Iowa CAUTI Prevention Collaborative Resource Manual

January 2011
Prevention Collaborative Resource Manual

A publication of the Iowa Healthcare Collaborative and the
Iowa Department of Public Health

January 2011

Comments, questions and suggestions regarding this reference manual are welcome.

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Funded by a grant from: U.S. Department of Health and Human Services, Center for Disease Control and Prevention (CDC); American Recovery and Reinvestment Act; Epidemiology and Laboratory Capacity for Infectious Diseases (ELC); Healthcare-Associated Infections-Building and Sustaining State Programs to Prevent Healthcare-associated Infections; Funding Opportunity Number: CI07-70402ARRA09
Iowa CAUTI Prevention Collaborative Resource Manual

A special thanks to the North Carolina Center for Hospital Quality and Patient Safety for their allowing Iowa’s use of their CAUTI Collaborative Toolkit © as the basis for the Iowa Collaborative Resource Manual.

www.NCQualityCenter.org
Acknowledgments

The Iowa Department of Public Health (IDPH) Center for Acute Disease Epidemiology (CADE), and the Iowa Healthcare Collaborative (IHC) wish to thank the following individuals for their efforts in reviewing material for the Iowa CAUTI Resource Manual.

- Lisa Caffery, MS, BSN, RN-BC, CIC, Genesis Health Center, Davenport
- Darla Eastman, PharmD, BCPS, Drake University College of Pharmacy and Health Sciences, Des Moines
- Loreen Herwaldt, MD, University of Iowa Hospitals and Clinics, Iowa City
- Louis Katz, MD, Scott County Health Department, Davenport
- Linda Opheim, BSN, MHCA, RN, CIC, Trinity Regional Medical Center, Fort Dodge
- Paula Simplot, RN, BSN, Ottumwa Regional Health Center/Collaborative Laboratory Services, Ottumwa
- Dee Vaage, RN, BSN, CIC, Spencer Hospital, Spencer
- Lisa Veach, MD, Iowa Health System, Des Moines

Thanks to the IDPH-CADE staff effort supporting development of this manual:

- Pam Deichmann, RN, MPH
- Judy Goddard, RN, BS, CPH
- Barbara Livingston, RN, BSN, MPH, CIC
- Mary Rexroat, RN, BS

Thanks to IHC staff supporting development of this manual:

- Gerd Clabaugh, MPA
- Ryan Meyer, BA
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Forward

This manual will explore the various challenges of preventing catheter-associated urinary tract infections (CAUTI), such as developing insertion criteria and a process to assure that it is used for every indwelling catheter that is placed. It will provide guidance on implementation as well as tools that can be readily adapted and used in your organization to prevent CAUTIs. Project management tools will assist teams to plan and track their implementation. Performance improvement methods and measurement will assist teams to design reliable processes. Evidence-based prevention strategies will assist the team with developing ideas and educating the healthcare team to prevent CAUTIs.

This manual will discuss measurement tools, explore optimal team functioning, provide strategies to improve communication and enhance transparency efforts to drive improvement. The teams on the identified unit will work with culture concepts and tools to improve their performance.

This manual was written to support healthcare improvement teams in their journey to deliver evidence-based, safe care for their patients. It is to be used as the source document for the Iowa CAUTI Prevention Collaborative.
Jerri’s Story
The Problem – Why Should We Care about Urinary Tract Infections?

Jerri Allen was a vibrant 72 year-old who was excited about getting her hip replacement behind her and back out on the dance floor with her husband. With all the long years of hip pain, she had seen some pretty nice results in several of her friends who had undergone the procedure, and was looking forward to being pain free or at least having less pain. She had always been so active and just recently reached the point she could no longer function well. She and her husband were planning a cruise to celebrate her recovery in three months. In no way was she prepared for what happened next.

Her surgery was a success and she was recovering well when on the third day after surgery, just as she was preparing to be transferred into the Rehab unit, she spiked a fever. Tests ruled out pneumonia and a blood infection but she did have a urinary tract infection. Her surgeon told her it was from having the bladder catheter in. She had kept the catheter in an extra day because her son had requested it to spare her the extra pain of getting out of bed to go to the bathroom. A few days and a few antibiotic doses later, her infection had cleared up, or so everyone thought. As she was preparing to leave Rehab for home, she began having more pain in her hip area. Her surgeon reassured her that it was most likely due to her increased activity as she progressed. Her incision looked good and there was no drainage.

Four days after getting home though, that changed. The incision became very inflamed and started draining a reddish yellow fluid. Her surgeon immediately readmitted her to the hospital and took her to the operating room to open up the wound to clean the area out and to open the hip incision. She was diagnosed with a deep surgical site infection. Cultures came back positive for the same organism she had in her urine. Her surgeon said she had probably “seeded” the hip infection from that urinary tract infection.

The next several months were a nightmare – hospital stays, going back and forth to the operating room to clean out the wound, then finally to remove her new hip. Jerri was sent to a skilled nursing facility to await the point when her wound would be clean enough to have a new hip implanted. She became very depressed and refused to participate in physical therapy. She lost weight and stopped eating. A feeding tube had to be placed. Three months later, when her surgeon decided to go ahead and replace the hip, Jerri was not the same person she was at her first surgery. Financial problems were added on top of the health problems. Jerri’s care was not fully covered by Medicare or their supplemental insurance, and Mr. Allen was going into their modest savings to pay medical bills, now in excess of $200,000. The end was not in sight, either. Who knew urinary tract infections could turn into this type of problem?
Jerri’s story is only one example of how healthcare-associated infections, in this case, catheter-associated urinary tract infections (CAUTIs), can impact lives. Healthcare-associated infections (HAIs) are a major cause of morbidity, mortality and costs. The Centers for Disease Control and Prevention (CDC) estimates nearly 2 million HAIs occur in U.S. hospitals and 99,000 people die as a result of these infections annually. There are approximately 4.5 HAIs per 100 hospital admissions, 9.3 infections per 1000 patient days in the intensive care unit and 2 surgical site infections per 100 operations. HAIs cost between 5-6 billion dollars annually, with an average additional incremental direct cost of $8,832 per patient. ¹, ²

CAUTIs are the most numerous HAI found in US hospitals. Nearly 450,000 CAUTIs were identified in 2002 in US hospitals. ³ At an average cost of approximately $1,000 for each infection in 2007, total costs of these infections are estimated at $450 million annually. ¹¹

Evidence Based Guidelines - What Can We do to Prevent These Infections?

While there are no silver bullets that will easily eradicate these types of infections, assessment of the medical literature has resulted in the development of evidence-based guidelines, which may be used to direct best practices to prevent them. Specific guidelines that are well accepted include those from the Centers for Disease Control and Prevention, the Infectious Disease Society of America, the Society of Healthcare Epidemiology of America, and the Association for Professionals in Infection Control and Epidemiology (see chapter 9 for specific citations).

The CDC endorses core strategies to eliminate CAUTIs:

- Insert catheters only for appropriate indications
- Leave catheters in place only as long as needed
- Ensure that only properly trained persons insert and maintain catheters
- Insert catheters using aseptic technique and sterile equipment (acute care setting)
- Following aseptic insertion, maintain a closed drainage system
- Maintain unobstructed urine flow
- Hand hygiene and Standard (or appropriate isolation) Precautions

In addition, CDC endorses additional supplemental strategies, including:

- Consideration of alternatives to indwelling urinary catheterization
- Use of portable ultrasound devices for assessing urine volume to reduce unnecessary catheterizations
- Use of antimicrobial/antiseptic-impregnated catheters

Important Note: Although this manual and collaborative focus on prevention of CAUTI specifically, the underpinning of all infection prevention programs, policies, and protocols that have the ability to impact these rates are even more basic:

- Appropriate hand hygiene
- Environmental and equipment cleanliness and other related considerations
- Compliance with standard and transmission-based precautions
Therefore, all CAUTI-specific discussions are conducted assuming a strong underpinning of these prevention basics are in place.

To assist Iowa hospitals in their quest to prevent CAUTIs using these best practices, a collaborative has been formed, concentrating on key elements in these guidelines.

Some Facts about CAUTI:

- Most of the HAIs reported are UTIs and 80% of those are catheter-associated.  
- CAUTI is associated with increased morbidity and mortality, and can be a source of surgical site infections. It is the second most common cause of bloodstream infections. 
- Urinary drainage systems are sources of antibiotic-resistant organisms that can be passed to other patients and staff. 
- 12% to 25% of hospitalized patients will have an indwelling urinary catheter placed and about half of those are placed without appropriate reasons. 
- Studies show that about 40% of attending doctors caring for patients with unnecessary indwelling urinary catheters were not aware they were still in. 
- Patients’ risk for getting a CAUTI is about 3% to 7% every day the indwelling urinary catheter is left in place. 
- Studies show that patients with CAUTI have a longer stay by 0.5 to 1 day and an added cost of approximately $1,000 per case more if they have a resistant organism or develop complications. 
- As of 10/1/08, the Centers for Medicare and Medicaid Services (CMS) implemented a rule eliminating payment for treatment of complications for CAUTI if a patient develops an infection while in the hospital.

BOTTOM LINE: CAUTIs can cause major harm and can increase cost for all.
A Strategy - The Iowa CAUTI Prevention Collaborative

Goal

• Decrease CAUTI Rate by 25% in participating Iowa hospitals by December 2011

How to accomplish this goal:

• By partnering with participating hospitals and building a statewide infrastructure: Partnerships have been formed and are used to support all aspects of the collaborative. The partners contribute resources and expertise unique to their organization. The sponsors for this prevention collaborative include the Iowa Department of Public Health (IDPH) Center for Acute Disease Epidemiology (CADE) and the Iowa Healthcare Collaborative (IHC). See the Acknowledgements page in this manual for a listing of the individuals and organizations directly involved in development of this manual.

• By using resources to assist hospitals in implementing best practice strategies to achieve goals: Participating hospitals will receive infection prevention improvement expertise at a state level and assistance to develop necessary cultural elements to support and sustain gains. Each participating hospital will identify a unit or units (example: intensive care unit, rehabilitation unit, surgical unit, etc.) to focus on in this collaborative. The hospital team will develop and redesign care processes to prevent CAUTI and will measure their effectiveness in data reported to the National Healthcare Safety Network (NHSN). Once reliable processes have been developed, project teams will be challenged to develop a spread plan to incorporate the improvements into additional areas.
<table>
<thead>
<tr>
<th>Activity</th>
<th>Purpose/Goal</th>
<th>Iowa Educational Opportunity</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-person learning sessions</td>
<td>To educate and collaborate with others</td>
<td>Iowa Healthcare Collaborative (IHC) conferences</td>
</tr>
<tr>
<td>Project timeline with milestones</td>
<td>To move the performance improvement process</td>
<td>Kickoff meeting will review with teams how to use timeline forms</td>
</tr>
<tr>
<td>Data collection</td>
<td>To demonstrate improvements</td>
<td>Training for enrollment and use of the Centers for Disease Control and Prevention’s (CDC) National Healthcare Safety Network (NHSN)</td>
</tr>
<tr>
<td>Comprehensive manual</td>
<td>To serve as a resource document assisting the hospital project team.</td>
<td>Iowa Prevention Collaborative Resource Manual</td>
</tr>
</tbody>
</table>
| Collaborative website and forum | • To serve as a central resource for all documents  
• To identify hospitals with best practice and share those practices with other hospitals  
• To share and communicate | IDPH Website  
IHC Website  
IHC Forum |
| Teleconferences and Webinars | To continue learning, drive process momentum, and provide an opportunity to share with larger audiences | Periodic webinars; monthly conference calls |
This template provides guidance for the
CAUTI Prevention Collaborative.

Prevent Catheter-Associated Urinary Tract Infections (CAUTI)

Template

Purpose: To guide and support efforts within Iowa hospitals in developing surveillance systems for catheter-associated urinary tract Infections. In addition the project supports collaborative efforts to define and implement effective prevention and control strategies within hospitals to reduce catheter-associated urinary tract Infections.

Project Timeline: January 1, 2010 to December 31, 2011. District prevention collaboratives will be supported by efforts from both the Center for Acute Disease Epidemiology (CADE) and Iowa Healthcare Collaborative (IHC).

Infection Prevention Target per the U.S. Department of Health and Human Services Action Plan:

- Iowa 2-year target: 25% reduction CAUTI
- National 5-year prevention target: 25% reduction CAUTI

Core Measures: Participating hospitals agree to implement

- Insert catheters only for appropriate indications
- Leave catheters in place only as long as needed
- Ensure that only properly trained persons insert and maintain catheters
- Insert catheters using aseptic technique and sterile equipment (acute care setting)
- Following aseptic insertion, maintain a closed drainage system
- Maintain unobstructed urine flow
- Hand hygiene and Standard (or appropriate isolation) Precautions

Supplemental Measures: To be addressed at a future date

- Consideration of alternatives to indwelling urinary catheterization
- Use of portable ultrasound devices for assessing urine volume to reduce unnecessary catheterizations
- Use of antimicrobial/antiseptic-impregnated catheters (after first implementing core recommendations for use, insertion, and maintenance)

*Hospitals will not be excluded from participation if they already have ongoing interventions using supplemental prevention strategies.

*IDPH project coordinators will track which supplemental prevention strategies are being utilized by participating facilities.
References:

1. Cardo D. Comments to the US House of Representatives on the CDC’s Role in Monitoring and Preventing Healthcare-Associated Infections. 03.29.06 Accessed 01.04.07 from http://www.hhs.gov/asl/testify/t060329.html


Experts at the Institute of Healthcare Improvement (IHI) list “Will”, “Ideas” and “Execution” as key factors that facilitate improvement. These factors work together to achieve improvement. “Will” must come from the senior leaders to the direct care providers. “Ideas” must come from those doing the process. “Execution” must incorporate both the “Will” and the “Ideas” to produce the change we call improvement. To “Execute” the steps necessary to improve a process, it is important to have a basic understanding of project characteristics and how to manage a project successfully. Project knowledge will help you plan, track, and communicate to others about your project. It will also help you navigate barriers to accomplishment. This chapter is designed to give you a basic understanding of a project - its design and management - and to assist you in applying these concepts to your project.

Definition

“Projects set out to produce a unique product or services that hasn’t been produced before. They have a limited time frame and are temporary in nature. This means that projects have a definite beginning and ending.” The project is completed when the objectives are reached or it is clear that the objectives will not or cannot be met, or there is no longer a need for the project and the project is terminated. It is important to communicate with others the characteristics of an effective project so they can have a clear understanding of expectations. Characteristics of a project are that it is temporary, unique and its conclusion is determined by specific, pre-determined criteria.

A project has a beginning and an end. A project is different from processes, or operations, which are permanent or semi-permanent, with ongoing functional work to create the same product or service over and over again. The purpose of a project is to attain its objective and then to terminate, whereas the objective of processes or ongoing operations is to sustain the business. In hospital quality and patient safety, projects are usually focused on improving and making safer or more efficient an already existing service or process, based upon scientific evidence. Therefore, the improvement project itself is temporary, and the process that was improved is permanent or semi-permanent. Making a clear distinction between the project and the processes we are trying to improve assists us in planning by securing the appropriate resources and communicating our project needs to others. It is far easier to ask a busy physician or nurse to assist on a project team that will have a beginning and an end, rather than to work on an on-going permanent or semi-permanent team.

The uniqueness of a product or service originates from the fact that each organization is different. In the case of a hospital, services may be similar from hospital to hospital, but the processes that they employ to deliver the service may be very different. The environment within which services are provided, their resources (financial, technological and human), their organizational structure and their culture will vary. Therefore, the purpose of improvement projects is to develop or revise processes tailored to the hospital’s unique environment that will
achieve the best and safest patient care based on scientific evidence. There is not a one-size-fits-all solution for process improvement across hospitals.

A project’s scope is often described broadly and then further defined as the project progresses and the project team learns more about the process and steps necessary to improve the process. In the case of a hospital quality improvement project, the scope may first be described as an evidence-based process necessary to achieve the outcome. For example, a component of care to prevent catheter-associated urinary tract infections is to use sterile technique during insertion. The team knows the steps necessary to maintain sterile technique, but finds that sterile technique is often broken because the items are packaged separately and they forget an item. The team meets with purchasing to investigate pre-packaged complete kits for indwelling catheterizations.

Other books and resources on performance improvement:

4. Institute for Healthcare Improvement website: http://www.ihi.org/IHI/Topics/Improvement/ImprovementMethods/HowToImprove/
5. Lean Hospitals by Mark Graban, Productivity Press, New York, 2009

Project Management

Project management is the discipline of organizing and managing resources (i.e., people, equipment, finances) in such a way that the project is completed within defined scope, quality, time and cost constraints. As defined by A Guide to the Project Management Body of Knowledge, 3rd edition, project management is the application of knowledge, skills, tools and techniques to project activities to meet project requirements.

Hospitals tend to be organized in a functional structure that is organized by specialty, such as respiratory, nursing, pharmacy, physical therapy, nutrition, etc. They can further be subdivided into other functional structures such as pediatric nursing service, or operative nursing service, etc. They tend to be hierarchal in nature and have staff members that directly answer to one supervisor. However, the processes that they engage in to deliver care often go across functional units. Therefore, projects that involve developing or refining processes need cross-functional teams. While some hospitals have quality improvement departments to work with the cross-functional teams, they are operating in an organization that is non-project based and sometimes lacking in management systems to support projects effectively.
Contrary to functional organizations, highly cross-functional oriented organizations have systems in place to assist the project manager. The project manager in a cross-functional organization has a great deal of authority and independence. Since hospitals tend to be toward the functional organizational end of the spectrum, it is important to equip the project team with skills, knowledge, tools and techniques to organize and manage resources. The fundamental project management concepts include project processes, life cycles, milestones, management systems and stakeholders.

Project Processes

Project management requires coordinating a series of project processes. These processes are the smaller steps necessary to achieve your goal. In the project management world, these are broken down into five different process groups: initiating, planning, executing, controlling and closing. In a hospital quality improvement project, an initiating process may be the senior leader requesting improvement in a quality indicator. To do so, a preliminary aim statement is developed, a project team is formed, and a project plan is drafted in the planning phase. In the executing phase, the team works on the interventions necessary to accomplish the change. For example, an intervention may be a new nurse-driven protocol to ensure everyone in the unit is using appropriate hand hygiene. During this phase, a process will be developed or refined and tried with the different segments, or groups. The monitoring or controlling phase is where the team would measure their progress. The final phase is the closing phase, and it is during this phase that the project is closed out. In hospital quality improvement, the closing phase is when the final tested process is closed and the process is turned over to operations.

Project Life Cycle

Project life cycle refers to the stage or timing that your project is in at any given time. They are broken down into four phases: concept, planning, execution and closeout. Using this “phase”
terminology will ensure that the team can communicate clearly with others regarding the status of the project.

**Project Milestones**

Project milestones are key events of the project. They do not represent an activity or a resource per se, but represent a major marker for the success of your project. The project milestone may indicate a completion of a phase or the creation of a prototype. For example, in a hospital quality improvement project, this may be completion of a phase or completion of process testing.

**The Project Management Systems**

Project management systems are a family of interrelated components that work together to support the project.\(^9\) They are categorized into seven components: human, cultural, organizational, methodological, informational, planning and control/management. Human components deal with people issues; cultural components deal with the beliefs and values of the hospital; organizational components relating to the structure of the hospital; methodological components are the software or tools used to track the project; informational components are the components that track information about the project (for example Plan/Do/Study/Act [PDSA] worksheets); planning outlines the project plan; and finally, control and management means having authority to actually get things done. The most crucial element to have in project management is people skills. People skills are adaptive or cultural skills.

**Project Stakeholders**

A stakeholder is a person, or more typically a group of people (represented by a person or a team) that has a vested interest in what your project is doing.\(^10\) There are many stakeholders in hospital quality improvement ranging from those at the blunt-end (those furthest from the patient like the Board of Directors, hospital leadership, and insurers) to those at the sharp-end (those closest to the patient), including the patient.

**Project Teams**

Project management determines the success of a project, and project management is 99% about managing people. In performance improvement, the group of people working to improve a process is called the project team or the performance improvement team. A team is defined as two or more people who interact dynamically, interdependently, and adaptively toward a common and valued goal, have specific roles or functions, and have time-limited membership.\(^11\) The project team must possess skills such as communicating, coaching, negotiating, leading, facilitating, and resolving conflicts as well as being diverse in their backgrounds in order to be successful. A dedicated project team should include direct care providers whenever possible.

The project team, like other teams, has attributes that makes it successful or high performing. They include things like having clear roles, a shared vision, strong leadership, developing a
strong sense of trust, providing regular feedback, and creating ways to work together. (see Table 2.1 High Performing Team Attributes).

Table 2.1 High Performing Teams’ Attributes – Adapted from TeamSTEPPS®

<table>
<thead>
<tr>
<th>Traits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear roles and responsibilities</td>
<td>• Each team member has a distinct role on the team</td>
</tr>
<tr>
<td></td>
<td>• Each team member has responsibilities associated with their role</td>
</tr>
<tr>
<td>A clear, valued and shared vision</td>
<td>• Common and engaging purpose</td>
</tr>
<tr>
<td></td>
<td>• A leader who promotes the vision with the appropriate level of detail</td>
</tr>
<tr>
<td>Optimize resources</td>
<td>• Assess available resources</td>
</tr>
<tr>
<td></td>
<td>• Coordinate resources to achieve project aim</td>
</tr>
<tr>
<td>Strong team leadership</td>
<td>• Organizes and coordinates the team</td>
</tr>
<tr>
<td></td>
<td>• Articulates clear goals and expectations</td>
</tr>
<tr>
<td></td>
<td>• Facilitates team work</td>
</tr>
<tr>
<td></td>
<td>• Skillful at conflict resolutions</td>
</tr>
<tr>
<td></td>
<td>• Delegates work</td>
</tr>
<tr>
<td>Provide regular feedback</td>
<td>• Regularly provide feedback to each other and as a team</td>
</tr>
<tr>
<td></td>
<td>• Establish and revise team goals and plans</td>
</tr>
<tr>
<td></td>
<td>• Differentiate between higher and lower priorities</td>
</tr>
<tr>
<td></td>
<td>• Have mechanisms for anticipating and reviewing issues of team members</td>
</tr>
<tr>
<td></td>
<td>• Periodically diagnose team effectiveness, including its results, processes and vitality (including moral, energy and retention)</td>
</tr>
<tr>
<td>Develop a strong sense of collective trust, team identity and confidence</td>
<td>• Manage conflict by effectively confronting one another</td>
</tr>
<tr>
<td></td>
<td>• Have strong sense of team orientation</td>
</tr>
<tr>
<td></td>
<td>• Trust other team members’ intentions</td>
</tr>
<tr>
<td></td>
<td>• Believe strongly in the team’s collective ability to succeed</td>
</tr>
<tr>
<td></td>
<td>• Develop collective efficacy</td>
</tr>
<tr>
<td></td>
<td>• Have a high degree of psychological safety</td>
</tr>
<tr>
<td>Create mechanisms to cooperate, coordinate and generate ongoing collaboration</td>
<td>• Identify teamwork and task requirements</td>
</tr>
<tr>
<td></td>
<td>• Ensure that team possesses the right mix of competencies through staffing and development</td>
</tr>
<tr>
<td></td>
<td>• Distribute and assign work thoughtfully</td>
</tr>
<tr>
<td></td>
<td>• Consciously integrate new team members</td>
</tr>
<tr>
<td></td>
<td>• Involve the right people in decisions in a flexible manner</td>
</tr>
<tr>
<td></td>
<td>• Examine and adjust the teams’ physical workplace to optimize communication and coordination</td>
</tr>
<tr>
<td>Manage and optimize performance outcomes</td>
<td>• Communicate often and at the right time to ensure that fellow team members have the information they need to contribute</td>
</tr>
<tr>
<td></td>
<td>• Use closed-loop communication</td>
</tr>
<tr>
<td></td>
<td>• Continually strive to learn and learn from each performance outcome</td>
</tr>
</tbody>
</table>
Project Team Composition

As we learned above, each organization and each project has uniqueness. No two units are the same and likewise no two project teams are alike. Teams can have assigned roles that define them such as the Project Team Leader, Day-to-Day Leader, Data Manager, Clinical Champion, and other direct care providers or process experts. The team may involve other members periodically over the life of the project. These team members could be staff from finance, marketing, patient education, etc. How you structure your team for this project will be dependent on the resources you have available and the scope of your project. Effective teams do include members representing three different kinds of expertise within the organization: organizational leadership, project leadership and clinical or technical expertise.

Organizational (system) leadership, sometimes referred to as the project or executive sponsor, is a person who is responsible and accountable to the organization for the performance and results of the project improvement team. This person is not a member of the team who is actually working on the steps necessary to improve the process, but is the person responsible for securing resources (i.e. time, money, etc.) needed, helps to eliminate barriers, communicates the project to organizational leaders and assures that the project is well-aligned with organizational strategic goals. The project sponsor has certain attributes and responsibilities in contributing productively to the project. Table 2.2 The Project Sponsor, explores these in more detail.

Table 2.2 The Project Sponsor

<table>
<thead>
<tr>
<th>Attributes</th>
<th>Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Authority to remove system barriers</td>
<td><strong>Organizational Responsibilities</strong></td>
</tr>
<tr>
<td>• Authority to obtain resources</td>
<td>1. Build “will” for the improvement initiative</td>
</tr>
<tr>
<td>• Direct connection to senior leadership</td>
<td>2. Connect improvement work to organizational priorities</td>
</tr>
<tr>
<td>• Administrative position and responsibilities aligned with improvement team</td>
<td>3. Communicate the team’s progress to the leadership</td>
</tr>
<tr>
<td>• Understanding of their role on the team and its relationship to team success</td>
<td>4. Assist with removal of organizational barriers</td>
</tr>
<tr>
<td>• Basic knowledge of project management &amp; improvement</td>
<td>5. Awareness of the improvement team’s impact on the rest of the organization</td>
</tr>
<tr>
<td></td>
<td>6. Once a reliable process is designed and tested, assists with organizational spread strategy</td>
</tr>
</tbody>
</table>

**Team Responsibilities**

1. Build the “will” for the improvement initiative
2. Reach agreement on aim for team’s work
3. Help select team members
4. Be aware of teams progress and barriers they may be encountering

The project sponsor’s attributes are common for most senior leaders in an organization. They may need some assistance with understanding the improvement process, how it relates to the project as a whole, and their role. The project sponsor has responsibilities both to the organization and to the team. Like other roles on the project team, the role of the project sponsor may be new to the senior leader, so it is wise to review with the team everyone’s role and
expectations. As they get accustomed to their role on the team, the project sponsor may want to start small and work up to their full role as the project proceeds.

There are strategies that will help the project sponsor in their role. These include communication strategies, like using stories to communicate the value and the progress of the project, tailoring the message to the audience and making sure to keep the team informed about barrier removal and resources. If possible, the project sponsor should be visible to the team by attending team meetings. During team meetings, the project sponsor should communicate progress on their responsibilities and also hold the team accountable for their responsibilities. Teleconferencing into the team meeting or connecting with the project leader before the team meeting may be an option for the project sponsor if they cannot attend in-person, though these options should be used sparingly. Working with the project leader, the sponsor should keep in mind the scope of the project, work with the team to assess their effectiveness, and offer some guidance to the team and its leader to assist with keeping the project on track.

The project team leader or project manager is crucial to the team. They drive the project by facilitating the team. An effective team leader is able to organize the team, articulate clear goals, make decisions through collective input of members, empower members to speak-up and challenge members when appropriate, actively promote and facilitate good teamwork, and resolve conflicts skillfully. A team leader is a well-informed team member and is decisive in their role. The team leader is able to delegate to others and communicate expectations clearly, “what” is to be done, and “who” should do it. They are able to work effectively with the project sponsor and the other team members, including the clinical champion. The project team leader will facilitate the design or redesign of the process and is able to assess the project’s progress as a whole. The project team leader may be a nurse manager of the unit where the process is being designed or redesigned. In a smaller hospital or unit, the project team leader may also be the day-to-day leader of the organizational unit in the hospital responsible for executing the process. The team leader may be the person actually testing the changes. In a larger unit or hospital, they may have another clinical or topical expert assigned to the role of the day-to-day leader. The project team leader, in the case of the CAUTI Collaborative, may also be the primary contact between the hospital-based multidisciplinary team and the hospital’s administrative leadership team.

“Notes from the field”

Trinity Regional Medical Center, Fort Dodge, initiated a nursing shared governance model in 2009. It is called IGNITE, Inviting Growth in Nursing and Igniting Teams in Excellence. There are four councils of staff nurses, one of which is Performance Improvement. This group developed strategies to make improvements in performance in the hospital and developed staff education on each part of the improvement initiative. The group actively monitors progress and makes additional recommendations to hospital senior staff regarding additional opportunities for improvement focused on improvement in outcome for the patient.
The clinical or technical expert is someone who is a subject matter or process expert. They are the direct care provider that lives and works in the care processes. This team member might be a pharmacist, radiologist, nurse, physician, unit secretary, or a patient transporter. The clinical or technical expert works to test change ideas and gather information on whether the change is an improvement. They are the leader of the Plan/Do/Study/Act (PDSA) cycles. As mentioned above, this position could also be the project team leader or in the case of the CAUTI Collaborative, the primary contact between the hospital administrative team and the multidisciplinary collaborative leadership team.

It is important to recognize the role of the clinical champion. This individual is a clinical expert who is well respected as a physician or other clinical provider, is good at communicating, has the courage to confront the change with others and works well with others. The team must help the clinical champion gain familiarity with the project and project data to ensure their effectiveness. Other considerations regarding the clinical champion include determining if compensation will be provided for their work and how best to keep them informed (email, teleconferences, etc.) if they are unable to attend team meetings.

Team Meetings and Other Team Tools

The project team meetings should be considered sacred time and used as an opportunity to brainstorm, discuss findings, assign tasks and assure a common direction. Some teams choose to do meetings electronically or over the telephone. If team members find the meeting valuable, they will continue to attend. Therefore, the team should strive to use meeting time as effectively and efficiently as possible. Regardless of how you decide to conduct your regularly scheduled team meetings, you should use agreed-upon ground rules.

Putting it Together - Managing Your Project

Now that you have a fundamental understanding of projects and project management, it is time to address your project. Two of the most important elements of an effective project are a clear plan to determine resources required and a realistic schedule. You may want to ask yourself the following questions:
As discussed above, your project is unique to your facility. It is dependent on your current systems, size, culture and adaptability. All of the factors listed above determine the number of tests of change and how quickly a project plan can be implemented. In the first six weeks of the project, the team will understand the current process, develop ideas to change or create a new process, and perform some tests of change. To prevent CAUTI, you may need to consider the place where urinary catheters are most commonly placed. For example, the project may focus on 6 West, the medicine floor, but most of those admissions may come from the emergency department where urinary catheters are routinely placed. This is an important consideration when determining the composition of the project team.

1. What elements of the project are we going to focus on? For example, indication for urinary catheter insertion, insertion of catheter, prompt removal of the catheter, maintenance of the catheter, etc.

2. How many resources are available to conduct this project?

3. When do I need to have the process in place? What are the time frames for completion?

4. Are the appropriate hospital staff available to work on this project?
Table 2.3 Project Process Guide

<table>
<thead>
<tr>
<th>Process Example: Insertion Criteria Protocol</th>
<th>Wk 1</th>
<th>Wk 2</th>
<th>Wk 3</th>
<th>Wk 4</th>
<th>Wk 5</th>
<th>Wk 6</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Initiate</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Preliminary aim statement – project scope statement</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Review of project management systems including resources (human, IT, supply system, etc.) and time line for execution</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project sponsor identified</td>
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<td></td>
</tr>
<tr>
<td>Form a project team</td>
<td></td>
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<tr>
<td><strong>Plan</strong></td>
<td></td>
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<td></td>
<td></td>
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<td>x</td>
</tr>
<tr>
<td>Further define scope; for example, segment – all Dr. Smith’s admissions to 6 West (medicine unit).</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assess your current process for urinary catheters</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>1. Identify the project milestones</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Determine tasks to necessary to accomplish milestones</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Identify dependencies</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>4. Determine resources required for segmented scope</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>5. Develop schedule – plot on timeline</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flow current process</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Educate others in segmented population about project</td>
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</tr>
<tr>
<td>Gather baseline data</td>
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<td></td>
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<td></td>
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</tr>
<tr>
<td><strong>Execute</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Run PDSA cycles</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Document the cycles</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td><strong>Control</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Monitor the on-going project against the plan, (on track, on-time, achieve aim)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Additional resources required</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td><strong>Close</strong></td>
<td></td>
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</tr>
<tr>
<td>Determine the spread plan and formalize process</td>
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</tr>
</tbody>
</table>

In addition to reviewing project processes, the team will need to identify the milestones for the project. The team will need to account for the interrelationships of the project management systems as they plan their project.
Reference


5. Ibid, p. 6


8. Ibid, p. 29


11. TeamSTEPPS, Department of Defense (DoD) Patient Safety Program and Agency for Healthcare Research and Quality, Instructor Guide, Team Structure, 06.1, p. 6-7


13. Ibid


15. TeamSTEPPS, Department of Defense (DoD) Patient Safety Program and Agency for Healthcare Research and Quality, Instructor Guide, Leadership, 06.1, p. 3
## Prevent Catheter-associated Urinary Tract Infection (CAUTI) Project Planning – Process List

### Prevent CAUTI Care Process:

- Improve Safety Culture:

### Initiate
- Preliminary aim statement – project scope statement
- Review of project management systems including resources (human, IT, pharmacy systems, etc.) and time line for execution
- Project sponsor identified
- Form project team
- Complete Pre-work – Baseline Cultural Assessment, Baseline Process Assessment
- Other

### Plan
- Further define scope; for example, segment patient population, either by area (unit), services or by physician
- Assess your current care process for preventing CAUTI care processes (i.e., criteria for insertion, process in place to review daily the urinary catheter necessity, maintenance, etc.)
- Determine schedule and resources required for segmented scope by outlining steps necessary to accomplish the task and identify dependencies
- Flow current process
- Educate others in segmented population about project
- Gather baseline data
- Other

### Executive
- Educate Team (Staff, Physicians, etc.)
- Run Plan/Do/Study Act (PDSA) cycles – predict how many cycles this will take ** Remember these tests should be done very small and therefore can be done very quickly
- Other

### Control
- Monitor the on-going project against the plan (on track, on-time, achieve aim)
- Additional resources required
- Other

### Close
- Determine spread plan
- Formalize process
- Other
Prevent Catheter-associated Urinary Tract Infection (CAUTI Collaborative)

Form a Project Team

<table>
<thead>
<tr>
<th>Develop Team</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Team Name:</strong></td>
</tr>
<tr>
<td><strong>Team Purpose:</strong></td>
</tr>
<tr>
<td><strong>Team Goal:</strong></td>
</tr>
</tbody>
</table>

- Recruit other staff members who are key to this project:
  - Think about your facility and the different areas, units or departments and how preventing CAUTI care processes may apply
  - Consider the possible process variations that exist throughout your hospital. Take a process inventory for your facility
  - Choose people to sit on your team that are direct care providers.
  - Choose people to sit on your team that will be accountable to spread the process throughout your organization and ones specific to the floor where you will initiate the project
  - Think about your current process at a high level – how current processes may exist.
  - A physician champion is imperative to the project’s success. Engage a physician in the beginning of this project.
  - Include a project sponsor on your team
Prevent Catheter-associated Urinary Tract Infection (CAUTI) Collaborative

Your team should include people involved in every phase of the process. Consider possible process variations that occur on different shifts, such as nights and weekends. Record this information in the table below.

<table>
<thead>
<tr>
<th>Name</th>
<th>Role or Title</th>
<th>Skill Inventory 1</th>
<th>Email</th>
<th>Telephone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sponsor</td>
<td>Administrative Liaison</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nurse Manager</td>
<td>Team Leader</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>QI Coordinator</td>
<td>Facilitator</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physician</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>ICP</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Staff RN</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Staff RN</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Lab personnel</td>
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</tr>
</tbody>
</table>

1 – i.e. facilitator for groups, authority within facility to make changes, able to communicate well with staff, data collection and/or analysis skills.
Prevent Catheter-associated Urinary Tract Infection (CAUTI) Collaborative

Project Sponsor Checklist

The project (team) leader and the project sponsor should review the following checklist together.

- Identify improvement opportunity
- Build “will” for the improvement initiative
- Develop basic knowledge of improvement initiative
- Develop basic knowledge of project management
- Assist team leader in connecting team’s work to organization priorities
- Authority to obtain resources
- Help select team members
- Reach agreement on aim for team’s work
- Work with team to get resources (support from IT, HR, Finance, etc.)
- Communicate with the team about the resources for project
- Keep abreast of the progress of the team and influence the tempo
- Communicate the team’s progress to the leadership
- Assist with removal of organizational barriers
- Start small and work up to full role of sponsor as project is elaborated
- Be aware of the impact the improvement team is having on the rest of the organization
- Set regular periodic calls/meeting with project leader to review Plan/Do/Study Act (PDSA)
- Assist in holding clinicians more accountable and keeping them engaged in the improvement project
- Know scope of all improvement strategies throughout the organizations and align initiatives
- Use stories and tell them across the organization to make improvement really align to organizational strategy
- Assess the effectiveness of the team and offer some guidance to the team leader
- Assist with the spread strategy
Prevent Catheter-associatef Urinary Tract Infection (CAUTI) Project Team Meeting

Kick-off Agenda

Meeting Date: _______ Meeting Time: _______ (Duration 1.5 hours)

Meeting Place: __________________________________________

<table>
<thead>
<tr>
<th>Item</th>
<th>Time</th>
<th>Discussion</th>
<th>Content</th>
<th>Facilitator</th>
</tr>
</thead>
</table>
| 1    | 15 min| Welcome and Overview of Improvement Team Aim                                | • Why this team is important  
• How this team connects to the overall organizational goals and strategy  
• Share any data that defines the organization’s current performance or the gap                                         | Sponsor              |
| 2    | 5 min | Introductions                                                              | • Introduce each team member and describe why they were selected for the team                                                            | Team Leader          |
| 3    | 15 min| Team roles and responsibilities  
Team Meeting                                                                | • Include general participation expectations team members  
For example each team is expected to come prepared to meeting  
• Set attendance expectations  
• Set time-address the most difficult schedules  
• Include specific expectations based on why they were selected, for example physician champion to review from physician perspective new process and communicate to his/her constituents | Team Leader          |
| 4    | 15 min| Project Time Line Draft                                                    | • Review draft project processes, milestones and life cycle                                                                            | Team Leader          |
| 5    | 15 min| Hopes and Concerns                                                         | • Round robin – have each team member describe their aspirations for the project and share their concerns (record on flip chart)     | Team Leader          |
| 6    | 10 min| Patient experience and observations                                         | • Share stories, data, and observations relevant to the team                                                                            | All Team Members     |
| 7    | 10 min| Closing Remarks                                                            | • Summarize and stress importance of the work  
• What do you need from me?                                                                                                            | Sponsor              |
| 8    | 5 min | Next Steps                                                                 | • Review what will happen next                                                                                                          | Team Leader          |
Improvement Project
Planning Timeline - ____________ Hospital

Implementation of ________________ Care Process(es)

Complete the time line below adding in project milestones (milestones are key events in the life cycle of a project, for example leadership support obtained, or the completion of a phase such as planning). Also add project deliverables; for example education of the staff, or new standing order sheet.
Improvement Project
Planning Timeline - ___________ Hospital

Implementation of ___________ Care Process(es)

Complete the timeline below adding in project milestones (milestones are key events in the life cycle of a project, for example leadership support obtained, or the completion of a phase such as planning). Also add project deliverables; for example education of the staff, or new standing order sheet.
In the previous chapter we talked about projects, project management and project teams. In later chapters we will discuss performance improvement, prevention strategies, measurement and spreading processes. In each of these chapters we will discuss strategies to implement the new care processes to improve outcomes. While implementation strategies can assist teams in achieving outcomes, it is important to recognize that the success of an implementation strategy in one unit may be very different than the success of the same strategy in another unit.

A large focus in healthcare quality improvement and safety has been on the reliable design of processes and systems. Organizations have used Six Sigma or other methods to create highly reliable processes or systems. While these methods are successful at developing processes, to sustain them and to have organizations prepared for additional challenges in safety and quality, culture must also be addressed.

There is a saying, “(w)hen it comes to changing an organization, culture eats strategy’s lunch every time,”¹ which emphasizes the importance of culture. In this chapter we will discuss culture and in subsequent chapters we will explore components of culture, specifically teamwork, communication, and reporting cultures.

Defining Culture

Merriam-Webster defines culture as “the set of shared attitudes, values, goals, and practices that characterizes an institution, organization or group.”² In its simplest definition, “culture is the way we do things around here.”³ It is the norms of the people working in a particular group, or in the case of a hospital, a particular unit or department.

Organizations that are considered highly reliable place a great deal of emphasis on safety and are said to have “safety cultures.” While there is no formal definition of a safety culture, in a meta-analysis conducted by Zhang and colleagues at the University of Illinois at Urbana-Champaign, they determined that there were common characteristics of a safety culture.⁴ The authors analyzed published definitions of a safety culture and formed a hybrid definition.

Safety culture is “the enduring value and priority placed on a worker and public safety by everyone in every group at every level of the organization. It refers to the extent to which individuals and groups will commit to personal responsibility for safety; act to preserve, enhance and communicate safety concerns; strive to
actively learn, adapt and modify (both individual and organizational) behavior based on lessons learned from mistakes; and be rewarded in a manner consistent with these values.”

Simply put, safety culture in a unit or department is the set of shared attitudes, values, goals and practices around safety for that unit or department. To achieve an organizational-wide safety culture, the entire organization must demonstrate a consistent practice across all work units of shared attitudes, values, goals and practices around safety.

Much has been studied about organizational behavior and preoccupation with quality as an overriding concept to safety.

The concept of safety culture originated outside of healthcare in industries such as nuclear power, where adverse events are minimized despite it being a complex environment. In the nuclear power industry there is a preoccupation with safety from the senior executive to the frontline workers. Since the 1950’s, the aviation industry has also had a preoccupation with safety. At that time, aircraft fatalities were at an all time high and the industry redesigned its approach to safety through the concept of crew resource management. As a result, airline travel is ultra safe. In the automobile industry, Toyota produces highly reliable automobiles. Toyota has two pillars, respect for people and continuous improvement. It is under these pillars that Toyota developed its values and guiding principles. In the book The Toyota Way, Jeffery Liker describes two ways an employee could be fired at Toyota; not showing up for work and not reporting an error. These principles are guiding the work of Toyota from the senior level of the organization to the employee on the frontline of production for both quality, safety and respect for people.

So are there parallels that can be drawn from these industries to healthcare? The answer to this question is not simple; while there are similarities there are also significant differences. In the airline and nuclear power industries, the consequence of failure to the employee is different than in the healthcare industry. For example, if there is pilot and or nuclear power technician error, they could die. Also, if the pilot, air traffic controller, or nuclear technician makes a mistake, the consequences of the failure usually involve several lives at once versus the healthcare provider error, which usually involves one life. Unit based teams in hospitals tend to be more decentralized, dealing with specific aspects of care, specialized care or certain populations - just ask any nurse who has had to float to an unfamiliar area. While the teams in the airline industry are not as decentralized.

Healthcare organizations, hospitals in particular, are very complex environments. Dr. Bryan Sexton, Director of Patient Safety for Duke University Health System, has determined that there tends to be greater cultural variability between units within the hospital. His research examining hospitals’ safety culture found that “the average variability that you see within an institution outpaces the variability that you see between institutions. For example, you could have a great ICU, but walk 20 feet down the hall to another unit and it’s a miserable place. It’s like politics—all culture is local. A frontline nurse in Unit X doesn’t really care what the hospital says, so much as how his or her actions are going to be viewed within the context of that specific unit and that specific situation.” That is not to say that hospital leadership is not important in setting the tone for safety for the hospital. However it does demonstrate the importance and uniqueness of
culture at the unit level and the impact on safety. To change a hospital’s safety culture, one must address safety culture at a local level, at each unit.

Regardless of their industry type, organizations of people exhibit similarities in terms of how work is organized and executed. These similarities among industries have yielded some valuable tools that we use in healthcare safety today. For example, a read-back and standard communication tool such as SBAR (Situation-Background-Assessment-Recommendation) originated in the nuclear Navy. Also, the concept of “stop-the-line” originated at Toyota. As we seek to use tools such as these derived from other industries and implement across our hospitals, it is important to understand that the strategies used to implement changes and the ultimate success of the project may look very different from one unit to another because of the influence of culture.8

Measuring Culture

Since 2008, the Joint Commission has required hospitals to regularly evaluate the safety culture using a validated and reliable tool. There have been various tools developed to measure safety in healthcare. In 2005 Colla, et al, reviewed tools used for measuring patient safety climates. Seven of the nine surveys examined looked at five common dimensions; leadership, policies and procedures, staffing, communication and reporting.9

The AHRQ Hospital Survey on Patient Safety Culture (HSOPS) measures seven unit level aspects of safety culture, three hospital level aspects and four outcome variables. The HSOPS safety dimensions are listed in Table 3.1 below.

3.1 Table: AHRQ HSOPS - Safety Culture Dimensions10

<table>
<thead>
<tr>
<th>Seven unit Level Aspects of Safety Culture</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Supervisor/Manager Expectations &amp; Actions Promoting Safety (4 items)</td>
</tr>
<tr>
<td>- Organizational Learning – Continuous Improvement (3 items)</td>
</tr>
<tr>
<td>- Teamwork Within Units (4 items)</td>
</tr>
<tr>
<td>- Communication Openness (3 items)</td>
</tr>
<tr>
<td>- Feedback and Communication About Error (3 items)</td>
</tr>
<tr>
<td>- Non-punitive Response to Error (3 items)</td>
</tr>
<tr>
<td>- Staffing (4 items)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Three Hospital Level Aspects of Safety Culture</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Hospital Management Support for Patient Safety (3 items)</td>
</tr>
<tr>
<td>- Teamwork Across Hospital Units (4 items)</td>
</tr>
<tr>
<td>- Hospital Handoffs and Transitions (4 items)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Four Outcome Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Overall Perceptions of Safety (4 items)</td>
</tr>
<tr>
<td>- Frequency of Event Reporting (3 items)</td>
</tr>
<tr>
<td>- Patient Safety Grade (of the Hospital Unit) (1 item)</td>
</tr>
<tr>
<td>- Number of Events Reported (1 item)</td>
</tr>
</tbody>
</table>
A focus to improve safety culture by assessing and acknowledging the current state, recognizing the risk of the environment and educating the units on human factors science will assist with preventing catheter-associated urinary tract infections. According to Sexton, if you can increase the extent to which individual caregivers feel encouraged to report safety concerns, that moves everything; trust, buy-in and engagement.\textsuperscript{11}
References


5. Ibid


8. Ibid


A team exists when two or more people interact dynamically, interdependently and adaptively toward a common goal. One cannot discuss culture without discussing teamwork and communication. In an analogy to the human body - if culture is the body, teamwork is the brain, and communication becomes the arteries supplying the blood to the teams and culture. You simply cannot talk about one without the other.

By analyzing aircraft fatalities, the aviation industry found that the majority of aviation errors (70% of commercial flight accidents) were caused by human error. Additionally, they determined that the better functioning teams were less likely to experience errors. To improve communication and teamwork, the industry developed and implemented crew resource management (CRM). CRM seeks to standardize communication and teamwork. The TeamSTEPPS® (Team Strategies and Tools to Enhance Performance and Patient Safety) curriculum was developed by the Department of Defense Patient Safety program in collaboration with the Agency for Healthcare Research and Quality (AHRQ) and is based on CRM. TeamSTEPPS is an evidence-based system aimed at optimizing patient outcomes by improving communication and other teamwork skills among teams. It is a model currently being used in healthcare to address communication errors and improve team functioning. This chapter includes the concepts, curriculum and tools taught by TeamSTEPPS. While this chapter will review AHRQ’s TeamSTEPPS communication tool, the prevention collaborative will not focus specific training efforts on this communications strategy. The manual will provide an overview of this strategy and then steer teams to tools they may use to learn more, independent of this prevention collaborative, to provide additional support as needed in these areas. TeamSTEPPS is not necessarily being endorsed as a process for use in the prevention collaborative. It is simply being presented as an alternative process, among many others, that can be used to assist in implementing process improvement. See the references section of this chapter for more information.

Teamwork

Teamwork is a set of interrelated behaviors, cognitions and attitudes that combine to facilitate coordinated adaptive performance. Teams can and do improve patient safety. Organizations find that teamwork is improving patient outcomes, reducing errors, improving processes, increasing patient and staff satisfaction and decreasing malpractice claims. The following table summarizes several studies citing the use of the TeamSTEPPS model in developing teamwork and communication.
Table 4.1: TeamSTEPPS Review of Teamwork and Communication in Healthcare Studies

<table>
<thead>
<tr>
<th>Citation</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pissano 2001</td>
<td>Teamwork and communication skills determined how quickly medical personnel develop expertise in new technology</td>
</tr>
<tr>
<td>Morey 2002</td>
<td>Healthcare organizations that have effectively implemented a medical teamwork system have a decreased clinical error rate from 30.9% to 4.4% along with increased positive safety culture attitudes</td>
</tr>
<tr>
<td>Pronovost 2003</td>
<td>After the implementation of an interdisciplinary communication tool to improve rounds, average length of ICU stays were decreased 50%</td>
</tr>
<tr>
<td>Di Meglio 2005</td>
<td>Healthcare organizations that have effectively implemented a medical teamwork system have a 27% reduction in nurse turnover</td>
</tr>
<tr>
<td>Mann 2006</td>
<td>After team training, a 50% reduction in adverse outcomes was achieved, based on the averaged scores after being weighted for severity</td>
</tr>
<tr>
<td>Sexton 2006</td>
<td>Operating room staff that have the most aligned teamwork culture attitudes also have lower postoperative sepsis rates than those that perceive the environment as being poorly conducive to teamwork</td>
</tr>
</tbody>
</table>

There are multiple types of teams in a hospital. First, there is the team that provides direct patient care. Second, there is a team that provides day-to-day operations for the unit, and direct patient care is a secondary function. Third, there is an ancillary team, which provides services such as purchasing or maintenance. Finally, there is the administrative team, which provides resources and the organizational foundation in setting the mission, vision, and values. The team described in Chapter 2, the project team, may have representatives from all of the teams described above.

TeamSTEPPS outlines four components of a well functioning team; leadership, situation monitoring, mutual respect and communication. A well-functioning team, regardless of the type (direct care providers, day-to-day operations, ancillary, administrative or a project team), will possess these components.

1. Leadership

Team leaders perform several roles on the team. To start, they must organize the team and articulate clear goals as to what the team is to accomplish. The team leader is a skilled facilitator, encouraging team members to contribute ideas for improvement and providing feedback on the progress of the project, while also being skilled at conflict resolution. The team leader sets the expectation for team participation and delegates tasks to team members. Many team leaders are not skilled at this, and they end up taking on too much of the workload, resulting in tasks not being completed. Finally, the team leader must manage the project resources and communicate needs to the project sponsor and administrative team. This is often a stumbling block for many direct care and day-to-day operations teams.
Three TeamSTEPPS tools used by the team leaders to monitor team progress are briefs, huddles, and debrief:

**Brief** – a short team session used to plan, discuss essential roles, assign work, anticipate outcomes (good or bad) and discuss contingencies. For example, the surgical team prior to starting a case reviews the planned procedure, assures resources are available, identifies possible issues that might affect the case and has a contingency plan set forth to address.

**Huddle** – an ad hoc session used to problem solve if the situation changes, to reinforce plans already in place or to assess the need to change the plan. A huddle could be used when an unexpected event occurs with a patient and more resources are required from one team member that will affect overall workload for the remaining team members.

**Debrief** – an informal session after an event or care episode used to improve team performance. It is the best opportunity to learn what went well and the opportunities for improvement. However, it is often a forgotten event by the healthcare team. A debrief can be used at the conclusion of any event including a shift, a case, a procedure or treatment.

2. Situation Monitoring

When teams share a clear, valued vision, they can anticipate each other’s needs, optimize resources and adapt to dynamic situations. Situation monitoring is the process of continually knowing what is going on in the environment. Teams with effective situation monitoring develop common understandings of the team environment and how to apply appropriate strategies to maintain the team’s performance. The team has a shared mental model of the plan and is “all on the same page.” Situation monitoring fosters respect, ensures that the team has a way, “to watch each other’s back” and provides a safety net for team members and the patient.

A TeamSTEPPS tool called STEP is used for situation monitoring in healthcare.

**STEP is an acronym for:**

- Status of the patient
- Team Members
- Environment
- Progress toward the goal
Another TeamSTEPPS tool focuses on the individual team member’s responsibility to monitor their own situation, which could impact team functioning and possibly patient outcomes. This tool, called the, “I’m Safe” checklist, is a tool for self-awareness and self-assessment. The tool provides a way for a team member to assess whether his or her functioning might be affected by illness, medication, stress, alcohol/drugs, fatigue or hunger.

3. Mutual Support

Successful teams will also employ mutual, supportive behaviors, sometimes referred to as “back-up behaviors.” Mutual support is the ability to anticipate other team members’ needs based on the knowledge of personnel stressors and shift workload to achieve balance during periods of high workload or pressure. In order for teams to engage in mutually supportive behaviors, they need to become proficient with five TeamSTEPPS actions:

1) task assistance which protects other team members from work overload;
2) feedback, or giving as well as receiving information to improve team performance;
3) advocacy when team member’s viewpoints don’t coincide and assertion of the need for a different solution;
4) conflict resolution: and
5) collaboration.

These behaviors allow teams to self-correct, compensate for one another, reallocate functions based on resources and provide information to one another. Teams become proactive rather than reactive.

4. Communication

This definition of communication on the right, as it pertains to culture is interesting, given that it emphasizes what was heard and not the message that was sent. We often just think of communication as the messages that we send and not what was heard or the responses from what was heard. At the beginning of this chapter, communication was compared to the blood in the arteries that supply teamwork and ultimately forms culture. Communication serves as a supporting structure for teamwork. The leadership must use communication to convey information, to determine roles and responsibilities, discuss the progress of the improvement team and to formulate action plans with the team. Team members must monitor situations by communicating changes to the team. Communication fosters mutual support as a mechanism for team members to inform one another of when assistance is needed. However communication is defined, it is ultimately the lifeline for teams and culture.

How important is communication for the healthcare team? The principle accrediting organization for US hospitals, The Joint Commission (TJC), collects and analyzes sentinel event data for hospitals. During a 10-year period (1995 to 2005) TJC listed ineffective communication as the
root cause for 66% of reported errors. In 2006, TJC added standardized handoffs as a National Patient Safety Goal, reinforcing the need for standard communication. In general, healthcare providers have not traditionally learned about standard communication tools, and healthcare disciplines communicate very differently. For example, nurses are taught to be broad and descriptive, whereas physicians are taught to be concise and get to the “headlines quickly.”

The principles for effective communication apply to any team. Communication must be complete, clear, concise and timely. Incomplete information negatively affects the goal of a team. Early and frequent communication is essential to the success of any initiative, especially when communicating to multiple teams within a hospital, unit or work area. John P. Kotter, a well-known author and Harvard business professor, wrote in his book *Leading Change*, “Leadership should estimate how much communication of the vision is needed, and then multiply that effort by a factor of ten.”

Effective communication exchange involves sending, recurring, verifying and validating techniques. Sending techniques seek information from all available sources. Recurring techniques involve analyzing the information provided and synthesizing it into content. Verifying techniques involve checking with the sender to assure the intent of the information received. Validating techniques confirm the intent of the sender. These techniques help to confirm that the message, as intended, was received.

Communication can be verbal and non-verbal. Nonverbal communication includes gestures, eye movements, body language and written communication. This last type of nonverbal communication is evolving with technology to include email, texting, electronic chatting and tweeting. Common communication methods are newsletters, posters in common areas, staff meeting agenda items, and face-to-face meetings.

When communicating, it is important to consider the audience to whom the message is being sent. This may alter the mode and the method of communication that you use. If communicating with a busy physician, a brief call to convey the information may be most appropriate. If you are communicating with a younger team member, the preferred mode of communication may be electronic, such as a text. It is also important to consider the type of information that needs to be conveyed and its level of urgency, as this will alter the mode of communication as well. Team interactions, if at all possible, should be conducted in-person.

A study done in 1971 by Albert Mehrabian found that there were three elements of any face-to-face communication; words, tone of voice and body language. Words accounted for 7%, tone accounted for 38% and body language accounted for 55% of the message meaning. Caution must be used when choosing the mode of communication, especially for the direct care provider team. Written or electronic communication should be verified with follow up oral communication when possible.” Even verbal communication, when it involves important pieces of information, should be verified. The healthcare team, borrowing from the aviation industry, now uses read-backs to verify a verbal physician’s order.

The TeamSTEPPS tool SBAR (Situation-Background-Assessment-Recommendation) provides a framework for communication between members of the health care team about a patient’s
condition. SBAR is an easy-to-remember, concrete mechanism useful for framing any conversation, especially a critical one that requires a clinician’s immediate attention and action. It allows for an easy and focused way to set expectations for what will be communicated and how between members of the team, which is essential for developing teamwork and fostering a culture of safety.

There is not one implementation plan for communication and teamwork tools that will work for each hospital or for each unit. Culture is local, and it is adaptive work. Therefore, culture must be worked on at a local unit or department level. There must be unit champions in the unit to lead this effort. This is the work of the project team members, as are the steps necessary to develop processes to prevent CAUTI. It will be up to the project team to implement communication and teamwork tools. However, the senior leadership gives the necessary support for this local level cultural change by setting improved communication and teamwork as an organizational goal.

TeamSTEPPS tools can be accessed at [http://teamstepps.ahrq.gov](http://teamstepps.ahrq.gov).

**Communicating the Project**

Tailoring communication to the audience is important as you try to engage others in the project work. The approach to communicating the project plan and progress to each team, administrative, day-to day operations or the ancillary team, will be different. Each requires a different focus and information.

Communication about the project to the administrative team should convey a concise message, outlining the problem in lay terms, specifically regarding healthcare acquired infections and the impact of CAUTIs on your patients and hospital. It should convey recommendations for a solution, such as evidenced-based processes for insertion and removal of catheters. Additionally, it is imperative to convey information about the financial costs of the project work to the organization. It is important to keep in mind the four sectors of the hospital’s business: financial, customer, learning and growth (employee development), and the internal business (mission, service or product). While all four quadrants of the hospital business are important from the leadership perspective, they may have a greater, perceived obligation to the financial aspects of the hospital business. Your message should be delivered with great emphasis on improved patient outcomes through improved patient safety as well as on financial costs and implications for infection reduction on them.

The financial costs of developing or revising a new process and implementing it can be broken down into two parts: project and non-project costs. Project costs are the costs associated with establishing a team, running pilot projects to test and tweak the process, educating the various
stakeholders, purchasing items that you may need to run the pilots and later, spreading and formalizing the process so it is incorporated into routine operations.

To determine non-project costs, you must have an understanding of who will be responsible for each step of the process, how much time each step will require, and the other non-human resources that may be required, such as equipment availability. It is important to note that it may be possible for many hospitals to implement processes to prevent CAUTI with little to no additional resources. To do so, organizations must carefully assess their current processes, eliminate steps that are no longer needed and be creative in addressing barriers. You can hypothesize what this may look like for your hospital based on similar hospitals’ strategies and added costs.

To balance expenditures, it is necessary to examine the benefits of the improvement project. The data collected in this project can assist you in comparing the number of CAUTIs in your hospital prior to starting collaborative work to the number of CAUTIs after the implementation of prevention processes. The team should involve a member of the finance team to assist with determining financial benefits. For example, the financial person can calculate and compare the financial costs associated with patient length of stay (LOS) pre and post implementation of the prevention processes. You can also add in the savings of not using the catheter devices (i.e. the price of the catheter itself). Some may argue that tying these indicators to financial costs is a stretch. However, the financial cost of care will be reduced if your process allows you to deliver better, more efficient and safer care. Until your team collects data for several months, however, documenting these benefits may be difficult. In the meantime, you can estimate the project the benefits by applying your hospital’s financial data to outcomes in published studies.

To engage the day-to-day operations team, it is necessary to consider impact to the patient, the hospital and to the staff. This team may see this initiative as requiring more human resources to accommodate for the additional toileting needs of the patient. One solution to address this concern is to recommend that the unit implement toileting rounds. Toileting rounds provide predictability for both the care provider and for the patient. In many units where this strategy has been implemented, it has diminished call light volume and provided greater satisfaction for both the patient and the nurse. The day-to-day operations team will also need to understand any financial cost and benefits associated with the initiative. The team leader will be a key person to work with the project team and the financial representative to gather this information.

The direct care provider team includes several disciplines (nurse, nursing aide, physical therapist, and physician) that provide direct care to the patient. The direct care provider may be more difficult to engage, since the project work directly impacts their workload. They are knowledgeable about preventing infections, but always struggle with the number of tasks that must be accomplished in a shift. They too, like others in the organization, need to understand the impact to the patient. Engage this team to develop alternate ways to ensure that the patient is receiving regular toileting and that safety measures are in place. The direct care provider team will need to understand the problem and help to design the solutions using the Model for Improvement (discussed in a Chapter 5). Many organizations have chosen to use a nurse driven protocol, empowering the nursing staff to determine, using guidelines, when a catheter should be placed or removed.
Many physicians are knowledgeable about the evidence supporting infection prevention strategies, but are frustrated that they are not able to accomplish them consistently for their patients. They must often change their work processes and adopt new ones. New processes should be efficient and reduce their workload in most cases. For example, with standing orders, eliminate non-value added steps and provide the orders as part of standard workflow. Some physicians may be reluctant to establish standing orders for removing indwelling catheters or to empower the nursing staff to use a nurse driven protocol. Communicating to physicians that a catheter can still be available if it is necessary for patient care will assist with buy-in of the new protocol. Ask a physician who has been involved with a performance improvement project in the past to be a physician champion on your project. Work with the physician to establish insertion criteria and processes to review daily catheter necessity.

When targeting physicians, a concise message delivered in many different formats will be important. Most physicians in today’s environment feel overwhelmed. A message that conveys the importance of preventing CAUTI for the safety of their patients should be emphasized. It will be important to deliver a balanced message that reassures them that the aim of preventing CAUTI project is not to question their practice. Rather, the aim is to build a system that guarantees that the patient receives exactly the care they should receive, every time.

Physicians are data driven, so sharing the outcome data, such as the CAUTI rates or the decreased number of urinary catheter days, will also be important. Until your unit’s data is available, you may need to share study data with the physicians. But perhaps the most effective and inspiring way to evoke change is to share the individual stories of patients with the physicians. The physician is the key player in this initiative, and therefore, must be involved in developing a process that works.

Keep in mind, asking anyone who is overburdened with work to learn about a new program, let alone participate in a pilot project or the development of the process, may seem too much for some. Therefore, the message to the direct care provider team should have great emphasis on the enhancement of patient care and the ability of the team to determine the new processes. It should be stressed that the aim of preventing CAUTI is not to question the care a provider has been delivering, or to take over their responsibilities, but rather to put a safety net in place to assure that all patients are given all the appropriate evidence-based care processes for the best outcomes every time.

Patients also play a major role in preventing CAUTI. Engage the patient by providing education on urinary catheter insertion and prompt removal as well as the importance of following a toileting schedule.

To effectively lead change, we must communicate our message again, and again and again. We may start to think that everyone already knows what we are going to say because we have shared it so many times before. According to Kotter in Leading Change, “the most carefully crafted messages rarely sink deeply into the recipient’s consciousness after only one pronouncement. Our minds are too cluttered, and any communication has to fight hundreds of other ideas for
attention…effective information transfer almost always relies on repetition.” Communication informs all audiences of why the effort is important and invites participation.
References


2. Salas, E, Sims, D; Klien, C and Burke, S; Department of Psychology & Institute for Simulation Training, University of Central FL, Can Teamwork Enhance Patient Safety?, Risk Management Foundation, Harvard Medical Institutions, Forum, July 2003


5. TeamSTEPPS, Department of Defense (DoD) Patient Safety Program and Agency for Healthcare Research and Quality, Instructor Guide, Team Structure, 06.1, p.4


As discussed in Chapter 1, significant patient harm can be caused by one healthcare-associated infection (HAI). As a result, many national healthcare improvement initiatives and requirements are in alignment with preventing, reducing and eliminating HAIs. These initiatives and requirements offer valuable insight into how well your hospital is providing the care processes it should be providing to prevent, reduce and eliminate HAIs. Based on this knowledge, most hospitals are working hard to improve these infection prevention processes. But is just hard work and diligence enough for a hospital to reliably provide the right care every time to every patient?

In this chapter you will learn how to assess your current processes related to CAUTI prevention; how to move your current processes to a 95% level of reliability; and gain knowledge of tools that can help you reach your goal.

Assessing the current process

Assessing your current level of performance is a two-step process. The first step is to review any process measure data that is collected by your hospital. Is the performance at an acceptable, reliable level? Does your organization have a “urinary catheter bundle?” What is the compliance with the bundle and its individual components? Can you guarantee to every patient with a urinary catheter that he/she will have the necessity of continuing the catheter reviewed on a daily basis? This data gives you insight into how reliable your process is currently performing.

Front-line staff can provide a general understanding of how the steps of your current processes are currently being carried out. Even if your organization has not yet implemented a process such as removal of a urinary catheter in a surgical patient on post-op day one or two, it is a good idea to understand how processes are currently being performed. A simple way to collect this information is to ask five front line staff, “What is the process?”, or ask them to write out the process they follow. Compare the information collected from each staff member. This will give you a quick way to gather information, tell you if the process or procedure is being done as it is intended and direct you in refining or developing your processes.

Reliability

The American health care system does not perform as well as it could. Recent studies show there is a gap in the care we deliver and the care we should deliver, for which solid research evidence exists, whether in acute, chronic, or preventive situations. Studies by the RAND Corporation report that only about 50% of patients receive care consistent with evidence-based recommendations¹.

Reliability is the ability of a system to perform and maintain its functions in routine, as well as in unexpected circumstances. Reliability principles are methods of evaluating, calculating and
improving the overall dependability of complex systems. These principles have been used effectively in industries such as manufacturing and aviation to improve both safety and the rate at which the system produces the desired outcomes. By applying reliability principles to healthcare, we can close the gap between the care we give and the care we should give, based on the evidence-based recommendations.

Definitions

The Institute for Healthcare Improvement (IHI) defines reliability in health care as, “the measurable ability of a health-related process, procedure, or service to perform its intended function in the required time under commonly occurring conditions.” Another way to say this is that reliability equals the number of actions that achieve the intended result, divided by the total number of actions taken. From the patient perspective, this is an all or none measure. That is, patients receive all of the elements of care associated with a process in order for it to be considered reliable.

\[
\text{Reliability} = \frac{\text{Number of actions that achieve the intended result}}{\text{Total number of actions taken}}
\]

Reliability is often expressed as a ratio, such as 0.90 or 90%. This means that nine times out of ten the process occurred as intended. Failure rate, or unreliability, calculated as 1 minus reliability, is used as an index expressed as an order of magnitude. For example 10^-1 means that one time in ten the action fails to achieve the intended result. The following are the starting levels of reliability definitions.
Table 5.1: Starting Levels of Reliability

<table>
<thead>
<tr>
<th>How reliable is the process?</th>
<th>How many failures?</th>
<th>How do we describe the process?</th>
<th>Healthcare example</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;80%</td>
<td>More than 2 failures out of 10 opportunities</td>
<td>Chaotic performance</td>
<td>Colon cancer screening in women (66.8%)&lt;sup&gt;4&lt;/sup&gt;</td>
</tr>
<tr>
<td>80-90%</td>
<td>1 or 2 failures out of 10 opportunities (10-1)</td>
<td>Level one reliability or performance</td>
<td>Childhood immunizations (80%)&lt;sup&gt;4&lt;/sup&gt;</td>
</tr>
<tr>
<td>95%</td>
<td>5 failures out of 100 opportunities (10-2)</td>
<td>Level two reliability or performance</td>
<td>Appropriate antibiotic is given one hour prior to surgery in US (95%)&lt;sup&gt;5&lt;/sup&gt;</td>
</tr>
<tr>
<td>99%</td>
<td>10 failures out of 1000 opportunities (10-3)</td>
<td>Level three reliability or performance</td>
<td>Blood banking processes</td>
</tr>
</tbody>
</table>

The key characteristic of a chaotic process is that no articulated process exists. If you asked five frontline individuals to describe the process, less than five will be able to do so. With level one performance, five frontline individuals can easily articulate the process but with some variation. A level three performance on process measures indicates a well-designed system with attention to system design based on human factors engineering. In a broader context, aviation passenger safety and nuclear power plant safety is measured at 10-6. However, in health care, patients receive the indicated care about 50% of the time or a chaotic level of performance.

**Designing a reliable system**

To be highly reliable, systems must be designed to compensate for human fallibility. Human factors engineering strategies assist in designing a reliable system. The Institute for Healthcare Improvement (IHI), which supports healthcare improvement efforts worldwide, uses a three-tier strategy to design reliable care systems: prevent; identify and mitigate; and redesign.<sup>6</sup>
Using Segmentation in Reliable Design

Working in segments is a key part of applying reliability science. A segment is a portion of the topic that can be clearly identified. Examples include patient populations, admission routes, and physician groups. Based on project management techniques, it is recommended that the segments of a population be identified first, with careful identification as to their differences and the different types of changes that each may require. This will allow for customization for the different segments of the population.

Segmentation is helpful in using reliability to improve processes:\n
- Allows for the control of some variables
- Defines the boundaries around which sequential expectations for success can be found
- More likely to test the validity of the design rather than deal with barriers
- Fosters a deeper understanding of the design complexity required for the project
- Forces understanding of the differences between segments as design strategies
- Allows the formation of predictable timetables.

Eventually you have to be able to apply the process to the entire population. Therefore, limit the segments of the population to no more than four segments. In choosing your first segment, the following requirements should be considered:\n
**Prevent:** The idea with this first strategy is to prevent initial failure by using intent and standardization. This typically results in level one performance. The focus is on the use of a standardized approach to care for patients. Tools and techniques used at this level of performance include standard order sheets, guidelines, checklists, feedback mechanisms and education/training.

**Identify and mitigate:** This tier focuses on catching and alleviating defects. Concepts used at this level seek to reduce opportunities for humans to make mistakes and are often referred to as “error-proofing.” Some common tools and techniques include using decision aids and reminders built into systems, making the desired action the default, designing redundant processes, taking advantage of habits and patterns, developing visual and sensory cues and creating barriers.

**Redesign:** This tier is level three performance and beyond. It involves identifying weaknesses in the design of the standardized process that might lead to failure in the future. A Failure Modes and Effects Analysis (FMEA) is a tool used to redesign the process once a level of 95% reliability or level two performance is reached.
- The segment needs to represent a significant volume
- The segment should have clear and distinct boundaries
- The segment should have willing participants (eliminates the barrier of agreeing)
- The segment should allow for key articulated variables or barriers to be neutralized
- The first segment should establish the design team

Use Segment Design Table at chapter end to identify the segments in your population.
Steps to designing a reliable process

The IHI, through its work with hospitals working on reliability, created a template for increasing the reliability of healthcare processes. The framework is based on the prevent-identify-mitigate and redesign approach. The following table uses the template to outline the steps you can use to design or redesign a reliable process.

**Table 5.2: Designing a Reliable Process**

<table>
<thead>
<tr>
<th>Step</th>
<th>Instruction</th>
<th>Prevent CAUTI Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify the process to standardize</td>
<td>Chose a process related to prevention of Healthcare Associated Infections</td>
<td>Urinary catheter removal on post-op day one or two</td>
</tr>
<tr>
<td>Assess your current level of performance</td>
<td>Review hospital data. Collect information from staff regarding your current process</td>
<td>66% of surgical patients have the urinary catheter removed on post-op day one or two</td>
</tr>
<tr>
<td>Determine a high volume segment population for initial design/redesign testing</td>
<td>Start with a high volume segment to allow for rapid cycle testing (Refer to Tool 6C)</td>
<td>Dr. Smith’s hip replacement patients admitted to the 4th floor surgical unit</td>
</tr>
<tr>
<td>Create a high-level flow map for the segment population</td>
<td>Understanding the key steps for the process is essential. However, construct a macro level flow chart with just the big picture detail. The flow map should include no more than 5 or 6 steps and be able to describe the process from start to finish</td>
<td>Patient admitted to the 4th floor surgical unit</td>
</tr>
<tr>
<td></td>
<td></td>
<td>On POD 1 or 2 the surgeon writes an order to remove the Foley catheter</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Foley catheter removed</td>
</tr>
<tr>
<td>Determine where the defects occur in the current system</td>
<td>Review 20 charts</td>
<td>Chart audit shows that orders to remove the Foley catheter by POD 2 are only written for 50% of the hip replacement patients. If the order is written 99% of the patients have the Foley catheter removed</td>
</tr>
<tr>
<td>Begin the design/redesign work where the most common defects occur</td>
<td>Chart audit shows the surgeon doesn’t write the order</td>
<td>Develop standardized procedure to have Foley catheter removed on either POD1 or 2</td>
</tr>
<tr>
<td>Test improvement ideas by using the Model for Improvement</td>
<td>Brainstorm change ideas and use PDSA to test. (Refer to Tools 6A and 6B)</td>
<td>Change idea to be tested: Nurse protocol</td>
</tr>
<tr>
<td>Measure processes against a specific reliability goal</td>
<td>Move to level one reliability if less than 80% by using of level one strategies. If at 80% to 90% use level two strategies</td>
<td>Add human factors strategies — add to checklist for multidiscipline rounds (Recovery)</td>
</tr>
<tr>
<td>Evaluate adherence to standardized approach and move to the next level of reliability</td>
<td>Once the standardize process is in placed and performing as intended (95% of hip replacement patients have the Foley discontinued on POD 1 or 2) create strategies that will identify failure to use of the process.</td>
<td>Conduct a FMEA</td>
</tr>
</tbody>
</table>
The Model for Improvement

The Model for Improvement was first published in 1992 by Langley, Nolan, et al, in “The Improvement Guide: A Practical Approach to Enhancing Organizational Performance”. This model provides a framework for developing, testing and implementing changes in the way we do things. It is a simple approach that is highly effective and reduces the risk associated with changing something we do by utilizing small tests of change. Highly successful organizations faithfully use the model for performance improvement. Reliability design methodology is intimately linked with rapid-cycle tests of change.

Improvement comes from the application of knowledge. The more knowledge you have, the better the improvement will be when you apply the knowledge. Therefore, your approach to improvement is based on building and applying knowledge. The Model for Improvement is a tool to help you build knowledge and then apply it. The model consists of two parts: the fundamental questions or the “thinking” part and the PDSA cycle or the “doing” part.

Fundamental Questions for Achieving Improvement

1. What are we trying to accomplish?

The key idea to answer the first question is to develop an aim statement for the project. For example, an aim of the US Department of Health and Human Services prevention plan for HAIs is to reduce the number of symptomatic UTIs/1000 catheter days by 25% within 5 years. An aim statement has several important characteristics. A good aim statement is specific, measurable, timely, and identifies a population to which the improvement is focused. For example: By Dec 31, 2010 95% of hip replacement patients will have the indwelling urinary catheter removed on postoperative day (POD 1 or 2). Use Aim Worksheet at chapter end to develop your aim.

2. How will we know that the change is an improvement?

To understand if you are making an improvement, it is necessary to collect data. Data includes chart audits and information obtained from those that were involved in the “doing” part or the PDSA cycle. Data or measures need to be related to your aim statement. If you choose to work on improving indwelling urinary catheter maintenance, then the data you collect would not include the number of patients with the indwelling urinary catheter removed on POD 1 or 2.

3. What changes can we make that will result in improvement?

Through brainstorming, the team will determine possible change concepts or ideas. One change idea to test will be identified initially. Be sure the detailed plan for the test includes the day, time, the location and the people involved.
The PDSA Cycle

The second part of the Model for Improvement, the “doing” part, consists of four components: plan, do, study, act, or PDSA. We refer to these cycles as test cycles.

**Plan:** The plan should include the objective, any predictions, the plan to carry out the cycle (who, what, where, when) and the plan for data collection. The detailed plan for the test of change should be shared with all involved in the process before the plan is executed.

**Do:** This involves actually carrying out the plan, documenting the observations and recording the data. Obtaining feedback from all involved in the test of change will determine the success of the new process (elimination of discrepancies), or if additional tests of change need to be explored.

**Study:** Analyze the data by comparing it to the predictions and summarize what was learned.

**Act:** You will want to re-run the test of change with a new or modified change idea if the evaluation of your first test of change reveals problems. Once you determine that your improved process is effective, the new process will need to be tested with an expanded population. For example, expand the test beyond Dr. Smith’s patients to all the patients admitted to the 4th floor surgical unit.

Use PDSA Worksheet at chapter end for each test cycle. The worksheet forces the team to be explicit in terms of the individual responsibilities in the design of the test, the tasks needed to be completed before the test is carried out, and the measures to be used to decide if the test was successful. Keep each worksheet in a notebook along with any data collected for the test cycle. This will provide you with information for future reference and assist you when you are telling your story of how you reliably implemented the measures to prevent CAUTIs.
Figure 5.1: The Model for Improvement
References


2. IHI Innovation Team paper, Designing Reliability in Health Care Processes. Jan 2007


6. IHI White paper, Improving the Reliability of Health Care. 2004

7. Resar RK and Stroebel RJ. Using Segmentation to Facilitate Reliable Design in Improvement Projects presented at the IHI Annual Forum, Dec 2005


10. IHI White paper, Improving the Reliability of Health Care 2004

Aim Worksheet

Key Concepts:

- A general Description of aim – should answer, “what are we trying to accomplish”
- Rationale/importance
- Clear timelines
- Measurable goals
- Can include some guidance for carrying out the work
- Specify target population

Aim Statement:  

________________________________________________________________________________________

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<table>
<thead>
<tr>
<th>Aim:</th>
<th>Project:</th>
<th>Date:</th>
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<thead>
<tr>
<th>Plan</th>
<th>Test of Change</th>
<th>Person Responsible</th>
<th>When to be done</th>
<th>Where to be done</th>
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<tr>
<th>List of the tasks needed to set up the test of change</th>
<th>Person Responsible</th>
<th>When to be done</th>
<th>Where to be done</th>
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<tr>
<th>Predict what will happen</th>
<th>Measures to determine if prediction succeeds</th>
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<tr>
<th>Do</th>
<th>Describe what happened when the test was run</th>
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<tr>
<th>Study</th>
<th>Describe the measured results. How did they compare to the prediction?</th>
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<thead>
<tr>
<th>Act</th>
<th>Describe the next cycle</th>
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<td></td>
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<tr>
<td>Segment</td>
<td>Strategy or Rule Change</td>
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In the previous chapter, concepts of building and monitoring reliable processes were introduced and discussed. This chapter is designed to provide background specific to CAUTI, and to help teams identify key processes to implement and standardize, with the highest potential to achieve the aim. (Measurement techniques and strategies are discussed in detail in the next chapter.) Additional information on CAUTI reduction strategies can be found on the Centers for Disease Control and Prevention website (http://www.cdc.gov/ncidod/dhqp/pdf/guidelines/CAUTI_Guideline2009final.pdf)

**Background**

Before launching into specific prevention strategies, some background on the pathogenesis and epidemiology of CAUTI is useful.

**Key definitions**

1. **Alcohol-based hand rub**: an alcohol-containing preparation designed to reduce the number of viable microorganisms on the hands. Such preparations contain 60 – 90 percent ethanol or isopropanol.

2. **Antimicrobial soap**: soap (i.e., detergent) containing an antiseptic agent.

3. **Antiseptic agent**: antimicrobial substances (e.g., alcohols) that are applied to the skin to reduce the number of microorganisms.

4. **Hand hygiene**: general term that applies to either hand washing with plain liquid soap, or hand antisepsis by washing with an antiseptic soap or by using an alcohol-based hand rub.

5. **Hand washing**: washing hands with plain, (i.e., non-antimicrobial) soap and water.

6. **Hand antisepsis**: refers to either washing hands with an antimicrobial soap or to rubbing an alcohol-based waterless product on the hands until they are dry.

7. **Indwelling urinary catheter**: drainage tube that is inserted into the urinary bladder through the urethra, is left in place, and is connected to a closed collection system.

8. **In-and-Out catheterization** (a.k.a. IOC, intermittent cath, etc.): brief insertion of a catheter into the bladder via the urethra to drain urine at different time intervals.
9. **External catheter** (a.k.a. condom cath, Texas cath.): a urine containment device that fits over the external genitalia and is attached to a urinary drainage bag. Most common use is in men.

10. **Asymptomatic bacteriuria** (a.k.a. ASB): the presence of bacteria in the urine, which is not causing symptoms of a UTI. 75% to 90% of patients with ASB do not develop a systemic inflammatory response or other signs/symptoms suggesting infection. Treatment of ASB has not been shown to be clinically beneficial in most patient populations and is associated with development of multi-drug resistant organisms. The National Healthcare Safety Network (NHSN) removed the ASB definition from its UTI definitions in 2009. (NOTE: this is NOT the same as asymptomatic bacteremic UTI – see next definition.)

11. **Asymptomatic Bacteremic UTI (ABUTI)**: Patient with or without an indwelling urinary catheter has no signs or symptoms (greater than 38 degrees C) for patients less than or equal to 65 years of age; and for any age no urgency, frequency, dysuria, suprapubic tenderness, or costovertebral angle pain or tenderness, OR for a patient less than or equal to 1 year of age, no fever (greater than 38 degrees C core), hypothermia (less than 36 degrees C core), apnea, bradycardia, dysuria, lethargy, or vomiting and a positive urine culture of greater than or equal to $10^5$ 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.

12. **Catheter-associated urinary tract infection (CAUTI)**: as defined by the NHSN, is divided into two classifications: symptomatic CAUTI and asymptomatic, bacteremic urinary tract infection (bloodstream infection secondary to a UTI). For details, see the NHSN definitions manual. Of note, definitions of CAUTI vary between studies, making the appraisal of evidence very difficult. Investigators have used many different definitions for CAUTI and even when using the NHSN definitions, do not typically distinguish between symptomatic CAUTI and asymptomatic bacteriuria, making meta-analysis virtually impossible. Therefore, the quality of evidence for any given intervention may be reduced.

13. **Biofilm**: communities of different types of microorganisms that attach to environmental surfaces, such as medical devices. They enclose themselves in a protective slime matrix that is highly protective, and are typically 50 to 500 times more resistant to antibiotics than free-floating organisms. They develop rapidly and may be found on any surface where moisture and nutrients are present. Also, fragments of biofilm can break off, spreading infection to other areas of the body. On a medical device, they can pose great risk to the patient.

14. **Short-term catheterization**: generally considered to be a period of less than 30 days of having an indwelling urinary catheter.

15. **Symptomatic UTI (SUTI)**: patients with a positive urine culture and experiencing NHSN-defined UTI signs or symptoms with no other recognized cause.

16. **Uropathogen**: microorganism that causes infection in the urinary tract.
Pathogenesis of CAUTI \textsuperscript{1,6,8}

The very presence of a urinary catheter interferes with the body’s natural host defense of clearing the bladder and urethral mucosa of microbes via the mechanism of voiding.\textsuperscript{6} The catheter also acts as a direct portal of entry into the bladder from nearby microorganisms.\textsuperscript{8} Sources of such microorganisms are either endogenous, from the patient’s own natural flora, or exogenous, from an external source. Examples of endogenous sources are meatal, vaginal or anal colonization, whereas healthcare workers’ hands or equipment represent exogenous sources.

These pathogens gain access to the urinary tract either from along the outside of the catheter (extraluminal route) or from inside the catheter itself (intraluminal route), from a contaminated collection bag or catheter-drainage tube connection. Both routes are important. Some recent studies have suggested that organisms most commonly reach the bladder via the extraluminal route. This route may play a greater role in females because of the short urethra and closeness to the vaginal and anal areas. However, for both genders, heavy periurethral colonization has been found to be an important risk factor for development of CAUTI.\textsuperscript{8}

Biofilm formation by uropathogens on indwelling catheters occurs universally, both intraluminally and extraluminally. The role of biofilm in the development of CAUTI is not well understood at this point in time, however, over time, the catheter becomes colonized with these organisms, rendering them resistant to antibiotics and host defenses. They are virtually impossible to eliminate without removing the catheter.\textsuperscript{6,8}

<table>
<thead>
<tr>
<th>Risk Factor for CAUTI Development</th>
<th>Relative Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prolonged catheterization &gt; 6 days</td>
<td>5.1-6.8</td>
</tr>
<tr>
<td>Female gender</td>
<td>2.5-3.7</td>
</tr>
<tr>
<td>Catheter insertion outside of the Operating Room</td>
<td>2.0-5.3</td>
</tr>
<tr>
<td>Urology service</td>
<td>2.0-4.0</td>
</tr>
<tr>
<td>Other active sites of infection</td>
<td>2.3-2.4</td>
</tr>
<tr>
<td>Diabetes</td>
<td>2.2-2.3</td>
</tr>
<tr>
<td>Malnutrition</td>
<td>2.4</td>
</tr>
<tr>
<td>Azotemia (creatinine &gt;2.0mg/dL)</td>
<td>2.1-2.6</td>
</tr>
<tr>
<td>Ureteral stent</td>
<td>2.5</td>
</tr>
<tr>
<td>Monitoring of urine output</td>
<td>2.0</td>
</tr>
<tr>
<td>Improper positioning of tubing above level of bladder or sagging below collection bag</td>
<td>1.9</td>
</tr>
<tr>
<td>Antimicrobial therapy</td>
<td>0.1-0.4</td>
</tr>
</tbody>
</table>

“The most important, potentially modifiable risk factor for development of CAUTI identified in every study is prolonged catheterization, beyond 6 days…”\textsuperscript{8}
Microbiology of CAUTI

Resistance to antimicrobials in these pathogens is an ever-increasing issue: approximately 25% of the *E. coli* isolates and one-third of the *P. aeruginosa* isolates from CAUTI cases were resistant to fluoroquinolones. In addition, the proportion of organisms that were multi-drug resistant, defined by being resistant to all antimicrobial agents in four drug classes, was: 4% of *P. aeruginosa*, 9% of *K. pneumoniae*, and 21% of *Acinetobacter baumannii*. These are sobering trends given the fact that CAUTI is the second leading cause of secondary healthcare-associated bacteremias and that approximately 17% of hospital-acquired bacteremias are from a urinary source with an associated mortality rate of 10%.

<table>
<thead>
<tr>
<th>Organism</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Escherichia coli</em></td>
<td>21.4%</td>
</tr>
<tr>
<td><em>Candida species</em></td>
<td>21.0%</td>
</tr>
<tr>
<td><em>Enterococcus species</em></td>
<td>14.9%</td>
</tr>
<tr>
<td><em>Pseudomonas aeruginosa</em></td>
<td>10.0%</td>
</tr>
<tr>
<td><em>Klebsiella pneumoniae</em></td>
<td>7.7%</td>
</tr>
<tr>
<td><em>Enterobacter species</em></td>
<td>4.1%</td>
</tr>
<tr>
<td>Other</td>
<td>20.9%</td>
</tr>
</tbody>
</table>

Table 6.2: Most Frequent Pathogens Associated with CAUTI (2006-2007)

High Priority Strategies for CAUTI Prevention

While it is recognized that there are additional prevention strategies contained in the referenced guidelines, this manual focuses on the three key prevention strategies with sufficient evidence to be recommended and deemed essential for all healthcare facilities caring for patients with urinary catheters by the CDC’s Healthcare Infection Control Practices Advisory Committee (HICPAC), which developed the CDC CAUTI prevention guideline of 2009. These three HICPAC recommendations are further enumerated by the CDC’s CAUTI toolkit, which outlines six specific core prevention strategies to reduce CAUTI. The CDC toolkit contains a seventh strategy – hand hygiene and standard precautions – which is also included here.

The HICPAC panel of experts chose the following high-priority recommendations based on strength of science and the likely impact of the strategy in preventing CAUTI. In-depth explanations along with more detailed descriptions of research can be found in the guidelines used as references for this chapter. It is strongly recommended that Collaborative Team Leaders and Infection Preventionists read the guidelines thoroughly in order to evaluate steps which will support improvement efforts in their facilities prior to embarking on the Collaborative work.

**High-Priority Strategies**

- Appropriate Urinary Catheter Use
  - Insert catheters only when clinically necessary
  - Review urinary catheter necessity daily and remove when no longer needed
• Use Proper Technique for Insertion
  - Ensure that only properly trained persons insert and maintain catheters
  - Insert urinary catheters using aseptic technique and sterile equipment

• Use Proper Technique for Catheter Maintenance
  - Maintain a closed drainage system
  - Maintain unobstructed urine flow

Figure 6.1: CAUTI Prevention Strategies

Priority Recommendation 1: Appropriate Use of Urinary Catheter

A. Insert catheters only when clinically necessary\textsuperscript{1,6}

1. What to do and why:

Since exposure to a urinary catheter is the most significant risk for developing a UTI\textsuperscript{6}, it stands to reason that the most important way to prevent CAUTI is to avoid placing a catheter unless absolutely necessary. Remember, studies have demonstrated that 12% to 25% of hospitalized patients will have an indwelling urinary catheter placed and about half of those are placed without appropriate reasons.\textsuperscript{9,10}
Such inappropriate use drives risk for patients as well as increases cost, since CAUTI is a recognized risk factor for more serious infections as well as mortality. Avoiding catheters helps to avoid such complications and associated costs.

The cost for insertion kits can also be avoided if fewer catheters are placed. For example, a hospital has 12,000 non-neonate discharges per year. After study, they determine that approximately 15% of their adult patients get indwelling urinary catheters inserted and 50% of those inserted are not clinically indicated. That means that 900 patients per year are catheterized without indications. Their indwelling urinary catheter insertion kits cost them $7.50 each. If they implement protocols requiring insertions only for clinically indicated catheters, they would automatically save $6,750 per year, substantially more if even one bloodstream or surgical site infection is avoided.

Table 6.3: Attributable Costs of Healthcare-Associated Infections

<table>
<thead>
<tr>
<th>Infection Type</th>
<th>Average Cost</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urinary tract infection</td>
<td>$1,006</td>
<td>$650 - $1,361</td>
</tr>
<tr>
<td>Bloodstream infection</td>
<td>$36,441</td>
<td>$1,822 - $107,156</td>
</tr>
<tr>
<td>Surgical site infection</td>
<td>$25,546</td>
<td>$1,783 - $134,602</td>
</tr>
</tbody>
</table>

Lastly, urinary catheters can be uncomfortable, even painful, and significantly limit mobility. Some authors have even described indwelling urinary catheters as “one-point restraints” due to their immobilizing effect, which can lead to complications such as deep venous thromboses and pressure ulcers.11

Therefore, it is important for each facility to develop indications for catheter insertion for staff to follow. The following table highlights indications developed by expert consensus.
Table 6.4: Appropriate/Inappropriate Indications for Indwelling Urinary Catheters

<table>
<thead>
<tr>
<th>Appropriate Indications</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Acute urinary retention or bladder outlet obstruction</td>
</tr>
<tr>
<td>• Need for accurate urine output measurement in critically ill patients</td>
</tr>
<tr>
<td>• Perioperative use for selected surgical populations such as:</td>
</tr>
<tr>
<td>o Patients undergoing GU surgery or other surgery on contiguous structures of the GU tract</td>
</tr>
<tr>
<td>o Anticipated prolonged duration of surgery (if inserted for this reason, should be removed in PACU)</td>
</tr>
<tr>
<td>o Patients anticipated to receive large-volume fluid infusions or diuretics during surgery</td>
</tr>
<tr>
<td>o Need for intraoperative monitoring of urine output</td>
</tr>
<tr>
<td>• To assist in healing of open sacral or perineal wounds in incontinent patients</td>
</tr>
<tr>
<td>• Patient requires prolonged immobilization (e.g. potentially unstable thoracic or lumbar spine, multiple trauma injuries such as pelvic fractures)</td>
</tr>
<tr>
<td>• For comfort in end-of-life care situations</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Inappropriate Indications</th>
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</thead>
<tbody>
<tr>
<td>• As a substitute for nursing care of the patient or resident with incontinence</td>
</tr>
<tr>
<td>• As a means of obtaining urine for culture or other diagnostic tests when the patient can void</td>
</tr>
<tr>
<td>• For prolonged postoperative duration without appropriate indications</td>
</tr>
<tr>
<td>• For healthcare worker or patient convenience</td>
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</table>

Alternatives to Indwelling Catheters

• External catheters in cooperative male patients without urinary retention or obstruction. This option has been shown to have lower risk for UTI and be less uncomfortable and allow more mobility than an indwelling catheter.

• Intermittent catheterization (in-and-out cath, IOC) several times daily. This method may have the same or lower risk of infection than an indwelling catheter but provides the patient greater mobility and ensures an indwelling catheter will not be left in longer than needed.

• Bladder ultrasound to assess for urinary retention. If retention is found, a catheter may be indicated, but if not, there may be other issues which need to be investigated. Studies have demonstrated that using bladder ultrasound can lower catheterization rates by 30% to 50%. This diagnostic procedure can be easily implemented at the bedside by nursing, poses no risk to the patient, and is resource efficient. (Nurses have demonstrated this procedure can be conducted at the bedside effectively and accurately in approximately 2 to 3 minutes vs. insertion of an indwelling urinary catheter, which takes 15 to 20 minutes.) Since urinary retention is often transient in the postoperative period, bladder scanning in combination with IOC may be especially useful in avoiding catheterization in this group.
• Regular patient checks for assistance in accessing the toilet or bedside commode. Important note: When fewer catheters are used, there may be implications for nursing time and resources such as increased numbers of bedside commodes or alert systems to avoid patient falls.

2. How to do it:⁴,⁶

• Develop criteria for appropriate catheter insertion based on current guidelines, in collaboration with the facility’s medical staff:
  • Protocols, policies
  • Build criteria into physician orders
  • Build criteria into indwelling urinary catheter insertion checklist

• Require verification that criteria are met prior to each insertion:
  • Documentation in medical record, build into electronic medical record (EMR) documentation
  • Physician orders, progress notes
  • Indwelling urinary catheter insertion checklist

• Set expectation with nursing and other clinical staff to assess all orders for indwelling catheters against criteria prior to insertion and empower them to not proceed and contact physician to clarify and discuss alternatives if the patient does not meet criteria.

• Educate staff on pathogenesis of CAUTI, indications for catheterization, and alternatives and embed ongoing education in annual competencies, orientation materials, etc. Consider the following to assist in this endeavor:
  • Identify the location where most catheters are inserted to focus efforts and maximize impact. In a recent study in New Jersey of 70 facilities, the majority of urinary catheters were placed in the emergency department, followed by the operating room.
  
  • Make use of CDs, DVDs, and other types of educational offerings available from the internet and/or your catheter vendor. (Many vendors have pre-packaged educational tools and/or employ Infection Preventionists who may be available for staff education.) Assess these prior to using to ensure they are consistent with current guidelines and hospital policies.
  
  • Self-learning packets (written or computer-based modules)
  
  • Ensure departments where catheters are inserted frequently have adequate supplies of alternatives to catheters, e.g. IOC and condom catheters, bedside toilets, etc.
• Ensure standing physician orders do not contain indwelling urinary catheter orders. Ensure the order has to be written in and not just checked. (Helps to “force” a thought process to assess need.)

• Revise routine admission assessments to include a check for the presence of a urinary catheter and if present, to verify need. If not indicated, the catheter should be removed on admission.

• Monitor catheter insertions and determine which ones do not meet recommendations. This will assist to identify issues with criteria so they can be improved along with opportunities for additional education.

The last chapter of this toolkit, “References” contains examples of tools along with references and helpful web sites.

B. Review urinary catheter necessity daily and remove promptly when no longer needed 1,4,6

1. What to do and why:

Once a catheter is determined to be clinically necessary, the next most important step to prevent CAUTI is to get it out as quickly as possible. Therefore, a daily assessment for need, based on hospital criteria, is the minimum standard for determining this. Strategies should be designed to eliminate the need for reliance on human memory.

2. How to do this:

Daily goals check list

• Include discussion of catheter necessity with each hand-off between shifts/units
• Automatic “stop” orders after specified time
• Mandatory renewal orders “X” hours after insertion, requiring documentation of rationale
• Nurse-driven protocol based on pre-determined need criteria (same as insertion criteria)
• Embed standardized continuance criteria in medical records’ documents (nursing flow sheets, physician orders, etc.)
• Reminder stickers/notices on chart, reminder notices in the EMR, etc.
• Staff education as described above
• Engage patient and family/significant others in reminding physician daily
• Require documentation of necessity on transfer checklists
• Include indwelling urinary catheter assessment on pain assessment documentation

Priority Recommendation 2: Insert Urinary Catheters Using Aseptic Technique and Sterile Equipment 1,4,6

1. What to do and why:
Having competent staff to insert and use indwelling urinary catheters is fundamental to prevent complications. Each staff member with the responsibility to insert urinary catheters should have specific education and training related to this function, including:

- Indications for insertion
- Alternatives to catheterization
- Knowledge of anatomy of the male and female urinary tract and perineum
- Structure and function of indwelling urinary catheters (e.g. lumens, catheter material and properties, catheter sizes and appropriate sizing, balloon, drainage ports, specimen collection ports, etc.)
- Aseptic technique (include hand hygiene)
- Insertion techniques
- Potential complications of insertion
- Potential complications of indwelling catheters
- Indications for continuation of catheterization
- Care and maintenance of indwelling urinary catheters

All organizations should train and verify competency of clinical staffs that insert urinary catheters, regardless of education or experience. (This includes anyone allowed to insert urinary catheters by hospital policy: nurses, physicians, nurse’s aides, residents, emergency technicians, interns, student nurses, etc.) Competency cannot be assumed, regardless of educational preparation or experience. It is important that all personnel are competent and practice at the standard set forth by the organization’s policies and protocols prior to being allowed to perform the function.

Insertions to be carried out only by trained personnel using aseptic technique and as small a catheter as possible, consistent with proper drainage.

2. How to do this:

- Assess current orientation/on-going competency assessment programs for catheter insertion for each category of employee allowed to insert urinary catheters
- Revise and standardize educational materials and competency assessments or if not in place, establish such, along with routine, periodic re-education
- Provide insertion checklists including indications for insertion along with proper technique. (Can also be used for documentation of procedure.)
- Create or supply standard supply kits that include the sterile catheter, pre-connected to a closed drainage system, and all necessary items in one place or work with vendors to purchase standard kits
- Ensure adequate supplies of checklists and insertion kits in areas where catheters are inserted, with focus on high-use areas such as the ED and OR
- Monitor insertion checklists as an “all or nothing” process to ensure all items are completed each time for each patient
Priority Recommendation 3: Maintain urinary catheters based on recommended guideline

A. Routine maintenance

1. What to do and why:

The overall goal of these strategies is to avoid inoculating the bladder and drainage system with microorganisms.

- Maintain a sterile, continuously closed drainage system
- Secure catheter to prevent movement and traction on urethra, which can damage urethra
- Keep collection bag and tubing below the level of the bladder at all times to prevent reflux of urine into bladder. (Urine can reflux into the bladder from tubing even when there is an anti-reflux valve on the bag.)
- If breaks in aseptic technique, disconnection, or leakage occur, replace the catheter and collecting system using aseptic technique and sterile equipment
- Instruct the patient, family/significant others, and other healthcare workers such as transport staff, physical therapists, radiology staff, etc. to keep the collection bag and tubing below the level of the bladder at all times. (Additional interventions may need to be considered for staff in magnetic resonance imaging (MRI) and computerized axial tomography (CAT) scan areas to avoid lifting the collection bag and tubing above bladder level during these procedures. Observation and discussion between Infection Prevention and these area staffs may be needed.)
- Prior to transporting the patient, empty the collection bag and tubing to avoid urine reflux
- Ensure unobstructed urine flow at all times
- Use standard precautions and good hand hygiene practices consistently when manipulating the catheter system
- Engage the patient and family/significant other and educate them to not empty the collection bag themselves or remove the securement device, etc
- Empty collection bag routinely, using a separate collecting container for each patient. Avoid allowing drainage spigot on collection bag from touching container. (The collecting container used should be devoted to an individual patient and not shared. If in a semi-private room situation, such containers should be labeled.)
- Routine cleaning of meatal area during daily bathing is appropriate. (More frequent cleaning is indicated if the patient has diarrhea.)
- Collection of urine specimens should be done using aseptic technique with sampling from the designated sampling port with sterile syringe or needle-less system. Cleanse the port with a disinfectant approved by the hospital Infection Preventionist. DO NOT break the connection between the catheter and drainage tubing

2. How to do this:

- Staff education (see above). For maintenance, it is critical to include staff that may not be responsible for catheter insertion such as transport staff, radiology, physical therapy, respiratory therapy, etc
• Patient and family/significant other education via flyers, verbal instruction when catheter inserted, etc
• Develop “bundle” checklist for daily catheter care (electronic medical record, standard flow sheet.)

B. Practices to Avoid

• Do not routinely replace indwelling catheters at fixed time intervals. Change catheters for clinical indications only such as infection, obstruction, or when the closed system is compromised
• Do not use systemic antimicrobials to prevent CAUTI in patients with long or short-term urinary catheters unless there are clinical indications to do so.¹
• Complex urinary drainage systems such as those utilizing mechanisms for reducing bacterial entry such as antiseptic-release cartridges in the drain port, are not necessary for routine use
• Bladder irrigation is not recommended unless obstruction is anticipated, e.g. due to bleeding after genitourinary (GU) surgery, etc
• Routine irrigation of the bladder with antimicrobials is not recommended
• Routine installation of antiseptic or antimicrobial solutions into urinary drainage bags is not recommended
• Clamping indwelling catheters prior to removal is not necessary
• Do not clean the periurethral area with antiseptics to prevent CAUTI while the catheter is in place. Routine hygiene (e.g., cleansing of the metal surface during daily bathing or showering) is appropriate

Priority Recommendation 4: Hand Hygiene

CDC’s HICPAC endorsed a series of hand hygiene measures in 2002. The following recommendations are from HICPAC’s published report ¹² and reflect those recommendations for which the strongest evidence exists (category IA):

Indications for handwashing and hand antisepsis

• When hands are visibly dirty or contaminated with proteinaceous material or are visibly soiled with blood or other body fluids and before eating and after using the restroom, wash hands with either a nonantimicrobial soap and water or an antimicrobial soap and water
• If hands are not visibly soiled, use an alcohol-based hand rub for routinely decontaminating hands in all other clinical situations
• Decontaminate hands after contact with body fluids or excretions, mucous membranes, nonintact skin, and wound dressings if hands are not visibly soiled

Hand hygiene agents:

• Do not add soap to a partially empty soap dispenser. This practice of “topping off” dispensers can lead to bacterial contamination of soap
Skin care:
- Provide healthcare workers (HCWs) with hand lotions or creams to minimize the occurrence of irritant contact dermatitis associated with hand antisepsis or handwashing.

Other aspects of hand hygiene:
- Do not wear artificial fingernails or extenders when having direct contact with patients at high risk (e.g., those in intensive-care units or operating rooms).

Healthcare worker educational and motivation programs:
- Monitor HCWs’ adherence with recommended hand-hygiene practices and provide personnel with information regarding their performance.

Administrative measures:
- As part of a multidisciplinary program to improve hand-hygiene adherence, provide HCWs with a readily accessible alcohol-based hand-rub product.
- To improve hand-hygiene adherence among personnel who work in areas in which high workloads and high intensity of patient care are anticipated, make an alcohol-based hand rub available at the entrance to the patient’s room or at the bedside, in other convenient locations, and in individual pocket-sized containers to be carried by HCWs.
References


This chapter will provide an overview of the National Healthcare Safety Network (NHSN), the definition of CAUTI in the NHSN, the 2009 changes in the CAUTI surveillance definition, locations for CAUTI surveillance, the forms and support materials used for CAUTI surveillance.

As described in previous chapters, select team members and identify roles. Ensure that the facility’s Infection Preventionist (IP) is included, as this team member will be key in collecting CAUTI rates and assisting in interpreting and using guidelines. Another consideration in CAUTI measurement is establishing a system, whether manual or electronic, to count urinary catheters on the unit of surveillance, at the same time each day. The person assigned to this collection must have back-up for days off, must understand the definition of a urinary catheter as described in NHSN and must get that information to the IP consistently. If utilizing an electronic medical record, there must be assurance that electronic documentation of urinary catheters is accurate and consistent. To ensure comparability with the CAUTI rate, it is essential for all IPs to use the NHSN criteria consistently.

This chapter will be presented to the hospital teams by the Department staff that are providing education and support to your hospital IP in NHSN surveillance and reporting by webinar at a date to be announced later in the Prevention Collaborative process.

**Understanding NHSN**

- The National Healthcare Safety Network (NHSN) is a voluntary, secure, internet-based surveillance system that integrates patient and healthcare personnel safety surveillance systems managed by the Division of Healthcare Quality Promotion (DHQP) at CDC.
- Enrollment in NHSN is open to all types of healthcare facilities in the United States, including acute care hospitals, long term acute care hospitals, psychiatric hospitals, rehabilitation hospitals, outpatient dialysis centers, ambulatory surgery centers, and long term care facilities.
- NHSN makes use of recent advances in information technology. While maintaining data security, integrity, and confidentiality, NHSN has the capacity for healthcare facilities to share data in a timely manner between healthcare facilities (e.g., a multihospital system) or with other entities (e.g., public health agencies or quality improvement organizations).
- The HAI plan will use nationally known NHSN data to determine relevant baseline measurements. These will be appropriately adjusted by such factors as patient risk, facility size and other factors deemed reasonable by the HAI prevention steering committee.
- The IDPH HAI prevention plan to use NHSN data will allow Iowa healthcare facilities to share data in a timely manner between healthcare facilities (e.g., a multihospital system) or with other entities (e.g., public health agencies or internal quality improvement).
Understanding Specific Collaborative Metrics

CAUTI rates: a reduction of 25% from a statewide infection baseline rate that will be determined by Department statisticians.

- CAUTI surveillance requires active, patient-based, prospective surveillance of CAUTI events and their corresponding denominator data (catheter days per unit) by a trained Infection Preventionist (IP). This means that the IP shall seek out infections during a patient’s stay by reviewing a variety of data sources, such as laboratory, pharmacy, admission/discharge/transfer, radiology/imaging, and pathology databases, and patient charts, including history and physical exam notes, nurses/physicians notes, temperature charts, etc. Others may be trained to screen data sources for these infections, but the IP must make the final determination.

- Retrospective chart reviews should be used only when patients are discharged before all information can be gathered. NHSN forms are used to collect all required data, using the NHSN definitions of each data field.

- CAUTI infection surveillance will be for acute care inpatient locations that meet the locations definition in NHSN; it may be specific locations, facility wide by location or facility wide over-all. The surveillance location your facility has selected is identified in the monthly reporting plan by your IP. You may report on additional locations such as long term care, skilled care, but that information will not be included in the CAUTI rate or the report generated by the Department.

- The rate of CAUTI will be determined by the number of numerator events (CAUTIs that meet NHSN case definitions) divided by the number of denominator events which are the total number of urinary catheter days for your chosen location x 1,000. This figure will give the rate of CAUTI for you on your selected location.

Definition of Numerator Events

- In January 2009, “Asymptomatic Bacteremia (ASB)” was removed as a surveillance definition and cannot be reported to NHSN. The NHSN added a new surveillance category known as “Asymptomatic Bacteremic UTI” (ABUTI) in March 2009.
- Urinary tract infections (UTI) are defined using symptomatic urinary tract infection (SUTI) criteria or Asymptomatic Bacteremic UTI (ABUTI) criteria. Your IP will report UTIs that are catheter-associated (i.e. patient had an indwelling urinary catheter at the time of or within 48 hours before onset of the event). There is no minimum period of time that the catheter must be in place in order for the UTI to be considered catheter-associated.
- The Urinary Tract Infection (UTI) Form (CDC 57.114) is used to collect and report each CAUTI that is identified during the month selected for surveillance. This form is located at http://www.idph.state.ia.us/hai_prevention/common/pdf/nhsn3_tracking.pdf.
The form includes patient demographic information and information on whether or not an indwelling urinary catheter was present. Additional data include the specific criteria met for identifying the UTI, whether the patient developed a secondary bloodstream infection, whether the patient died, and the organisms isolated from cultures and their antimicrobial susceptibilities.

Denominator data: Catheter days and patient days are used for denominators. Indwelling urinary catheter days, which are the number of patients with an indwelling urinary catheter device, are collected daily, at the same time each day, according to the chosen location using the appropriate form. These daily counts are summed and only the total for the month is entered into NHSN. Indwelling urinary catheter days and patient days are collected separately for each of the locations monitored.

*Please note that an indwelling catheter is defined as a drainage tube that is inserted into the urinary bladder through the urethra, is left in place, and is connected to a closed collection system; also called a Foley catheter; does not include straight in-and-out catheters nor supra pubic catheters.*

Data Analyses: The CAUTI rate per 1,000 urinary catheter days is calculated by dividing the number of CAUTIs by the number of catheter days and multiplying the result by 1,000.

Facilities may chose to address urinary catheter usage and report this to NHSN, but it is not a reporting requirement of the HAI prevention grant metrics. The Urinary Catheter Utilization Ratio is calculated by dividing the number of urinary catheter days by the number of patient days. These calculations will be performed separately for the different types of ICUs, specialty care areas, and other locations in the institution, except for neonatal locations.

Facilities may also wish to do surveillance and reporting for long term care, skilled nursing beds, and so forth, but again, this is not a requirement for this project.

A target of zero is the CAUTI healthcare associated infections is the central metric for the CAUTI infection surveillance. Each team may want to establish interim aims/milestones as they stretch for this target. Each team may also chose to do additional process measures in NHSN.

The NHSN web site contains comprehensive and up-to-date information on CAUTI definitions and reporting. To support the IP doing the surveillance for your hospital team and to share with the team members the surveillance and reporting criteria required by NHSN, the information available on the web site will be used as the source of information related to this chapter on measurement as well as a webinar to the entire team on NHSN overview, confidentiality, infection definitions, report generation and any other current information critical at the time of the presentation (state reporting laws, CMS rules, etc.).

- CAUTI Monthly Reporting Plan - [http://www.idph.state.ia.us/hai_prevention/common/pdf/nhsn3_cauti_plan.pdf](http://www.idph.state.ia.us/hai_prevention/common/pdf/nhsn3_cauti_plan.pdf)
- CAUTI Event - [http://www.idph.state.ia.us/hai_prevention/common/pdf/nhsn3_event.pdf](http://www.idph.state.ia.us/hai_prevention/common/pdf/nhsn3_event.pdf)
IDPH has comprehensive web based NHSN educational materials; these materials are updated frequently and will be presented to your team when your training takes place for this chapter. You may find these resources at [http://www.idph.state.ia.us/hai_prevention/nhsn.asp](http://www.idph.state.ia.us/hai_prevention/nhsn.asp)

Other valuable resources in understanding and answering questions about reporting and measurement are available on the NHSN web site as follows:

- Overview of the reporting components
  [http://www.cdc.gov/nhsn/about.html](http://www.cdc.gov/nhsn/about.html)

- Confidentiality issues
  [http://www.cdc.gov/nhsn/about.html#Purposes](http://www.cdc.gov/nhsn/about.html#Purposes)

- HIPPA Privacy Rules

- Agreement to participate and consent questions and answers
  [http://www.cdc.gov/nhsn/PDFs/NHSN_ConsentAgreementQA.pdf](http://www.cdc.gov/nhsn/PDFs/NHSN_ConsentAgreementQA.pdf)

- How data are used in NHSN
  [http://www.cdc.gov/nhsn/about.html#Data](http://www.cdc.gov/nhsn/about.html#Data)

- Enrollment
  [http://www.cdc.gov/nhsn/wcEnrollment.html](http://www.cdc.gov/nhsn/wcEnrollment.html)


**The Secure Data Network (SDN) of the NHSN**

Reporting to the NHSN requires a digital certificate and a consent agreement. Each IP at your facility has completed the process in obtaining a digital certificate as instructed by the department and your CEO signed an agreement with NHSN regarding data reporting and confidentiality. In addition, your IP, for the purposes of this HAI prevention grant, have joined the IDPH HAI group and conferred rights to IDPH to see the data that is being reported on CAUTI. The IDPH staff will generate infection rate reports for each facility and will provide comparison data for each facility with no facilities or patients identified.

Again, the SDN can only be accessed by those with a digital certificate and is a secure internet based website managed by the CDC. It has been the selected reporting site by most of the states with mandatory reporting laws, by most of the states with HAI prevention ARRA grants, such as
Iowa, and has been selected by CMS as the reporting site for the rules for pay for performance in HAIs of CLABSI and SSI’s.
# Urinary Tract Infection (UTI)

<table>
<thead>
<tr>
<th>* required for saving</th>
<th>**required for completion</th>
<th>Event #:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facility ID:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Patient ID:</td>
<td>Social Security #:</td>
<td></td>
</tr>
<tr>
<td>Secondary ID:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient Name, Last:</td>
<td>First:</td>
<td>Middle:</td>
</tr>
<tr>
<td>*Gender: F M</td>
<td>*Date of Birth:</td>
<td></td>
</tr>
<tr>
<td>Ethnicity (specify):</td>
<td>Race (specify):</td>
<td></td>
</tr>
<tr>
<td>*Event Type: UTI</td>
<td>*Date of Event:</td>
<td></td>
</tr>
<tr>
<td>Post-procedure UTI:</td>
<td>Yes No</td>
<td>Date of Procedure:</td>
</tr>
<tr>
<td>NHSN Procedure Code:</td>
<td>ICD-9-CM Procedure Code:</td>
<td></td>
</tr>
<tr>
<td>*MDRO Infection Surveillance:</td>
<td>Yes, this event's pathogen &amp; location are in-plan for the MDRO/CDAD Module</td>
<td>No, this event's pathogen &amp; location are not in-plan for the MDRO/CDAD Module</td>
</tr>
<tr>
<td>*Date Admitted to Facility:</td>
<td>*Location:</td>
<td></td>
</tr>
</tbody>
</table>

## Risk Factors

*Urinary Catheter status at time of specimen collection:
- [ ] In place
- [ ] Removed within 48 hours prior
- [ ] Not in place nor within 48 hours prior

Location of Device Insertion: ______________ Date of Device Insertion: / / 

## Event Details

**Specific Event:**
- [ ] Symptomatic UTI (SUTI)
- [ ] Asymptomatic Bacteremic UTI (ABUTI)
- [ ] Other UTI (OUTI)

**Specify Criteria Used:** (check all that apply)

### Signs & Symptoms

<table>
<thead>
<tr>
<th>Any Patient</th>
<th>≤1 year old</th>
<th>Laboratory &amp; Diagnostic Testing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fever</td>
<td>Fever</td>
<td>1 positive culture with ≥10^2 CFU/ml with no more than 2 species of microorganisms</td>
</tr>
<tr>
<td>Urgency</td>
<td>Hypothermia</td>
<td>Positive dipstick for leukocyte esterase or nitrite</td>
</tr>
<tr>
<td>Frequency</td>
<td>Apnea</td>
<td>Pyuria</td>
</tr>
<tr>
<td>Dysuria</td>
<td>Bradycardia</td>
<td>Microorganisms seen on Gram stain of unspun urine</td>
</tr>
<tr>
<td>Suprapubic tenderness</td>
<td>Dysuria</td>
<td>1 positive culture with ≥10^2 CFU/ml and &lt; 10^7 CFU/ml with no more than 2 species of microorganisms</td>
</tr>
<tr>
<td>Costovertebral pain or tenderness</td>
<td>Lethargy</td>
<td>Positive culture</td>
</tr>
<tr>
<td>Abscess</td>
<td>Vomiting</td>
<td>Positive blood culture</td>
</tr>
<tr>
<td>Pain or tenderness</td>
<td></td>
<td>Radiographic evidence of infection</td>
</tr>
<tr>
<td>Purulent drainage or material</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other evidence of infection found on direct exam, during surgery, or by diagnostic tests+</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| *Secondary Bloodstream Infection: Yes No |
| ** Died: Yes No | UTI Contributed to Death: Yes No |

**Discharge Date:** *Pathogens Identified: Yes No *If Yes, specify on page 2

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Assurance of Confidentiality: The information obtained in this surveillance system that would permit identification of any individual or institution is collected with a guarantee that it will be held in strict confidence, will be used only for this purpose stated, and will not otherwise be disclosed or released without the consent of the individual, or the institution in accordance with sections 304, 306, and 308(a) of the Public Health Service Act (42 U.S.C. 264a, 264d, and 264b(1)).

Public reporting burden of this collection of information is estimated to average 50 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. An agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a currently valid OMB control number. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to OMB, Reports Clearance Officer, 1800 G St. NW, MS D-74, Atlanta, GA 30333, ATTN: PRA (0920-0666).
## Urinary Tract Infection (UTI)

### Gram-positive Organisms

<table>
<thead>
<tr>
<th>Pathogen</th>
<th>DRG-positive Organisms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coagulase-negative staphylococci (specify):</td>
<td>SIRN</td>
</tr>
<tr>
<td>Enterococcus faecalis</td>
<td>AMP SIRN DAPTO SIRN LNZ SIRN PENG SIRN VANC SIRN</td>
</tr>
<tr>
<td>Enterococcus faecium</td>
<td>AMP SIRN DAPTO SIRN LNZ SIRN PENG SIRN QUIDAL SIRN RIF SIRN TMZ SIRN VANC SIRN</td>
</tr>
<tr>
<td>Staphylococcus aureus</td>
<td>CLIND SIRN DAPTO SIRN ERYTH SIRN GENT SIRN LNZ SIRN OX SIRN QUIDAL SIRN RIF SIRN TMZ SIRN VANC SIRN</td>
</tr>
</tbody>
</table>

### Gram-negative Organisms

<table>
<thead>
<tr>
<th>Pathogen</th>
<th>Gram-negative Organisms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acinetobacter spp. (specify)</td>
<td>AMK AMPSUL CEFEP CEFTAZ CIPRO GENT IMI LEVO MERO PIPTAZ TOBRA SIRN SIRN SIRN SIRN SIRN SIRN SIRN SIRN SIRN SIRN</td>
</tr>
<tr>
<td>Escherichia coli</td>
<td>AMK CEFEP CEFOT CEFTRX CIPRO IMI LEVO MERO SIRN SIRN SIRN SIRN SIRN SIRN SIRN SIRN SIRN SIRN</td>
</tr>
<tr>
<td>Enterobacter spp. (specify)</td>
<td>AMK CEFEP CEFOT CEFTRX CIPRO IMI LEVO MERO SIRN SIRN SIRN SIRN SIRN SIRN SIRN SIRN SIRN SIRN</td>
</tr>
<tr>
<td>Klebsiella oxytoca</td>
<td>AMK CEFEP CEFOT CEFTRX CIPRO IMI LEVO MERO SIRN SIRN SIRN SIRN SIRN SIRN SIRN SIRN SIRN SIRN</td>
</tr>
<tr>
<td>Klebsiella pneumoniae</td>
<td>AMK CEFEP CEFOT CEFTRX CIPRO IMI LEVO MERO SIRN SIRN SIRN SIRN SIRN SIRN SIRN SIRN SIRN SIRN</td>
</tr>
<tr>
<td>Serratia marcescens</td>
<td>AMK CEFEP CEFOT CEFTRX CIPRO IMI LEVO MERO SIRN SIRN SIRN SIRN SIRN SIRN SIRN SIRN SIRN SIRN</td>
</tr>
<tr>
<td>Pseudomonas aeruginosa</td>
<td>AMK CEFEP CEFTRX CIPRO IMI LEVO MERO PIP SIRN SIRN SIRN SIRN SIRN SIRN SIRN SIRN SIRN SIRN</td>
</tr>
<tr>
<td>Stenotrophomonas maltophilia</td>
<td>TMZ SIRN</td>
</tr>
</tbody>
</table>

### Other Organisms

<table>
<thead>
<tr>
<th>Organism 1 (specify)</th>
<th>Drug 1</th>
<th>Drug 2</th>
<th>Drug 3</th>
<th>Drug 4</th>
<th>Drug 5</th>
<th>Drug 6</th>
<th>Drug 7</th>
<th>Drug 8</th>
<th>Drug 9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organism 2 (specify)</td>
<td>Drug 1</td>
<td>Drug 2</td>
<td>Drug 3</td>
<td>Drug 4</td>
<td>Drug 5</td>
<td>Drug 6</td>
<td>Drug 7</td>
<td>Drug 8</td>
<td>Drug 9</td>
</tr>
<tr>
<td>Organism 3 (specify)</td>
<td>Drug 1</td>
<td>Drug 2</td>
<td>Drug 3</td>
<td>Drug 4</td>
<td>Drug 5</td>
<td>Drug 6</td>
<td>Drug 7</td>
<td>Drug 8</td>
<td>Drug 9</td>
</tr>
</tbody>
</table>

**Result Codes:**
- **1** = Susceptible
- **2** = Intermediate
- **3** = Resistant
- **N** = Not tested

**Drugs:**
- AMP = ampicillin
- AMPSUL = ampicillin/sulbactam
- CEFEP = cefepime
- CEFTRX = ceftaxime
- CIPRO = ciprofloxacin
- CLIND = clindamycin
- ERYTH = erythromycin
- GENT = gentamicin
- IMI = imipenem
- LEVO = levofloxacin
- MERO = meropenem
- OX = oxacillin
- PENG = penicillin G
- PIP = piperacillin
- QUIDAL = quinupristin/dalfopristin
- RIF = rifampin
- TMZ = trimethoprim/sulfamethoxazole
- TOBRA = tobramycin
- VANC = vancomycin
Catheter-Associated Urinary Tract Infection (CAUTI) Event

Introduction: The urinary tract is the most common site of healthcare-associated infection, accounting for more than 30% of infections reported by acute care hospitals. Virtually all healthcare-associated urinary tract infections (UTIs) are caused by instrumentation of the urinary tract.

CAUTI can lead to such complications as cystitis, pyelonephritis, gram-negative bacteremia, prostatitis, epididymitis, and orchitis in males and, less commonly, endocarditis, vertebral osteomyelitis, septic arthritis, endophthalmitis, and meningitis in all patients. Complications associated with CAUTI cause discomfort to the patient, prolonged hospital stay, and increased cost and mortality. Each year, more than 13,000 deaths are associated with UTIs.

Prevention of CAUTIs is discussed in the CDC/HICPAC document, Guideline for Prevention of Catheter-associated Urinary Tract Infections.

Settings: Surveillance will occur in any of three types of inpatient locations: (1) ICUs, (2) SCAs (includes hematology/oncology wards, bone marrow transplant units, solid organ transplant units, inpatient dialysis units, long term acute care areas), and (3) any other inpatient location in the institution where denominator data can be collected (e.g., surgical wards).

NOTE: It is not required to monitor for CAUTIs after the patient is discharged from the facility, however, if discovered, they should be reported to NHSN. No additional indwelling catheter days are reported.

Requirements: Surveillance for CAUTI is performed in at least one inpatient location in the healthcare institution for at least one calendar month as indicated in the Patient Safety Monthly Reporting Plan (CDC 57.106).

Definitions: Urinary tract infections (UTI) are defined using symptomatic urinary tract infection (SUTI) criteria or Asymptomatic Bacteremic UTI (ABUTI) criteria (Table 1 and Figure 1). Report UTIs that are catheter-associated (i.e. patient had an indwelling urinary catheter at the time of or within 48 hours before onset of the event). NOTE: There is no minimum period of time that the catheter must be in place in order for the UTI to be considered catheter-associated. NOTE: SUTI 1b and 2b and other UTI (OUTI) cannot be catheter-associated.

EXAMPLE: Patient has a Foley catheter in place on an inpatient unit. It is discontinued, and 4 days later patient meets the criteria for a UTI. This is not reported as a CAUTI because the time since Foley discontinuation exceeds 48 hours.
**Location of attribution:** The location where the patient was assigned on the date of the UTI event, which is further defined as the date when the first clinical evidence appeared or the date the specimen used to meet the criterion was collected, whichever came first.

**EXAMPLE:** Patient has a Foley catheter inserted in the Emergency Department and then is admitted to the MICU. Within 24 hours of admission to the MICU, patient meets criteria for UTI. This is reported to the NHSN as a CAUTI for the MICU, because the Emergency Department is not an inpatient location and no denominator data are collected there.

**EXAMPLE:** Patient on the urology ward of Hospital A had the Foley catheter removed and is discharged home a few hours later. The ICP from Hospital B calls the next day to report that this patient has been admitted to Hospital B with a UTI. This CAUTI should be reported to NHSN for Hospital A and attributed to the urology ward.

**EXCEPTION:** If a CAUTI develops within 48 hours of transfer from one inpatient location to another in the same facility, the infection is attributed to the transferring location. This is called the **Transfer Rule** and examples are shown below.

- Patient with a Foley catheter in place in the SICU is transferred to the surgical ward. Thirty six (36) hours later, the patient meets the criteria for UTI. This is reported to NHSN as a CAUTI for the SICU.
- Patient is transferred to the medical ward from the MSICU after having the Foley catheter removed. Within 24 hours, patient meets criteria for a UTI. This is reported to NHSN as a CAUTI for the MSICU.
- Patient with a Foley catheter in place is transferred from the medical ward to the coronary care ICU (CCU). After 4 days in the CCU, the patient meets the criteria for UTI. This is reported to NHSN as a CAUTI for the CCU.

**Indwelling catheter:** A drainage tube that is inserted into the urinary bladder through the urethra, is left in place, and is connected to a closed collection system; also called a Foley catheter; does not include straight in-and-out catheters.

**Numerator Data:** The *Urinary Tract Infection (UTI) Form* (CDC 57.114) is used to collect and report each CAUTI that is identified during the month selected for surveillance. The *Instructions for Completion of Urinary Tract Infection Form* (Tables of Instructions, Tables 5 and 2a) includes brief instructions for collection and entry of each data element on the form. The UTI form includes patient demographic information and information on whether or not an indwelling urinary catheter was present. Additional data include the specific criteria met for identifying the UTI, whether the patient developed a secondary bloodstream infection, whether the patient died, and the organisms isolated from cultures and their antimicrobial susceptibilities.

**Denominator data:** Device days and patient days are used for denominators (See Chapter 16 Key Terms). Indwelling urinary catheter days, which are the number of patients with an indwelling urinary catheter device, are collected daily, at the same time each day, according to the chosen location using the appropriate form (CDC 57.116,
57.117, and 57.118). These daily counts are summed and only the total for the month is entered into NHSN. Indwelling urinary catheter days and patient days are collected separately for each of the locations monitored.

**Data Analyses:** The CAUTI rate per 1000 urinary catheter days is calculated by dividing the number of CAUTIs by the number of catheter days and multiplying the result by 1000. The Urinary Catheter Utilization Ratio is calculated by dividing the number of urinary catheter days by the number of patient days. These calculations will be performed separately for the different types of ICUs, specialty care areas, and other locations in the institution, except for neonatal locations.


Table 1-Urinary Tract Infection Criteria

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Symptomatic Urinary Tract Infection (SUTI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a</td>
<td>Patient had an indwelling urinary catheter in place at the time of specimen collection and at least 1 of the following signs or symptoms with no other recognized cause: fever (&gt;38°C), suprapubic tenderness, or costovertebral angle pain or tenderness and a positive urine culture of ≥10^5 colony-forming units (CFU)/ml with no more than 2 species of microorganisms.</td>
</tr>
<tr>
<td></td>
<td>OR Patient had indwelling urinary catheter removed within the 48 hours prior to specimen collection and at least 1 of the following signs or symptoms with no other recognized cause: fever (&gt;38°C), urgency, frequency, dysuria, suprapubic tenderness, or costovertebral angle pain or tenderness and a positive urine culture of ≥10^5 CFU/ml with no more than 2 species of microorganisms.</td>
</tr>
<tr>
<td>1b</td>
<td>Patient did not have an indwelling urinary catheter in place at the time of specimen collection nor within 48 hours prior to specimen collection and has at least 1 of the following signs or symptoms with no other recognized cause: fever (&gt;38°C) in a patient that is ≤65 years of age, urgency, frequency, dysuria, suprapubic tenderness, or costovertebral angle pain or tenderness and a positive urine culture of ≥10^5 CFU/ml with no more than 2 species of microorganisms.</td>
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<tr>
<td>2a</td>
<td>Patient had an indwelling urinary catheter in place at the time of specimen collection and at least 1 of the following signs or symptoms with no other recognized cause: fever (&gt;38°C), suprapubic tenderness, or costovertebral angle pain or tenderness and a positive urinalysis demonstrated by at least 1 of the following findings: a. positive dipstick for leukocyte esterase and/or nitrite b. pyuria (urine specimen with ≥10 white blood cells [WBC]/mm³ or ≥3 WBC/high power field of unspun urine) c. microorganisms seen on Gram stain of unspun urine and a positive urine culture of ≥10^3 and &lt;10^5 CFU/ml with no more than 2 species of microorganisms.</td>
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<tr>
<td></td>
<td>OR Patient had indwelling urinary catheter removed within the 48 hours prior to specimen collection and at least 1 of the following signs or symptoms with no other recognized cause: fever (&gt;38°C), urgency, frequency, dysuria, suprapubic tenderness, or costovertebral angle pain or tenderness and a positive urinalysis demonstrated by at least 1 of the following findings: a. positive dipstick for leukocyte esterase and/or nitrite b. pyuria (urine specimen with ≥10 white blood cells [WBC]/mm³ or ≥3 WBC/high power field of unspun urine)</td>
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</tbody>
</table>


<table>
<thead>
<tr>
<th>Table 1: Urinary Tract Infection Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Field of unspun urine</strong></td>
</tr>
<tr>
<td>2b Patient did not have an indwelling urinary catheter in place at the time of specimen collection nor within 48 hours prior to specimen collection</td>
</tr>
<tr>
<td>3 Patient ( \leq 1 ) year of age with or without an indwelling urinary catheter has at least 1 of the following signs or symptoms with no other recognized cause: fever (( &gt;38^\circ C ) in a patient that is ( \leq 65 ) years of age, urgency, frequency, dysuria, suprapubic tenderness, or costovertebral angle pain or tenderness</td>
</tr>
<tr>
<td>4 Patient ( \leq 1 ) year of age with or without an indwelling urinary catheter has at least 1 of the following signs or symptoms with no other recognized cause: fever (( &gt;38^\circ C ) core), hypothermia (( &lt;36^\circ C ) core), apnea, bradycardia, dysuria, lethargy, or vomiting</td>
</tr>
</tbody>
</table>

**Criterion Asymptomatic Bacteremic Urinary Tract Infection (ABUTI)**

| Patient with or without an indwelling urinary catheter has no signs or symptoms (i.e., no fever (\( >38^\circ C \)) for patients \( \leq 65 \) years of age\(^*\); and for any age patient no urgency, frequency, dysuria, suprapubic tenderness, or costovertebral angle pain or tenderness, OR for a patient \( \leq 1 \) year of age, no fever (\( >38^\circ C \) core), hypothermia (\( <36^\circ C \) core), apnea, bradycardia, dysuria, lethargy, or vomiting) | a positive urine culture of \( \geq 10^5 \) 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. **Uropathogen microorganisms are: Gram-negative bacilli, Staphylococcus spp., yeasts, beta-hemolytic Streptococcus spp., Enterococcus spp., G. vaginalis, Aerococcus urinae, and Corynebacterium (urease positive). |

**Comments**

- 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 March, 2009
Table 1-Urinary Tract Infection Criteria

catheterization. Specimens from indwelling catheters should be aspirated through the disinfected sampling ports.

- 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.

- Urine specimens for culture should be processed as soon as possible, preferably within 1 to 2 hours. If urine specimens cannot be processed within 30 minutes of collection, they should be refrigerated, or inoculated into primary isolation medium before transport, or transported in an appropriate urine preservative. Refrigerated specimens should be cultured within 24 hours.

- Urine specimen labels should indicate whether or not the patient is symptomatic.

- Report secondary bloodstream infection = “Yes” for all cases of Asymptomatic Bacteremic Urinary Tract Infection (ABUTI).

- Report *Corynebacterium* (urease positive) as either *Corynebacterium species unspecified* (COS) or, as *C. urealyticum* (CORUR) if so speciated.

**Criterion** Other Urinary Tract Infection (OUTI) (kidney, ureter, bladder, urethra, or tissue surrounding the retroperineal or perinephric space)

Other infections of the urinary tract must meet at least 1 of the following criteria:

1. Patient has microorganisms isolated from culture of fluid (other than urine) or tissue from affected site.

2. Patient has an abscess or other evidence of infection seen on direct examination, during a surgical operation, or during a histopathologic examination.

3. Patient has at least 2 of the following signs or symptoms with no other recognized cause: fever (>38°C), localized pain, or localized tenderness at the involved site and at least 1 of the following:
   - a. purulent drainage from affected site
   - b. microorganisms cultured from blood that are compatible with suspected site of infection
   - c. radiographic evidence of infection (e.g., abnormal ultrasound, CT scan, magnetic resonance imaging [MRI], or radiolabel scan [gallium, technetium]).

4. Patient ≤ 1 year of age has at least 1 of the following signs or symptoms with no other recognized cause: fever (>38°C core), hypothermia (<36°C core), apnea, bradycardia, lethargy, or vomiting and at least 1 of the following:
   - a. purulent drainage from affected site
   - b. microorganisms cultured from blood that are compatible with suspected site of infection
   - c. radiographic evidence of infection, (e.g., abnormal ultrasound, CT scan, magnetic resonance imaging [MRI], or radiolabel scan [gallium, technetium]).

**Comment**
- Report infections following circumcision in newborns as SST-CIRC.

March, 2009

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Other Urinary Tract Infection (OUTI) (kidney, ureter, bladder, urethra, or tissue surrounding the retroperineal or perinephric space)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Patient has microorganisms isolated from culture of fluid (other than urine) or tissue from affected site.</td>
</tr>
<tr>
<td>2</td>
<td>Patient has an abscess or other evidence of infection seen on direct examination, during a surgical operation, or during a histopathologic examination.</td>
</tr>
<tr>
<td>3</td>
<td>Patient has at least 2 of the following signs or symptoms with no other recognized cause: fever (&gt;38°C), localized pain, or localized tenderness at the involved site and at least 1 of the following:</td>
</tr>
<tr>
<td></td>
<td>a. purulent drainage from affected site</td>
</tr>
<tr>
<td></td>
<td>b. microorganisms cultured from blood that are compatible with suspected site of infection</td>
</tr>
<tr>
<td></td>
<td>c. radiographic evidence of infection (e.g., abnormal ultrasound, CT scan, magnetic resonance imaging [MRI], or radiolabel scan [gallium, technetium]).</td>
</tr>
<tr>
<td>4</td>
<td>Patient ≤ 1 year of age has at least 1 of the following signs or symptoms with no other recognized cause: fever (&gt;38°C core), hypothermia (&lt;36°C core), apnea, bradycardia, lethargy, or vomiting and at least 1 of the following:</td>
</tr>
<tr>
<td></td>
<td>a. purulent drainage from affected site</td>
</tr>
<tr>
<td></td>
<td>b. microorganisms cultured from blood that are compatible with suspected site of infection</td>
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<tr>
<td></td>
<td>c. radiographic evidence of infection, (e.g., abnormal ultrasound, CT scan, magnetic resonance imaging [MRI], or radiolabel scan [gallium, technetium]).</td>
</tr>
</tbody>
</table>

Comment
- Report infections following circumcision in newborns as SST-CIRC.
Patient had an indwelling urinary catheter at the time of specimen collection

At least 1 of the following with no other recognized cause:
- fever (>38°C)
- suprapubic tenderness
- costovertebral angle pain or tenderness

OR

A positive urinalysis demonstrated by at least 1 of the following findings:
- positive dipstick for leukocyte esterase and/or nitrite
- pyuria (urine specimen with \( \geq 10 \) WBC/mm\(^3\) or \( \geq 3 \) WBC/high power field of unspun urine)
- microorganisms seen on Gram stain of unspun urine

A positive urine culture of \( \geq 10^3 \) CFU/ml with no more than 2 species of microorganisms

A positive urine culture of \( \geq 10^5 \) CFU/ml with no more than 2 species of microorganisms

SUTI – Criterion 1a

SUTI – Criterion 2a

CAUTI

CAUTI
Identification and Categorization of SUTI Indwelling Catheter Discontinued in Prior 48 Hours

Patient had an indwelling urinary catheter discontinued within 48 hours prior to specimen collection

At least 1 of the following with no other recognized cause:
- fever (>38°C)
- urgency
- frequency
- dysuria
- suprapubic tenderness
- costovertebral angle pain or tenderness

OR

A positive urinalysis demonstrated by at least 1 of the following findings:
- positive dipstick for leukocyte esterase and/or nitrite
- pyuria (urine specimen with \( \geq 10 \) WBC/mm\(^3\) or \( \geq 3 \) WBC/high power field of unspun urine)
- microorganisms seen on Gram stain of unspun urine

A positive urine culture of \( \geq 10^5 \) CFU/ml with no more than 2 species of microorganisms

SUTI – Criterion 1a

CAUTI

SUTI – Criterion 2a

CAUTI

March, 2009
Identification and Categorization of SUTI Without Indwelling Catheter at Time of or Within 48 Hours Prior to Specimen Collection

Patient did not have an indwelling urinary catheter at the time of specimen collection nor within 48 hours prior to specimen collection

Signs and Symptoms

- At least 1 of the following with no other recognized cause:
  - fever (>38°C) in a patient ≤65 years of age (fever is not part of criteria for those >65 years of age)
  - urgency
  - frequency
  - dysuria
  - suprapubic tenderness
  - costovertebral angle pain or tenderness

Urinalysis

A positive urinalysis demonstrated by at least 1 of the following findings:
- positive dipstick for leukocyte esterase and/or nitrite
- pyuria (urine specimen with ≥10 WBC/mm³ or ≥3 WBC/high power field of unspun urine)
- microorganisms seen on Gram stain of unspun urine

Culture

- A positive urine culture of ≥10⁵ CFU/ml with no more than 2 species of microorganisms
- A positive urine culture of ≥10³ and <10⁵ CFU/ml with no more than 2 species of microorganisms

SUTI – Criterion 1b

SUTI – Criterion 2b

March, 2009
Identification and Categorization of SUTI in Patient ≤1 Year of Age

Figure 4.

Patient ≤1 year of age (with or without an indwelling urinary catheter)

At least 1 of the following with no other recognized cause:

- Fever (>38°C core)
- Hypothermia (<36°C core)
- Apnea
- Bradycardia
- Dysuria
- Lethargy
- Vomiting

OR

A positive urinalysis demonstrated by at least 1 of the following findings:
- Positive dipstick for leukocyte esterase and/or nitrite
- Pyuria (urine specimen with ≥10 WBC/mm³ or ≥3 WBC/high power field of unspun urine)
- Microorganisms seen on Gram stain of unspun urine

A positive urine culture of ≥10⁵ CFU/ml with no more than 2 species of microorganisms

A positive urine culture of ≥10³ and <10⁵ CFU/ml with no more than 2 species of microorganisms

SUTI – Criterion 3
- Was an indwelling urinary catheter in place within the last 48 hours?
- Yes
  - CAUTI
- No
  - SUTI

SUTI – Criterion 4
- Was an indwelling urinary catheter in place within the last 48 hours?
- Yes
  - CAUTI
- No
  - SUTI

March, 2009
Identification of Asymptomatic Bacteremic Urinary Tract Infection (ABUTI)

**Patient with or without an indwelling catheter**

**Patient of any age:**
- NONE of the following:
  - urgency
  - frequency
  - dysuria
  - suprapubic pain
  - costovertebral angle pain or tenderness
  Nor: fever >38°C if patient ≤65 years of age

**Patient ≤1 year of age:**
- NONE of the following:
  - fever (>38°C core)
  - hypothermia (<36°C core)
  - apnea
  - bradycardia
  - dysuria
  - lethargy
  - vomiting

**Signs and Symptoms**

**Culture Evidence**

A positive urine culture of ≥10⁵ CFU/ml with no more than 2 species of uropathogen microorganisms*

A positive blood culture with at least 1 matching uropathogen microorganism* to the urine culture

**Asymptomatic Bacteremic Urinary Tract Infection (ABUTI)**

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

†Report Corynebacterium (urease positive) as either Corynebacterium species unspecified (COS) or, as C. urealyticum (CORUR) if so speciated.
* required for saving

Facility ID: ___________________________  *Month/Year: ______ / ______

☐ No NHSN Patient Safety Modules Followed this Month

### Device Associated Module

<table>
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<th>Locations</th>
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### Procedure Associated Module

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<th>Post-procedure PNEU</th>
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**Assurance of Confidentiality:** The information obtained in this surveillance system that would permit identification of any individual or institution is collected with a guarantee that it will be held in strict confidence, will be used only for the purposes stated, and will not otherwise be disclosed or released without the consent of the individual, or the institution in accordance with Sections 304, 306 and 308(d) of the Public Health Service Act (42 USC 242b, 242k, and 242m(d)).

Public reporting burden of this collection of information is estimated to average 35 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. An agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a currently valid OMB control number. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to CDC, Project Clearance Officer, 1600 Clifton Rd., MS D-74, Atlanta, GA 30333, ATTN: PRA (0920-0666).
### MDRO and CDAD Module

<table>
<thead>
<tr>
<th>Locations (Circle one)</th>
<th>Specific Organism Type</th>
<th>(^\text{§}^\text{LabID Event All specimens})</th>
<th>(^\text{§}^\text{LabID Event Blood specimens only})</th>
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</thead>
<tbody>
<tr>
<td>FacWideIN FacWideOUT</td>
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<td></td>
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<td>FacWideIN FacWideOUT</td>
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<tr>
<td>FacWideIN FacWideOUT</td>
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</table>

### Process and Outcome Measures

<table>
<thead>
<tr>
<th>Locations Specific Organism Type</th>
<th>Infection Surveillance</th>
<th>(^\text{§}^\text{AST Timing})</th>
<th>(^\text{§}^\text{AST Eligible})</th>
<th>Incidence</th>
<th>Prevalence</th>
<th>Lab ID Event</th>
<th>HH</th>
<th>GG</th>
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<td></td>
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<td>Adm Both All NHx</td>
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</tbody>
</table>

### High Risk Inpatient Influenza Vaccination Module

Check one:
- Method A
- Method B

\(+\text{FacWideIN=} \text{Facility-wide Inpatient} \quad \text{FacWideOUT=} \text{Facility-wide Outpatient}\)

\(^\text{§}\text{For AST, circle one to indicate timing of testing and one to indicate type of patients tested.}\)

Timing: Adm = Admission \quad \text{Both} = \text{Both Admission and Discharge/Transfer}

Patients: All = All patients tested \quad NHx = \text{Only patients tested are those who have no documentation at the admitting facility in the previous 12 months of MDRO-colonization or infection at the time of admission.}

\(^\text{§}\text{LabID Event = Laboratory-identified Event}\)
Spreading and formalizing the changes is an important part of implementation of new processes. It is necessary in order to achieve an overall improvement in the reduction in infections at the hospital. Spreading can be applied to other segments in the same area or to completely different areas within the hospital. For example, the change may have started in one nursing unit, and will then be moved to another unit. Spreading takes the process from the narrow, segmented population(s) or group(s) and broadens it to include all the population(s) or group(s) that will use the process. Formalizing a process provides a reference to others; those new to the organization and those in the organization needing clarity about the specifics of the process.

**Spreading**

In Chapter 5, the importance of segmentation, taking a portion of the overall population, or a part of the process and using the Model for Improvement to develop or revise the process was discussed. After success is achieved with the segmented population, it is time to spread it to others. For example, you may have started with the medical intensive care unit (MICU) patients, and you are now ready to spread this to the surgical intensive care unit (SICU) patients. You may have started with the elective admissions first, and now you are ready to spread to the non-elective or emergent patients. Spreading your process to other populations, other shifts, or other areas of the hospital will require a plan. The project team should decide the order in which to spread, who will be responsible for the spread, and the actual dates/times for implementation. Spread should occur on similar patient populations, shifts or diagnoses first. As you introduce the process to the new population or area of the hospital, you will need to educate the staff and solicit feedback. Below is an example of a typical hospital spread plan.

<table>
<thead>
<tr>
<th>Unit/Floor</th>
<th># Beds</th>
<th>Similar Unit</th>
<th>Service Type</th>
<th>Nurses Commonly Float From</th>
<th>Admitting Physician</th>
<th>IP</th>
<th>Manager</th>
<th>Spread Order</th>
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</thead>
<tbody>
<tr>
<td>MICU</td>
<td>12</td>
<td>Medicine</td>
<td>SICU</td>
<td>Brown</td>
<td>Sarah Doe</td>
<td>Scott</td>
<td>Pilot</td>
<td></td>
</tr>
<tr>
<td>4 West</td>
<td>24</td>
<td>Surgery</td>
<td>SICU, 3West</td>
<td>Smith</td>
<td>Jane Bell</td>
<td>Moore</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3 West</td>
<td>24</td>
<td>Medicine</td>
<td>MICU, 4 West</td>
<td>Brown</td>
<td>Jane Bell</td>
<td>Harris</td>
<td>3</td>
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</tr>
<tr>
<td>SICU</td>
<td>12</td>
<td>Surgery</td>
<td>MICU</td>
<td>Jones</td>
<td>Sarah Doe</td>
<td>Rogers</td>
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<tr>
<td>3 North</td>
<td>18</td>
<td>GYN</td>
<td>4 West</td>
<td>Wright</td>
<td>Sarah Doe</td>
<td>Parker</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

As you spread, you will need to take into account potential variations between the units or populations. If there seems to be substantial variation needed to the process, then this may warrant the completion of additional PDSA for that area or population. Your goal is to account for the variation that may exist with slight modifications to the process. Kevin Nolan and colleagues discuss a framework for spread used by the IHI and the Veterans Health Administration.
The framework includes:

1. Responsibilities of leadership
2. Identification of better ideas
3. Communication
4. Strengthening of the social system
5. Measurement and feedback, and
6. Knowledge transfer

Leadership embraces the improvement goal as part of the organizational strategic initiative, works to align the improvement within the organization, establishes a committee to lead spread efforts and assigns a person to be in charge of the spread efforts. The ability to easily spread an idea or change depends on how good the idea is and how adoptable it is in comparison to other ideas. Communication and knowledge transfer are the heart of the spread plan, so communicating the initiative to both general and targeted audiences is important (see Chapter 4). At the end of this chapter, the Spread Process Checklist and Preventing Catheter-Associated Urinary Tract Infections Process Inventory tools will assist with planning your spread.

Measurement and feedback of spread are also important. According to Nolan and colleagues, there are two measurements that are meaningful for spread. One measurement is to look at the extent of spread. For example, has the process spread to 25% or 60% of the organization? The second measurement is to look at the outcome of the changes implemented. For example, have rates decreased? Lastly, as organizations spread, the management of organizational learning, how the organization can transfer knowledge is an important. Knowledge transfer within an organization effects organizational safety and quality. It is also something that hospitals have traditionally not done well.

Spread of the adaptive or cultural components, of this collaborative must also be considered. An assessment of the unit’s culture, staff attitudes, beliefs and values, including that of local (unit) leadership, is an important determinate of the success of a spread process. Since culture is unique to each work area, spreading culture changes from one work area to another work area can be more challenging than spreading a technical type of process change. It is recommended that an individualized, unique plan be developed to improve the subsequent unit’s safety culture. The first step to improving the safety culture is to discuss errors with the staff. This should include storytelling and sharing the unit’s results on their safety culture survey. The education should include content on human factors, and teamwork and communication. Following this education, tools can be discussed and selected by the staff to implement. For example, using TeamSTEPPS tools, a unit may elect to start using a leadership tool such as a “Brief” to guide its future effort (see Chapter 4). It is important to note that culture changes over time, as teams and
communication improve and trust is developed. The steps listed above are steps to consider as hospitals work to spread safety culture throughout the entire organization.

**Formalizing**

The final step to ensure that your process will be consistently and widely used is to write or revise your procedures and remove all evidence of old processes. This should be the last step that you do, only after you have revised your process using the Model for Improvement and have spread it to the other populations and or areas. The team can be drafting this as they revise the process, but it should not be finalized until the process has been spread. This will allow the team to account for slight variations in the procedures for the different populations, shifts, and areas within the hospital. Your policy or procedure should outline the new processes in your organization and the roles and responsibilities of staff. You will also need to provide on-going education of the processes for new staff members, and hold existing staff accountable for the new processes by incorporating this into yearly competency training and performance evaluations. Lastly, you will need to continue to monitor the effectiveness of the new processes. At the end of this section includes an example of a Formalizing the Process Checklist that you can use.
Prevent Catheter-associated Urinary Tract (CAUTI) Infections

Process Checklist

Spread process to similar areas, departments, nursing units/floors. One of the last steps in your project before formalizing is to spread. Take a systematic approach to spreading the new process. Be sure to account for variations in process or patients in the unit/floor that you are spreading to and be sure to evaluate the process as it is being implemented.

- Educate widely on findings of test (e.g., display graphs from the monitoring tool).

<table>
<thead>
<tr>
<th>Check</th>
<th>TASK</th>
<th>PERSON RESPONSIBLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Face-to-Face meeting with administrator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Face-to-Face meeting with physician champion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Schedule meetings with large groups (physicians, departments most affected)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Report to board/executive committee</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Team members report back to respective groups and committees</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Update posters</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elicit ongoing feedback from all staff affected</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Prevent Catheter-associated Urinary Tract (CAUTI) Infections Process Check List

- Set start date for educating and initiating the new process to additional areas, departments, nursing units/floors

<table>
<thead>
<tr>
<th>DATE</th>
<th>NURSING UNIT/FLOOR</th>
<th>PERSON RESPONSIBLE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tbody>
</table>

Success Tip: Remember to Continue to Monitor!

After project completion, facilities are encouraged to periodically monitor the progress of implemented interventions. Successful and sustainable interventions depend on constant evaluation of your process. A current quality improvement or safety committee that meets regularly could assume monitoring duties after the project has ended.
[Hospital Name] Prevent Catheter-associated Urinary Tract Infections (CAUTI) Process Inventory

<table>
<thead>
<tr>
<th>Unit/Floor</th>
<th># Beds</th>
<th>Similar Unit</th>
<th>Service Type</th>
<th>Nurses Commonly Float From</th>
<th>Admitting Physician</th>
<th>ICP</th>
<th>Manager</th>
<th>Spread Order</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
Formalize New Process of Care

- Write or revise policies/procedures
- Remove all evidence of old processes. Make it difficult to do things the ‘old way’.
- Make the new standard part of performance evaluations
- Post permanent reminders of the new process
- Continue monitoring effectiveness of the process
- Close project and turn over to operations
- Reward Success, efforts of staff:

<table>
<thead>
<tr>
<th>Check</th>
<th>TASK</th>
<th>PERSON RESPONSIBLE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Food/party</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Recognition of key areas and staff</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Token gifts</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Letters to supervisors/administration</td>
<td></td>
</tr>
</tbody>
</table>
Chapter 9 – Reference Materials

This chapter includes links to resources, an acronym table, the CDC CAUTI toolkit, and the Iowa baseline CAUTI Survey.

Links

1. Iowa Department of Public Health - Healthcare-Associated Infection website

http://www.idph.state.ia.us/hai_prevention/tract_infection.asp

The Department’s general website information resource for CAUTI reduction

2. Centers for Disease Control and Prevention CAUTI Prevention toolkit

http://www.idph.state.ia.us/hai_prevention/common/pdf/cdc_cauti_toolkit.pdf

Document outlines the core and supplemental strategies relating to CAUTI reduction

3. Institute for Healthcare Improvement (IHI) website for CAUTI prevention.

http://www.ihi.org/IHI/Programs/ImprovementMap/PreventCatheterAssociatedUrinaryTractInfections.htm

Useful links and information on experiences in other hospitals. (Some links are old or don’t work for CDC information.)

4. StudyStack website

http://www.studystack.com/menu-127478

This website provides entertaining, educational games for staff.

5. Iowa Healthcare Collaborative website for CAUTI prevention


Good links for staff and patient education.
6. IP Tools website

http://www.infectionpreventiontools.com/tools-and-resources/cat_view/54-infection-prevention-programs

Website for sharing of infection prevention information, tools, etc. Must register but it is free. You can also submit tools for sharing.

7. APIC website for CAUTI prevention resources


Access APIC recommendations on this site.

8. CDC CAUTI Prevention Guidelines for 2009


9. SHEA/IDSA guidelines

http://www.shea-online.org/about/compendium.cfm


Slow to load due to size, but good information and examples of protocols.

11. Commonwealth of Pennsylavnia Patient Safety Authority

http://patientsafetyauthority.org/EducationalTools/PatientSafetyTools/cauti/Pages/webinar.aspx#bm1

Collection of webinars from Pennsylvania’s Safety Authority on overcoming barriers to implementing CAUTI prevention best practices.

12. Commonwealth of Pennsylavnia Patient Safety Authority


Pennsylvania Authority website library. Excellent CAUTI prevention resources, examples, and links.


http://www.designedtoadapt.com/

“Dr. John Kenagy’s formula for saving healthcare one problem at a time is termed “Adaptive Design,” a set of methods, skills and tools designed to get healthcare back to the ideals of patient care by cultivating adaptability into the everyday work of the organization and its people”

15. Lean Hospitals by Mark Graban

http://www.leanhospitalsbook.com/

Website supporting the book. Book available for purchase from Amazon.com
Background: Catheter-associated urinary tract infection (CAUTI) is the most common type of health-care associated infection and is a major health concern due to the associated complications and frequent occurrence. CAUTI is an infection of the urinary tract associated with a catheter that is inserted through the urethra to the bladder to drain urine. It may cause illness, death, increased cost, extend hospital stays, and cause exposure to antibiotics leading to antibiotic resistance. Fortunately, CAUTI can be prevented and, as numbers of infections are reduced, can save lives and decrease costs (CDC guidelines for prevention of CAUTIs, 2009).

CAUTI Baseline Survey: The Iowa Department of Public Health (IDPH) is partnering with acute care Iowa hospitals to measure and reduce two preventable healthcare-associated infections including CAUTI. The purpose is to provide healthcare providers and the public with accurate and current information in order to increase public confidence and lower CAUTI infection rates. In July, 2010, the IDPH conducted a baseline survey on CAUTI prevention practices with the participating Iowa collaborative hospitals to evaluate the status of the CAUTI control efforts in their facilities. The results of the survey will help the IDPH staff understand what is currently being done in Iowa, develop implementation strategies, and determine next steps. The results will also be used to measure CAUTI prevention practice changes as well as to determine the extent to which prevention targets are being met and the effectiveness of outcomes being achieved. The survey results will also be shared with members of our multidisciplinary advisory group and participating prevention collaborative stakeholders, partners, and hospitals as an important piece of feedback.
CAUTI Survey Administration and Results: The survey was a web-based survey administered using SurveyMonkey. The survey was sent to infection preventionists at the participating CAUTI facilities in Iowa for online completion in July, 2010. The respondents were asked to respond to questions related to specific CAUTI prevention practices currently used or in place at their facilities. Of 63 eligible facilities, 60 (95%) responded to the survey questions.

- On average, the total number of full-time equivalents (FTE’s) currently working in infection prevention at the facility is 1.
- Sixty-two percent of facilities reported that they were going to perform hospital-wide surveillance for CAUTI (Figure 9.1).

![Figure 9.1: Identify the type of unit(s) for CAUTI surveillance](image-url)
A majority (68%) of facilities do not have a written CAUTI prevention policy or procedure in place (Figure 9.2). For those facilities that have policies, the external sources of guidance used in the development of infection prevention policy include the Centers for Disease Control and Prevention (CDC), Healthcare Infection Control Practices Advisory Committee (HICPAC) (95%), the Association for Professionals in Infection Control and Epidemiology (APIC) (87%), APIC chapter and district infection prevention meeting/networking (68%), Institute for Healthcare Improvement (IHI) (55%), Society for Healthcare Epidemiology of America (SHEA) (52%), Infectious Disease Society of America (23%), individual expert opinion (18%), and others (20%) (Figure 9.3).
• Registered nurses (100%), licensed practical nurses (70%), and physicians (43.3%) are the most common persons who insert urinary catheters at the facility (Figure 9.4).

![Figure 9.4: Who inserts urinary catheters at your facility?](image)

- A large majority (88%) of facilities currently perform surveillance for CAUTI (Figure 9.5) and 83% of facilities reported that surveillance was performed hospital-wide (Figure 9.6). Eighty-six percent of facilities use NHSN definitions for CAUTI surveillance (Figure 9.8), however, most (81%) facilities do not report to the National Healthcare Safety Network (NHSN) (Figure 9.7)

![Figure 9.5: Is CAUTI surveillance performed at your facility?](image)
Figure 9.6: Where is CATUTI surveillance performed?

- Hospital-wide: 83.0%
- Unit(s)-specific: 17.0%

Figure 9.7: Does your facility report to the National Healthcare Safety Network (NHSN) for CAUTI surveillance?

- Yes: 81.4%
- No: 18.6%

Figure 9.8: Are NHSN definitions used for CAUTI surveillance?

- Yes: 86.0%
- No: 14.0%
Quality improvement programs for CAUTI prevention at the facility include alerts or reminders for removing unnecessary catheters (52%), guidelines or algorithms for appropriate perioperative catheter management (28%), stop orders for urinary catheters (15%), multidisciplinary urinary catheter “rounds” (8%), protocols for nurse-direct removal of unnecessary catheters (7%), and other (28%). At the same time, one-quarter (25%) of facilities checked none to any improvement programs.

Figure 9.9: Are any quality improvement programs for CAUTI prevention in place?
With respect to urinary catheters that the facility provides, virtually, all (100%) of facilities reported providing readily available supplies necessary for aseptic urinary catheter insertion on a hospital-wide basis. A large majority of facilities reported providing guidelines on proper techniques or indications for urinary catheter use (66% hospital-wide and 5.2% unit-specific), for urinary catheter insertion (93% hospital-wide and 3.4% unit-specific), and for urinary catheter maintenance (90% and 1.7% unit-specific), as well as providing system of documenting urinary catheter insertions (77% hospital-wide and 5.3% unit-specific) and urinary catheter removals (74% and 5.3% for unit-specific). The least common items that facilities reported providing include regular in-service training for appropriate healthcare personnel on techniques and procedures for urinary catheter insertion, maintenance, and removal (34% hospital-wide and 12% unit-specific) and daily rounds which includes urinary catheter need assessment (25% hospital-wide and 12% unit-specific) (Figure 9.10).

**Figure 9.10: Indicate whether the facility provides the following with respect to urinary catheters**

<table>
<thead>
<tr>
<th>Item</th>
<th>Hospital-wide</th>
<th>Unit-specific</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guidelines on proper techniques for urinary catheter use</td>
<td>65.5%</td>
<td>12.1%</td>
</tr>
<tr>
<td>Guidelines on proper techniques for urinary catheter insertion</td>
<td>93.2%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Guidelines on proper techniques for urinary catheter maintenance</td>
<td>89.8%</td>
<td>12.3%</td>
</tr>
<tr>
<td>System of documenting urinary catheter insertions</td>
<td>77.2%</td>
<td>34.5%</td>
</tr>
<tr>
<td>System of documenting urinary catheter removals</td>
<td>73.7%</td>
<td>24.6%</td>
</tr>
<tr>
<td>Regular in-service training on techniques for aseptic urinary catheter insertion, maintenance, and removal</td>
<td>5.3%</td>
<td>5.3%</td>
</tr>
<tr>
<td>Readily available supplies necessary for aseptic urinary catheter insertion</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Daily rounds which includes urinary catheter need assessment</td>
<td>12.3%</td>
<td>0.0%</td>
</tr>
</tbody>
</table>
Table 9.1 shows the responses to the items that best apply to the facility, on a scale from never to always, regarding urinary catheter policies and practices. The items reported always or often applies to the facilities include urinary catheters inserted using aseptic technique and sterile equipment (100%), urinary drainage bags kept below level of bladder (97%), urinary drainage systems with pre-connected, sealed catheter-tubing junctions used (93%), adherence to hand hygiene policies (84%), urinary catheters removed postoperatively within 24-48 hours (79%), portable bladder ultrasounds used to assess urine volume (69%), CAUTI rates reported to providers (67%), and adherence to documentation of catheter insertion and removal dates (42%). The items reported never or rarely applied to the facilities regarding urinary catheter policies and practices include nitrofurazone-releasing catheters used (100%), urinary-drainage bags instilled with antiseptics or antimicrobials (95%), systemic antimicrobial prophylaxis for urinary catheters used (92%), urinary catheters disconnected from collecting systems (86%), catheters changed at routine fixed intervals (80%), adherence to proper aseptic insertion of urinary catheters (71%), silver alloy catheters used (63%), adherence to documentation of indication for urinary catheter placement (58%), and screening for asymptomatic bacteria (ASB) performed (51%).
Table 9.1: Responses on a scale from Never to Always regarding urinary catheter policies and practices at your facility

<table>
<thead>
<tr>
<th>Urinary catheter policies and practices at the facility</th>
<th>Never (%)</th>
<th>Rarely (%)</th>
<th>Sometimes (%)</th>
<th>Often (%)</th>
<th>Always (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urinary catheters inserted using aseptic technique and sterile equipment</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>20.3</td>
<td>79.7</td>
</tr>
<tr>
<td>Urinary drainage bags kept below level of bladder</td>
<td>1.7</td>
<td>1.7</td>
<td>0.0</td>
<td>48.3</td>
<td>48.3</td>
</tr>
<tr>
<td>Urinary drainage systems with pre-connected, sealed catheter-tubing junctions used</td>
<td>6.9</td>
<td>0.0</td>
<td>0.0</td>
<td>10.3</td>
<td>82.8</td>
</tr>
<tr>
<td>Adherence to hand hygiene policies</td>
<td>8.8</td>
<td>1.8</td>
<td>5.3</td>
<td>22.8</td>
<td>61.4</td>
</tr>
<tr>
<td>Urinary catheters removed postoperatively within 24-48 hours</td>
<td>0.0</td>
<td>1.8</td>
<td>19.3</td>
<td>49.1</td>
<td>29.8</td>
</tr>
<tr>
<td>Portable bladder ultrasounds used to assess urine volume</td>
<td>12.1</td>
<td>3.4</td>
<td>15.5</td>
<td>43.1</td>
<td>25.9</td>
</tr>
<tr>
<td>CAUTI rates reported to providers</td>
<td>12.1</td>
<td>12.1</td>
<td>8.6</td>
<td>17.2</td>
<td>50.0</td>
</tr>
<tr>
<td>Adherence to documentation of catheter insertion and removal dates</td>
<td>26.3</td>
<td>17.5</td>
<td>14.0</td>
<td>21.1</td>
<td>21.1</td>
</tr>
<tr>
<td>Silver alloy catheters used</td>
<td>42.4</td>
<td>20.3</td>
<td>6.8</td>
<td>6.8</td>
<td>23.7</td>
</tr>
<tr>
<td>Adherence to documentation of indication for urinary catheter placement</td>
<td>44.8</td>
<td>13.8</td>
<td>13.8</td>
<td>17.2</td>
<td>10.3</td>
</tr>
<tr>
<td>Alternatives to indwelling catheters used when appropriate</td>
<td>6.8</td>
<td>25.4</td>
<td>40.7</td>
<td>27.1</td>
<td>0.0</td>
</tr>
<tr>
<td>Screening for asymptomatic bacteriuria (ASB) performed</td>
<td>28.8</td>
<td>22.0</td>
<td>25.4</td>
<td>13.6</td>
<td>10.2</td>
</tr>
<tr>
<td>Adherence to proper aseptic insertion of urinary catheters</td>
<td>51.7</td>
<td>19.0</td>
<td>6.9</td>
<td>17.2</td>
<td>5.2</td>
</tr>
<tr>
<td>Catheters changed at routine, fixed intervals</td>
<td>52.5</td>
<td>27.1</td>
<td>5.1</td>
<td>6.8</td>
<td>8.5</td>
</tr>
<tr>
<td>Urinary catheters used for management of incontinence</td>
<td>5.2</td>
<td>36.2</td>
<td>50.0</td>
<td>8.6</td>
<td>0.0</td>
</tr>
<tr>
<td>Urinary drainage bags instilled with antiseptics or antimicrobials</td>
<td>89.5</td>
<td>5.3</td>
<td>0.0</td>
<td>1.8</td>
<td>3.5</td>
</tr>
<tr>
<td>Urinary catheters disconnected from collecting systems</td>
<td>28.8</td>
<td>57.6</td>
<td>10.2</td>
<td>1.7</td>
<td>1.7</td>
</tr>
<tr>
<td>Systemic antimicrobial prophylaxis for urinary catheters used</td>
<td>66.1</td>
<td>27.1</td>
<td>5.1</td>
<td>1.7</td>
<td>0.0</td>
</tr>
<tr>
<td>Nitrofurazone-releasing catheters used</td>
<td>91.4</td>
<td>8.6</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Summary: Most facilities currently perform surveillance for CAUTI on a hospital-wide basis and a large majority of facilities use NHSN definitions for CAUTI surveillance even though over 80% of facilities do not report to the NHSN. More than two-third of facilities do not have a written policy in place for CAUTI prevention. Half of facilities reported having alerts or reminders for removing unnecessary catheters and one-third reported having guidelines or algorithms for appropriate perioperative catheter management, however, one in four reported none to any CAUTI prevention quality improvement programs. Most facilities provide readily
available supplies necessary for aseptic urinary catheter insertion, guidelines on appropriate indications for urinary catheter use, guidelines on proper techniques for urinary catheter insertion, guidelines on proper techniques for urinary catheter maintenance, system of documenting urinary catheter insertions, and system of documenting urinary catheter removals, however, few facilities provide regular personnel training on urinary catheter use and daily rounds which includes urinary catheter need assessment. The items regarding urinary catheter policies and practices that often or always apply to the facility include urinary catheters inserted using aseptic technique and sterile equipment, urinary drainage bags kept below level of bladder, urinary drainage systems with pre-connected, sealed catheter-tubing junctions used, adherence to hand hygiene policies; urinary catheters removed postoperatively within 24–48 hours, portable bladder ultrasounds used to assess urine volume, and CAUTI rates reported to providers.

**Limitation:** The survey participants were limited to acute care hospitals that participate in the Iowa healthcare-associated infection (HAI) prevention grant with IDPH. The survey results may not be generalized to all hospitals in Iowa regarding CAUTI prevention practices. In addition, the survey results were self-reported, therefore may be prone to report bias and should be interpreted with caution.

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Complete Phrase</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABUTI</td>
<td>Asymptomatic Bacteremic Urinary tract infection</td>
</tr>
<tr>
<td>AHRQ</td>
<td>Agency for Healthcare Research and Quality</td>
</tr>
<tr>
<td>APIC</td>
<td>Association for Professionals in Infection Control and Epidemiology</td>
</tr>
<tr>
<td>ARRA</td>
<td>American Recovery and Reinvestment Act</td>
</tr>
<tr>
<td>ASB</td>
<td>Asymptomatic Bacteriuria</td>
</tr>
<tr>
<td>ASC</td>
<td>Active Surveillance Culture</td>
</tr>
<tr>
<td>AST</td>
<td>Active Surveillance Testing</td>
</tr>
<tr>
<td>CAH</td>
<td>Critical Access Hospital</td>
</tr>
<tr>
<td>CAT</td>
<td>Computerized Axial Tomography</td>
</tr>
<tr>
<td>CAUTI</td>
<td>Catheter-associated Urinary Tract Infection</td>
</tr>
<tr>
<td>CDC</td>
<td>Centers for Disease Control and Prevention</td>
</tr>
<tr>
<td>CDI</td>
<td>Clostridium difficile Infection</td>
</tr>
<tr>
<td>CDIFF</td>
<td>Clostridium difficile</td>
</tr>
<tr>
<td>CEO</td>
<td>Chief Executive Officer</td>
</tr>
<tr>
<td>CMS</td>
<td>Centers for Medicare &amp; Medicaid Services</td>
</tr>
<tr>
<td>CRM</td>
<td>Crew Resource Management</td>
</tr>
<tr>
<td>DHQP</td>
<td>Division of Healthcare Quality Promotion</td>
</tr>
<tr>
<td>ED</td>
<td>Emergency Department</td>
</tr>
<tr>
<td>EMR</td>
<td>Electronic Medical Record</td>
</tr>
<tr>
<td>FMEA</td>
<td>Failure Mode and Effects Analysis</td>
</tr>
<tr>
<td>GU</td>
<td>Genitourinary</td>
</tr>
<tr>
<td>HAI</td>
<td>Healthcare-associated Infection</td>
</tr>
<tr>
<td>HCUP</td>
<td>Healthcare Cost and Utilization Project</td>
</tr>
<tr>
<td>HCW</td>
<td>Healthcare Worker</td>
</tr>
<tr>
<td>HICPAC</td>
<td>Healthcare Infection Control Practices Advisory Committee</td>
</tr>
<tr>
<td>HIPAAA</td>
<td>Health Insurance Portability and Accountability Act</td>
</tr>
<tr>
<td>HSOPS</td>
<td>Hospital Survey on Patient Safety Culture</td>
</tr>
<tr>
<td>HHS</td>
<td>United States Department of Health and Human Services</td>
</tr>
<tr>
<td>ICU</td>
<td>Intensive Care Unit</td>
</tr>
<tr>
<td>IDPH</td>
<td>Iowa Department of Public Health</td>
</tr>
<tr>
<td>IFMC</td>
<td>Iowa Foundation for Medical Care</td>
</tr>
<tr>
<td>IHC</td>
<td>Iowa Healthcare Collaborative</td>
</tr>
<tr>
<td>IHI</td>
<td>Institute of Healthcare Improvement</td>
</tr>
<tr>
<td>IOC</td>
<td>In and Out Catheterization</td>
</tr>
<tr>
<td>IP</td>
<td>Infection Preventionist</td>
</tr>
<tr>
<td>LOS</td>
<td>Length of Stay</td>
</tr>
<tr>
<td>MICU</td>
<td>Medical Intensive Care Unit</td>
</tr>
<tr>
<td>MRI</td>
<td>Magnetic Resonance Imaging</td>
</tr>
<tr>
<td>NHSN</td>
<td>National Healthcare Safety Network</td>
</tr>
<tr>
<td>OR</td>
<td>Operating Room</td>
</tr>
<tr>
<td>PCMX</td>
<td>Parachlorometaxylenol</td>
</tr>
<tr>
<td>PDSA</td>
<td>Plan/Do/Study/Act</td>
</tr>
<tr>
<td>Acronym</td>
<td>Definition</td>
</tr>
<tr>
<td>---------</td>
<td>------------</td>
</tr>
<tr>
<td>POD</td>
<td>Postoperative Day</td>
</tr>
<tr>
<td>PSC</td>
<td>Patient Safety Component</td>
</tr>
<tr>
<td>SBAR</td>
<td>Situation-Background-Assessment-Recommendation</td>
</tr>
<tr>
<td>SCA</td>
<td>Special Care Area</td>
</tr>
<tr>
<td>SDN</td>
<td>Secure Data Network</td>
</tr>
<tr>
<td>SHEA</td>
<td>Society for Healthcare Epidemiology of America</td>
</tr>
<tr>
<td>SICU</td>
<td>Surgical Intensive Care Unit</td>
</tr>
<tr>
<td>SO</td>
<td>Standing Orders</td>
</tr>
<tr>
<td>SUTI</td>
<td>Symptomatic Urinary Tract infection</td>
</tr>
<tr>
<td>TeamSTEPPS</td>
<td>Team Strategies and Tools to Enhance Performance and Patient Safety</td>
</tr>
<tr>
<td>TJC</td>
<td>The Joint Commission</td>
</tr>
<tr>
<td>UTI</td>
<td>Urinary Tract Infection</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organization</td>
</tr>
</tbody>
</table>
Catheter-associated Urinary Tract Infection (CAUTI) Toolkit

Activity C: ELC Prevention Collaboratives

Carolyn Gould, MD MSCR
Division of Healthcare Quality Promotion
Centers for Disease Control and Prevention

Disclaimer: The findings and conclusions in this presentation are those of the authors and do not necessarily represent the views of the Centers for Disease Control and Prevention.

Outline

• Background
  – Impact
  – HHS Prevention Targets
  – Pathogenesis
  – Epidemiology
• Prevention Strategies
  – Core
  – Supplemental
• Measurement
  – Process
  – Outcome
• Tools for Implementation/Resources/References
Background: Impact of CAUTI

- Most common type of healthcare-associated infection
  - > 30% of HAIs reported to NHSN
  - Estimated > 560,000 nosocomial UTIs annually
- Increased morbidity & mortality
  - Estimated 13,000 attributable deaths annually
  - Leading cause of secondary BSI with ~10% mortality
- Excess length of stay — 2-4 days
- Increased cost — $0.4-0.5 billion per year nationally
- Unnecessary antimicrobial use

References:
Hidron AI et al. ICHE 2008;29:996-1011
Green MS et al. J Infect Dis 1982;145:667-72
Saint S. Am J Infect Control 2000;28:68-75

Background: Urinary Catheter Use

- 15-25% of hospitalized patients
- 5-10% (75,000-150,000) NH residents
- Often placed for inappropriate indications
- Physicians frequently unaware
- In a recent survey of U.S. hospitals:
  - > 50% did not monitor which patients catheterized
  - 75% did not monitor duration and/or discontinuation

References:
Weinstein JW et al. ICHE 1999;20:543-8
Munasinghe RL et al. ICHE 2001;22:647-9
Background: HHS Metrics and Prevention Targets

- # of symptomatic UTI / 1,000 urinary catheter days as measured in NHSN
  - National 5-Year Prevention Target: 25% decrease from baseline
- Appendix G in HHS plan discusses a new type of metric, the standardized infection ratio (SIR)

http://www.hhs.gov/ophs/initiatives/hai/prevtargets.html
http://www.hhs.gov/ophs/initiatives/hai/appendices.html

Background: Pathogenesis of CAUTI

* Source of microorganisms may be endogenous (meatal, rectal, or vaginal colonization) or exogenous, usually via contaminated hands of healthcare personnel during catheter insertion or manipulation of the collecting system

Figure from: Maki DG, Tambyah PA. Emerg Infect Dis 2001;7:1-6
Background: Pathogenesis of CAUTI

- Formation of biofilms by urinary pathogens common on the surfaces of catheters and collecting systems
- Bacteria within biofilms resistant to antimicrobials and host defenses
- Some novel strategies in CAUTI prevention have targeted biofilms

CAUTI Definitions

- Surveillance definitions for UTI recently modified in NHSN (as of Jan 2009)
- Count symptomatic UTI (SUTI) only, not asymptomatic bacteriuria (ASB)
  - Exception is “ABUTI” (asymptomatic bacteremic UTI) – see NHSN manual above
- Clinical significance of ASB unclear
  - Should not screen for or treat ASB routinely, except in certain clinical situations
  - Most literature to date includes ASB in outcomes, making interpretation of data difficult
Evidence-based Risk Factors for CAUTI

<table>
<thead>
<tr>
<th>Symptomatic UTI</th>
<th>Bacteriuria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prolonged catheterization*</td>
<td>Disconnection of drainage system*</td>
</tr>
<tr>
<td>Female sex†</td>
<td>Lower professional training of inserter*</td>
</tr>
<tr>
<td>Older age†</td>
<td>Placement of catheter outside of OR†</td>
</tr>
<tr>
<td>Impaired immunity†</td>
<td>Incontinence†</td>
</tr>
<tr>
<td></td>
<td>Diabetes</td>
</tr>
<tr>
<td></td>
<td>Meatal colonization</td>
</tr>
<tr>
<td></td>
<td>Renal dysfunction</td>
</tr>
<tr>
<td></td>
<td>Orthopaedic/neurology services</td>
</tr>
</tbody>
</table>

* Main modifiable risk factors  † Also inform recommendations

Prevention Strategies

- **Core Strategies**
  - High levels of scientific evidence
  - Demonstrated feasibility

- **Supplemental Strategies**
  - Some scientific evidence
  - Variable levels of feasibility

*The Collaborative should at a minimum include core prevention strategies. Supplemental prevention strategies also may be used. Most core and supplemental strategies are based on HICPAC guidelines. Strategies that are not included in HICPAC guidelines will be noted by an asterisk (*) after the strategy. HICPAC guidelines may be found at [www.cdc.gov/hicpac](http://www.cdc.gov/hicpac).
Core Prevention Strategies
(all Category IB)

- Insert catheters only for appropriate indications
- Leave catheters in place only as long as needed
- Ensure that only properly trained persons insert and maintain catheters
- Insert catheters using aseptic technique and sterile equipment (acute care setting)
- Following aseptic insertion, maintain a closed drainage system
- Maintain unobstructed urine flow
- Hand hygiene and Standard (or appropriate isolation) Precautions

http://www.cdc.gov/hicpac/cauti/001_cauti.html

Core Prevention Strategies
Specific recommendations (IB)

- Insert catheters only for appropriate indications

Table 2. A. Examples of Appropriate Indications for Indwelling Urethral Catheter Use *

<table>
<thead>
<tr>
<th>Indications</th>
<th>Intermittent catheter use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient has acute urinary retention or bladder outlet obstruction</td>
<td>Never</td>
</tr>
<tr>
<td>Need for accurate measurements of urinary output in critically ill patients</td>
<td>intermittently</td>
</tr>
<tr>
<td>Perioperative use for selected surgical procedures:</td>
<td></td>
</tr>
<tr>
<td>- Patients undergoing urologic surgery or other surgery on contiguous</td>
<td></td>
</tr>
<tr>
<td>structures of the genitourinary tract</td>
<td></td>
</tr>
<tr>
<td>- Anticipated prolonged duration of surgery (catheters inserted for this</td>
<td></td>
</tr>
<tr>
<td>reason should be removed in PACU)</td>
<td></td>
</tr>
<tr>
<td>- Patients anticipated to receive large-volume infusions or diuretics during</td>
<td></td>
</tr>
<tr>
<td>surgery</td>
<td></td>
</tr>
<tr>
<td>- Need for intraoperative monitoring of urinary output</td>
<td></td>
</tr>
<tr>
<td>To assist in healing of open sacral or perineal wounds in incontinent patients</td>
<td></td>
</tr>
<tr>
<td>Patient requires prolonged immobilization (e.g., potentially unstable thoracic or lumbar spine, multiple traumatic injuries such as pelvic fractures)</td>
<td></td>
</tr>
<tr>
<td>To improve comfort for end of life care if needed</td>
<td></td>
</tr>
</tbody>
</table>

http://www.cdc.gov/hicpac/cauti/001_cauti.html
Core Prevention Strategies
Specific recommendations (IB)

• Insert catheters only for appropriate indications
  – Minimize use in all patients, particularly those at higher risk of CAUTI and mortality (women, elderly, impaired immunity)
  – Avoid use for management of incontinence
  – Use catheters in operative patients only as necessary

http://www.cdc.gov/hicpac/cauti/001_cauti.html

Core Prevention Strategies
Specific recommendations (IB)

• Leave catheters in place only as long as needed
  – Remove catheters ASAP postoperatively, preferably within 24 hours, unless there are appropriate indications for continued use

http://www.cdc.gov/hicpac/cauti/001_cauti.html
Core Prevention Strategies
Specific recommendations (IB)

• Insert catheters using aseptic technique and sterile equipment (acute care setting)
  – Perform hand hygiene before and after insertion
  – Use sterile gloves, drape, sponges, antiseptic or sterile solution for periurethral cleaning, single-use packet of lubricant jelly
  – Properly secure catheters

http://www.cdc.gov/hicpac/cauti/001_cauti.html

Core Prevention Strategies
Specific recommendations (IB)

• Following aseptic insertion, maintain a closed drainage system
  – If breaks in aseptic technique, disconnection, or leakage occur, replace catheter and collecting system using aseptic technique and sterile equipment
  – Consider systems with preconnected, sealed catheter-tubing junctions (II)
  – Obtain urine samples aseptically

http://www.cdc.gov/hicpac/cauti/001_cauti.html
Core Prevention Strategies
Specific recommendations (IB)

• Maintain unobstructed urine flow
  – Keep catheter and collecting tube free from kinking
  – Keep collecting bag below level of bladder at all times (do not rest bag on floor)
  – Empty collecting bag regularly using a separate, clean container for each patient. Ensure drainage spigot does not contact nonsterile container.

http://www.cdc.gov/hicpac/cauti/001_cauti.html

Core Prevention Strategies: Specific recommendations (IB)

• Implement quality improvement programs to enhance appropriate use of indwelling catheters and reduce risk of CAUTI
  Examples:
  — Alerts or reminders
  — Stop orders
  — Protocols for nurse-directed removal of unnecessary catheters
  — Guidelines/algorithms for appropriate perioperative catheter management

http://www.cdc.gov/hicpac/cauti/001_cauti.html
Supplemental Prevention Strategies: Examples

- Consideration of alternatives to indwelling urinary catheterization (II)
- Use of portable ultrasound devices for assessing urine volume to reduce unnecessary catheterizations (II)
- Use of antimicrobial/antiseptic-impregnated catheters (IB, after first implementing core recommendations for use, insertion, and maintenance)

http://www.cdc.gov/hicpac/cauti/001_cautil.html

- The following slides will provide further details on supplemental strategies...

Supplemental Prevention Strategies: Alternatives to Indwelling Catheterization

- Intermittent catheterization – consider for:
  - Patients requiring chronic urinary drainage for neurogenic bladder
    - Spinal cord injury
    - Children with myelomeningocele
  - Postoperative patients with urinary retention
  - May be used in combination with bladder ultrasound scanners

- External (i.e., condom) catheters – consider for:
  - Cooperative male patients without obstruction or urinary retention

http://www.cdc.gov/hicpac/cauti/001_cautil.html
Supplemental Prevention Strategies: Bladder Ultrasound Scanners

- Rationale: fewer catheterizations = lower risk of UTI
- 2 studies of adults with neurogenic bladder undergoing intermittent catheterization
- Inpatient rehabilitation centers
- Fewer catheterizations per day but no reported differences in UTI
  - Significant study limitations: likely underpowered; UTIs undefined


Supplemental Prevention Strategies: Antimicrobial/Antiseptic-Impregnated Urinary Catheters

- Considered using if CAUTI rates not decreasing after implementing a comprehensive strategy
  - First implement core recommendations for use, insertion, and maintenance
  - Ensure compliance with core recommendations

http://www.cdc.gov/hicpac/cauti/001_cauti.html
Supplemental Prevention Strategies: Silver-Coated Catheters

- Decreased risk of bacteriuria compared to standard latex catheters in a meta-analysis of RCTs
- Significant differences for silver alloy but not silver oxide-coated catheters
- Effect greater for patients catheterized < 1 week
- Mixed results in observational studies in hospitalized patients
  - Most used laboratory-based outcomes (bacteriuria)
  - 1 positive, 2 negative, 5 inconclusive

http://www.cdc.gov/hicpac/cauti/001_cauti.html

Supplemental Prevention Strategies: Silver-Coated Catheters

- One study in a burn referral center found a decrease in SUTI
- Pre-intervention catheters standard latex
- Intervention group had silver-impregnated catheters and had new catheters inserted on admission under nonemergent sterile conditions
  - “The improved results in time period 2 are probably due to the combination of these two changes in therapy.”

### Summary of Prevention Measures

#### Core Measures
- Insert catheters only for appropriate indications
- Leave catheters in place only as long as needed
- Only properly trained persons insert and maintain catheters
- Insert catheters using aseptic technique and sterile equipment
- Maintain a closed drainage system
- Maintain unobstructed urine flow
- Hand hygiene and standard (or appropriate isolation) precautions

#### Supplemental Measures
- Alternatives to indwelling urinary catheterization
- Portable ultrasound devices to reduce unnecessary catheterizations
- Antimicrobial/antiseptic-impregnated catheters

*All recommendations in HICPAC guidelines at: http://www.cdc.gov/hicpac/cauti/001_cauti.html*

### Strategies NOT recommended for CAUTI prevention
- Complex urinary drainage systems (e.g., antiseptic-releasing cartridges in drain port)
- Changing catheters or drainage bags at routine, fixed intervals (clinical indications include infection, obstruction, or compromise of closed system)
- Routine antimicrobial prophylaxis
- Cleaning of periurethral area with antiseptics while catheter is in place (use routine hygiene)
- Irrigation of bladder with antimicrobials
- Instillation of antiseptic or antimicrobial solutions into drainage bags
- Routine screening for asymptomatic bacteriuria (ASB)

*http://www.cdc.gov/hicpac/cauti/001_cauti.html*
Measurement: Examples of Process Measures

- Compliance with hand hygiene
- Compliance with educational program
- Compliance with documentation of catheter insertion and removal
- Compliance with documentation of indications for catheter placement

Measurement: Recommended Outcome Measures

- Examples of metrics:
  - Number of CAUTI per 1000 catheter-days
  - Number of BSI secondary to CAUTI per 1000 catheter-days
  - Catheter utilization ratio (urinary catheter-days/patient-days) x 100
- Use CDC/NHSN definitions for numerator data (SUTI only): http://www.cdc.gov/nhsn/library.html
Measurement: Outcome

Use NHSN Device-associated Module

http://www.cdc.gov/nhsn/library.html

Measurement Considerations

• May need to consider alternative metrics (*in addition to standard rates by device days*) to demonstrate a reduction in CAUTIs if catheter days (denominators) greatly reduced with interventions
  • Alternative denominator examples:
    – Patient days on unit
    – Numbers of catheters inserted
Evaluation Considerations

- Assess baseline policies and procedures
- Areas to consider
  - Surveillance
  - Prevention strategies
  - Measurement
- Coordinator should track new policies/practices implemented during collaboration

References/resources

- IHI Program to Prevent CAUTI [http://www.ihi.org/](http://www.ihi.org/)
- SHEA/IDSA Compendium (ICHE 2008;29:S41-S50)
- CDC/Medscape collaboration [http://www.cdc.gov/hicpac/](http://www.cdc.gov/hicpac/)