

Template for State Healthcare-associated Infection Plan

In response to the increasing concerns about the public health impact of healthcare-associated infections (HAIs), the US Department of Health and Human Services (HHS) has developed an Action Plan to help prevent Healthcare-associated Infections. 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 5-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

Background: The 2009 Omnibus bill required states who received Preventive Health and Health Services (PHHS) Block Grant funds to certify that they would submit a plan to reduce HAIs to the Secretary of Health and Human Services not later than January 1, 2010. In order to assist states in responding within the short timeline required by that language and to facilitate coordination with national HAI prevention efforts, the Centers for Disease Control and Prevention (CDC) created a template to assist state planning efforts.

This template helps to ensure progress toward national prevention targets as described in the HHS Action Plan. CDC is leading the implementation of recommendations on national prevention targets and metrics and states should tailor the plan to their state-specific needs.

Initial emphasis for HAI prevention 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. 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.

The State HAI Action Plan template targets the following areas:

1. Enhance HAI Program Infrastructure
2. Surveillance, Detection, Reporting, and Response
3. Prevention
4. Evaluation, Oversight, and Communication

With new Ebola-related, infection control activities, the following two tables have been added to reflect those activities:

5. Infection Control Assessment and Response (Ebola-associated activity from FOA Supplement, CK14-1401PPHFSUPP15, Project A)
6. Targeted Healthcare Infection Prevention Programs (Ebola-associated activity from FOA Supplement, CK14-1401PPHFSUPP15, Project B)

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.

Template for developing HAI plan

The following template provides choices for enhancing state HAI prevention activities in the six areas identified above. For each section, please choose elements which best support current activities or planned activities. Current activities are those in which the state is presently engaged and includes activities that are scheduled to begin using currently available resources. Planned activities represent future directions the state would like to move in to meet currently unmet needs, contingent on available resources and competing priorities. A section for additional activities is included to accommodate plans beyond the principal categories.

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. Please select areas for development or enhancement of state HAI surveillance, prevention, and control efforts.

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
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. Establish statewide HAI prevention leadership through the formation of multidisciplinary group or state HAI advisory council <ul 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
		<p><i>2015.</i></p> <p><i>iii. The HAI Advisory Committee has made antimicrobial stewardship a priority topic and since 2013 has discussed ongoing activities to support improved antibiotic use and the antibiotic-resistant threats facing Arkansas at nearly every meeting since. The HAI Program with the committee's support has participated in various local and national initiatives to engage healthcare workers and the public on this topic. Going forward, both the HAI Advisory Committee and the HAI Program will continue to identify, address, and participate in efforts to reduce antimicrobial resistant pathogens.</i></p> <p><i>iv. The HAI Advisory Committee was a significant factor in the creation and passing of Arkansas Act 634 of 2011 that mandated sharing of HAI data from the NHSN from acute care hospitals. The committee continues to evaluate the data submitted and provides guidance on the need for expanded data access.</i></p> <p><i>v. The HAI Program has adopted the HHS HAI Prevention Targets outlined in the HHS National Action Plan as suitable prevention goals. Arkansas has met the HHS goal for only one measure; therefore expanded state targets have not been established as national targets have not been met. When applicable, the HAI Advisory Committee will be consulted on establishing state targets once national targets are being met.</i></p>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<p>2. Establish an HAI surveillance prevention and control program</p> <p>i. Designate a State HAI Prevention Coordinator</p>	<p>Completed</p>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<p>ii. Develop dedicated, trained HAI staff with at least one FTE (or contracted equivalent) to oversee HAI activities areas (Integration, Collaboration, and Capacity</p>	<p>Completed</p>

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
		Building; Reporting, Detection, Response, and Surveillance; Prevention; Evaluation, Oversight, Communication, and Infection Control)	
		<p><i>Other activities or descriptions:</i></p> <p><i>A State HAI Prevention Coordinator position has been designated and continues to be maintained. Due to the limited amount of recurrent funding that the ADH receives in regards to HAI Prevention Infrastructure, the program is only able to support two positions with dedicated activities regarding HAI surveillance and prevention. However, Arkansas received a significant amount of one-time funding to engage hospitals and other healthcare facilities on basic infection control practices and dealing with high consequence pathogens such as Ebola. This funding has allowed the program to add additional staff to enhance core activities regarding outbreak reporting, facility mapping, on site assessments, protocol development, and informatics. In addition, this funding has provided the opportunity to support two in training students from the University of Arkansas for Medical Sciences Fay W. Boozman College of Public Health.</i></p> <p><i>The HAI Prevention Coordinator along with program staff regularly attends and participates in various national and local on site and webinar trainings to enhance the capabilities of HAI Prevention and Outbreak response here in Arkansas.</i></p>	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<p>3. Integrate laboratory activities with HAI surveillance, prevention, and control efforts.</p> <p style="padding-left: 40px;">i. Improve laboratory capacity to confirm emerging resistance in HAI pathogens and perform typing where appropriate (e.g., outbreak investigation support, HL7</p>	<p>2017-2018</p>

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
		messaging of laboratory results)	
		<p><i>Other activities or descriptions:</i></p> <p><i>The ADH HAI Program currently has limited laboratory capacity but could expand if needed in terms of a significant outbreak investigation. We are beginning to partner with our state’s NEDSS (National Electronic Disease Surveillance System) group to identify potential functionality of electronic lab reporting and how this data could be integrated into the current information the HAI program has on antibiotic resistant pathogens of interest. Future activities include partnering with the ADH Public Health Laboratory to identify potential opportunities for expanded laboratory support as it relates to HAI and Antimicrobial Resistance surveillance.</i></p>	
☒	☐	<p>4. Improve coordination among government agencies or organizations that share responsibility for assuring or overseeing HAI surveillance, prevention, and control (e.g., State Survey agencies, Communicable Disease Control, state licensing boards)</p>	Ongoing
		<p><i>Other activities or descriptions:</i></p> <p><i>HAI Program staff attends weekly updates regarding communicable disease in Arkansas and participates in weekly meetings to ensure that the program is aware of HAI issues in a timely matter. Additionally, the HAI Prevention Coordinator regularly meets with both internal and external partners such as our state hospital association, quality improvement organization, and local professional organizations to ensure transparency of activities and reduce duplication. The program also communicates with the licensing and survey professionals at the Arkansas Department of Health on HAI topics when warranted.</i></p>	

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
		<p><i>Going forward, the HAI Program would like to expand communication and partnership routes with long-term care licensing and survey representatives.</i></p>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<p>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. Providing technical assistance or other incentives for implementations of standards-based reporting can 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). Facilitating use of standards-based solutions for external reporting also can strengthen relationships between healthcare facilities and regional nodes of healthcare information, such as Regional Health Information Organizations (RHIOs) and Health Information Exchanges (HIEs). These relationships, in turn, can yield broader benefits for public health by consolidating electronic reporting through regional nodes.</p>	<p>Ongoing</p>
		<p><i>Other activities or descriptions:</i></p> <p><i>The CDC's NHSN has been established as the HAI surveillance system in Arkansas to meet mandated HAI reporting detailed in Arkansas Act 634 of 2011. NHSN allows for electronic reporting of HAI data with CDC establishing and maintaining protocols for surveillance definitions. The HAI Program in collaboration with our external partners has developed an Arkansas NHSN users group meeting to discuss surveillance updates and provide guidance and facilitation on HAI surveillance best practices.</i></p> <p><i>Arkansas has developed and implemented a Health Information Exchange but this information is not currently available to the HAI Program. The HAI program will explore availability of this data going forward but specific protocols for identifying useful and relevant HAI data from this format have not been explored and will need to be implemented before fully integrating this</i></p>	

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
		<p><i>capability.</i></p> <p><i>The HAI program is beginning to partner with our state's NEDSS group to identify potential functionality of electronic lab reporting and how this data could be integrated into the current information the HAI program has on antibiotic resistant pathogens of interest.</i></p>	

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.¹ 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 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)

State 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.

¹ Thacker SB, Berkelman RL. Public health surveillance in the United States. *Epidemiol Rev* 1988;10:164-90.

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
☒	☐	1. Improve HAI outbreak detection and investigation	Ongoing
☐	☒	i. Work with partners including CSTE, CDC, state legislatures, and providers across the healthcare continuum to improve outbreak reporting to state health departments	July 2016
☒	☐	ii. Establish protocols and provide training for health department staff to investigate outbreaks, clusters, or unusual cases of HAIs.	Ongoing
☐	☒	iii. Develop mechanisms to protect facility/provider/patient identity when investigating incidents and potential outbreaks during the initial evaluation phase, where possible, to promote reporting of outbreaks	July 2016
		<p><i>Other activities or descriptions:</i></p> <p><i>i. The HAI Program is currently working on a collaborative effort with the ADH's Emergency Preparedness Branch to create a web-based database that will house the primary infection control point of contact and additional facility information for healthcare facilities throughout Arkansas. The database will allow for easier dissemination of important contact information during an HAI outbreak. Additionally, ADH will take the lead in communicating with various partners such as the state legislature and local hospital, quality improvement</i></p>	

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
		<p><i>organizations, and professional organizations about the importance of outbreak reporting to the health department. In addition, HAI Program staff regularly attends trainings regarding general and HAI outbreak investigations held by CDC, the Council of State and Territorial Epidemiologists (CSTE), and the Association for Professionals in Infection Control and Epidemiology (APIC).</i></p> <p><i>ii. The HAI Program will help facilitate the development of protocols and training opportunities for reporting of HAI outbreaks and clusters. CDC, CSTE, APIC, and other external partners may be able to aid in the development of protocols and to serve as a resource for other materials.</i></p> <p><i>iii. ADH already has mechanisms in place to protect all identities involved during outbreak/incident investigations.</i></p> <p><i>iv. An overarching goal of the HAI Program is to improve the use of HAI surveillance data (NHSN, NEDSS, syndromic, surveys, etc.) as well as to develop improved methods to identify trends and outbreaks. Enhanced cooperation with the Communicable Disease Department of ADH will improve notification of healthcare-associated infections that are not on the reportable disease list. Additionally, the HAI Program, with consultation with the HAI Advisory Committee, intends to develop guidance on how to collectively work together in the event of a regional/state outbreak. Of note, an HAI section is available in the ADH outbreak plans.</i></p>	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<p>2. Enhance laboratory capacity for state and local detection and response to new and emerging HAI issues.</p>	<p>July 2018</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></p> <p><i>The ADH HAI Program currently has limited laboratory capacity but could expand if needed in terms of a significant outbreak investigation. That being said, increased capacity building should include all laboratories within the state. The ADH Public Health Lab currently does outreach and training in regards to bioterrorism capacity. Ideally, the HAI Program would partner with this existing program (if able to) to utilize previously built connections and communication channels to provide guidance on responding to new and emerging HAIs.</i></p>	
<input type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input type="checkbox"/>	<p>3. Improve communication of HAI outbreaks and infection control breaches</p> <ul style="list-style-type: none"> i. Develop standard reporting criteria including, number, size, and type of HAI outbreak for health departments and CDC ii. Establish mechanisms or protocols for exchanging information about outbreaks or breaches among state and local governmental partners (e.g., State Survey agencies, Communicable Disease Control, state licensing boards) 	<p>April 2016</p> <p>Ongoing</p>
		<p><i>Other activities or descriptions:</i></p> <p><i>i. An HAI outbreak summary template with defined fields is in the process of being created in an effort to standardize the way that HAI</i></p>	

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
		<p><i>outbreak information is presented. This template will additionally help define fields in an HAI outbreak response and management spreadsheet which will allow for investigations to be tracked and analyzed for trends.</i></p> <p><i>ii. The ADH has established mechanisms and protocols for sharing outbreak information both internally and externally. These include weekly communicable disease round tables as well as mass distributing messages utilizing the Health Alert Network (HAN). The program is working to increase the number of healthcare workers signed up to receive messages through the HAN.</i></p>	
<input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<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 Staphylococcus aureus (MRSA) Infections v. Surgical Site Infections (SSI) vi. Ventilator-associated Pneumonia (VAP) 	Completed
		<p><i>Other activities or descriptions:</i></p> <p><i>The two priority prevention targets were chosen based on prevalence and performance of Arkansas rates compared to national rates. CAUTIs represent the most frequently reported device-associated infection and remain a target and priority for our external partners' prevention collaboratives.</i></p>	

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
		<p><i>MRSA bloodstream infections account for the state's highest SIR and was statistically higher than the nation for 2013. Additional analyses on the geographic variation within the state for these two metrics are planned, as well as outreach to facilities with the highest number and rates of infection for these two metrics.</i></p>	
<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<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). ii. Establish baseline measurements for prevention targets 	<p>Completed</p> <p>Completed</p>
		<p><i>Other activities or descriptions:</i></p> <p><i>i. The CDC National Healthcare Safety Network (NHSN) has been established as the HAI surveillance system in Arkansas to meet mandated HAI reporting detailed in Arkansas Act 634 of 2011. CDC has established and maintains protocols for surveillance definitions for HAI metrics submitted to NHSN. The NHSN metrics correlate with those in the HHS HAI Action Plan and success is based on data reported through NHSN. Arkansas has adopted the same prevention targets as HHS. This data is used to generate Standardized Infection Ratios (SIR) for each measure which compares the number of current infections to the number of predicted infections based on national baseline information.</i></p> <p><i>ii. CDC has established national baseline measurements for targeted HAI metrics. These baselines will be reevaluated throughout 2015 and the HAI Program will work to identify and support facilities as the new</i></p>	

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
		<i>baseline data is implemented in 2016.</i>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	6. Develop state surveillance training competencies <ul style="list-style-type: none"> i. Conduct local training for appropriate use of surveillance systems (e.g., NHSN) including facility and group enrollment, data collection, management, and analysis 	Ongoing
		<p><i>Other activities or descriptions:</i></p> <p><i>The HAI Program in collaboration with our external partners has established a regularly occurring NHSN users group call to provide guidance and assistance with utilization of NHSN and application of surveillance definitions. This online meeting has been well received by the target audience.</i></p> <p><i>Additionally, the State HAI Prevention Coordinator gives frequent presentations at state-wide meetings on using NHSN and how to analyze and interpret this data.</i></p>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	7. Develop tailored reports of data analyses for state or region prepared by state personnel	Ongoing
		<p><i>Other activities or descriptions:</i></p> <p><i>An annual report on Arkansas aggregate data is developed and released to the public that details current progress on HAI metrics and a brief financial analysis of impact, where applicable. The annual report is a requirement of Arkansas Act 845 of 2007. The annual HAI reports and recent HAI aggregate data can be found at the HAI</i></p>	

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
		<p><i>Program website:</i> http://www.healthy.arkansas.gov/programsServices/epidemiology/Pages/HAI.aspx.</p>	
<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>	<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>Ongoing</p> <p>Ongoing</p> <p>Ongoing</p> <p>July 2016</p> <p>July 2017</p> <p>July 2016</p> <p>Ongoing</p>
		<p><i>Other activities or descriptions:</i></p> <p><i>The HAI Program is in the process of developing and establishing a validation plan to assess the quality and accuracy of data entered into CDC's NHSN surveillance system. This is a high priority as this data is used to measure HAI prevention progress in aggregate for the state but to also compare individual facilities and assist those with higher rates.</i></p> <p><i>Currently, the Program has visited a few targeted facilities to pilot validation techniques with a goal to implement statewide in years to</i></p>	

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
		<i>come. The CDC has developed validation toolkits and the program aims to appropriately incorporate those materials into our validation plan. Findings and successes/barriers of validation activities have and will continue to be reported to the HAI Advisory Committee.</i>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	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	July 2016
		<i>Other activities or descriptions:</i> <i>An HAI Outbreak Plan has been recently created to assist with outbreak management and has been added to the overall Outbreak Plan for the Arkansas Department of Health. The Arkansas Department of Health has contingency plans for large outbreaks that may involve activating the Emergency Operations Center and assistance by additional ADH staff and external partners.</i>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	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	Ongoing
		<i>Other activities or descriptions:</i> <i>According to ADH legal advice, ADH is not allowed into individual physician offices to investigate alleged complaints. Some physicians have labeled outpatient surgery centers as physician offices and are therefore not subject to ADH oversight. This poses a challenge for the</i>	

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
		<p><i>HAI Program and its investigative responsibility for provider infection control practice. However, ADH works closely with professional licensing boards and has successfully conducted investigations in non-hospital settings in the recent past. The HAI Program is available to provide assistance when requested.</i></p>	
<input type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input type="checkbox"/>	<p>11. Adopt integration and interoperability standards for HAI information systems and data sources</p> <ul style="list-style-type: none"> i. 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) across the spectrum of inpatient and outpatient healthcare settings ii. Promote definitional alignment and data element standardization needed to link HAI data across the nation. 	<p>July 2017</p>
		<p><i>Other activities or descriptions:</i></p> <ul style="list-style-type: none"> <i>i. HAI surveillance data available to the HAI Program continues to expand and as such strategies and techniques are being identified and implemented to analyze this data to provide useful information for infection prevention. The goal is to develop a process for identifying clusters and actionable thresholds based on baseline data and geo/spatial elements.</i> <i>ii. Arkansas has joined other states in mandating HAI surveillance using CDC's NHSN. CDC has established and maintains surveillance</i> 	

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
		<i>protocols enabling comparability of HAI data across the nation.</i>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<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 style="padding-left: 40px;">i. Report HAI data to the public</p>	Ongoing
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<p><i>Other activities or descriptions:</i></p> <p><i>Arkansas has established NHSN as the HAI surveillance system for the state. NHSN allows for electronic reporting of HAI data with CDC establishing and maintaining protocols for surveillance definitions. Additionally, the HAI Program supports the use of the NHSN Antibiotic Use and Resistance module to gather data electronically regarding antibiotic prescribing and resistant pathogens of interest. However, there is no mandate for use of this module and implementation of a fully electronic reporting mechanism has been identified as a barrier to facilities at this time. As interest in this topic area increases, the HAI Program will collaborate with CDC on implementing this reporting in Arkansas hospitals.</i></p> <p><i>The program is beginning to partner with our state's NEDSS (National Electronic Disease Surveillance System) group to identify potential functionality of electronic lab reporting and how this data could be integrated into the current information the HAI program has on antibiotic resistant pathogens of interest.</i></p>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	13. Make available risk-adjusted HAI data that enable state agencies	Ongoing

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
		to make comparisons between hospitals.	
		<p><i>Other activities or descriptions:</i></p> <p><i>An annual report on Arkansas aggregate data is developed and released to the public that details current progress on HAI metrics and a brief financial analysis of impact, where applicable. Data comes from Arkansas hospitals reporting into NHSN and is displayed as a Standardized Infection Ratio (SIR). SIRs are risk-adjusted by hospital characteristics, patient acuity, and patient census. The annual report is a requirement of Arkansas Act 845 of 2007. The annual HAI reports and recent HAI aggregate data can be found at the HAI Program website:</i></p> <p><i>http://www.healthy.arkansas.gov/programsServices/epidemiology/Pages/HAI.aspx.</i></p> <p><i>Additionally, the HAI Program has created individual hospital reports that detail and interpret prevention progress as compared to the established national baselines. Also included, are blinded graphs that depict how that facility is doing compared to other Arkansas facilities for each metric. These reports are confidential and are only shared with each corresponding facility to stay compliant with Arkansas Act 634 of 2011 Section 8 "Privacy and Confidentiality" requirements for data display and sharing.</i></p>	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	14. Enhance surveillance and detection of HAIs in nonhospital settings	Pending National Guidance
		<p><i>Other activities or descriptions:</i></p> <p><i>Currently, non-hospital facilities do not report their HAI data to ADH. The surveillance of HAI in these settings is challenging and may need</i></p>	

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
		<p><i>to be addressed on a national level with guidance provided to the individual state programs. The providers will need to be engaged from the very beginning of this process and will need to have buy-in for this to be successful.</i></p>	

3. Prevention

State 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. Please select areas for development or enhancement of state HAI prevention efforts.

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
<input type="checkbox"/>	<input checked="" type="checkbox"/>	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. 	July 2017
		<i>Other activities or descriptions:</i> <i>The HAI Program will develop a plan to implement HICPAC recommendations into the prevention activities focused for CAUTIs and MRSA bloodstream infections.</i>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	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> <i>The HAI State Coordinator regularly meets with both external partners</i>	

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
		<i>such as our state hospital association, quality improvement organization, and local professional organizations (e.g. APIC) to discuss progress of Arkansas facilities on HAI prevention, new initiatives, ensure transparency of activities, and reduce duplication.</i>	
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<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><i>Other activities or descriptions:</i></p> <p><i>The HAI Program does not have the financial support to conduct an independent HAI collaborative at this time. However, the HAI Program is currently supporting and advising current quality improvement initiatives and collaboratives involving multiple acute care hospitals regarding antimicrobial stewardship conducted by external partners and shareholders.</i></p>	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<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, 	2017

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
		public education campaigns, and targeted provider education) or work with healthcare partners to establish best practices for training and certification	
		<p><i>Other activities or descriptions:</i></p> <p><i>Feedback and results from on-site infection control assessments mentioned in Section 6 will allow the HAI Program to describe common limitations observed. This data may prove useful in developing targeted HAI Prevention and Infection Control trainings.</i></p>	
<input type="checkbox"/>	<input type="checkbox"/>	5. Establish collaborative(s) to prevent HAIs in nonhospital settings (e.g., long term care, dialysis)	
		<p><i>Other activities or descriptions:</i></p> <p><i>The HAI Program does not have the financial support to conduct an independent nonhospital setting HAI collaborative at this time. However, the HAI Program remains committed to supporting and advising current quality improvement initiatives and collaboratives conducted by external partners and shareholders. For example, the program encourages participation of affiliated nonhospital facilities in recognition of the importance of the healthcare continuum to enhance intra-facility transfer of best practices in regards to HAI prevention and antimicrobial stewardship.</i></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. Please select areas for development or enhancement of state HAI prevention efforts.

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
<input type="checkbox"/> <input type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	1. Conduct needs assessment and/or evaluation of the state HAI program to learn how to increase impact <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 	November 2015 July 2016
		<p><i>Other activities or descriptions (not required):</i></p> <p><i>The HAI Program is in the process of developing and conducting a needs assessment to identify needs associated with HAI surveillance, education, prevention, analysis, and access to resources. A few questions will be geared towards defining best communication routes and training preferences.</i></p> <p><i>Information received from the needs assessment will be presented to the HAI Advisory Committee and a plan to implement approaches to address key needs.</i></p>	
		2. Develop and implement a communication plan about the state’s HAI program and about progress to meet public and private stakeholders needs	

<input checked="" type="checkbox"/>	<input type="checkbox"/>	<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>	<p>Ongoing</p>
		<p><i>Other activities or descriptions:</i></p> <p><i>An annual report on Arkansas aggregate data is developed and released to the public that details current progress on HAI metrics and a brief financial analysis of impact, where applicable. Data comes from Arkansas hospitals reporting into NHSN and is displayed as a Standardized Infection Ratio (SIR). SIRs are risk-adjusted by hospital characteristics, patient acuity, and patient census. HAI data is also displayed on the website. The annual HAI reports and recent HAI aggregate data can be found at the HAI Program website: http://www.healthy.arkansas.gov/programsServices/epidemiology/Pages/HAI.aspx.</i></p> <p><i>The HAI State Prevention Coordinator gives frequent presentations to a variety of audiences on the current status of HAI prevention in Arkansas as well as addresses state priorities.</i></p>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<p>3. Provide consumers access to useful healthcare quality measures</p> <p>i. Disseminate HAI data to the public</p>	<p>Ongoing</p>
		<p><i>Other activities or descriptions:</i></p> <p><i>Aggregate Arkansas HAI data is available to the public through the HAI Annual Report, as well as the HAI Program website. A link to CMS' Hospital Compare website is posted on the program's website for those that are interested in a specific hospital's rate.</i></p>	

<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. Guide patient safety initiatives i. Identify priorities and provide input to partners to help guide patient safety initiatives and research aimed at reducing HAIs	Ongoing
		<i>Other activities or descriptions:</i> <i>The HAI Program works to guide patient safety initiatives by collaborating on quality improvement initiatives with the Arkansas Hospital Association and the Arkansas Foundation for Medical Care.</i>	

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 health care 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
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. Create an inventory of all healthcare settings in state. List must include at least one infection control point of contact at the facility	November 2015
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. Identify current regulatory/licensing oversight authorities for each healthcare facility and explore ways to expand oversight	November 2015

		<p><i>Other activities or descriptions:</i></p> <p><i>1. The HAI Program is currently working on a collaborative effort with the ADH's Emergency Preparedness Branch to create a web-based database that will house an inventory of the state's healthcare facilities. This web based resource will include primary infection control point of contacts as well as other relevant infection control information for each healthcare facility. This database has been created in a way so that it will be both easily updatable and accessible to all infectious disease departments within ADH.</i></p> <p><i>2. As this database is created, information regarding current regulatory/licensing oversight authorities will also be collected to identify additional stakeholders that have regulatory oversight of infection control activities.</i></p>	
<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<p>3. Assess readiness of Ebola-designated facilities within the state</p> <ul style="list-style-type: none"> i. Use CDC readiness assessment tool and determine gaps in infection control ii. Address gaps (mitigate gaps) iii. Conduct follow-up assessments 	<p>Ongoing</p> <p>Ongoing</p> <p>Ongoing</p>
		<p><i>Other activities or descriptions:</i></p> <p><i>The HAI Program has formalized an Ebola Response Team for Arkansas (ERTA). This team includes ID physicians, an infection control nurse, HAI staff, EMS staff, and various subject matter experts. The ERTA team will review the CDC readiness assessment tool and develop based on those a logistical plan for conducting assessments. These assessments will include conducting pre- and post-inspection education with all</i></p>	

		<i>institutions via a telemedicine network, conducting on-site and follow-up inspections and assessments, and providing assistance in mitigating gaps according to the defined Ebola preparedness standards.</i>	
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	4. Assess outbreak reporting and response in healthcare facilities <ul style="list-style-type: none"> 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 	April 2016 April 2016 April 2016
		<i>Other activities or descriptions:</i> <i>In order to investigate gaps in the outbreak detection, reporting, and response of HAI outbreaks, the HAI program plans to survey healthcare facilities within the state using the CDC's forthcoming standardized outbreak assessment tool. The information from these surveys will be used to address the observed gaps internally and externally in outbreak response and reporting. The HAI program plans to use additional strategies such as, data sharing, streamlining the outbreak reporting process, creating standardized procedures/protocols for outbreak management, and conducting trainings and speaking to these topics at statewide meetings.</i>	

Table 6: Targeted Healthcare Infection Prevention Programs

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
<input type="checkbox"/>	<input checked="" type="checkbox"/>	1. Expand infection control assessments <ul style="list-style-type: none"> i. Expand assessments to other additional facilities and other healthcare settings and determine gaps in infection control 	2016-2018

		train-the-trainer programs in key domains of infection control, including the incorporation of hands on evaluations and competency assessments of best practices and a system to monitor ongoing compliance and competency.	
		<p><i>Other activities or descriptions:</i></p> <p><i>i. The HAI Program will expand conversations about infection control capacity and oversight to the state licensing board in an effort to incorporate infection control knowledge into the licensing, credentialing, or continuing education requirements for clinical care providers.</i></p> <p><i>ii. ADH will establish contractual support from an outside stakeholder to conduct three regional trainings in the latter part of year 2 of the ELC Ebola Supplement grant. This training program will be based on information gathered from the assessment of the EACs as well as the outbreak reporting and response surveys conducted during the Year 1 and Year 2 funding period. The quality of the training program will be compared with the guidelines from APIC that outline core competencies of infection control practitioners. Additional lectures and curriculum will be provided to clinical care providers through educational outreach opportunities.</i></p>	
<input type="checkbox"/> <input type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<p>3. Enhance surveillance capacity to improve situational awareness, describe emerging threats, and target onsite assessments to implement prevention programs</p> <p>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.</p> <p>ii. Work with CDC to guide analytic direction and identify facilities for prioritized assessments/response</p>	2016-2020

<input type="checkbox"/> <input type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<p>iii. Improve outbreak reporting capacity by developing an infrastructure that includes clear definitions of infectious threats of epidemiologic importance that are communicated to facilities</p> <p>iv. Implement a response plan to address potential emerging threats identified by using enhanced surveillance</p>	
		<p><i>Other activities or descriptions:</i></p> <p><i>i. ADH is in the process of hiring an Informatician/Database Analyst who will use currently available NHSN data to automate production of facility-specific reports in order to identify facilities with higher than predicted HAIs. This online web interface will include a reporting tool to allow ICPs to query and visualize their facility-specific data, including HAI data reported to NHSN. Additionally, this web interface will include an outlet for voluntary reporting of healthcare-associated infections and outbreaks beyond those that are routinely reported to NHSN or NEDSS as well as an outlet for general communicable disease reporting of required notifiable conditions by all healthcare providers.</i></p> <p><i>ii. The Informatician will assist the ELC epidemiologist and existing surveillance staff to implement aberration detection functionality that can be applied to NHSN, NEDSS, and syndromic surveillance data.</i></p> <p><i>iii. The existing HAI response plan will be reviewed to identify gaps and establish priorities. Additionally, HAI staff will compare the functionality of aberration detection functionality to traditional outbreak detection mechanisms with an emphasis on sensitivity and timeliness.</i></p>	

Appendix 1

The HHS Action plan identifies metrics and 5-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. Please select items or add additional items for state planning efforts.

Metric Number and Label	Original HAI Elimination Metric	HAI Comparison Metric	Measurement System	National Baseline Established (State Baselines Established)	National 5-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 5-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
$\text{SIR} = \frac{\text{observed}}{\text{expected}} = \frac{170 + 58}{100000 \times \left(\frac{2}{1000}\right) + 58,000 \times \left(\frac{1.5}{1000}\right)} = \frac{228}{200 + 87} = \frac{228}{287} = 0.79 \quad 95\% \text{CI} = (0.628, 0.989)$						

*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 5-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 5-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 5-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)