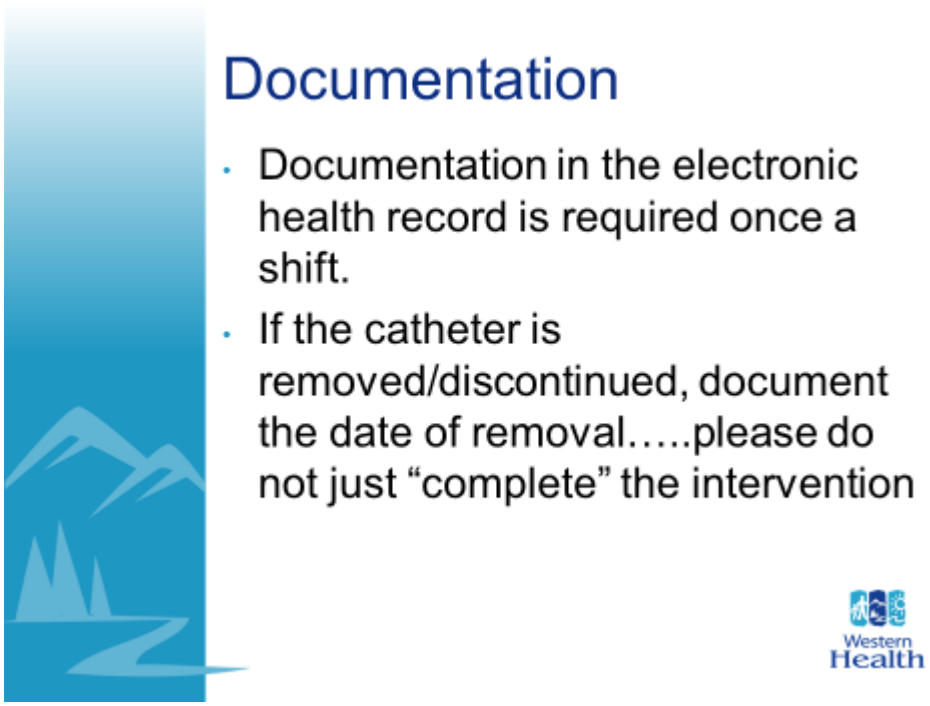
Answer: A, B, and D. C is not correct as routine changing is not recommended. Changes should be related to your assessment and patient obstruction, infection, leaking or if the system has been compromised. E is not correct. You should use a clean separate patient/resident specific labelled collection device for each patient/resident.


Test Your Knowledge
2. Cleansing of the catheter should occur daily starting at the meatus working outward.
a) True
b) False
Western Health

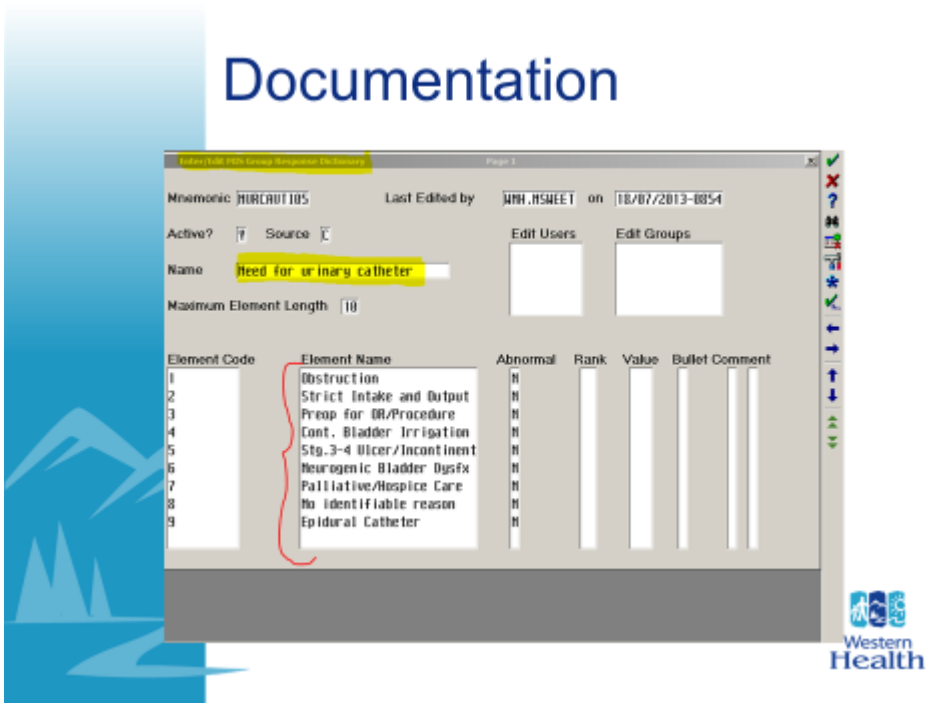
Answer: True


Test Your Knowledge
3. Contamination of the spigot is acceptable as long as you have a clean collection container.
a) True
b) False
Western Health

Answer: False. If you touch the spigot to the container or contaminate it with your gloved hands, it is important to cleanse the spigot with a 70% alcohol swab prior to closing the system to limit risk of bacterial growth.

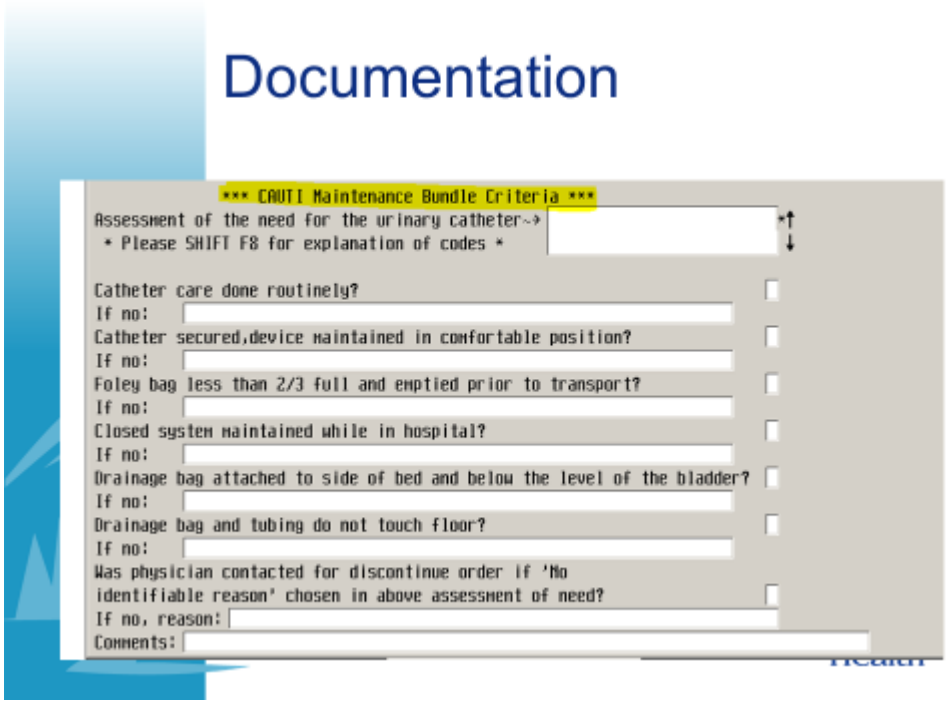


Documentation of the date of removal will be important for determining the catheter days for your unit. Simply "completing" the intervention without including the date of removal will skew your unit specific data, and Infection Prevention and Control will not be able to provide you with accurate rates showing how well you have improved your practice!



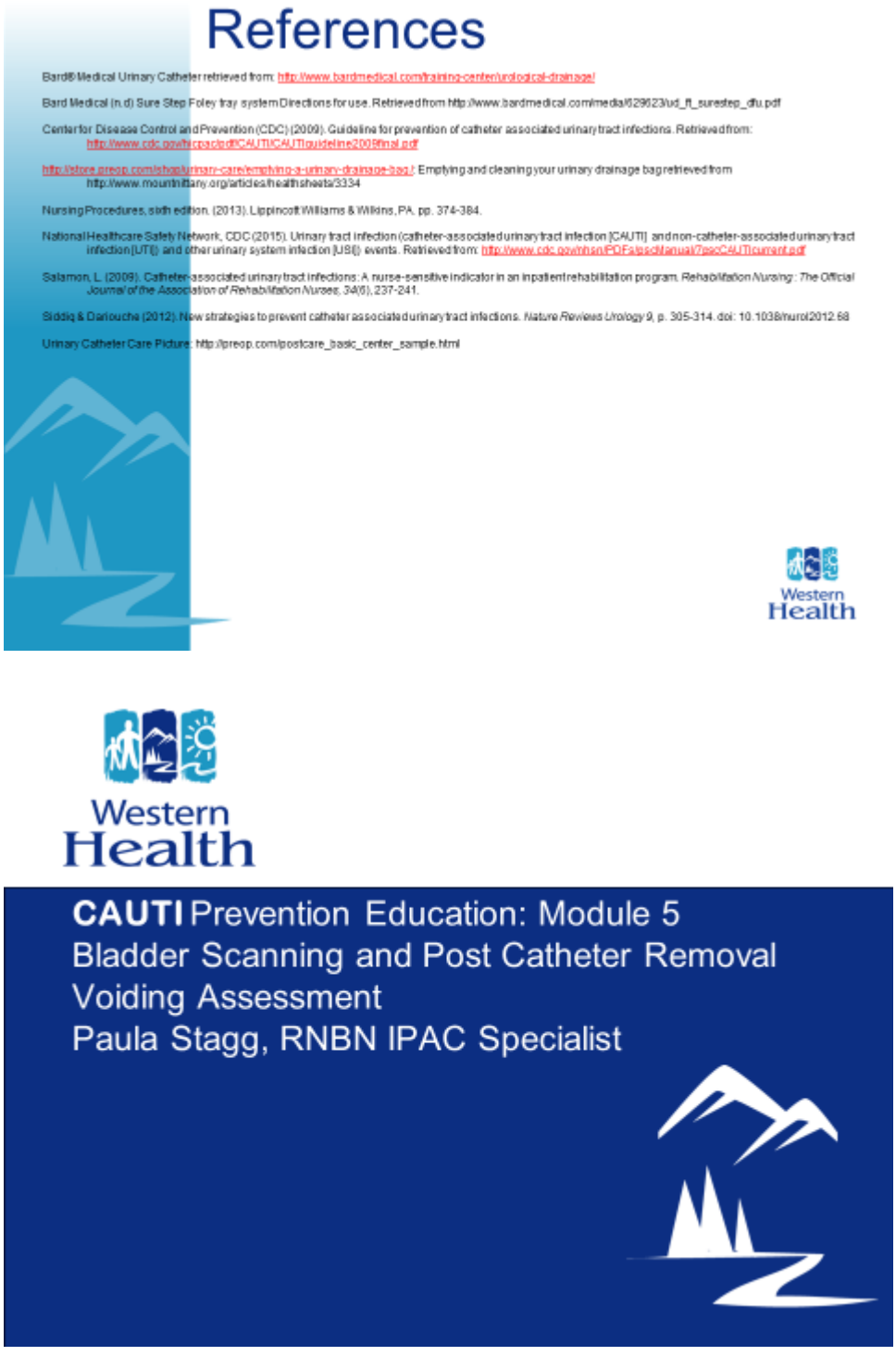
This slide will be changed as soon as I get the "epidural catheter" choice removed from the indications menu – the written part of this slide will not change, just the picture*

After you have added your intervention (should have been completed by the person who inserted the catheter) daily maintenance documentation is required. The list above give you the list of appropriate indication for urinary catheterization (see next slide for where this is documented, this only shows the list). This is based on your assessment for the shift, and does not need to reflect other peoples assessment because your patient/resident status may have improved or deteriorated since the last documentation. Remember if you have to select "no identifiable reason" that is your cue to remove the urinary catheter. For now, you will need a physician order to do so. Once staff are competent, urinary catheter removal will be an advanced competency and nursing or urology technologists will be able to remove the catheter without an order.



On the top of the page you will see where you document your assessment of need for your patient/resident during the current shift. Pressing SHIFT and F8 on your keyboard will bring up the list from the previous slide. The next six statements represent the required steps for appropriate maintenance to reduce CAUTI risk. This includes catheter care; using a securement device; emptying the bag at 2/3 full; maintaining a closed system; and keeping the bag below the bladder and off the floor. Please read each sentence prior to selecting yes or no. Part of learning includes repetition thus facilitating knowledge transfer into behaviors. After reading these steps for a couple of weeks, the maintenance of the catheter in relation to best practices will become second nature!

The final question refers to the indication for use. If you have to select “no identifiable reason” and you notify the physician but he/she would like to keep the catheter insitu, this gives you an opportunity to document your action to facilitate early removal and provide the rationale given to you by the physician for keeping the catheter in place. It is still important to advocate on behalf of your patient for early removal as other complications related to prolonged indwelling urinary catheters include decreased mobility, damage to the meatus and/or urethra, increase use of antibiotics, increased length of stay, and pain (Salamon, 2009).



The final module will consist of bladder scanner use and assessment of your patient/resident's voiding post urinary catheter removal. It will also review assessment criteria for in and out catheterization vs. Foley catheter insertion post trial of voiding. The

target audience for this module include all health care providers who are competent for urinary catheter insertion and removal.

Goals

- Understand the proper technique for bladder scanner use
- Post urinary catheter removal voiding assessment
- Understand the signs and symptoms of urinary retention
- Assessment for in and out catheterization vs. Foley catheter reinsertion.

Western Health

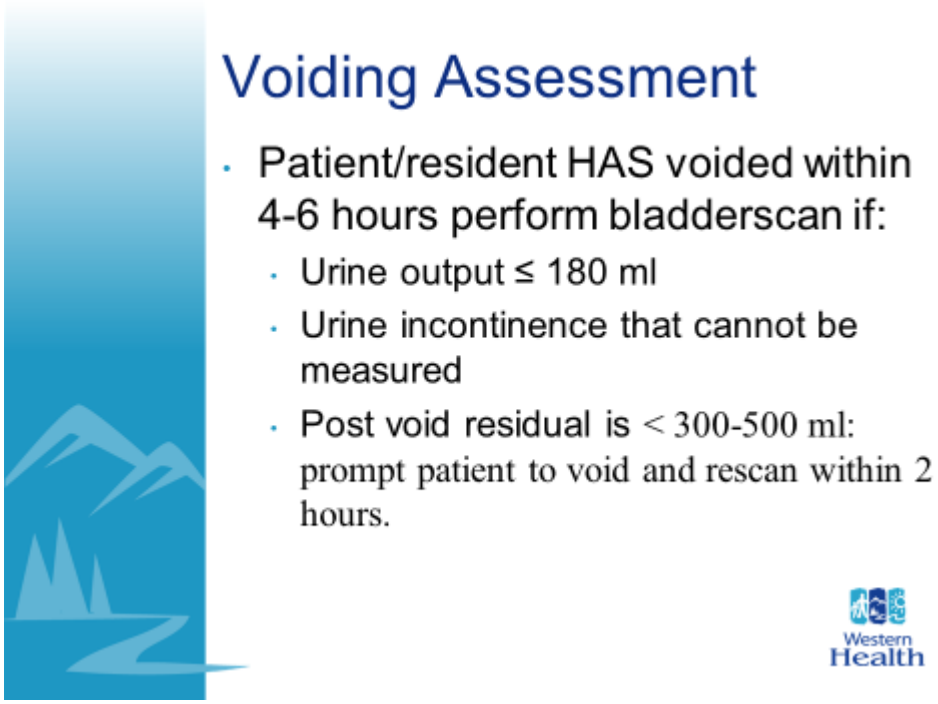
Bladder Scanning

Source: Verathon (2016). Bladderscanner BVI 3000 Bladder Volume Instruments. Retrieved from http://verathon.ca/bladderscan-bvi-3000/

Western Health

Bladder scanners are an important tool when assessing bladder retention or non invasive post void residuals. Knowing how to properly use the bladder scanner will help you know your assessment is accurate. Western Health uses the Verathon Bladderscanner BVI 3000®. If you have not received a demonstration from a super-user in your workplace or from the sales representative, you should review the DVD which came with the scanner. For your convenience, a link to the video from the manufacturers website is located in the next slide. You may skip the video if you are competent with using the bladder scanner.

Must view in slide show format to access the video.



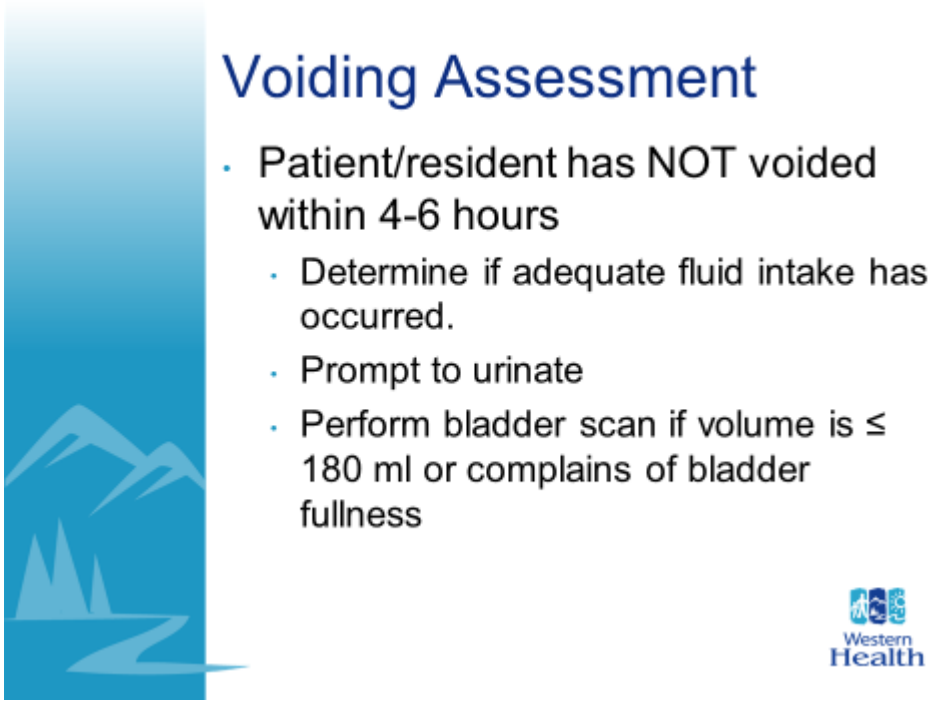
Congratulations! You have advocated for early urinary catheter removal for your patient/resident. Now you need to feel confident in your post catheter removal assessment. Remember, every patient/resident is different and these are only guidelines to help you with best practices to avoid catheter re-insertion. *These guidelines are NOT intended for post urologic surgery assessments – Follow the urologist post operative orders!

Assess your patient/resident within four to six hours of urinary catheter removal. If he/she has voided and has an output of less than 180 ml or is incontinent or you cannot measure output, you should complete a bladder scan to assess bladder emptying.

If your patient/resident has a post void residual bladder scan between 300 and 500 ml, he/she should be encouraged to void again within two hours of the scan, and then re-scanned (ANA, n.d.).

Part of your assessment is your patient/resident symptoms. Remember there may be swelling of the urethra from the catheter removal. Some people may require a longer period of time to void completely. If they exhibit urinary frequency or do not feel as though their bladder is empty (bladder fullness) perform a bladder scan.

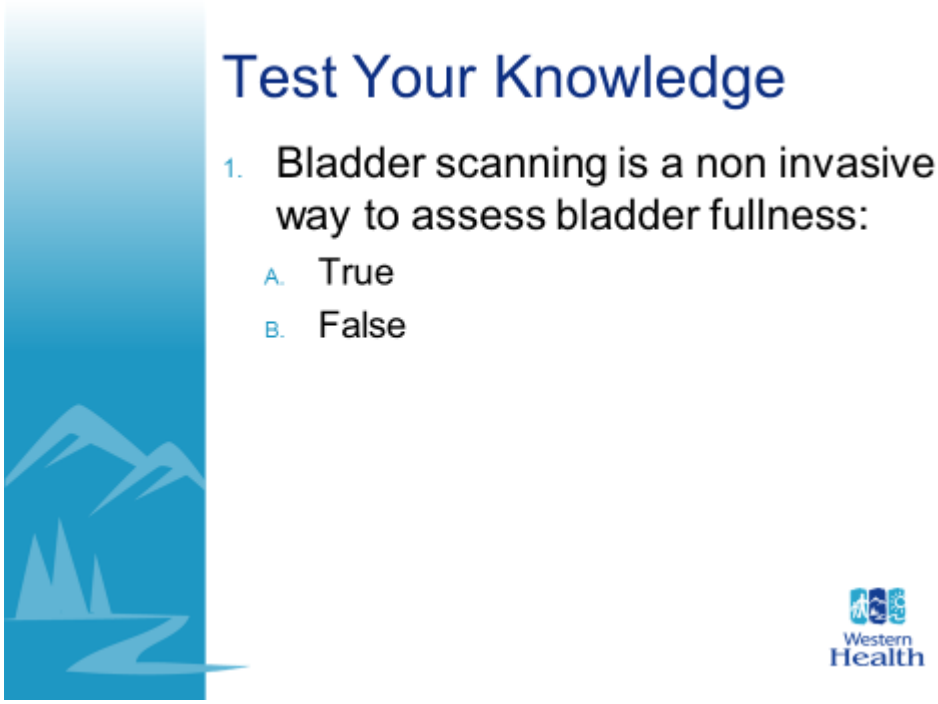
If the residual volume is between 300 and 500 ml in the symptomatic patient/resident and they cannot further empty their bladder on their own, an in and out catheterization should be performed. Remember to treat the patient/resident, not the test results alone!



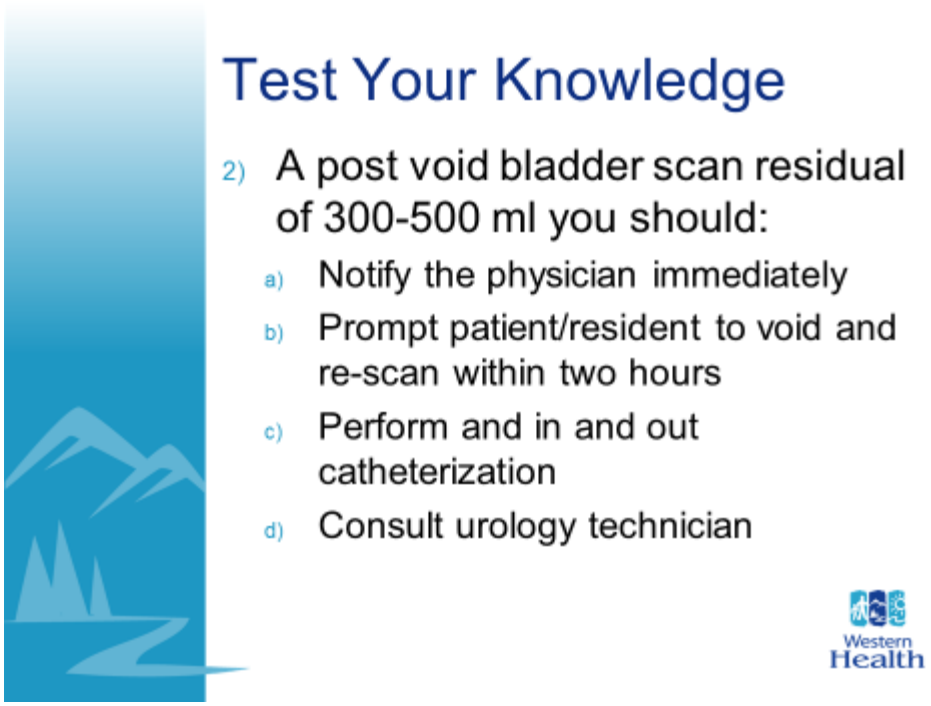
So, it is four to six hours since the urinary catheter has been removed and your patient has not voided. Remember, everyone is different and these are guidelines. However, assessing your patient/resident within four to six hours of urinary catheter removal is important.

If they have not voided, nor feel the need to void, you should prompt the patient/resident to try. If he/she is unable to urinate, determine if there was sufficient fluid intake. This amount will vary depending on your patient/resident and any fluid restrictions he/she may have. If there are no fluid restrictions, then it is acceptable to encourage an intake of 30 ml/kg/day (Nursing Procedures, 2013). Remember, as people age, their sensation of thirst decreases (Leduc, 2014). Some patients/residents will required additional assessment and encouragement of fluid intake.

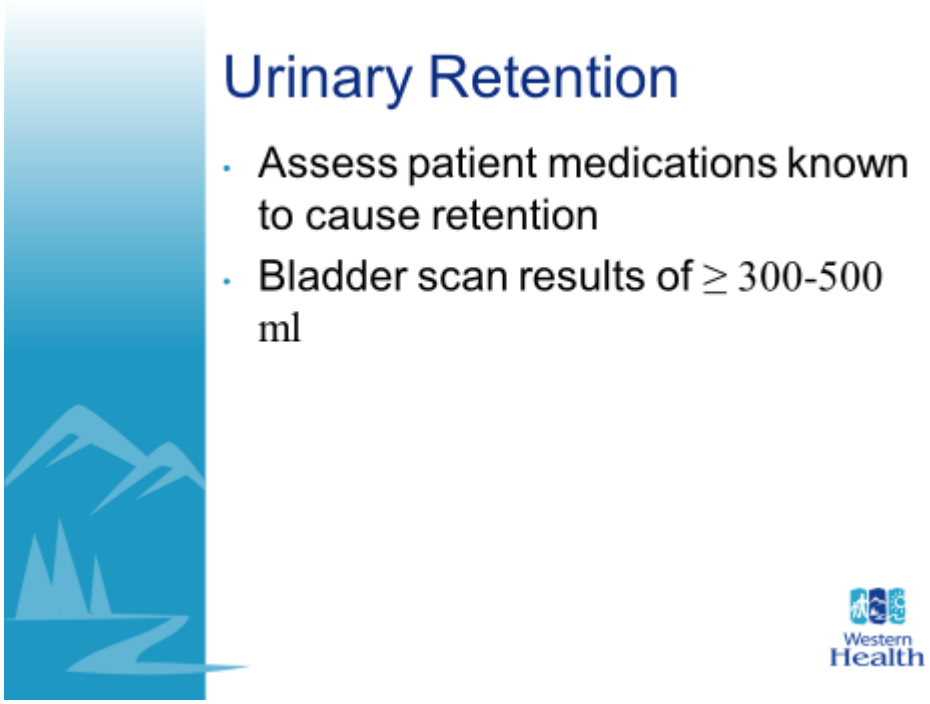
A bladder scan should be performed if the patient/resident: 1) cannot void; 2) has voided less than or equal to 180 ml; or 3) complains of bladder fullness.



Answer: True

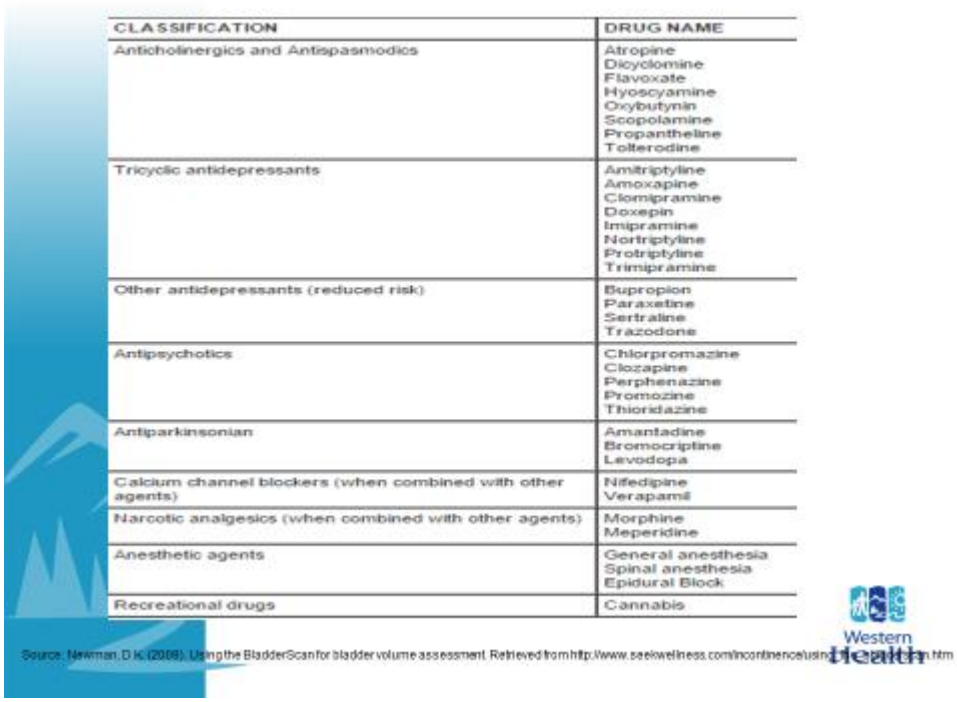


Answer: B. However, if your patient is complaining of a full bladder, then performing an in and out catheterization is appropriate



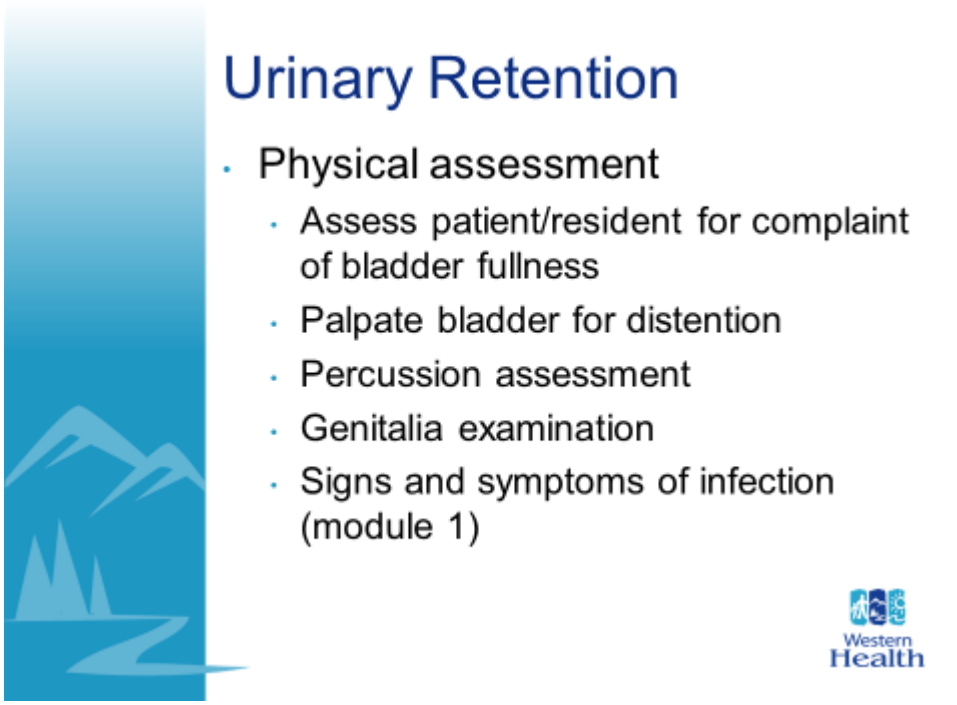
The previous slides discussed how to perform a bladder scan and how to interpret the results. However, urinary retention may be related to prescribed medications or recreational drug use. Prescription drug classifications and recreational drugs which are known to cause retention include: 1) Anticholinergics and antispasmodics such as Atropine, hyoscyamine, and oxybutynin; 2) Tricyclic antidepressants – amitriptyline; 3) Other antidepressants (reduced risk) – Sertraline; 4) Antipsychotics – Chlorpromazine, Clozapine; 5) Antiparkinsonian – Levodopa; 6) Calcium channel blockers (when combined with other agents) – Nifedipine, Verapamil; 7) Narcotic analgesics (when combined with other agents) – Morphine, Meperidine; 8) Anesthetic agents – General anesthesia, spinal anesthesia, epidural block; 9) recreational drugs – cannabis (Newman, 2009). This list of drug names is not inclusive. Refer to the table on the next slide for a complete list of drug names in each classification.

Bladder scan results greater than 300 to 500 ml may require in and out catheterization, especially if there is bladder fullness and an inability to urinate. Report to provider or consult urology technician if this occurs on two consecutive scans. Re-insert urinary catheter if a third consecutive occurrence of in and out catheterization is required or follow prescribers orders (based on results of consultation with physicians).



CLASSIFICATION	DRUG NAME
Anticholinergics and Antispasmodics	Atropine Dicyclomine Flavoxate Hyoscyamine Oxybutynin Scopolamine Propantheline Tolterodine
Tricyclic antidepressants	Amitriptyline Amoxapine Clomipramine Doxepin Imipramine Nortriptyline Protriptyline Trimipramine
Other antidepressants (reduced risk)	Bupropion Paraxetine Sertraline Trazodone
Antipsychotics	Chlorpromazine Clozapine Perphenazine Promozine Thioridazine
Antiparkinsonian	Amantadine Bromocriptine Levodopa
Calcium channel blockers (when combined with other agents)	Nifedipine Verapamil
Narcotic analgesics (when combined with other agents)	Morphine Meperidine
Anesthetic agents	General anesthesia Spinal anesthesia Epidural Block
Recreational drugs	Cannabis

Source: Newman, D K. (2008). Using the BladderScan for bladder volume assessment. Retrieved from http://www.seekwellness.com/incontinence/using



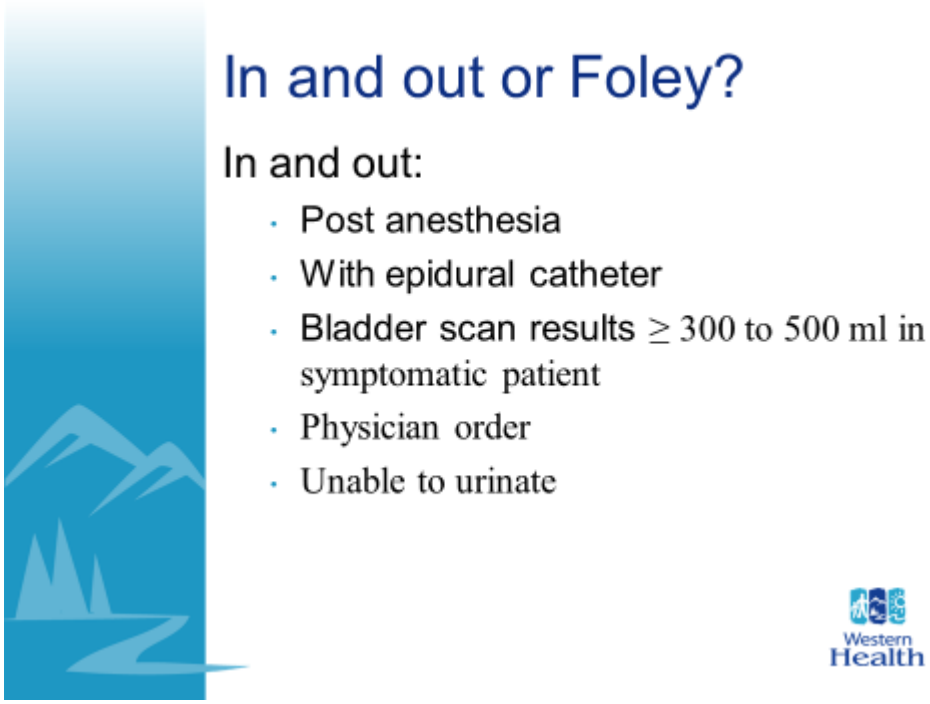
While bladder scanning is a reliable tool for evaluation of bladder emptying, it is not your only tool. Listening to your patient/resident and their specific concerns is most important. Additionally, physical examination of the abdomen for bladder for distention is useful.

Palpation of a midline mass above the suprapubic area could indicate a full bladder. Percuss the area. If you hear a dull sound it indicates there is fluid in the area, perhaps from the bladder (Newman, 2009). (This is assuming you patient/resident does not have ascites).

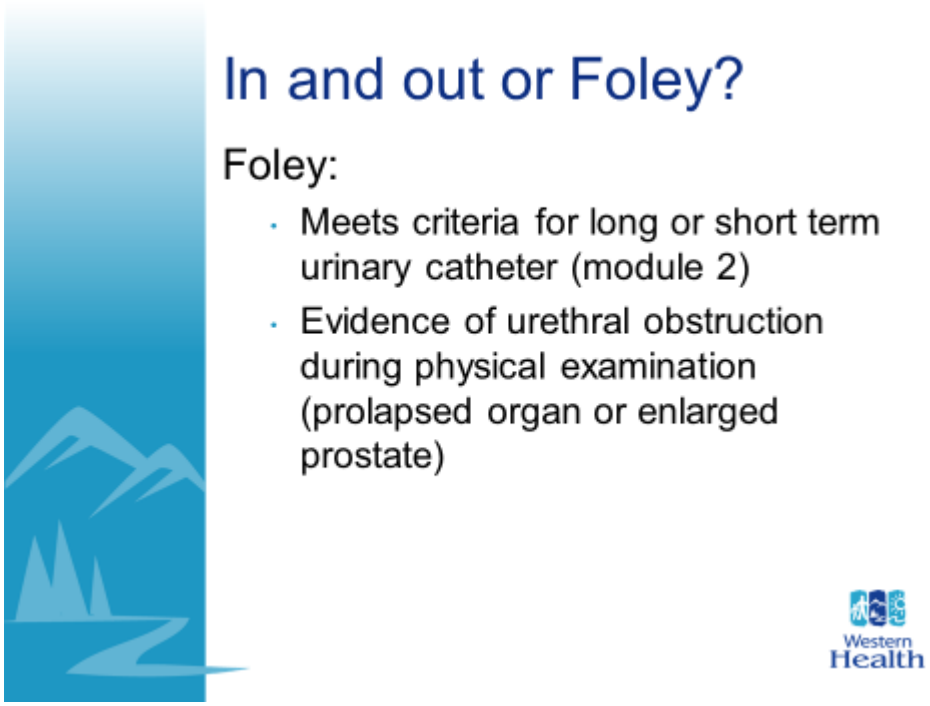
Examination of the genitalia will allow visualization of structural abnormalities such as a uterine prolapse which may obstruct the urethra in female patients/residents. For health care professionals who are trained to perform a rectal examination, palpating the prostate will provide information related to obstruction in males, thus decreasing urination. If there is a physical obstruction noted, an indwelling urinary catheter may be required. In the instance of structural abnormalities, the physician should be notified for further instruction and/or for orders to consult urology technologists or other medical specialist.

During your post catheter removal assessment, note how long your patient/resident has been sitting upright. In the 2009 Cochrane Collaboration review of CAUTIs there were findings which suggested sitting up post catheter removal could increase pressure on the urethra which could increase swelling and thus decrease one's ability to urinate. More research is needed in this area.

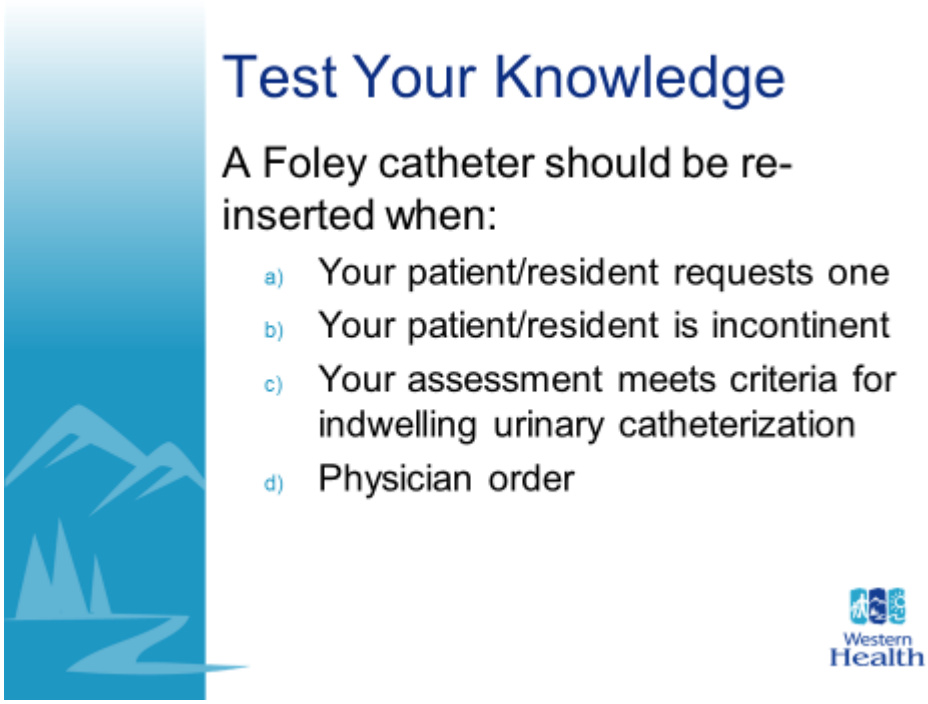
Another reason for retention is infection. Remember, people with urinary catheters are at risk for UTI which may not be symptomatic until the catheter is removed. Complaints of urgency, frequency, pain while voiding, pressure, with or without a fever may indicate active infection. Collection of a urine sample through a clean catch or in and out catheter may be necessary. Don't forget to clean the periurethral area with soap and water prior to urine collection.



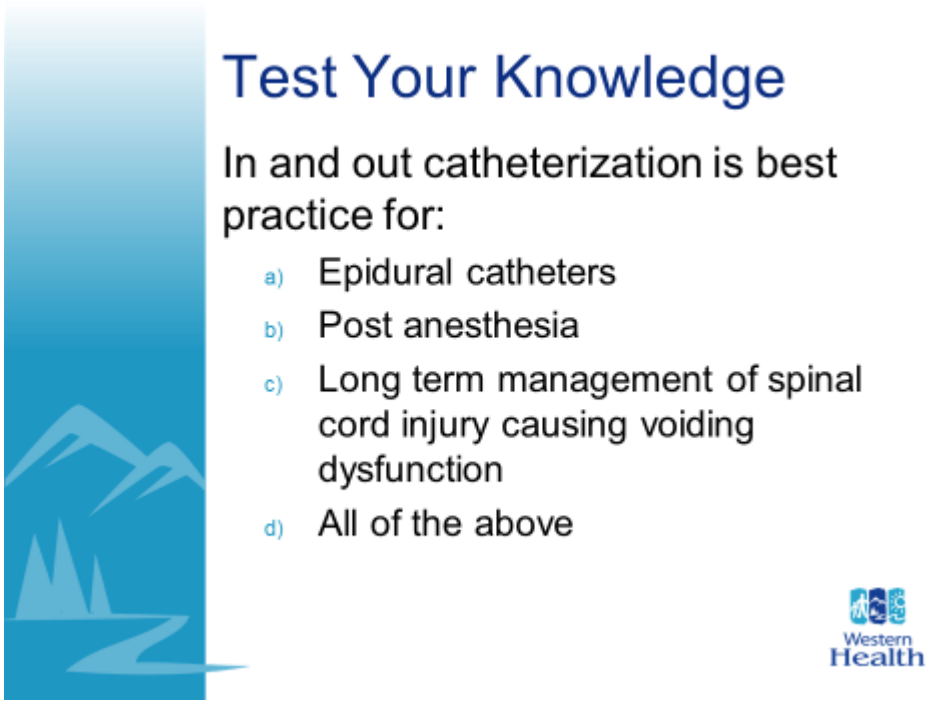
An in and out urinary catheterization should be preformed when the patient/resident does not meet the recommended criteria for indwelling urinary catheter and your assessment indicates the bladder requires emptying.



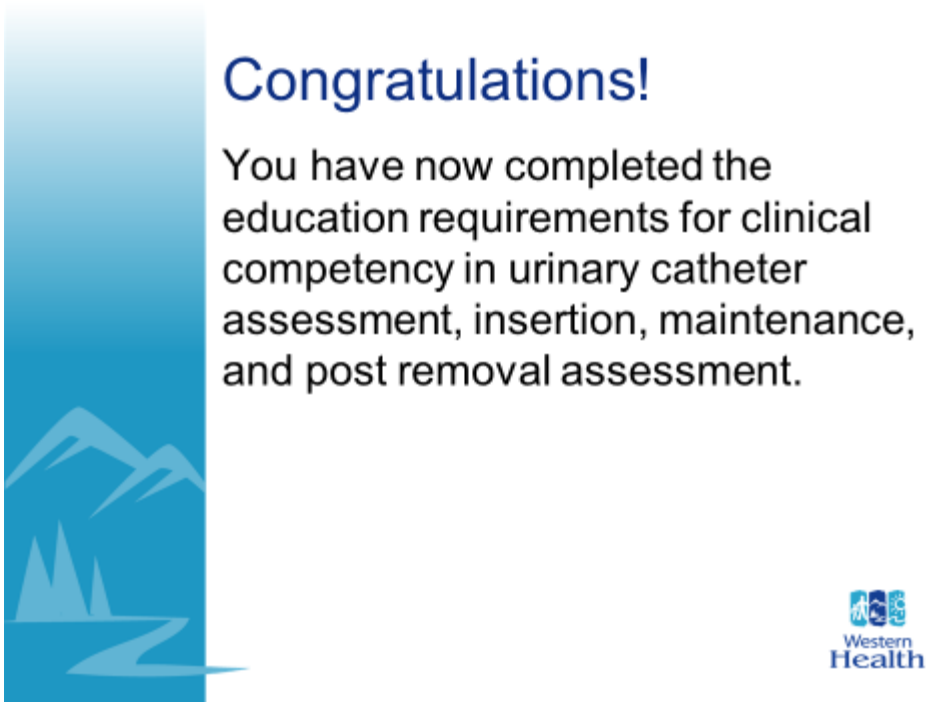
Deciding to use an indwelling urinary catheter is based on your assessment of need. If your patient/resident meets the criteria for short or long term indwelling urinary catheter including: 1) continuous bladder irrigation; 2) urologic surgery or other surgery requiring a catheter; 3) urologic studies; 4) strict intake and output; 5) acute neurogenic bladder dysfunction; 6) palliative care; 7) stage III or IV sacral decubiti in the incontinent patient; 8) urinary tract obstruction; or 9) urinary retention that cannot be maintained by other means.



Answer: C. A physician order without appropriate indication requires you to advocate for the patient/resident to clarify indication and ensure best practices.



Answer: D all of the above.



References

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Leduc, A. (2014). Reducing the treatment of asymptomatic bacteriuria in seniors in a long-term care facility. *The Canadian Nurse, 110*(7), 25-30.

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Western Health

CATEGORY:	**GENERAL PROGRAM/SERVICE DELIVERY POLICIES - CLIENT/PATIENT/RESIDENT CARE PROGRAMS AND SERVICES**
SUB-CATEGORY:	**INFECTION PREVENTION AND CONTROL**
GROUP:	
DISTRIBUTION:	**PATIENT SERVICES, LTC, RURAL HEALTH, POPULATION HEALTH (Mental Health Unit ONLY)**
TITLE:	**PREVENTION OF CATHETER ASSOCIATED URINARY TRACT INFECTIONS (CAUTI)**

PURPOSE

To reduce the risk of catheter associated urinary tract infection (CAUTI).

POLICY

All patients/residents who have a urinary catheter will be assessed for need daily. Urinary catheter will be promptly removed when patient/resident assessment does not meet the Western Health approved criteria for indwelling urinary catheter. This does not apply to suprapubic urinary catheters. Only persons (health professionals, family members or patients/residents themselves) who know the correct technique of aseptic insertion and maintenance of the catheter will handle catheters.

ACUTE and LONG TERM CARE:

Physicians/Nurse Practitioners/Nurses/Urology Technicians must:

1. Ensure patient meets criteria for urinary catheter. These include:

Acute placement (less than 30 days)	*Long term placement (> 30 days)*
• Continuous bladder irrigation • Urologic surgery or other surgery requiring urinary catheter • Urologic studies • Management of acute urinary	• Palliative care • Stage III or IV sacral decubiti in the incontinent patient • Urinary Tract Obstruction (blood clots; enlarged prostate; urethral

retention/obstruction • Strict intake and output (critically ill patient) • Acute Neurogenic Bladder Dysfunction (eg., spinal cord injury, advanced MS or Parkinson's Disease)	problems) • Urinary retentions that cannot be maintained by other methods

2. Maintain aseptic technique for insertion of catheter (See Procedure section of this policy).
3. Complete appropriate documentation in the Electronic Health Record or paper health record including date of insertion, date of removal and appropriate indication for insertion.
    a) Electronic Health record add two interventions:
        I. ADL Bladder Elimination intervention – Catheterized (70300-D)

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ADL: Bladder Elim-Catheterized          L     703000-D
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        II. Urinary Catheter – Indwelling Ins/Care (450110 or 450115). This one is for the maintenance bundle charting. There are two to choose in case the patient has both a suprapubic and a urethral urinary catheter.

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Urinary Catheter-Indwelling Ins/Care  #1      450110
Urinary Catheter-Indwelling Ins/Care  #2      450115
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4. Maintain catheter based on recommended guidelines. (see procedure section)
5. Assess catheter need at least daily and obtain orders to remove promptly when no longer indicated (see catheter removal procedure section).
6. Only irrigate catheters to prevent or relieve obstruction as per physician's orders. (see procedure section)
7. Supply a single patient use labeled measuring device for each patient. Clean measuring device after each use. Disinfect with Prevention Wipes after cleaning complete.
8. If urinary specimen is required, ensure specimen collection from an indwelling catheter is collected using aseptic technique. A catheter in place more than 7 days should be replaced prior to specimen collection.

DEFINITION

Health Care Associated Infections- Hospital acquired: are infections acquired in a hospital or a long term care facility. This is specifically an infection that was not present or incubating prior to admission to hospital or long term care facility.

Catheter Associated Urinary Tract Infection: UTIs that are catheter-associated indicate the patient had an indwelling urinary catheter inserted 48 hours before onset of the event or the urinary catheter was in place but removed within the previous 48 hours. (CDC/NSHN 2015)

Western Health definitions for UTI/CAUTI- see appendix A

PROCEDURE (Catheter insertion, maintenance, and removal)

1. Confirm patient/resident meets Western Health's approved criteria for urinary catheter insertion.
2. Identifies patient/resident using two identifiers.
   Preparation:

3. Collect supplies including:
   - Use the **smallest** catheter possible, to minimize urethral trauma, while still permitting good drainage;
   - Foley insertion tray system;
   - drainage bag;
   - alcohol based hand rub at the point of care;
   - Statlock® Stabilization Device;
   - clean gloves
   - Instillagel®
   - peri-wipes or warm cloth with soap and water plus a warm cloth with just water to rinse.
   - Towel
   - Water proof pad
   - 10 cc prefilled syringe of sterile water
4. Explain the procedure to the patient/resident and provide privacy.
5. Place patient/resident in appropriate position:
   a) Female – supine with knees flexed and separated and feet flat on the bed about 2 inches apart. Alternatively, patients/residents with mobility challenges or severe contractures may be place on their side with knees drawn up to the chest.
   b) Male – supine with legs extended and flat on the bed.

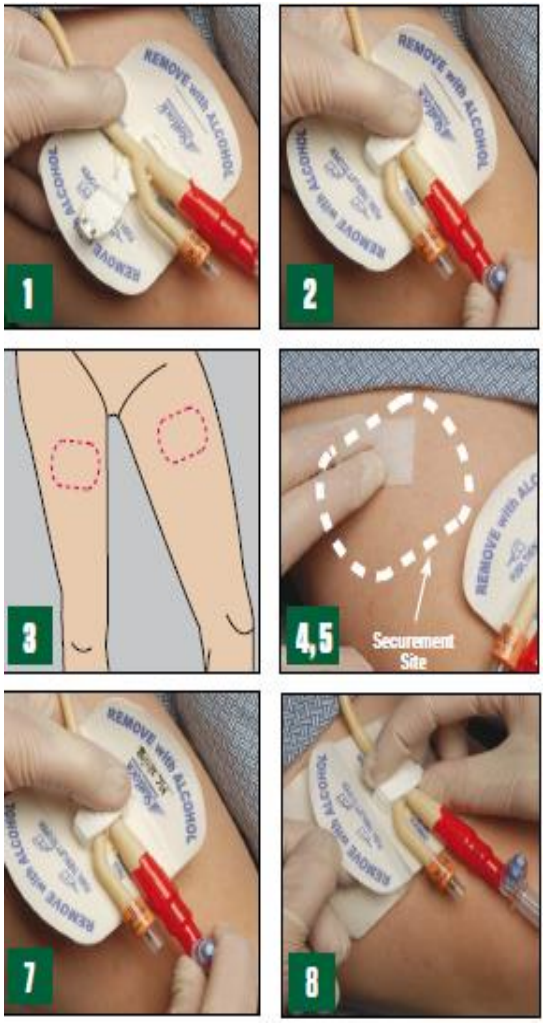
6. Open outer plastic packaging, placing tray between patient/resident's legs.
7. Open external wrap using aseptic technique.
8. Remove sterile gloves and place on clean surface. Keep packing closed to maintain sterility
9. Open urinary drainage bag
10. Open urinary catheter from outer package and place inner sterile catheter onto sterile field.
11. Open instillagel® and sterile water and place on sterile field.
12. Perform hand hygiene and don clean gloves.
13. Place water proof pad beneath patient
14. Use peri-wipes or cloth with soap and water to clean genital area and perineum using downward strokes from anterior to posterior. If using soap and water, rinse area with clean cloth and dry with a towel.
15. Discard gloves and perform hand hygiene with alcohol based hand rub for 15 to 20 seconds.

Catheter Insertion:

1. Maintain aseptic technique and don sterile gloves
2. Place under pad beneath patient/resident "shiny" side down. Be careful not to contaminate your gloves
3. Position fenestrated drape on patient/resident appropriately.
4. Deposit 2/3 of Instagel® into the tray for Foley catheter lubrication. Place remaining instill-a-gel on sterile drape to use after meatus is cleansed.
5. Connect urinary catheter to drainage bag (some manufactures have this done for you: eg. Bard® Sure Step system). Ensure all tubing ends remain sterile, and be sure the clamp at the emptying port of the drainage bag is closed (to prevent leaking).
6. Place urinary catheter in tray and lubricate well with Instagel®.
7. Cleanse meatus with pre-packaged antiseptic swab sticks:
    a) Female: With the non-dominant hand, hold the labial apart. With the dominant hand use downward stoke cleanse the right labia minora and discard the swab. Repeat for left labial minora. Use the last swab stick to cleanse the area between the labia minora.
    b) Male: Hold the penis with your non-dominant hand. If the patient/resident is uncircumcised, retract the foreskin. Gently lift and stretch the penis to a 60-90 degree angle. Hold the penis this way throughout the procedure to straighten the urethra and maintain a sterile field. Cleanse the penis in a circular motion starting at the urethral meatus and work outward.
8. Inject the remaining Instagel® into the urethra. This will help prevent trauma to the urethral lining as well as possible urinary tract infection.
9. Do NOT inflate balloon prior to insertion. This may cause micro-tears that may cause infection.
10. Proceed with catheterization until urine is visible in the drainage tube:
    a) Female: Advance the catheter two more inches (~5 cm)
    b) Male: Advance catheter 6-10 inches (~15-25 cm)

11. Inflate catheter balloon using prefilled syringe. Ensure you use the amount of water indicated on the catheter port (eg 5 ml or 10 ml).
12. Once the balloon is inflated, ease the catheter back by gently pulling on the catheter until slight tension is detected indicating that the balloon is in place at the neck of the bladder.

Secure device with a Statlock®:

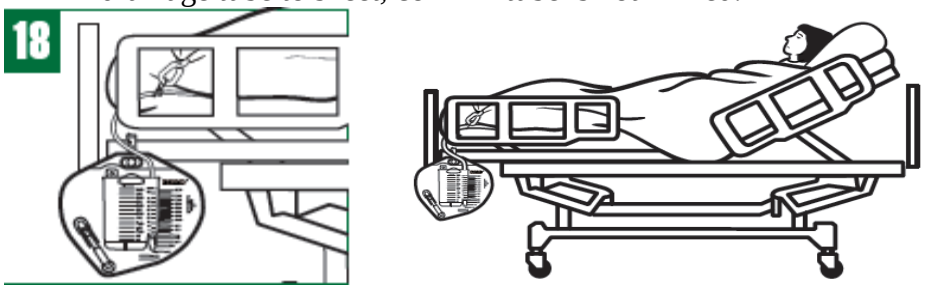


Prep:

1. Place Foley Catheter into retainer. Directional arrow should point towards catheter tip, and the balloon infiltration arm should be next to the clamp hinge.
2. Close lid by placing your fingers under the pad and pressing the grip markers at the end of the clamp with your thumb, being careful to avoid pinching the catheter.
3. Identify proper securement site by gently laying the Statlock® stabilization device straight on the front of the thigh, then back up one inch towards the insertion site. *make sure leg is fully extended.
   - Gently place the Statlock® stabilization device off to the side, away from the selected securement site.
4. Cleanse and degrease securement site with alcohol. Let skin dry. Be sure to clean area larger than securement site. **if patient has hair in the securement area, use clippers. Do NOT shave with a razor**
5. Apply skin protectant using both pads, in direction of hair growth, to area larger than securement site. Allow to dry completely (10-15 seconds).
6. Using permanent marker, write initials and date of application on Statlock® device anchor pad.
7. Align the Statlock® device over securement site leaving one inch of catheter slack between insertion site and the Statlock® device retainer. *Make sure leg is fully extended.
8. While holding the retainer to keep the pad in place, peel away paper backing, one side at a time, and place tension –free on skin.

Change when clinically indicated or every seven days* Source: Bard® medical.

13. Remove debris and discard appropriately.
14. Remove gloves and clean hands with alcohol based hand rub for 15 to 20 seconds; or if visibly soiled use soap and water.
15. Position Hanger on bed rail at the foot of the bed and use sheeting clip to secure drainage tube to sheet, confirm tube is not kinked.



Maintenance (All Staff):

16. Maintain a closed system while in hospital. Teach families how to maintain catheters for clients going home with long term catheters.
17. Wash perineal area with soap and water at least **daily** and as needed after bowel movements. Always clean by wiping away from—never toward—the urinary meatus.
18. Change catheters **only as needed**. Reasons for change include:
    - Obstruction
    - Infection (biofilms build up on catheter and will not be removed with antibiotic use. Change prior to urine specimen collection or antibiotic administration.)
    - Leaking
    - Closed system is compromised
19. Obtain urine samples aseptically. If catheter in place greater than 7 days, replacement of catheter is recommended prior to specimen collection.
20. Maintain an unobstructed urine flow.
21. Maintain the drainage bag below the level of the bladder and off the floor.

Catheter Removal:

1. Verify removal order
2. Assemble supplies including:
    - Clean gloves
    - Alcohol pad
    - 10 cc syringe with leur lock
    - Waterproof pad
    - Bedpan
    - Washcloth and towel

3. Identify patient/resident with two identifiers
4. Explain procedure to patient/resident
5. Perform hand hygiene with alcohol based hand rub or soap and water
6. Don gloves
7. Place waterproof pad under patient.
8. Provide catheter care with soap and water. Dry with a towel.
9. Remove Statlock® stabilization device:
    - Gently lift edge of anchor pad.
    - Wipe along skin and pad with alcohol swab to aid with removal.
10. Deflate catheter balloon:
    - Back off syringe to 0.5 ml and insert into the inflation port.
    - Allow the water to naturally flow back into the syringe to deflate the balloon.
    - Remove all water (look at port for amount ie, 5 ml or 10 ml)
    - Do not use vigorous aspiration as this may cause the inflation lumen to collapse, preventing balloon deflation
    - Use only gentle aspiration to encourage deflation
11. Remove catheter
12. Measure output in drainage collection system
13. Discard catheter and drainage collection system in appropriate receptacle.
14. Remove gloves and perform hand hygiene.
15. Assess for adequate bladder emptying every 4-6 hours
    a) Patient HAS voided within 4-6 hours:
        - Assess Post Void Residual (PVR) with bladder scanner within 2 hours of voiding
        - If PVR < 300-500 ml recheck PVR within 2 hours.
            - If patient is uncomfortable or distended, encourage voiding.
            - If unable to void, perform in and out catheterization.
            - Repeat scan within 4-6 hours
            - If retention persists, notify physician
    b) Patient HAS NOT voided within 4-6 hours and/or complains of bladder fullness:
        - Prompt patient to void.
        - If output ≤ 180 perform bladder scan to assess retention.
        - If retention noted (< 300-500) follow above “has voided” regime.

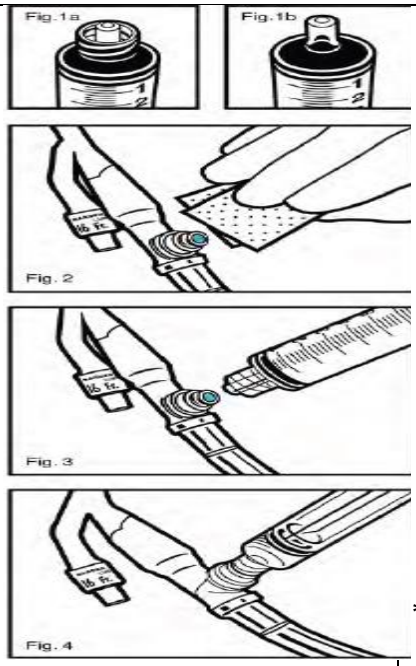
Catheter Irrigation Procedure:

1. Collect and prepare equipment:
    - Ordered irrigating solution
    - Sterile graduated receptacle or emesis basin
    - 50 ml catheter tip syringe
    - Alcohol swabs
    - Sterile gloves

- Water proof pad

2. Check expiration dates.
3. Clean hands and assemble the equipment at the bedside.
4. Explain procedure to patient/resident.
5. Place water proof pad under patient buttocks to protect linens.
6. Create a sterile field at the bedside. Open equipment using aseptic technique.
7. Place the tip of the syringe into the solution. Pull back plunger and fill with the appropriate amount of solution.
8. Open the alcohol swabs.
9. Clean hands and don sterile gloves.
10. Clean the juncture of the catheter and drainage tube with an alcohol swab to remove as many bacteria as possible.
11. Disconnect the catheter and drainage tube by twisting them in opposite directions and carefully pulling them apart without creating tension on the catheter. Don't let go of the catheter - hold it in your non-dominate hand. Then place the end of the drainage tube on the sterile field, making sure not to contaminate the tube.
12. Twist the catheter-tip syringe onto the catheter's distal end.
13. Slowly push the plunger of the syringe to instill the irrigating solution through the catheter. If necessary repeat this step until you've instilled the prescribed amount of irrigating solution.
14. Remove the syringe and direct the return flow from the catheter into a graduate receptacle or emesis basin. Don't let the catheter end touch the drainage in the receptacle or become contaminated in any other way.
15. Wipe the end of the drainage tube and catheter with the remaining alcohol swabs.
16. Wait a few seconds to allow the alcohol to evaporate, and then reattach the drainage tubing to the catheter.
17. Dispose of all used supplies properly.
18. Remove gloves and clean hands.

PROCEDURE (catheter urine sample collection next page)



1. Verify need for sample collection.
2. If catheter in-situ ≥7 days, catheter should be removed if possible** and new catheter inserted using aseptic technique. (Biofilm will form on catheter and will become colonized with bacteria causing false positive results.)
3. Occlude drainage tubing a minimum of 3 inches below the sampling port by kinking the tubing until urine is visible under the access site.
4. Clean hands and put on gloves. If the drainage tube has a built –in sampling port, wipe the port with an alcohol swab. Aspirate the specimen into the syringe.
5. Transfer the specimen to a sterile container.
6. Unclamp the catheter.
7. Remove gloves and clean hands.
8. Ensure appropriate label indicating "catheter specimen" is selected. Bring to lab.

*If delay in transport to the lab, place in specimen refrigerator

Source Bard® medical

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KEY WORDS

Catheter

Catheters

Urinary Tract Infection

Urinary Tract Infections

CAUTI

UTI

Infection Control

Approved By: Chief Executive Officer	Maintained By: Regional Infection Control Specialist
Effective Date: 5/October/2007	☐ Reviewed: x Revised: January 12, 2016
Review Date: 5/October/2010	☐ Replaces: *(Indicates name and number of policy being replaced)* OR ☐ New

Appendix A

Fever 65 years and older:

1. Single oral temperature > 37.8°C (>100°F)
   OR
2. Repeated oral temperatures >37.2°C (>99°F) or rectal temperatures >37.5°C (99.5°F)
   OR
3. Single temperature >1.1°C (2°F) over baseline from any site (oral, tympanic, axillary) (Stone et. all, 2012)

URINATRY TRACT INFECTION (UTI) – ACUTE CARE

Urinary tract infections (UTI) are defined using symptomatic urinary tract infection (SUTI) criteria or Asymptomatic Bacteremic UTI (ABUTI) criteria.

Catheter-associated urinary tract infections (CAUTI) are defined as a UTI where an indwelling urinary catheter was in place for > 2 calendar days on the date of event, with day of device placement being Day 1

And

And indwelling urinary catheter was in place on the date of event or the day before. If an indwelling urinary catheter was in place for > 2 calendar days and then removed, the UTI criteria must be fully met on the day of discontinuation or the next day.

****Only includes indwelling Foley Catheters***

Symptomatic Urinary Tract Infection (SUTI)

Symptomatic Urinary Tract Infection (SUTI) must meet at least **one** of the following criteria:

Criterion 1a: Patient had an indwelling urinary catheter in place for > 2 calendar days, with day of device placement being Day 1, and catheter was in place on the date of event

and

at least **one** of the following signs or symptoms with no other recognized cause:

- fever (>38°C),
- suprapubic tenderness
- costovertebral angle pain or tenderness

and

a positive urine culture of $\geq 10^5$ colony-forming units (CFU)/ml with no more than 2 species of microorganisms. Elements of the criterion must occur within a timeframe that does not exceed a gap of 1 calendar day between two adjacent elements

OR

Patient had indwelling urinary catheter in place for > 2 calendar days and had it removed the day of or the day before the date of event

And

at least **one** of the following signs or symptoms with no other recognized cause:

- fever (>38°C),

- urgency
- frequency,
- dysuria,
- suprapubic tenderness
- costovertebral angle pain or tenderness

and

a positive urine culture of $\geq 10^5$ colony-forming units (CFU)/ml with no more than 2 species of microorganisms. Elements of the criterion must occur within a timeframe that does not exceed a gap of 1 calendar day between two adjacent elements

Criterion1b: Patient did not have an indwelling urinary catheter that had been in place for > 2 calendar days and in place at the time of or the day before the date of event

And

has at least **one** of the following signs or symptoms with no other recognized cause:

- fever (>38°C) in a patient that is ≤65 years of age,
- urgency
- frequency
- dysuria
- suprapubic tenderness
- costovertebral angle pain or tenderness

and

a positive urine culture of $\geq 10^5$ CFU/ml with no more than 2 species of microorganisms. Elements of the criterion must occur within a timeframe that does not exceed a gap of 1 calendar day between two adjacent elements

Criterion 2a: Patient had an indwelling urinary catheter in place for > 2 calendar days, with day of device placement being Day 1, and catheter was in place on the date of event

and

at least **one** of the following signs or symptoms with no other recognized cause:

- fever (>38°C)
- suprapubic tenderness
- costovertebral angle pain or tenderness

and

a positive urinalysis demonstrated by at least **one** of the following findings:

- positive dipstick for leukocyte esterase and/or nitrite
- pyuria (urine specimen with ≥10 white blood cells [WBC]/mm^3 or ≥3 WBC/high power field of unspun urine)
- microorganisms seen on Gram stain of unspun urine

and

a positive urine culture of $\geq 10^3$ and $<10^5$ CFU/ml with no more than 2 species of microorganisms. Elements of the criterion must occur within a timeframe that does not exceed a gap of 1 calendar day between two adjacent elements

OR

Patient had indwelling urinary catheter for > 2 calendar days and had it removed the day of or the day before the date of event

and

at least **one** of the following signs or symptoms with no other recognized cause:

- fever (>38°),
- urgency,
- frequency,
- dysuria,
- suprapubic tenderness,or costovertebral angle pain or tenderness

and

a positive urinalysis demonstrated by at least **one** of the following findings:

- positive dipstick for leukocyte esterase and/or nitrite
- pyuria (urine specimen with ≥10 WBC/mm^3)
- microorganisms seen on Gram stain of unspun urine or ≥3 WBC/high power field of unspun urine)

and

a positive urine culture of ≥10^3 and <10^5 CFU/ml with no more than 2 species of microorganisms. Elements of the criterion must occur within a timeframe that does not exceed a gap of 1 calendar day between two adjacent elements

Criterion 2b: Patient did <u>not</u> have an indwelling urinary catheter that had been in place for > 2 calendar days and in place at the time of or the day before the date of event

And

has at least **one** of the following signs or symptoms with no other recognized cause:

- fever (>38°C) in a patient that is ≤65 years of age,
- urgency,
- frequency,
- dysuria,
- suprapubic tenderness,
- costovertebral angle pain or tenderness

and

a positive urinalysis demonstrated by at least **one** of the following findings:

- positive dipstick for leukocyte esterase and/or nitrite
- pyuria (urine specimen with ≥10 WBC/mm^3
- microorganisms seen on Gram stain of unspun urine or ≥3 WBC/high power field of unspun urine)

and

a positive urine culture of $\geq 10^3$ and $<10^5$ CFU/ml with no more than 2 species of microorganisms. Elements of the criterion must occur within a timeframe that does not exceed a gap of 1 calendar day between two adjacent elements

Criterion 3: Patient ≤1 year of age with or without an indwelling urinary catheter has at least **one** of the following signs or symptoms with no other recognized cause:

- fever (>38°C core)
- hypothermia (<36°C core)
- apnea
- bradycardia
- dysuria
- lethargy
- vomiting

and

a positive urine culture of $\geq 10^5$ CFU/ml with no more than 2 species of microorganisms. Elements of the criterion must occur within a timeframe that does not exceed a gap of 1 calendar day between two adjacent elements

Criterion 4: Patient ≤1 year of age with or without an indwelling urinary catheter has at least **one** of the following signs or symptoms with no other recognized cause:

- fever (>38°C core)
- hypothermia (<36°C core)
- apnea
- bradycardia
- dysuria
- lethargy
- vomiting

and

a positive urinalysis demonstrated by at least **one** of the following findings:

- positive dipstick for leukocyte esterase and/or nitrite
- pyuria (urine specimen with ≥ 10 WBC/mm^3)
- microorganisms seen on Gram's stain of unspun urine or ≥3 WBC/high power field of unspun urine

and

a positive urine culture of between $\geq 10^3$ and $<10^5$ CFU/ml with no more than two species of microorganisms. Elements of the criterion must occur within a timeframe that does not exceed a gap of 1 calendar day between two adjacent elements

Asymptomatic Bacteremic Urinary Tract Infection (ABUTI)

Criterion: Patient with an indwelling urinary catheter in place for > 2 calendar days, (with day of device placement being Day 1), and catheter was in place on the date of event or without an indwelling urinary catheter has no signs or symptoms (i.e., no fever (>38°C) for patients ≤ 65 years of age*); and for any age patient, no urgency, frequency, dysuria, suprapubic tenderness, or costovertebral angle pain or tenderness

OR

for a patient ≤1 year of age, no and fever (>38°C core), hypothermia (<36°C core), apnea, bradycardia, dysuria, lethargy, or vomiting)

and

a positive urine culture of $>10^5$ CFU/ml with no more than 2 species of uropathogen microorganisms**

and

a positive blood culture with at least 1 matching uropathogen microorganism to the urine culture.

* Fever is not diagnostic for UTI in the elderly (> 65 years of age) and therefore fever in this age group does not disqualify from meeting the criteria of an ABUTI. * For ABUTI, report only isolate(s) in both blood and urine specimens.

* * Uropathogen microorganisms are: Gram-negative bacilli, *Staphylococcus* spp., yeasts, beta-hemolytic *Streptococcus* spp., *Enterococcus* spp., G. *vaginalis, Aerococcus urinae*, and *Corynebacterium* (urease positive).

Comments:

Laboratory cultures reported as "mixed flora" represent at least 2 species of organisms. Therefore and additional organism recovered from the same culture, would represent > 2 species of microorganisms. Such a specimen cannot be used to meet the UTI criteria.

Urinary catheter tips should not be cultured and are not acceptable for the diagnosis of a urinary tract infection.

Urine cultures must be obtained using appropriate technique, such as clean catch collection or catheterization. Specimens from indwelling catheters should be aspirated through the disinfected sampling ports. Change the catheter prior to collection if it is in place greater than 7 days.

In infants, urine cultures should be obtained by bladder catheterization or suprapubic aspiration; positive urine cultures from bag specimens are unreliable and should be confirmed by specimens aseptically obtained by catheterization or suprapubic aspiration.

URINARY TRACT INFECTION – LONG TERM CARE

Urinary tract infection includes only <u>symptomatic</u> urinary tract infections. Surveillance for asymptomatic bacteriuria (defined as the presence of a positive urine culture in the absence of new signs and symptoms of urinary tract infection) is not recommended, as this represents baseline status for many residents.

Symptomatic urinary tract infection

Indwelling catheter NOT present
Both of the following criteria must be met:

1. The resident has *at least one* of the following signs and symptoms:

- Acute dysuria or acute pain, swelling, or tenderness of the testes, epididymis, or prostate

OR

- Fever or leukocytosis (see Box, above) and *at least one* of the following:
  - acute costovertebral angle pain or tenderness
  - suprapubic pain
  - gross hematuria
  - new or marked increase in incontinence
  - new or marked increase in urgency
  - new or marked increase in frequency

OR

- In the absence of fever or leukocytosis, *two or more* of the following are present:
  - suprapubic pain
  - gross haematuria
  - new or marked increase in incontinence
  - new or marked increase in urgency
  - new or marked increase in frequency

AND

2. The resident has *one* of the following microbiologic criteria:

- At least 105 cfu/mL of no more than two species of microorganisms in a voided urine sample

OR

- At least 102 cfu/mL of any number of organisms in a specimen collected by in-and-out catheter

Indwelling catheter present
Both of the following criteria must be met:

1. The resident has *at least one* of the following signs or symptoms:
   - Fever, rigors, or new onset hypotension, with no alternate site of infection
   - Either acute change in mental status or acute functional decline, with no alternate diagnosis, and leukocytosis (see box, Section A.III)
   - New onset suprapubic pain or costovertebral angle pain or tenderness
   - Purulent discharge from around the catheter or acute pain, swelling, or tenderness of the testes, epididymis, or prostate

AND

2. The resident has a urinary catheter specimen culture with at least 105 cfu/mL of any organism

Comments:

UTI should be diagnosed when there are localizing genitourinary signs and symptoms and a positive urine culture result. A diagnosis of UTI can be made without localizing symptoms if a blood culture isolate is the same as the organism isolated from the urine and there is no alternate site of infection. In the absence of a clear alternate source of infection, fever or rigors with a positive urine culture result in the noncatheterized resident or acute confusion in the catheterized resident will often be treated as UTI. However, evidence suggests that most of these epidsodes are likely not due to infection of a urinary source.

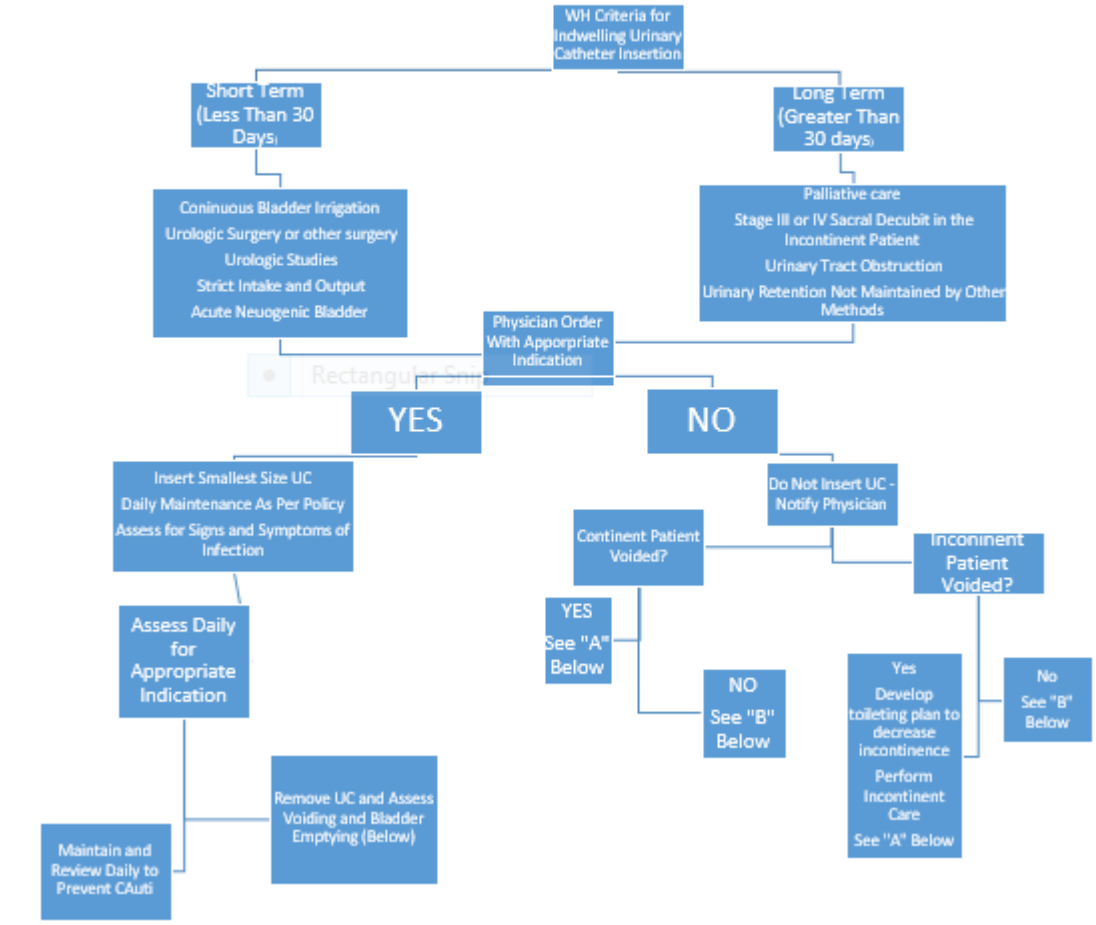
Urine specimens for culture should be processed as soon as possible, preferably within one to two hours after collection. If urine specimens cannot be processed within 30 minutes of collection, they should be refrigerated. Refrigerated specimens should be cultured within 24 hours.

Recent catheter trauma, catheter obstruction, or new onset haematuria are useful localizing signs that are consistent with UTI but are not necessary for diagnosis.

Urinary catheter specimens for culture should be collected following replacement of the catheter if the current catheter has been in place for more than 7 days.

Western Health CAUTI Prevention Clinical Pathway

Legend
PVR-Post residual void
CAUTI-Catheter Associated
Urinary Tract Infection
UC-Urinary Catheter



Assess for Adequate Bladder Emptying

A. If patient **HAS** urinated (voided) within 4-6 hours follow these guidelines:

- If minimum urinated volume ≤ 180 ml in 4-6 hours or urinary incontinence present, confirm bladder emptying.
- Prompt patient to urinate/check for spontaneous urination within 2 hours if post-void residual (PVR) < 300-500 ml
  - Recheck PVR within 2 hours.*
  - Perform straight catheterization for PVR per scan ≥ 300-500 ml
- Repeat scan within 4-6 hours and determine need for straight catheterization.
- Report to provider if retention persists ≥ 300-500ml.
- Perform ongoing straight catheterization per facility protocol to prevent bladder over distension and renal dysfunction (CDC, 2009), usually every 4-6 hours.

*If urinated > 180ml in 4-6 hours (adequate bladder emptying), use individual plan to promote/maintain normal pattern.

B. If patient **HAS NOT** urinated within 4-6 hours and/or complains of bladder fullness then determine presence of incomplete bladder emptying.*

- Prompt patient to urinate. If urinate volume ≤ 180ml. perform bladder scan.*

*Perform bladder scan (CDC, 2009) to determine PVR. If no scanner available, perform straight catheterization.

Reference

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