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AST Guidelines for Best Practices in Urinary Catheterization

Introduction

The following Guidelines for Best Practices were researched and authored by the AST Education and Professional Standards Committee, and are AST approved.

AST developed the Guidelines to support healthcare delivery organization's (HDO) reinforce best practices in urinary catheterization as related to the role and duties of the Certified Surgical Technologist (CST®), the credential conferred by the National Board of Surgical Technology and Surgical Assisting (NBSTSA). The purpose of the Guidelines is to provide information OR supervisors, risk management, and surgical team members can use in the development and implementation of policies and procedures for urinary catheterization in the surgery department. The Guidelines are presented with the understanding that it is the responsibility of the HDO to develop, approve, and establish policies and procedures for the surgery department regarding urinary catheterization practices per HDO protocols.

Rationale

Urinary tract infections (UTI) are the second most common type of healthcare-associated infection reported to the National Healthcare Safety Network accounting for approximately 8 - 10 million annual visits to healthcare providers.¹⁻³ Most UTIs are linked to *urinary catheterization*.⁴ Women are especially susceptible to UTIs; the lifetime risk of having a UTI is greater than 50%.⁵ Approximately 11 million women a year report having had a UTI and research indicates that one out of five women at some point in their life will acquire a UTI.^{3,6,7} About 20% of women with a first-time UTI will have a recurrent infection and of that group 30% will have another UTI, and of this last group, 80% will have a recurrent UTI.^{3,8,9} Additionally, a questionnaire-based study reported that 4% - 5% pregnant women develop a UTI.¹⁰ Studies indicate that women undergoing total vaginal hysterectomy who were catheterized, including short-term catheterization, experienced longer hospital stays that obviously adds to the patient's cost of treatment and morbidity.¹¹

Patient factors for acquiring UTIs include older age, existing disease conditions and how advanced is the disease, and physical condition of the patient such as obesity or malnutrition. Besides women, other high-risk groups include people with diabetes and those with spinal injuries, e.g., hemiplegic, quadriplegic.¹ However, the number one risk factor associated with acquiring a UTI is prolonged use of an indwelling catheter; other risk factors include method of catheterization, not maintaining a closed drainage system, and the patient's susceptibility to infections due to a weakened immune system.¹² Several

pathogens have been identified as the cause of UTIs, but 80% - 90% of the UTIs are caused by *Escherichia coli*.³

Therefore, to prevent the patient from acquiring a UTI and to maintain metabolic homeostasis, the *principles of asepsis* and *sterile technique* must be strictly followed when inserting and removing a urinary catheter.

Evidence-based Research and Key Terms

The research of articles, letters, nonrandomized trials, and randomized prospective studies is conducted using the Cochrane Database of Systematic Reviews and MEDLINE®, the U.S. National Library of Medicine® database of indexed citations and abstracts to medical and healthcare journal articles.

The key terms used for the research of this Guideline include: CAUTI; *Escherichia coli*; indwelling catheter; principles of asepsis; sterile technique; urinary catheterization; urine specimen; urinary tract infection.

Guideline I

Surgical technologists who insert and remove urinary catheters should be graduates of a CAAHEP accredited program and certified as a CST with currency.

1. CSTs know the anatomy of the genitourinary tract to prevent urinary catheter insertion and removal errors and patient injury.¹³
2. CSTs are experts in the principles of asepsis and sterile technique that are applied when inserting and removing a urinary catheter, and obtaining a *urine specimen*.^{4,13,14}
3. CSTs can be assigned the responsibility of catheter insertion, removal, and maintenance since they are required to complete this training as a student per the requirements of the *Core Curriculum for Surgical Technology*.¹³

Guideline II

CSTs should complete training in the use of accessory urinary catheter devices.

1. Accessory devices, such as stylet, guide wire, or filiforms can cause patient injury.¹⁴ CSTs should understand and practice the correct techniques of the use of the urinary catheter devices in simulated training sessions prior to using the skills on surgical patients. Simulated training sessions in the OR are an effective method of practice that improves the skills of the individual and surgical team.^{25, 32-34}

Guideline III

Surgery departments should base their practices for the insertion and removal of urinary catheters on the *Guideline for Prevention of Catheter-Associated Urinary Tract Infections 2009* published by the Centers for Disease Control and Prevention' Healthcare Infection Control Practices Advisory Committee.⁴

1. Urinary catheters should only be used in surgical patients as deemed necessary and not as part of routine care of the surgical patient.⁴ Appropriate indications for the perioperative use of *indwelling catheters* include:
 - A. lengthy surgical procedure;
 - B. patients undergoing genitourinary surgery;
 - C. anticipated need to monitor the intraoperative urinary output;

- D. patients anticipated to be receiving a large volume of infusions or diuretics during surgery;
 - E. anticipated postoperative reasons such as patient recovering from prolonged effect of epidural anesthesia or type of surgical procedure, e.g., transurethral removal of the prostate.
2. Indwelling urethral catheters should only be left in place as long as needed and removed as soon as possible to reduce the risk of a UTI.^{4,15}
- A. The use and duration of urinary catheters should be minimized, particularly in surgical patients who are at a higher risk for *catheter-associated urinary tract infections (CAUTI)* or mortality including the elderly, immunocompromised patients, and women.
 - B. For surgical patients, the catheter should be removed postoperatively within 24 hours unless there are appropriate indications for prolonged use.⁴
3. CSTs must use sterile technique for urinary catheter insertion and removal to prevent the patient from acquiring a CAUTI.
- A. The CST must perform the hand wash immediately before and after the insertion, removal, or manipulation of the catheter device or site of catheter insertion.
 - B. Sterile technique for insertion of urinary catheters includes using a sterile catheter kit that is commercially available that includes sterile gloves to be donned using the open gloving technique; fenestrated drape; sponges; antiseptic solution for cleansing the urethral meatus; single-use packet of lubricant jelly; and catheter with collection bag. A preconnected, sealed catheter-tubing junction should be used; an antimicrobial/antiseptic-impregnated catheter should not be routinely used.¹² Additionally, routine use of antiseptic lubricant jelly is not necessary.⁴
 - C. Unless indicated differently by surgeon's orders, the smallest diameter catheter should be used to minimize bladder neck and urethral trauma.⁴ A catheter with a 1.5-mL or 3-mL balloon for pediatric patients should be used or 5-mL balloon for adults that is filled per manufacturer instructions.¹⁶ A 30-mL balloon should not be used; when filled it positions itself high in the bladder.¹⁶ This places undue pressure on the bladder neck and pelvic floor causing bladder spasms and leakage, as well as resulting in stasis because the drainage eyes are positioned superior to the balloon and, therefore, above the urine.¹⁶
 - 1) Pretesting the balloon must be based on manufacturer's recommendations. Some catheter manufacturers, such as Bard, indicate pretesting is not necessary since they pretest each Foley catheter before it is packaged.¹⁷ Pretesting silicone balloons is not recommended; the silicone can form a cuff or crease at the balloon area that can cause trauma to the urethra during catheter insertion and removal.^{18,19}
 - D. The CST must secure the catheter tubing after insertion to prevent urethral traction and inadvertent catheter removal such as when moving the patient from the OR bed to the stretcher.

4. The CST must use proper techniques for urinary catheter maintenance.
 - A. To prevent CAUTIs, a sterile, continuously closed drainage system should be maintained.⁴
 - 1) If a break in sterile technique, disconnection, or urine leakage occur, the catheter and collecting bag should be replaced using sterile technique and sterile supplies.
 - B. Unobstructed flow of the urine must be maintained and backflow of urine from the bag must be prevented.
 - 1) The catheter and collecting tube must be kept from kinking and bending.
 - 2) The collecting bag must always be kept below the level of the bladder to prevent the backflow of urine and the bag must not be placed on the floor. This is especially important when transferring the patient from the stretcher to the OR bed and vice versa.
 - 3) During lengthy surgical procedures or prolonged stay in the post-anesthesia care unit (PACU), the collecting bag should be emptied using a clean collecting container. The CST or HCW should wear personal protective equipment (PPE) including gloves and protective eyewear. He/she should avoid splashing and prevent the drainage opening of the collecting bag from contacting the nonsterile collecting container.⁴ The amount of urine should be recorded in the patient's operative record or PACU record.
 - 4) A clamp should not be placed on the catheter or collecting tube when emptying the collection bag or removing the catheter.⁴
 - C. If a sterile urine specimen is needed for culture/urinalysis, the urine should be removed using the needleless sampling port with a sterile syringe/cannula adaptor after cleansing the port with a disinfectant.⁴

Guideline IV

The surgery department should have a written plan for the selection and evaluation of urinary catheter devices. The selection process provides the surgery department a systematic method for making an informed decision as which urinary catheter device is the easiest and safest to use on patients that will help to prevent CAUTIs.

1. A multidisciplinary team should be selected and responsible for the evaluation of current urinary catheter devices, and the identification, evaluation, and selection of new devices. The team should consist of non-managerial employees who provide direct patient care including CSTs, surgeons, RNs, infection control officer, materials management/purchasing, and risk management.
 - A. The key factor in collecting data is the in-use device evaluation. Product evaluations are not the same as conducting a clinical trial. Clinical trials are governed by a rigorous, scientific process; whereas, product evaluation involves surgical personnel using the device during a surgical procedure to evaluate its performance formally and informally.

The team should gather information on the urinary catheter device that is currently being used including ease of use, effectiveness, and types and frequencies of CAUTIs. The selection and priority criteria for

the urinary catheter device should be established. The criteria should include patient safety; performance of the device; ease and efficiency of use; and user acceptance.

The team should next gather information on urinary catheter device products that are available on the market. Information should be obtained from the manufacturer, evidence-based research, and feedback from surgery departments that are known to already be using the products. The team should request samples of the device to be evaluated from manufacturers/distributors.

The team should develop a one-page, easy-to-complete and score product evaluation form for surgery personnel to complete that includes a section for written comments; the evaluations should be anonymous. The team should also establish a time period for the evaluation.

At the end of the evaluation period, the team should tabulate and analyze the results of the evaluations to determine which urinary catheter device to select and use. The final decision should not be solely based on the cost of the product. Other costs to take into consideration include cost of educating and training surgery personnel in the use of the device; and potential cost savings related to reducing the incidence of CAUTIs.

Once the new device has been implemented the team should monitor its use to determine that device is being correctly used and if surgery personnel need to complete additional training; gather formal and informal feedback on the surgery personnel's experience in using the device; and identify if the device is not meeting the needs of the surgery team and patient and should be replaced.

Guideline V

The surgery department should implement a quality improvement (QI) program to establish and implement strategies to reduce the risk of CAUTI based on department risk assessment.⁴ The QI program should be based on evidence-based guidelines that address catheter insertion, maintenance, and removal.⁴

1. The purposes of the QI program should be to assure there are appropriate indications for the use of a catheter; identify when catheters are no longer needed and should be removed; ensure HCP are adhering to strict principles of asepsis and hand hygiene practices.
 - A. The QI program should involve a multidisciplinary team that includes CSTs, surgeons, RNs, infection control officer, and risk management to develop, implement and assess the results of the program to identify areas of improvement.
 - 1) The results of the assessment should be shared with surgery personnel. Additionally, formal and informal feedback from surgery personnel should be collected by the team regarding aspects of the QI program that are working and what can be improved. Feedback can be formal surveys and informal recording of verbal comments.

B. Components of a QI program should include a system of documentation; continuing education and performance feedback to assess the skills of surgery personnel; procedure-specific guidelines for catheter insertion, maintenance, and removal; and review of policies and procedures (P&P).

- 1) The documentation system should include use of a use of a “urinary catheter reminder” checklist to identify all patients with urinary catheters and assess the need for continued catheterization. A systematic review of hospitalized patients reported that the use of a reminder that a catheter was in place and/or an order to remove a catheter reduced the CAUTI rate by 53%.²⁰

Documentation that should be in the patient’s medical record includes: physician order for catheter placement; indications for catheter insertion; date and time of catheter insertion; name of individual with credentials who inserted the catheter; and date and time catheter was removed.⁴

The information should be recorded in a standard format for data collection and quality improvement purposes.⁴ Electronic documentation that can be easily searched is recommended.⁴

- 2) The surgery department should document when the P&Ps were reviewed, revision completed (if necessary), and who participated in the review process.
 - 3) CSTs should be familiar with the P&Ps for urinary catheterization. The orientation of new employees should include reviewing the P&Ps.
2. The success of a CAUTI QI program can be measured by decreased rates of CAUTI and decreased catheter-days.¹²
- A. It is important to provide feedback to the surgery personnel on the success of the QI program to promote awareness and “buy-in” of the techniques that are working such as increase in the hand hygiene rate, catheter removal rates in the PACU, and CAUTI rates in the HDO.²¹⁻²⁴

Guideline VI

CSTs should complete continuing education to remain current in their knowledge of the techniques for urinary catheter insertion, maintenance, and removal.²⁵

1. The continuing education should include information about CAUTI, other complications of urinary catheterization, and alternatives to indwelling catheters.
2. CSTs should complete continuing education and training when a new catheter urinary device and/or supplies is implemented for use.
3. The continuing education should be based upon the concepts of adult learning, referred to as andragogy. Adults learn best when the information is relevant to their work experience; the information is practical, rather than academic; and the learner is actively involved in the learning process.²⁶

4. It is recommended surgery departments use various methods of instruction to facilitate the learning process of CSTs.
 - A. If the education is primarily lecture, methods to engage learners include presentation of case studies for discussion, and audience discussion providing suggestions for reinforcing (subject of Guidelines).
 - B. Other proven educational methods include interactive training videos, and computerized training modules and teleconferences.
5. The surgery department should maintain education records for a minimum of three years that include dates of continuing education; names and job titles of employees that completed the continuing education; synopsis of each continuing education session provided; names, credentials, and experience of instructors.

Competency Statements

Competency Statements	Measurable Criteria
<ol style="list-style-type: none"> 1. CSTs have detailed knowledge of genitourinary anatomy. 2. CSTs are experts in the principles of asepsis and application of sterile technique. 3. CSTs are knowledgeable of the risks and infection-control concerns associated with the insertion and removal of urinary catheters in the perioperative environment. 4. CSTs who are graduates of a CAAHEP accredited program are qualified to perform urinary catheterization to include use of the accessories and collection of urine specimens in the perioperative environment. 	<ol style="list-style-type: none"> 1. Educational standards as established by the <i>Core Curriculum for Surgical Technology</i>.¹³ 2. The didactic subject of urinary catheterization and infection control practices is included in a CAAHEP accredited surgical technology program. 3. Students demonstrate knowledge of urinary catheterization in the lab/mock OR and during clinical rotation. 4. As practitioner's, CSTs perform urinary catheterization insertion and removal in the perioperative setting following the principles of asepsis and sterile technique. 7. CSTs complete continuing education to remain current in their knowledge and skills of urinary catheterization including annual review of the policies and procedures of the HDO.²⁵

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Glossary

Catheter-associated urinary tract infection (CAUTI): An infection that involves any part of the urinary system including urethra, bladder, ureters and kidneys caused by an indwelling catheter.

Escherichia coli: Rod-shaped, facultative anaerobic bacteria that live in the large intestine of humans; it is also an opportunistic microbe that can cause infections.

Indwelling catheter: Flexible rubber or plastic tube (catheter) that is inserted into the bladder that remains to provide continuous urinary drainage.

Principles of asepsis: Strategies that are used by HCP to prevent healthcare-acquired infections in patients.

Sterile technique: Methods of the principles of asepsis that HCP implement to prevent contamination of sterile items and introduction of microbes that can cause healthcare-associated infections in patients.

Urinary catheterization: Flexible rubber or plastic tube (catheter) that is inserted through the urethra into the bladder for intermittent drainage (straight catheterization) or continuous drainage.

Urine specimen: Sterile urine obtained from the collection bag to be sent for culture/urinalysis.

Urinary tract infection (UTI): An infection that involves any part of the urinary system including urethra, bladder, ureters and kidneys by an opportunistic bacterium.

References

1. National Institute of Diabetes and Digestive and Kidney Diseases. Urinary tract infections in adults. May 2012. <https://www.niddk.nih.gov/health-information/health-topics/urologic-disease/urinary-tract-infections-in-adults/Pages/facts.aspx#common>. Accessed December 3, 2016.
2. Schappert SM, Rechtsteiner EA. Ambulatory medical care utilization estimates for 2007. *Vital Health Statistics*. April 2011; 169: 1-38.
3. National Kidney Foundation. Urinary tract infections. 2010. <https://www.kidney.org/sites/default/files/uti.pdf>. Accessed December 3, 2016.
4. Gould CV, Umscheid CA, Agarwal RK, Kuntz G, Pegues DA and the Healthcare Infection Control Practices Advisory Committee (HICPAC). Guideline for prevention of catheter-associated urinary tract infections 2009. December 2009. <https://www.cdc.gov/hicpac/pdf/CAUTI/CAUTIguideline2009final.pdf>. Accessed December 3, 2016.

5. Litwin MS, Saigal CS, eds. Urologic diseases in America. National Institute of Diabetes and Digestive and Kidney Diseases. NIH Publication No. 12-7865. 2012. http://urology.ucla.edu/workfiles/Research/UDA_2012_Compndium.pdf. Accessed December 4, 2016.
6. Howell A. Bioactive compounds in cranberries and their role in prevention of urinary tract infections. *Molecular Nutrition and Food Research*. 2007; 51: 732-737.
7. Ross S. Clinical applications of cranberry in urinary tract infections. *Holistic Nursing Practice*. 2006; 213-214.
8. Tolkoff-Rubin NE, Cotran RS, Rubin RH. Urinary tract infection, pyelonephritis, and reflux nephropathy. In: Brenner BM, ed., *Brenner & Rector's The Kidney*. 8th ed., Vol. 2. Philadelphia, PA: Saunders; 2008: 1203-1238.
9. Schaeffer AJ. Infections of the urinary tract. In: Walsh PC, Retik AB, Vaughan ED, Wein AJ, eds., *Campbell's Urology*. 8th ed., Vol. 1. Philadelphia, PA: Saunders; 2002: 515-602.
10. Sharma JB, Aggarwal S, Singhai S, Kumar S, Roy KK. Prevalence of urinary incontinence and other urological problems during pregnancy: a questionnaire based study. *Archives of Gynecology and Obstetrics*. 2009; 279(6): 845-851.
11. Cravens D, Zweig S. Urinary catheter management. *American Family Physician*. 2000; 61(2): 369-376.
12. Lo E, Nicolle LE, Coffin SE, Gould C, Maragakis LL, Meddings J, Pegues DA, Pettis AM, Saint S, Yokoe DS. Strategies to prevent catheter-associated urinary tract infections in acute care hospitals: 2014 update. *Infection Control and Hospital Epidemiology*. 2014; 25(5): 464-479.
13. Association of Surgical Technologists. Core curriculum for surgical technology. 2011. http://www.ast.org/uploadedFiles/Main_Site/Content/Educators/Core%20Curriculum%20v2.pdf. Accessed December 3, 2016.
14. Frey K. (ed.). Surgical technology for the surgical technologist: a positive care approach. 5th ed. Clifton Park, NY: Delmar Cengage Learning; 2017.
15. Hooten TM, Bradley SF, Cardenas DD, Colgan R, Geerlings SE, Rice JC, Saint S, Schaeffer AJ, Tambayh PA, Tenke P, Nicolle LE and the Infectious Diseases Society of America. Diagnosis, prevention, and treatment of catheter-associated urinary tract infection in adults: 2009 international clinical practice guidelines from the Infectious Diseases Society of America. *Clinical Infectious Diseases*. 2010; 50(5): 625-663.
16. Smith JM. Indwelling catheter management: from habit-based to evidence-based practice. *Ostomy Wound Management*. 2003; 49(12): 34-45.
17. Griffith D. Letter – pretesting of Foley balloons. C.R. Bard, Inc. July 7, 2010.
18. Robinson J. Deflation of a Foley catheter balloon. *Nursing Standard*. 2003; 17(27): 33-38.
19. Parkin J, Scanlan J, Woolley M, Grover D, Evans A, Feneley RC. Urinary catheter 'deflation cuff' formation: clinical audit and quantitative in vitro analysis. *British Journal of Urology*. 2002; 90(7): 666-671.

20. Medding J, Rogers MAM, Krein SL, Fakhri MG, Olmsted RN, Saint S. Reducing unnecessary urinary catheter use and other strategies to prevent catheter-associated urinary tract infection: an integrative review. 2013. <http://qualitysafety.bmj.com/content/early/2013/09/27/bmjqs-2012-001774.full>. Accessed December 3, 2016.
21. Rosenthal VD, Ramachandran B, Dueñas L, Alvarez-Moreno C, Navoa-Ng JA, Armas-Ruiz A, Ersoz G, Matta-Cortés L, Pawar M, Nevzat-Yalcin A, Rodríguez-Ferrer M, Bran de Casares AC, Linares C, Villanueva VD, Campuzano R, Kaya A, Rendon-Campo LF, Gupta A, Turhan O, Barahona-Guzmán N, de Jesús-Machuca L, Tolentino MC, Mena-Brito J, Kuyucu N, Astudillo Y, Saini N, Gunay N, Sarmiento-Villa G, Gumus E, Lagares-Guzmán A, Dursun O. Findings of the International Nosocomial Infection Control Consortium (INICC), part 1: effectiveness of a multidimensional infection control approach on catheter-associated urinary tract infection rates in pediatric intensive care units of 6 developing countries. *Infection Control and Hospital Epidemiology*. 2012; 33(7): 696-703.
22. Rosenthal VD, Todi SK, Álvarez-Moreno C, Pawar M, Karlekar A, Zeggwagh AA, Mitrev Z, Udawadia FE, Navoa-Ng JA, Chakravarthy M, Salomao R, Sahu S, Dilek A, Kanj SS, Guanche-Garcell H, Cuéllar LE, Ersoz G, Nevzat-Yalcin A, Jaggi N, Medeiros EA, Ye G, Akan ÖA, Mapp T, Castañeda-Sabogal A, Matta-Cortés L, Sirmatel F, Olarte N, Torres-Hernández H, Barahona-Guzmán N, Fernández-Hidalgo R, Villamil-Gómez W, Sztokhamer D, Forciniti S, Berba R, Turgut H, Bin C, Yang Y, Pérez-Serrato I, Lastra CE, Singh S, Ozdemir D, Ulusoy S; INICC Members. Impact of a multidimensional infection control strategy on catheter-associated urinary tract infection rates in the adult intensive care units of 15 developing countries: findings of the International Nosocomial Infection Control Consortium (INICC). *Infection*. 2012; 40(5): 517-526.
23. Misset B, Timsit JF, Dumay MF, Garrouste M, Chalfine A, Flouriot I, Goldstein F, Carlet J. A continuous quality-improvement program reduces nosocomial infection rates in the ICU. *Intensive Care Medicine*. 2004; 30(3): 395-400.
24. Jaggi N, Sissodia P. Multimodal supervision programme to reduce catheter associated urinary tract infections and its analysis to enable focus on labour and cost effective infection control measures in a tertiary care hospital in India. *Journal of Clinical and Diagnostic Research*. 2012; 6: 137201376.
25. Association of Surgical Technologists. AST continuing education policies for the CST and CSFA. 2005. Revised July 2016. <http://www.ast.org/webdocuments/CEpolicies/>. Accessed December 5, 2016.
26. Pappas C. The adult learning theory-andragogy-of Malcolm Knowles. 2013. <https://www.elearningindustry.com/the-adult-learning-theory-andragogy-of-malcolm-knowles>. Accessed December 4, 2016.