

Utah Healthcare-Associated Infection Prevention Plan

In response to the increasing concerns about the public health impact of healthcare-associated infections (HAIs), the U.S. Department of Health and Human Services (HHS) has developed an Action Plan to help prevent HAIs. The HHS Action Plan includes recommendations for surveillance, research, communication, and metrics for measuring progress toward national goals. Three overarching priorities have been identified:

- Progress toward five-year national prevention targets (e.g., 50-70% reduction in bloodstream infections);
- Improve use and quality of the metrics and supporting systems needed to assess progress towards meeting the targets; and
- Prioritization and broad implementation of current evidence-based prevention recommendations.

The Centers for Disease Control and Prevention (CDC) is leading the implementation of recommendations on national prevention targets and metrics. The intent of the Utah HAI Plan is to help ensure progress toward national prevention targets as described in the HHS Action Plan.

Initial emphasis for national HAI prevention activities focused on acute care, inpatient settings, and then expanded to outpatient settings. The public health model of population-based healthcare delivery places health departments in a unique and important role in this area, particularly given shifts in healthcare delivery from acute care settings to ambulatory and long term care settings. Nationally, in non-hospital settings, infection control and oversight have been lacking which have resulted in outbreaks which can have a wide-ranging and substantial impact on affected communities. At the same time, trends toward mandatory reporting of HAIs from hospitals reflect increased demand for accountability from the public.

Framework and Funding for Prevention of HAIs

CDC's framework for the prevention of HAIs builds on a coordinated effort of federal, state, and partner organizations and is based on a collaborative public health approach that includes surveillance, outbreak response, infection control, research, training, education, and systematic implementation of prevention practices. Legislation in support of HAI prevention provides a unique opportunity to strengthen existing state capacity for prevention efforts.

Developing HAI plan

Healthcare-associated infections (HAIs) are a major, yet often preventable, threat to patient safety. HAIs are a significant cause of morbidity and mortality. On any given day, about 1 in every 25 hospital patients has at least one HAI. There were an estimated 722,000 HAIs in U.S. acute care hospitals in 2011. About 75,000 hospital patients with HAIs died during their hospitalizations. More than half of all HAIs occurred outside of the intensive care unit. ¹These infections cost the U.S. healthcare system billions of dollars each year and lead to the loss of tens of thousands of

lives. In addition, HAIs can have devastating emotional, financial and medical consequences. ²HAIs can be acquired anywhere healthcare is delivered, including inpatient acute care hospitals, outpatient settings such as ambulatory surgical centers and end-stage renal disease facilities, and long-term care facilities such as nursing homes and rehabilitation centers.

The prevention and reduction of HAIs in Utah is a top priority for the Utah Department of Health's (UDOH) HAI Program. In order to maximize the efficiency of statewide prevention efforts, the Utah Healthcare Infection Prevention Governance Committee (UHIP-GC) was established in 2010 and is organized and staffed by the UDOH. The purpose of the UHIP-GC is to provide leadership and direction for HAI prevention and reporting activities in Utah. It currently consists of 24 members, not including support staff from UDOH, representing a wide range of healthcare affiliated organizations, including state leaders in administration, quality improvement, patient safety, infectious diseases, and infection prevention and control. The UHIP-GC has provided the UDOH with a number of recommendations, including input into the development and implementation of the Utah HAI Prevention Plan.

Utah has several legislative mandates to address HAI prevention efforts. The Utah legislative mandates for facilities who report data on the incidence and rate of healthcare-associated infections, as mandated by the Center for Medicare and Medicaid Services (CMS), to the National Healthcare Safety Network (NHSN) in the Centers for Disease Control and Prevention (CDC) are, in brief, to:

- Share the facility's data, on the incidence and rate of healthcare-associated infections that the facility submits to the National Healthcare Safety Network (NHSN) in the Center for Disease Control and Prevention (CDC) pursuant to the Center for Medicare and Medicaid Services (CMS) rules for infection reporting, with the UDOH.
- Implement processes to prevent the incidence of healthcare-associated infections, including at least one intervention that is proven by scientifically valid means to be effective in healthcare-associated infection prevention and recommended by an accepted health authority, including the CDC, or the federal Hospital Infection Control Practices Advisory Committee (HICPAC).
- Institute a system to monitor these infection prevention processes and shall make information about them available upon request.

The legislative mandates for the Utah Department of Health are, in brief, to:

- Use the required data submitted by facilities to compile an annual report on healthcare-associated infections, identifying facility by name, for public distribution.
- The department shall publish the HAI report on the department's website and the Utah Health Exchange by October 1 of each calendar year.
- The Utah Department of Health's (UDOH) HAI Prevention and Control Program is committed to helping Utah patients receive the best and safest care. Implementing statewide HAI prevention efforts is an essential part of a comprehensive patient safety program. Publicly releasing HAI data is an important step in creating transparency for healthcare safety and quality in Utah.

1. Magill SS, Edwards JR, Bamberg W, et al. Multistate Point-Prevalence Survey of Health Care–Associated Infections. N Engl J Med 2014;370:1198-208.
2. National Action Plan to Prevent Healthcare-Associated Infections: Road Map to Elimination. http://www.health.gov/hai/prevent_hai.asp#ha.

The Utah HAI Prevention Plan targets the following areas:

1. Enhance HAI Program Infrastructure
2. Surveillance, Detection, Reporting, and Response
3. Prevention
4. Evaluation, Oversight, and Communication
5. Infection Control Assessment and Response
6. Targeted Healthcare Infection Prevention Program

Each of the target areas will be addressed below. It is envisaged that the implementation of these activities will help ensure the timely detection of infections and the knowledge gained will drive strategies to prevent healthcare-associated infections in Utah.

1. Enhance HAI program infrastructure

Successful HAI prevention requires close integration and collaboration with state and local infection prevention activities and systems. Consistency and compatibility of HAI data collected across facilities will allow for greater success in reaching state and national goals.

Table 1: State infrastructure planning for HAI surveillance, prevention, and control.

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
X		1. Establish statewide HAI prevention leadership through the formation of multidisciplinary group or state HAI advisory council <ol style="list-style-type: none"> i. Collaborate with local and regional partners (e.g., state hospital associations, professional societies for infection control and healthcare epidemiology, academic organizations, laboratorians, and networks of acute care hospitals and long term care facilities). 	Ongoing

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
X	X	<p style="text-align: center;">1. Enhance structure and operations for the Utah Healthcare Infection Prevention Governance Committee (UHIP-GC).</p> <p>ii. Include hospital preparedness partners (e.g., hospital/healthcare coalitions funded through the ASPR Hospital Preparedness Program). Additional representation from accrediting and/or licensing agency with surveyor authority is ideal.</p> <p style="text-align: center;">1. Determine gaps in membership; ensure representation is adequate to meet UHIP-GC goals and objectives.</p>	<p>10-22-2015</p> <p>06-16-2015</p>
X	X	<p>iii. Engage HAI advisory committee in potential roles and activities to improve antibiotic use in the state (antibiotic stewardship).</p> <p style="text-align: center;">1. UHIP-CG has initiated discussions regarding interest in establishing a statewide antibiotic stewardship collaboration.</p>	<p>Ongoing</p> <p>Ongoing</p>
X		<p>iv. Engage HAI advisory committee in activities to increase health department's access to data and subsequently use those data in prevention efforts.</p> <p>iv. Identify specific HAI prevention targets consistent with HHS priorities.</p> <p style="text-align: center;">1. The UHIP-GC continues to be actively involved in identifying and prioritizing HAI prevention targets consistent with HHS.</p>	<p>Ongoing</p>
		<p><i>Other activities or descriptions:</i> The UDOH established a statewide HAI advisory group, the Utah Healthcare Infection Prevention Governance Committee (UHIP-GC), in 2009.</p>	

<p>X X</p>		<p>2. Establish an HAI surveillance prevention and control program</p> <ul style="list-style-type: none"> i. Designate a State HAI Prevention Coordinator. ii. Develop dedicated, trained HAI staff with at least one FTE (or contracted equivalent) to oversee HAI activities areas (Integration, Collaboration, and Capacity Building; Reporting, Detection, Response, and Surveillance; Prevention; Evaluation, Oversight, Communication, and Infection Control). 	<p>11/2009 Ongoing</p>
		<p><i>Other activities or descriptions:</i> The UDOH has had a designated HAI Prevention Coordinator since 2009 who manages the UDOH Healthcare Associated Infections (HAI) Program. The HAI Program staff currently includes one full-time Epidemiologist, one part-time data analyst, and 3 full-time Infection Preventionists (IPs) who are nationally certified in Infection Prevention and Control (CIC).</p>	
	<p>X</p>	<p>3. Integrate laboratory activities with HAI surveillance, prevention, and control efforts.</p> <ul style="list-style-type: none"> i. Improve laboratory capacity to confirm emerging resistance in HAI pathogens and perform typing where appropriate (e.g., outbreak investigation support, HL7 messaging of laboratory results). 	<p>2016</p>
		<p><i>Other activities or descriptions:</i> The Utah Public Health Laboratory’s (UPHL) Infectious Diseases Laboratory currently helps the state and local health departments investigate outbreaks and tests for infectious diseases. The laboratory is a member of the Laboratory Response Network and employees are trained and equipped to identify agents that could be used as biological weapons. The laboratory also serves as a resource and reference to private laboratories in the state.</p> <p>Discussions with the UPHL regarding the feasibility of integrating laboratory activities with HAI-related activities will be initiated during 2016.</p>	
<p>X</p>		<p>4. Improve coordination among government agencies or organizations that share responsibility for assuring or overseeing HAI surveillance, prevention, and control.</p>	<p>Ongoing</p>

		<i>Other activities or descriptions:</i> a. A representative from Licensing and Certification Hospital and Ambulatory Care Section serves as a member of UHIP-GC. b. Identify regulatory/licensing authorities at state and local levels for each licensed healthcare facility and incorporate data into the HAI Program’s Utah healthcare facility data base.	06-16-2015 09-30-2015
X	X	5. Facilitate use of standards-based formats (e.g., Clinical Document Architecture, electronic messages) by healthcare facilities for purposes of electronic reporting of HAI data. i. Provide technical assistance to help develop capacity for HAI surveillance and other types of public health surveillance, such as for conditions deemed reportable to state and local health agencies using electronic laboratory reporting (ELR). ii. Facilitate use of standards-based solutions for external reporting to strengthen relationships between healthcare facilities and regional nodes of healthcare information, such as Regional Health Information Organizations. (RHIOs) and Health Information Exchanges (HIEs). 1. UDOH is working with the Utah HIE on developing standards-based solutions.	Ongoing
		<i>Other activities or descriptions:</i> UDOH has the ability to receive/parse/use all messages with standards-based formats. UDOH will provide documentation to all healthcare facilities detailing where to put ancillary HAI-related information in the messages.	

2. Surveillance, Detection, Reporting, and Response

Timely and accurate monitoring remains necessary to gauge progress towards HAI elimination. Public health surveillance has been defined as the ongoing, systematic collection, analysis, and interpretation of data essential to the planning, implementation, and evaluation of public health practice, and timely dissemination to those responsible for prevention and control.³ Increased participation in systems, such as the National Healthcare Safety Network (NHSN,) has been demonstrated to promote HAI reduction. This, combined with improvements to simplify and

³ Thacker SB, Berkelman RL. Public health surveillance in the United States. *Epidemiol Rev* 1988;10:164-90.

enhance data collection, and improve dissemination of results to healthcare providers and the public are essential steps toward increasing HAI prevention capacity.

The HHS Action Plan identifies targets and metrics for five categories of HAIs and identified Ventilator-associated Pneumonia as an HAI under development for metrics and targets (Appendix 1):

- Central Line-associated Blood Stream Infections (CLABSI)
- *Clostridium difficile* Infections (CDI)
- Catheter-associated Urinary Tract Infections (CAUTI)
- Methicillin-resistant *Staphylococcus aureus* (MRSA) Infections
- Surgical Site Infections (SSI)
- Ventilator-associated Pneumonia (VAP)

Utah’s capacity for investigating and responding to outbreaks and emerging infections among patients and healthcare providers is central to HAI prevention. Investigation of outbreaks helps identify preventable causes of infections including issues with the improper use or handling of medical devices; contamination of medical products; and unsafe clinical practices.

Table 2: State planning for surveillance, detection, reporting, and response for HAIs

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
X		1. Improve HAI outbreak detection and investigation.	Ongoing
X		i. Work with partners including CSTE, CDC, state legislatures, and providers across the healthcare continuum to improve outbreak reporting to state health departments.	Ongoing
X		ii. Establish protocols and provide training for health department staff to investigate outbreaks, clusters, or unusual cases of HAIs. iii. Develop mechanisms to protect facility/provider/patient identity when investigating incidents and potential outbreaks during the initial evaluation phase,	Ongoing

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
		where possible, to promote reporting of outbreaks.	
X	X	iv. Improve overall use of surveillance data to identify and prevent HAI outbreaks or transmission in HC settings (e.g., hepatitis B, hepatitis C, multi-drug resistant organisms (MDRO), and other reportable HAIs). <ol style="list-style-type: none"> 1. The current Communicable Disease reporting Rule will be amended to mandate electronic reporting of all healthcare facility <i>Clostridium difficile</i> cultures and antigen tests. 	Ongoing 01-01-2016
		<p><i>Other activities or descriptions:</i></p> <ol style="list-style-type: none"> a. The HAI program has conducted specific HAI trainings for all of Utah’s local health departments (LHD) since 2010. Trainings provide general information regarding HAI outbreaks, introduce information about new and emerging HAIs that are being detected in Utah’s healthcare facilities, and reinforce and/or establish working relationships across the healthcare continuum (LHD to hospital, long-term care facilities (LTCF), ambulatory surgical centers, etc.). b. UDOH HAI Program, which currently only has access to <i>C difficile</i> data as reported by Utah healthcare facilities to NHSN, will work with the UDOH Informatics Team to create processes to electronically import real-time electronic laboratory surveillance data, and place it into the communicable disease database. Program algorithms will be written directly into the database structure to identify aberrations and outbreaks. An automated trigger that identifies both the facility and the condition that requires immediate attention will be sent to the HAI program for response. 	

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
	X	2. Enhance laboratory capacity for state and local detection and response to new and emerging HAI issues.	2016
		<i>Other activities or descriptions:</i> Priority activity but UPHL capacity enhancement is dependent on additional program funding.	
X	X	3. Improve communication of HAI outbreaks and infection control breaches. <ul style="list-style-type: none"> i. Develop standard reporting criteria including, number, size, and type of HAI outbreak for health departments and CDC. <ul style="list-style-type: none"> 1. The target date for implementation is dependent on national criteria being established. ii. Establish mechanisms or protocols for exchanging information about outbreaks or breaches among state and local governmental partners. 	Ongoing
X	X		
		<i>Other activities or descriptions:</i> <ul style="list-style-type: none"> a. The Utah Communicable Disease (CD) Rule definition of outbreak is as follows: “ Outbreak means an increase in incidence of disease, or two or more cases of disease with a common exposure” CD rule also requires the reporting of “Any unusual occurrence of infectious or communicable disease or any unusual or increased occurrence of any illness that may indicate a Bioterrorism event or public health hazard, including any single case or multiple cases of a newly recognized, emergent or re-emergent disease or disease-producing agent, including newly identified multidrug resistant bacteria or a novel influenza strain such as pandemic influenza strain.” 	Effective 10-1-1999

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
<p style="text-align: center;">X</p> <p style="text-align: center;">X</p> <p style="text-align: center;">X</p>	<p style="text-align: center;">X</p> <p style="text-align: center;">X</p> <p style="text-align: center;">X</p>	<p>4. Identify at least 2 priority prevention targets for surveillance in support of the HHS HAI Action Plan</p> <ul style="list-style-type: none"> i. Central Line-associated Bloodstream Infections (CLABSI) ii. <i>Clostridium difficile</i> Infections (CDI) iii. Catheter-associated Urinary Tract Infections (CAUTI) iv. Methicillin-resistant <i>Staphylococcus aureus</i> (MRSA) Infections v. Surgical Site Infections (SSI) vi. Ventilator-associated Pneumonia (VAP) 	<p>Ongoing; targeted HAI started with CLABSI in 2008</p>
		<p><i>Other activities or descriptions:</i></p> <p>Utah HAI data are self-reported to the Centers of Disease Control and Prevention's (CDC) National Safety and Health Network (NHSN), by each healthcare facility required by the Centers for Medicare and Medicaid Services (CMS) to report HAIs. Under Utah Code 26-6-31, the HAI Program is required to analyze HAI data submitted to NHSN at least annually and, in partnership with the UHIP-GC, identify and target HAIs for validation and prevention activities.</p> <ul style="list-style-type: none"> a. Priority prevention targets for surveillance in support of the HHS HAI Action Plan will be determined based on analysis of the annual data entered by facilities required to report HAIs in Utah. 	<p>June 1st of every calendar year</p>
<p style="text-align: center;">X</p>		<p>5. Adopt national standards for data and technology to track HAIs (e.g., NHSN).</p> <ul style="list-style-type: none"> i. Develop metrics to measure progress towards national goals (align with targeted state goals). (See Appendix 1). 	<p>Effective 2008 (CLABSI initially); ongoing</p>

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
X	X	ii. Establish baseline measurements for prevention targets.	
		<p><i>Other activities or descriptions:</i> The standardized infection ratio (SIR) is a summary statistic developed by NHSN used to track HAI prevention progress over time. Progress is measured at the national, state, and facility level. Facilities with small numbers of patients may not have enough HAI events to reliably compare to the standard population. SIRs for these facilities are not included in the UDOH's annual HAI reports. As of 2013, SIRs were not included for long-term acute care facilities or dialysis facilities because a national baseline has not yet been established.</p>	
X		<p>6. Develop state surveillance training competencies.</p> <p>i. Conduct local training for appropriate use of surveillance systems (e.g., NHSN) including facility and group enrollment, data collection, management, and analysis.</p>	Effective 2011; ongoing Annually
		<p><i>Other activities or descriptions:</i> Since 2011, the UDOH HAI Program has partnered with Utah's Quality Improvement Organization, HealthInsight, to provide training/resources for Utah's acute and long-term acute care hospital Infection Preventionists (IPs). Topics have included NHSN HAI surveillance definitions and reporting criteria, HAI case studies, NHSN hospital enrollment and reporting criteria and data analysis.</p>	
X		7. Develop tailored reports of data analyses for state or region prepared by state personnel.	Effective 2008; ongoing annually
		<p><i>Other activities or descriptions:</i> Effective in 2008, Utah Rule 386-705, Epidemiology, Healthcare-Associated Infection required the Utah Department of Health (UDOH) to collect and report data on HAIs. Since 2008, acute care</p>	

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
		<p>hospitals with intensive care units submitted CLABSI data directly to the UDOH for the annual HAI report; however, reporting facilities were not identified by name. In 2011, CMS required acute healthcare facilities to report specific HAI data to NHSN. Effective 2012, Utah Code 26-6-31 requires the UDOH to access and analyze facility-specific NHSN data required by CMS and publish an annual HAI report for the public in which facilities are identified by name. Since 2012, the annual report has compared data for reporting facilities and identified them by name; facilities are also rated based on their performance when compared to the national standardized infection ration (SIR). All infections required by CMS to be reported to NHSN, according to the CMS Healthcare Facility HAI Reporting Requirements timeline, are included.</p>	
<p>X</p> <p>X</p> <p>X</p> <p>X</p> <p>X</p> <p>X</p> <p>X</p>		<p>8. Validate data entered into HAI surveillance (e.g., through healthcare records review, parallel database comparison) to measure accuracy and reliability of HAI data collection.</p> <ul style="list-style-type: none"> i. Develop a validation plan. ii. Pilot test validation methods in a sample of healthcare facilities. iii. Modify validation plan and methods in accordance with findings from pilot project. iv. Implement validation plan and methods in all healthcare facilities participating in HAI. Surveillance. v. Analyze and report validation findings. vi. Use validation findings to provide operational guidance for healthcare facilities that targets any data shortcomings detected. 	<p>Effective 2012; ongoing annually</p>

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
		<p><i>Other activities or descriptions:</i> Effective 2012, Utah Code 26-6-31 requires the UDOH to conduct validation activities. On-site validation activities included reviewing the facilities' surveillance processes for accurately identifying and reporting infections. Effective 2013, medical record review of targeted reportable HAIs was added, using the recommendations set forth by the NHSN External Validation Guidance and Toolkit.</p>	
	X	<p>9. Develop preparedness plans for improved response to HAI. i. Define processes and tiered response criteria to handle increased reports of serious infection control breaches (e.g., syringe reuse), suspect cases/clusters, and outbreaks.</p>	2016
		<p><i>Other activities or descriptions:</i> Developing preparedness plans for improved response to HAIs is a UDOH priority activity for 2016.</p>	
X		<p>10. Collaborate with professional licensing organizations to identify and investigate complaints related to provider infection control practice in non-hospital settings and set standards for continuing education and training.</p>	Ongoing
		<p><i>Other activities or descriptions:</i> During 2016, UDOH HAI Program will continue to partner with licensing/regulatory authorities to identify and mitigate breaches in infection control. Further work will need to be done to partner with accreditation regulatory authorities, e.g. The Joint Commission, to facilitate reporting of infection control breaches discovered upon their surveys to UDOH HAI Program.</p>	2016
X		<p>11. Adopt integration and interoperability standards for HAI information systems and data sources i. Improve overall use of surveillance data to identify and prevent HAI outbreaks or transmission in HC settings (e.g., hepatitis B,</p>	Effective 05-2013; ongoing. Communicable Disease Reporting Rule updated

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
		<p>hepatitis C, multi-drug resistant organisms (MDRO), and other reportable HAIs) across the spectrum of inpatient and outpatient healthcare settings.</p> <p>ii. Promote definitional alignment and data element standardization needed to link HAI data across the nation.</p>	when indicated
		<p><i>Other activities or descriptions:</i></p> <p>In May 2013, the Utah Department of Health updated the Communicable Disease Reporting Rule (Rule R386-702). This rule requires healthcare facilities, laboratories and providers to report laboratory identified cases of Acinetobacter, Klebsiella, and E. coli species that are carbapenem non-susceptible; all cases were reported to, and investigated by, public health. An annual report, <i>Carbapenem Non-susceptible Organism Incidence Report, Utah, 2013</i> was first published in 2014. Annual reports continue to be posted on the UDOH Bureau of Epidemiology website at: http://health.utah.gov/epi/diseases/HAI/surveillance/index.html.</p>	
X		<p>12. Enhance electronic reporting and information technology for healthcare facilities to reduce reporting burden and increase timeliness, efficiency, comprehensiveness, and reliability of the data.</p> <p>i. Report HAI data to the public.</p>	Ongoing
		<p><i>Other activities or descriptions:</i></p> <p>The UDOH, as the Informatics portion of the Ebola funding via the ELC grant, is attempting to develop greater "situational awareness" of HAIs in hospitals. For the first 2 years of the grant, the goal is to use C. diff ELR reports as a proxy for NHSN lab ID event. The intent is to provide more timely information without burden to facility Infection Preventionists. The UDOH Informatics will also be working on developing a better infrastructure to receive antibiotic</p>	

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
		susceptibility data to track other resistant organisms automatically.	
X		13. Make available risk-adjusted HAI data that enable state agencies to make comparisons between hospitals.	Ongoing
		<p><i>Other activities or descriptions:</i></p> <p>Since 2008, the UDOH HAI Program has published the Utah Healthcare Associated Infections Annual Report as indicated and required by law; standardized infection ratio (SIR) risk-adjusted HAI data has been published since 2012. HAI data is available on the UDOH Bureau of Epidemiology website at: http://health.utah.gov/epi/diseases/HAI/surveillance/index.html and the Utah Health Exchange.</p>	
X		14. Enhance surveillance and detection of HAIs in nonhospital settings.	Ongoing
		<p><i>Other activities or descriptions:</i></p> <p>a. The UDOH currently collects data on over 75 communicable diseases that affect the residents of Utah. These data are monitored by epidemiologists to detect changes in disease activity, and guide prevention and education efforts; all diseases are reported monthly. A report is issued for selected conditions weekly. Data is posted on the UDOH website.</p> <p>b. The UT-Trax project is a Utah public health initiative to develop an open-source software epidemiologic and disease surveillance system modeled after the National Electronic Disease Surveillance System (NEDSS) vision. The system is designed to support Utah state and local public health agency surveillance and epidemiologic needs, including receiving or entering disease reports, conducting case/outbreak investigations, managing cases/outbreaks, analyzing data, reporting to the CDC.</p>	

3. Prevention

Implementation of HHS Healthcare Infection Control Practices Advisory Committee (HICPAC) recommendations is a critical step toward the elimination of HAIs. CDC and HICPAC have developed evidence-based HAI prevention guidelines cited in the HHS Action Plan for implementation. These guidelines are translated into practice and implemented by multiple groups in hospital settings for the prevention of HAIs. CDC guidelines have also served as the basis for the Centers for Medicare and Medicaid Services (CMS) Surgical Care Improvement Project. These evidence-based recommendations have also been incorporated into Joint Commission standards for accreditation of U.S. hospitals and have been endorsed by the National Quality Forum.

Table 3: State planning for HAI prevention activities

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
		1. Implement HICPAC recommendations. <ul style="list-style-type: none"> i. Develop strategies for implementation of HICPAC recommendations for at least 2 prevention targets specified by the state multidisciplinary group. 	Effective 2011; ongoing
		<i>Other activities or descriptions:</i> Since 2011, the HAI Program has collaborated with Utah’s Quality Improvement Organization (QIO), HealthInsight. Two HAI prevention collaboratives sponsored by HealthInsight to-date have targeted CLABSIs and CAUTIs.	
X		2. Establish prevention working group under the state HAI advisory council to coordinate state HAI collaboratives. <ul style="list-style-type: none"> i. Assemble expertise to consult, advise, and coach inpatient healthcare facilities involved in HAI prevention collaboratives. 	Ongoing
		<i>Other activities or descriptions:</i> A multidisciplinary Utah HAI work group (HAIWG) was established in 2006. he HAIWG was comprised of Infection Preventionists representing all major healthcare systems in Utah, Infectious Disease physicians/Hospital Epidemiologists, and representatives from Utah’s	

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
		<p>Hospital Association, Utah’s Quality Improvement agency (HealthInsight), Utah’s Long Term Care Association, and members of Utah’s Infection Control Association at the time (Rocky Mountain Infection Control Association), Rocky Mountain Pus club (a regional Infectious Disease Society), the UDOH Epidemiology Bureau and Patient Safety Initiative. This group was tasked with and addressed HAI surveillance, prevention, and mandatory reporting-related issues. During 2009-2010, the group expanded in membership and role and became the state HAI advisory committee, the Utah Healthcare Infections Prevention Governance Committee (UHIP-GC). The UHIP-CG provides executive level leadership for HAI policy and priority setting in the state. The UHIP-GC is involved in all related HAI activities, including HAI prevention collaboratives. Ad-hoc UHIP-GC subcommittees are assembled only when indicated to focus on select projects/issues.</p>	
<p>X</p> <p>X</p> <p>X</p>		<p>3. Establish HAI collaboratives with at least 10 hospitals (this may require a multi-state or regional collaborative in low population density regions).</p> <ul style="list-style-type: none"> i. Identify staff trained in project coordination, infection control, and collaborative coordination. ii. Develop a communication strategy to facilitate peer-to-peer learning and sharing of best practices. iii. Establish and adhere to feedback from standardized outcome data to track progress. 	<p>2010; ongoing</p>

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
		<p><i>Other activities or descriptions:</i> The HAI Program has partnered with Utah’s Quality Improvement Organization (QIO), HealthInsight, on multiple HAI prevention related issues since 2010. HealthInsight has taken the lead in convening a community of patients, caregivers, hospitals, health care professionals and community stakeholders to identify and implement solutions to prevent and reduce the number of healthcare-associated infections in hospitals throughout Utah.</p>	
X	X	<p>4. Develop state HAI prevention training competencies.</p> <ul style="list-style-type: none"> i. Consider establishing requirements for education and training of healthcare professionals in HAI prevention (e.g., certification requirements, public education campaigns, and targeted provider education) or work with healthcare partners to establish best practices for training and certification. <ul style="list-style-type: none"> 1. The HAI Program plans to offer a 1.5 day course to encourage and prepare Utah’s Infection Preventionists (IPs) to become Certified in Infection Control (CIC) by the Certification Board for Infection Control (CBIC). 	<p>Ongoing</p> <p>03-31-16</p>
		<p><i>Other activities or descriptions:</i> The UHIP- GC has been a strong proponent of supporting the educational needs of IPs; ongoing discussions have included establishing requirements for education and training of healthcare professionals hired to manage Infection Prevention and Control Programs (eg., IPs) and/or certification in Infection Prevention and Control (CIC). Since the dissolution in 2010 of the Rocky Mountain Infection Control Association, Utah has established a chapter of the Association for Professionals in Infection Control and Epidemiology, Inc (APIC). In</p>	

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
		<p>conjunction with national APIC, the Utah chapter provides a forum for HAI information dissemination, education and training issues and promotes competency and certification of infection control professionals.</p>	
<p>X</p> <p>X</p>	<p>X</p> <p>X</p>	<p>5. Implement strategies for compliance to promote adherence to HICPAC recommendations.</p> <ul style="list-style-type: none"> i. Consider developing statutory or regulatory standards for healthcare infection control and prevention or work with healthcare partners to establish best practices to ensure adherence. ii. Coordinate/liaise with regulation and oversight activities such as inpatient or outpatient facility licensing/accrediting bodies and professional licensing organizations to prevent HAIs. iii. Improve regulatory oversight of hospitals, enhance surveyor training and tools, and add sources and uses of infection control data. iv. Consider expanding regulation and oversight activities to currently unregulated settings where healthcare is delivered and work with healthcare partners to establish best practices to ensure adherence. 	<p>1-31-2012</p> <p>Ongoing</p> <p>03-31-2018</p>
		<p><i>Other activities or descriptions:</i> Utah' statutory or regulatory standards for healthcare infection control and prevention state: Utah Rule R386-705. Epidemiology, Health Care Associated Infection. R386-705-5. Health Care Associated Infection Prevention. Each facility required to share data with the Department as described in R386-705-3 shall implement processes to prevent the incidence of health care associated infections. (1) The processes shall include at least one intervention that is</p>	<p>12-21-2012</p>

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
		<p>proven by scientifically valid means to be effective in health care associated infection prevention. Interventions that have been recommended by an accepted health authority, including the CDC, or the federal Hospital Infection Control Practices Advisory Committee (HICPAC), meet this requirement.</p> <p>(2) The facility shall have a system to monitor these processes and shall make information about them available upon request.</p> <p>R386-705-6. Attestation Required.</p> <p>Each facility required to share data with the Department as described in R386-705-3 and R386-705-4 shall attest to the implementation and effectiveness of its health care infection prevention program, as described in R386- 705-5, and its systems for reporting, as required by this rule, once every three years.</p>	
X		6. Enhance prevention infrastructure by increasing joint collaboratives with at least 20 hospitals (e.g., this may require a multi-state or regional collaborative in low population density regions).	Ongoing
		<p><i>Other activities or descriptions:</i></p> <p>With the support of the UHIP-GC, Utah’s Quality Improvement Organization (QIO), HealthInsight, has coordinated the recruitment and participation in HAI prevention collaborative activities, in partnership with the UDOH and Utah Hospital Association (UHA).</p>	
X		7. Establish collaborative(s) to prevent HAIs in nonhospital settings (e.g., long term care, dialysis).	
		<p><i>Other activities or descriptions:</i></p> <p>The first non-hospital prevention collaborative which the UDOH coordinated was established in 2011. The catheter-associated urinary tract infection (CAUTI) prevention collaborative with 17 participating long-term care facilities (LTCFs) was completed July 2012. HealthInsight, Utah’s Quality Improvement Organization, is currently coordinating a</p>	May 2015

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
		<p>LTCF Comprehensive Unit-based Safety Program (CUSP) CAUTI project through July 2016.</p> <p>Priority activity, but unfunded. The UDOH HAI Program was unsuccessful in obtaining funding for targeted LTCF-related infection prevention and control activities during the 2012 CDC Epidemiology and Laboratory Capacity (ELC) grant cycle.</p>	

4. Evaluation and Communication

Program evaluation is an essential organizational practice in public health. Continuous evaluation and communication of findings integrates science as a basis for decision-making and action for the prevention of HAIs. Evaluation and communication allows for learning and ongoing improvement. Routine, practical evaluations can inform strategies for the prevention and control of HAIs.

Table 4: State HAI communication and evaluation planning

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
X		1. Conduct needs assessment and/or evaluation of the state HAI program to learn how to increase impact.	Ongoing
X		<ul style="list-style-type: none"> i. Establish evaluation activity to measure progress toward targets and ii. Establish systems for refining approaches based on data gathered. 	
		<p><i>Other activities or descriptions (not required):</i></p> <p>Since its inception, the HAI Program has surveyed IPs annually in various healthcare settings to determine current Infection Control activities, program needs and gaps in resources. Findings are analyzed and presented to the UHIP-GC. Survey findings and UHIP-GC</p>	Effective 2010; ongoing

		recommendations drive the activities and planned intervention(s), whenever indicated, by the HAI program in conjunction with partner organizations such as HealthInsight.	
X		<p>2. Develop and implement a communication plan about the state's HAI program and about progress to meet public and private stakeholders needs.</p> <p>i. Disseminate state priorities for HAI prevention to healthcare organizations, professional provider organizations, governmental agencies, non-profit public health organizations, and the public.</p>	Ongoing
Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
X		<p>3. Provide consumers access to useful healthcare quality measures.</p> <p>i. Disseminate HAI data to the public. Publication of Utah HAI data is required by law; the HAI Report in Utah is to be published by October 1st on the UDOH website (http://health.utah.gov/epi/diseases/HAI/surveillance) and the Utah Health Exchange.</p>	Effective 2009, CLABSI first publically reportable HAI in Utah; ongoing annually
		<p><i>Other activities or descriptions:</i> <i>Utah Code 26-6-31. Public reporting of health care associated infections.</i></p> <p>1. An ambulatory surgical facility, a general acute hospital, a specialty hospital, an end stage renal disease facility, and other facilities as required by rules of the Center for Medicare and Medicaid Services shall give the department access to the facility's data on the incidence and rate of healthcare associated infections that the facility submits to the National Healthcare Safety Network in the Center for Disease Control pursuant to the Center for Medicare and Medicaid Services rules for infection reporting. Access to data under this Subsection (1) may include data sharing through the National</p>	Effective May 1, 2013; ongoing

		<p>Healthcare Safety Network.</p> <p>2. a. The department shall, beginning May 1, 2013, use the data submitted by the facilities in accordance with Subsection (1) to compile an annual report on health care associated infections in ambulatory surgical facilities, general acute hospitals, and specialty hospitals for public distribution in accordance with the requirements of this subsection. The department shall publish the report on the department's website and the Utah Health Exchange.</p>	
X		<p>4. Guide patient safety initiatives.</p> <p>i. Identify priorities and provide input to partners to help guide patient safety initiatives and research aimed at reducing HAIs.</p>	
		<p><i>Other activities or descriptions:</i></p> <p>Utah Rule 380 Health Administration. Patient Safety Surveillance and Improvement Program (PSSIP). This proposed rule updates the current Sentinel Event Reporting program perspective to a “patient safety surveillance” perspective. The updated rule will include 1) provision for a reportable events program intended to meet public accountability and transparency needs at a state-wide level, and 2) quality improvement. Reporting of events has been categorized into 3 areas; HAIs will be categorized under “Reportable Events referenced by other reporting rules.”</p>	<p>Ongoing; updated 2015</p>

Healthcare Infection Control and Response (Ebola-associated activities)

The techniques and practice on which infection control protocols are based form the backbone of infectious disease containment for pathogens that are otherwise amplified and accelerated in healthcare settings. Investments in a more robust infection control infrastructure will prevent many HAIs transmitted to, and among, patients and healthcare workers.

Table 5: Infection Control Assessment and Response

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
X		1. Create an inventory of all healthcare settings in state. List must include at least one infection control point of contact at the facility.	10-1-2015
X		2. Identify current regulatory/licensing oversight authorities for each healthcare facility and explore ways to expand oversight .	10-1-2015
		<i>Other activities or descriptions:</i>	
X X X		3. Assess readiness of Ebola-designated facilities within the state i. Use CDC readiness assessment tool and determine gaps in infection control. ii. Address gaps (mitigate gaps). iii. Conduct follow-up assessments.	7-1-2015
		<i>Other activities or descriptions:</i> The CDC Ebola Readiness Assessment (ERA) Team assisted the UDOH in performing onsite assessments of Utah’s 3 designated Ebola Assessment Hospitals during September 2015.	
	X X X	4. Assess outbreak reporting and response in healthcare facilities. i. Use standard assessment tool and determine gaps in outbreak reporting and response. ii. Address gaps (mitigate gaps). iii. Track HAI outbreak response and outcome.	10-1-2015
		<i>Other activities or descriptions:</i> The CDC Standardized Outbreak Reporting and Response Assessment Tool is currently in clearance. Once cleared, the HAI program plans to administer it in a survey format to assess the capacity of acute healthcare facilities to detect, report, and respond to potential outbreaks and emerging threats.	

		<p>competency as a requirement for professional licensure. However, under Rule 414-7B, Utah Nurse Aid Training and Competency Evaluation Program, “nurse aid” required training requirements include competence in infection control in order to be certified to work in a licensed and Medicare or Medicaid-certified facility providing long-term care.</p> <p>Consideration for infection prevention and control-related state licensing board requirements, credentialing, and continuing education requirements will be presented to UHIP-GC during 2016.</p>	
X	x	3. Enhance surveillance capacity to improve situational awareness, describe emerging threats, and target onsite assessments to implement prevention programs	Ongoing
X		i. Build capacity to analyze data reported by facilities in a defined region to allow for a comprehensive assessment of potential healthcare-associated infection threats, and communicate results with healthcare facilities.	
X	X	ii. Work with CDC to guide analytic direction and identify facilities for prioritized assessments/response.	
X	X	iii. Improve outbreak reporting capacity by developing an infrastructure that includes clear definitions of infectious threats of epidemiologic importance that are communicated to facilities.	
X	X	iv. Implement a response plan to address potential emerging threats identified by using enhanced surveillance.	
		<p><i>Other activities or descriptions:</i></p> <p>The UDOH will improve use of surveillance data to identify and prevent HAI outbreaks or transmission in healthcare settings by continuing to work closely with an internal UDOH surveillance group that includes participation from the Bureau of Epidemiology, Patient Safety, and State Licensing agencies. The UDOH continues to update the Disease Investigation Plans posted on the UDOH website as information becomes available. Updates include case definitions, case identification and reporting responsibilities and investigation</p>	

	<p>process, and definition of an outbreak and identification of case contacts.</p> <p>The UDOH listserv is one form of communication used to rapidly distribute information, improve situational awareness and describe emerging threats. Another venue is the Utah APIC Chapter; a UDOH CD report is a standing agenda item.</p>	
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Appendix 1

The HHS Action plan identifies metrics and five-year national prevention targets. These metrics and prevention targets were developed by representatives from various federal agencies, the Healthcare Infection Control Practices Advisory Committee (HICPAC), professional and scientific organizations, researchers, and other stakeholders. The group of experts was charged with identifying potential targets and metrics for six categories of healthcare-associated infections:

- Central Line-associated Bloodstream Infections (CLABSI)
- Clostridium difficile Infections (CDI)
- Catheter-associated Urinary Tract Infections (CAUTI)
- Methicillin-resistant Staphylococcus aureus (MRSA) Infections
- Surgical Site Infections (SSI)
- Ventilator-associated Pneumonia (VAP)

Following the development of draft metrics as part of the HHS Action Plan in January 2009, HHS solicited comments from stakeholders for review.

Stakeholder feedback and revisions to the original draft Metrics

Comments on the initial draft metrics published as part of the HHS Action Plan in January 2009 were reviewed and incorporated into revised metrics. While comments ranged from high level strategic observations to technical measurement details, commenters encouraged established baselines, both at the national and local level, use of standardized definitions and methods, engagement with the National Quality Forum, raised concerns regarding the use of a national targets for payment or accreditation purposes and of the validity of proposed measures, and would like to have both a target rate and a percent reduction for all metrics. Furthermore, commenters emphasized the need for flexibility in the metrics, to accommodate advances in electronic reporting and information technology and for advances in prevention of HAIs, in particular ventilator-associated pneumonia.

To address comments received on the Action Plan Metrics and Targets, proposed metrics have been updated to include source of metric data, baselines, and which agency would coordinate the measure. To respond to the requests for percentage reduction in HAIs in addition to HAI rates, a new type of metric, the standardized infection ratio (SIR), is being proposed. Below is a detailed technical description of the SIR.

Below is a table of the revised metrics described in the HHS Action plan.

Metric Number and Label	Original HAI Elimination Metric	HAI Comparison Metric	Measurement System	National Baseline Established (State Baselines Established)	National Five-Year Prevention Target	Coordinator of Measurement System	Is the metric NQF endorsed?
1. CLABSI 1	CLABSIs per 1000 device days by ICU and other locations	CLABSI SIR	CDC NHSN Device-Associated Module	2006-2008 (proposed 2009, in consultation with states)	Reduce the CLABSI SIR by at least 50% from baseline or to zero in ICU and other locations	CDC	Yes*
2. CLIP 1 (formerly CLABSI 4)	Central line bundle compliance	CLIP Adherence percentage	CDC NHSN CLIP in Device-Associated Module	2009 (proposed 2009, in consultation with states)	100% adherence with central line bundle	CDC	Yes†
3a. C diff 1	Case rate per patient days; administrative/discharge data for ICD-9 CM coded <i>Clostridium difficile</i> Infections	Hospitalizations with <i>C. difficile</i> per 1000 patient discharges	Hospital discharge data	2008 (proposed 2008, in consultation with states)	At least 30% reduction in hospitalizations with <i>C. difficile</i> per 1000 patient discharges	AHRQ	No
3b. C diff 2 (new)		<i>C. difficile</i> SIR	CDC NHSN MDRO/CDAD Module LabID‡	2009-2010	Reduce the facility-wide healthcare facility-onset <i>C. difficile</i> LabID event SIR by at least 30% from baseline or to zero	CDC	No
4. CAUTI 2	# of symptomatic UTI per 1,000 urinary catheter days	CAUTI SIR	CDC NHSN Device-Associated Module	2009 for ICUs and other locations 2009 for other hospital units (proposed 2009, in consultation with states)	Reduce the CAUTI SIR by at least 25% from baseline or to zero in ICU and other locations	CDC	Yes*

Metric Number and Label	Original HAI Elimination Metric	HAI Comparison Metric	Measurement System	National Baseline Established (State Baselines Established)	National Five-Year Prevention Target	Coordinator of Measurement System	Is the metric NQF endorsed?
5a. MRSA 1	Incidence rate (number per 100,000 persons) of invasive MRSA infections	MRSA Incidence rate	CDC EIP/ABCs	2007-2008 (for non-EIP states, MRSA metric to be developed in collaboration with EIP states)	At least a 50% reduction in incidence of healthcare-associated invasive MRSA infections	CDC	No
5b. MRSA 2 (new)		MRSA bacteremia SIR	CDC NHSN MDRO/CDAD Module LabID [‡]	2009-2010	Reduce the facility-wide healthcare facility-onset MRSA bacteremia LabID event SIR by at least 25% from baseline or to zero	CDC	No
6. SSI 1	Deep incision and organ space infection rates using NHSN definitions (SCIP procedures)	SSI SIR	CDC NHSN Procedure-Associated Module	2006-2008 (proposed 2009, in consultation with states)	Reduce the admission and readmission SSI [§] SIR by at least 25% from baseline or to zero	CDC	Yes [¶]
7. SCIP 1 (formerly SSI 2)	Adherence to SCIP/NQF infection process measures	SCIP Adherence percentage	CMS SCIP	To be determined by CMS	At least 95% adherence to process measures to prevent surgical site infections	CMS	Yes

* NHSN SIR metric is derived from NQF-endorsed metric data.

[†] NHSN does not collect information on daily review of line necessity, which is part of the NQF.

[‡] LabID, events reported through laboratory detection methods that produce proxy measures for infection surveillance.

[§] Inclusion of SSI events detected on admission and readmission reduces potential bias introduced by variability in post-discharge surveillance efforts.

[¶] The NQF-endorsed metric includes deep wound and organ space SSIs only which are included the target.

Understanding the Relationship between HAI Rate and SIR Comparison Metrics

The Original HAI Elimination Metrics listed above are very useful for performing evaluations. Several of these metrics are based on the science employed in the NHSN. For example, metric #1 (CLABSI 1) for CLABSI events measures the number of CLABSI events per 1000 device (central line) days by ICU and other locations. While national aggregate CLABSI data are published in the annual NHSN Reports, these rates must be stratified by types of locations to be risk-adjusted. This scientifically sound risk-adjustment strategy creates a practical challenge to summarizing this information nationally, regionally or even for an individual healthcare facility. For instance, when comparing CLABSI rates, there may be quite a number of different types of locations for which a CLABSI rate could be reported. Given CLABSI rates among 15 different types of locations, one may observe many different combinations of patterns of temporal changes. This raises the need for a way to combine CLABSI rate data across location types.

A standardized infection ratio (SIR) is identical in concept to a standardized mortality ratio and can be used as an indirect standardization method for summarizing HAI experience across any number of stratified groups of data. To illustrate the method for calculating an SIR and understand how it could be used as an HAI comparison metric, the following example data are displayed below:

Risk Group Stratifier	Observed CLABSI Rates			NHSN CLABSI Rates for 2008 (Standard Population)		
Location Type	#CLABSI	#Central line-days	CLABSI rate*	#CLABSI	#Central line-days	CLABSI rate*
ICU	170	100,000	1.7	1200	600,000	2.0
WARD	58	58,000	1.0	600	400,000	1.5
$\text{SIR} = \frac{\text{observed}}{\text{expected}} = \frac{170 + 58}{100,000 \times \left(\frac{2}{1000}\right) + 58,000 \times \left(\frac{1.5}{1000}\right)} = \frac{228}{200 + 87} = \frac{228}{287} = 0.79 \quad 95\% \text{CI} = (0.628, 0.989)$						

*defined as the number of CLABSIs per 1000 central line-days

In the table above, there are two strata to illustrate risk-adjustment by location type for which national data exist from NHSN. The SIR calculation is based on dividing the total number of observed CLABSI events by an “expected” number using the CLABSI rates from the standard population. This “expected” number is calculated by multiplying the national CLABSI rate from the standard population by the observed number of central line-days for each stratum which can also be understood as a prediction or projection. If the observed data represented a follow-up period such as 2009, one would state that an SIR of 0.79 implies that there was a 21% reduction in CLABSIs overall for the nation, region or facility.

The SIR concept and calculation is completely based on the underlying CLABSI rate data that exist across a potentially large group of strata. Thus, the SIR provides a single metric for performing comparisons rather than attempting to perform multiple comparisons across many strata which makes the task cumbersome. Given the underlying CLABSI rate data, one retains the option to perform comparisons within a particular set of strata where observed rates may differ significantly from the standard populations. These types of more detailed comparisons could be very useful and necessary for identifying areas for more focused prevention efforts.

The National Five-year prevention target for metric #1 could be implemented using the concept of an SIR equal to 0.25 as the goal. That is, an SIR value based on the observed CLABSI rate data at the five-year mark could be calculated using NHSN CLABSI rate data stratified by location type as the baseline to assess whether the 75% reduction goal was met. There are statistical methods that allow for calculation of confidence intervals, hypothesis testing and graphical presentation using this HAI summary comparison metric called the SIR.

The SIR concept and calculation can be applied equitably to other HAI metrics list above. This is especially true for HAI metrics for which national data are available and reasonably precise using a measurement system such as the NHSN. The SIR calculation methods differ in the risk group stratification only. To better understand metric #6 (SSI 1) see the following example data and SIR calculation:

Risk Group Stratifiers		Observed SSI Rates			NHSN SSI Rates for 2008 (Standard Population)		
Procedure Code	Risk Index Category	#SSI [†]	#procedures	SSI rate [*]	#SSI [†]	#procedures	SSI rate [*]
CBGB	1	315	12,600	2.5	2100	70,000	3.0
CBGB	2,3	210	7000	3.0	1000	20,000	5.0
HPRO	1	111	7400	1.5	1020	60,000	1.7
$\text{SIR} = \frac{\text{observed}}{\text{expected}} = \frac{315 + 210 + 111}{12600 \times \left(\frac{3.0}{100}\right) + 7000 \times \left(\frac{5.0}{100}\right) + 7400 \left(\frac{1.7}{100}\right)} = \frac{636}{378 + 350 + 125.8} = \frac{636}{853.8} = 0.74 \quad 95\% \text{CI} = (0.649, 0.851)$							

[†] SSI, surgical site infection

^{*} defined as the number of deep incision or organ space SSIs per 100 procedures

This example uses SSI rate data stratified by procedure and risk index category. Nevertheless, an SIR can be calculated using the same calculation process as for CLABSI data except using different risk group stratifiers for these example data. The SIR for this set of observed data is 0.74 which indicates there's a 26% reduction in the number of SSI events based on the baseline NHSN SSI rates as representing the standard population. Once again, these data can reflect the national picture at the five-year mark and the SIR can serve as metric that summarizes the SSI experience into a single comparison.

There are clear advantages to reporting and comparing a single number for prevention assessment. However, since the SIR calculations are based on standard HAI rates among individual risk groups there is the ability to perform more detailed comparisons within any individual risk group should the need arise. Furthermore, the process for determining the best risk-adjustment for any HAI rate data is flexible and always based on more detailed risk factor analyses that provide ample scientific rigor supporting any SIR calculations. The extent to which any HAI rate data can be risk-adjusted is obviously related to the detail and volume of data that exist in a given measurement system.

In addition to the simplicity of the SIR concept and the advantages listed above, it's important to note another benefit of using an SIR comparison metric for HAI data. If there was need at any level of aggregation (national, regional, facility-wide, etc.) to combine the SIR values across mutually-exclusive data one could do so. The below table demonstrates how the example data from the previous two metric settings could be summarized.

HAI Metric	Observed HAIs			Expected HAIs		
	#CLABSI	#SSI [†]	#Combined HAI	#CLABSI	#SSI [†]	#Combined HAI
CLABSI 1	228			287		
SSI 1		636			853.8	
Combined HAI			228 + 636 = 864			287+853.8 = 1140.8
$\text{SIR} = \frac{\text{observed}}{\text{expected}} = \frac{228 + 636}{287 + 853.8} = \frac{864}{1140.8} = 0.76 \quad 95\% \text{CI} = (0.673, 0.849)$						

[†] SSI (surgical site infection)