

Arkansas State Plan for Healthcare Associated Infections

In response to the increasing concerns about the public health impact of healthcare-associated infections (HAIs), the Arkansas Department of Health (ADH) in conjunction with the HAI Advisory Committee has developed an Action Plan to control and prevent Healthcare-Associated Infections in Arkansas. The Action Plan includes recommendations for surveillance, research, communication and metrics for measuring progress towards national goals.

The template that was used to draft the state plan will help to ensure progress towards national prevention targets as described in the HHS Action Plan, wherein CDC is leading the implementation of recommendations on National Prevention Targets and Metrics and the implementation of priority prevention recommendations, while allowing flexibility to tailor the plan to Arkansas' specific needs.

Initial emphasis for HAI prevention may focus on acute care, inpatient settings, yet the need for prevention activities for outpatient settings is recognized. The ADH is increasingly challenged by the needs to identify, respond to, and prevent HAI across the continuum of settings where healthcare is currently delivered. The public health model's population based perspective places the ADH 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 the non-hospital setting, infection control and oversight have been lacking and outbreaks –which can have a wide-ranging and substantial impact on affected communities-, are increasingly reported. At the same time, trends toward mandatory reporting of HAIs from hospitals reflect increased demand for accountability from the public.

The current state plan/template targets the following areas:

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

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. The framework is based on a collaborative public health approach that includes surveillance, outbreak response, research, training and education, and systematic implementation of prevention practices. Recent legislation in support of HAI prevention provides a unique opportunity to strengthen existing and expand state capacity for prevention efforts.

Support for HAI prevention has been enhanced through the American Recovery and Reinvestment Act (ARRA). Congress allocated \$40 million through CDC to support state health department efforts to prevent HAIs by enhancing state capacity for HAI prevention, leverage CDC's National Health Care Safety Network to assess progress and support the dissemination of HHS evidence-based practices within healthcare facilities, and pursue state-based collaborative implementation strategies. In addition, the Center for Medicaid Services (CMS) will support expansion of State Survey Agency inspection capability of Ambulatory Surgery Centers nationwide through \$10 million of ARRA funds. This template is intended to support the high level of reporting and accountability required of ARRA recipients.

1. Develop or 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.

Planning Level	Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
Level I	X	<input type="checkbox"/>	1. Establish statewide HAI prevention leadership through the formation of multidisciplinary group or state HAI advisory council	2009 – 2010
		X	<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 (LTCFs)) ii. Identify specific HAI prevention targets consistent with HHS priorities 	March 2010
			<i>Other activities or descriptions (not required): The current advisory committee has been formed and will be expanded as</i>	March 2010

Planning Level	Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
			<i>needed to reflect the needs of the state's HAI functions. A representative from the state public health laboratory will be added to the committee as well as representatives from long term care facilities and dialysis centers.</i>	
	X	<input type="checkbox"/>	2. Establish an HAI surveillance prevention and control program Designate a State HAI Prevention Coordinator	October 2009
	<input type="checkbox"/>		ii. Develop dedicated, trained HAI staff with at least one FTE (or contracted equivalent) to oversee the four major HAI activity areas (Integration, Collaboration, and Capacity Building; Reporting, Detection, Response and Surveillance; Prevention; Evaluation, Oversight and Communication)	2010 – 2011 (as funding permits)
	X		i. <i>Other activities or descriptions (not required): The HAI Prevention Coordinator/Epidemiologist (Catherine Tapp, MPH) was brought on board in October in time for her to travel to the HAI Grantee meeting that was held in Atlanta. Due to the limited amount of funding that was awarded to Arkansas, only two FTE's will be hired to develop and oversee the HAI program. An administrative assistant position has been sent to personnel to be posted. Currently, administrative support is being borrowed from other programs when needed. It will be a challenge for the state to complete all the activities described in this plan without funding for additional staff.</i>	
	<input type="checkbox"/>	X	3. Integrate laboratory activities with HAI surveillance, prevention and control efforts. i. Improve laboratory capacity to confirm emerging resistance in HAI pathogens and perform typing where appropriate (e.g., outbreak investigation)	2010 – 2011

Planning Level	Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
			support, HL7 messaging of laboratory results)	
			<i>Other activities or descriptions (not required): Collaborate with the ADH Public Health Laboratory and coordinate with NEDSS (National Electronic Disease Surveillance System) to integrate lab activities with HAI surveillance. Methodology on how to receive HL-7 messaging will need to be developed for HAI surveillance. Dr. Nate Smith, the HAI grant Principal Investigator, will follow up on these activities and will report back to the advisory committee all of his findings.</i>	
Level II	<input type="checkbox"/>		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)	April 2010
	X		<i>Other activities or descriptions (not required): The ADH will take a lead in coordinating with the Department of Human Services for inclusion of long term care facilities, the Arkansas State Board of Medicine and the State Board of Nursing. We will coordinate and share with them our mission, goals and future plans with regards to HAI prevention. Each of our roles will need to be defined and a coordinated effort will need to be established on how we will all work together to accomplish common objectives.</i>	
	<input type="checkbox"/>	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. 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	Goal date not yet defined.

Planning Level	Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
			<p>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><i>Other activities or descriptions (not required):</i> <i>The National Healthcare Safety Network (NHSN) reporting will be the core of this program. Health Information Exchange (HIE) is in the development process, and we need to explore how to specifically identify HAI disease in the HIE. HIE has been given a grant to create a communication exchange so that facilities and providers can exchange electronic health records. HAI needs to assist the communication of a standardized definition of HAI diseases. NHSN has their own standard definitions, and we need to coordinate with and encourage all reporting facilities and providers to abide by these. The HAI program needs to communicate that one specification of the HIE is to be able to identify where infections occur and communicate this between facilities.</i></p>	
<p>Please also describe any additional activities, not listed above, that your state plans to undertake. Please include target dates for any new activities.</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)

Work is ongoing to identify optimal metrics and targets for VAP infection. However, detection and measurement with existing tools and methods can be combined with recognized prevention practices in states where an opportunity exists to pursue prevention activities on that topic.

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. Please choose items to include in your plan at the planning levels desired.

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

Planning Level	Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
Level I	X	<input type="checkbox"/>	1. Improve HAI outbreak detection and investigation i. Work with partners including CSTE, CDC, state legislatures, and providers across the healthcare continuum to improve outbreak reporting to state health departments	2010 – 2011
	<input type="checkbox"/>	X	ii. Establish protocols and provide training for health department staff to investigate outbreaks, clusters or unusual cases of HAIs.	September 2010
	X	<input type="checkbox"/>	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	2009 – 2010
	<input type="checkbox"/>	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)	January 2011
			<i>Other activities or descriptions (not required): The ADH will take the lead in communicating with various partners such as the state legislature and local hospital organizations about the importance of outbreak reporting to the health department.</i>	

Planning Level	Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
			<p><i>The HAI program will help facilitate the development of protocols and training opportunities for surveillance and reporting of HAI's. The existing EM System that is currently being used for influenza reporting could be expanded to fit the needs of the HAI program. The national and local chapters of the Association of Professionals in Infection Control and Epidemiology (APIC) as well as the Arkansas Foundation for Medical Care (AFMC) may also be able to aid in the development of protocols and training opportunities and to serve as a resource for other materials.</i></p> <p><i>ADH already has mechanisms in place to protect all identities involved during outbreak/incident investigations.</i></p> <p><i>An overarching goal of the HAI program is to improve the overall use of surveillance data and determine where the program can expand and improve. The Advisory Committee intends to develop guidance on how to collectively work together in the event of a regional/state outbreak and how to strengthen the capacity of each organization involved.</i></p>	
	X	<input type="checkbox"/> 2.	Enhance laboratory capacity for state and local detection and response to new and emerging HAI issues.	
			<p><i>Other activities or descriptions (not required):</i></p> <p><i>This endeavor needs to include all laboratories within the state along with the state public health lab. Some lab outreach and training activities are already in place with the Bioterrorism program, so the HAI program will examine these efforts and expand upon them to meet the needs for HAI prevention.</i></p>	

Planning Level	Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
Level II	<input type="checkbox"/>	X	3. Improve communication of HAI outbreaks and infection control breaches i. Develop standard reporting criteria including, number, size and type of HAI outbreak for health departments and CDC	2010 – 2011
	<input type="checkbox"/>	X	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)	2010 – 2011
			<i>Other activities or descriptions (not required): Information from other states that have successfully implemented HAI prevention programs such as South Carolina and Pennsylvania will be requested and reviewed by the HAI Advisory Committee to see how Arkansas can adapt certain activities and criteria to the new HAI state program. The current communicable disease reporting protocols will be reviewed and updated. Criteria will be identified to report diseases that are not on the communicable disease report. It will also be important to review what neighboring states are doing and determine what activities and criteria can be applied to the Arkansas HAI program.</i>	
<input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/>	4. Identify at least 2 priority prevention targets for surveillance in support of the HHS HAI Action Plan i. Central Line-associated Bloodstream Infections (CLABSI) <i>Clostridium difficile</i> Infections (CDI) iii. Catheter-associated Urinary Tract Infections (CAUTI)	November 2009 November 2009	

Planning Level	Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
	<input type="checkbox"/>	X	iv. Methicillin-resistant Staphylococcus aureus (MRSA) Infections Surgical Site Infections (SSI) Ventilator-associated Pneumonia (VAP)	November 2009
	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<i>Other activities or descriptions (not required): The two priority prevention targets that were chosen include CLABSI and CAUTI. An attempt will be made to follow MRSA as an additional third target because of the critical need to reduce occurrences. Some activities are already underway, and these will be identified and built upon.</i>	
	X	v. vi. <input type="checkbox"/>	5. Adopt national standards for data and technology to track HAIs (e.g., NHSN). i. Develop metrics to measure progress towards national goals (align with targeted state goals). (See Appendix 1). ii. Establish baseline measurements for prevention targets	June 2010
	X	<input type="checkbox"/>	<i>Other activities or descriptions (not required): The Advisory Committee voted in a previous meeting to use NHSN as the reporting system that will be used to track HAI at both the state and local level. Once the state is given rights to the reported data, baseline measurements will be determined and used to develop metrics and measure progress towards national and state goals.</i>	
	<input type="checkbox"/>		6. Develop state surveillance training competencies i. Conduct local training for appropriate use of surveillance systems (e.g., NHSN) including facility and group enrollment, data collection, management, and analysis	January 2011

X

Planning Level	Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
			<p><i>Other activities or descriptions (not required):</i> <i>The HAI Coordinator will obtain rights to the data that have been reported to NHSN and will go through the training requirements and activities offered by the CDC. Once the training has been obtained, the ADH will move forward with additional staff training. The hospitals and other reporting sources require training on how to use NHSN for reporting their data. AFMC will be a valuable resource for the training activities because they have learned the system and have trained 13 of the hospitals that are reporting in Arkansas. APIC can also be used as a training resource.</i></p>	
	<input type="checkbox"/>	X	7. Develop tailored reports of data analyses for state or region prepared by state personnel	October 2010
			<p><i>Other activities or descriptions (not required):</i> <i>Once access to the NHSN data is obtained and training is completed, then state and regional data reports will be developed. A large amount of information about NHSN will need to be reviewed as well as the data analysis techniques that will be used for HAI data. Additional training and further guidance on best practices will need to be obtained from the CDC.</i></p>	
Level III	<input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> X <input type="checkbox"/> X X		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 <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 	October 2011

X

Planning Level	Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> X X	X	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	
			<i>Other activities or descriptions (not required): The HAI Advisory Committee would like for the HAI Program Coordinator to talk with South Carolina and other states to identify how they have implemented the data validation process into their programs. This will be a long process and will require additional monetary and staff resources to implement.</i>	
	<input type="checkbox"/>	X	9. Develop preparedness plans for improved response to HAI <ul style="list-style-type: none"> 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 	October 2010
			<i>Other activities or descriptions (not required): ADH preparedness plans and cancer cluster protocols will be reviewed for content and used for developing response plans for the HAI program. Step by step protocols will be developed and collaboration with the Epidemiology Branch will take place to coordinate and define the exact terminology of a cluster and outbreak situation. Contingency plans will be developed that will help define the roles of each partner organization.</i>	
	<input type="checkbox"/>	X	10. Collaborate with professional licensing organizations to	June 2010

Planning Level	Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
	<input type="checkbox"/>		the data i. Report HAI data to the public	
	X		<i>Other activities or descriptions (not required): There is a significant need to provide NHSN training for new and current health care facility staff. The state HAI program would like to partner with CDC and AFMC to coordinate a statewide training for all reporting facilities. This will be very important to enhance reporting and improve the outcome measures that will be analyzed. Additional resources will be needed in order to put together a training of this magnitude. The state law requires that an annual report be submitted in January. However, due to the delay in funding and other issues, this deadline will need to be pushed back until data are obtained and a report can be developed. A letter will be submitted to the appropriate committees at the state legislature stating the delay and reviewing what has been done with the HAI program thus far. This letter will be submitted right after the first of the year along with a copy of the proposed state HAI plan. Once an annual report is developed, it will be posted on the new HAI website along with the state HAI plan. The intent is to have very open and transparent program where the public will have access to the data reports and other program information.</i>	
	<input type="checkbox"/>	X	13. Make available risk-adjusted HAI data that enables state agencies to make comparisons between hospitals.	2010 – 2011
			<i>Other activities or descriptions (not required): All of the risk-adjusted data will be made available on the new HAI website as soon as it is available. These data will also be promoted and presented at a variety of venues such as local hospital infection control meetings, local chapter APIC meetings and other interested organizations. Additional time will be</i>	

Planning Level	Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
			<i>needed for the HAI program to obtain access to the NHSN data and to become trained and familiar with the various analyses associated with infection control data.</i>	
	<input type="checkbox"/>		14. Enhance surveillance and detection of HAIs in nonhospital settings	2011 or later
	X		<i>Other activities or descriptions (not required): Currently, non-hospital facilities do not report their HAI data. The surveillance of HAI in these settings is challenging and may need 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>	
Please also describe any additional activities, not listed above, that your state plans to undertake. Please include target dates for any new activities.				

3. Prevention

State implementation of HHS Healthcare Infection Control Practices Advisory Committee (HICPAC) recommendations is a critical step towards the elimination of HAIs. CDC with HICPAC has 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 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

Planning Level	Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
Level I	<input type="checkbox"/>	X	1. Implement HICPAC recommendations. i. Develop strategies for implementation of HICPAC recommendations for at least 2 prevention targets specified by the state multidisciplinary group.	2010 – 2011
			<i>Other activities or descriptions (not required): The HICPAC recommendations will be reviewed to determine how they relate to the three target areas (CLABSI, CAUTI and MRSA) that were chosen. These recommendations are a major resource for hospitals and are very well-defined. They make up a core component of hospital infection control programs within the state. A group from Johns Hopkins has developed an initiative (Stop BSI) that Arkansas will review to determine if it could be used as a resource to move forward with this activity (refer to Appendix 1A).</i>	
	<input type="checkbox"/>		2. Establish prevention working group under the state HAI advisory council to coordinate state HAI collaboratives i. Assemble expertise to consult, advise, and	2010 – 2011

Planning Level	Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
			coach inpatient healthcare facilities involved in HAI prevention collaboratives	
			<i>Other activities or descriptions (not required): A collaborative model is encouraged by the Department of Health and Human Services (HHS) and the Arkansas Hospital Association (AHA) is engaged as a key partner. They are still learning about the collaborative process but currently have 20 hospitals in their collaborative. AHA has agreed to provide assistance to the HAI prevention effort especially with the education and training components. Lack of necessary funding for training activities will be a challenge, and other sources will need to be explored. The HAI program may be able to partner with APIC and AHA to help establish training competencies because this activity coincides with their mission for continuing education and training.</i>	
	<input type="checkbox"/>	X	3. Establish HAI collaboratives with at least 10 hospitals (i.e. this may require a multi-state or regional collaborative in low population density regions)	2010 – 2011
	<input type="checkbox"/>	X	i. Identify staff trained in project coordination, infection control, and collaborative coordination	
	<input type="checkbox"/>	X	ii. Develop a communication strategy to facilitate peer-to-peer learning and sharing of best practices	
			iii. Establish and adhere to feedback of a clear and standardized outcome data to track progress	
			<i>Other activities or descriptions (not required): See description from #2 above.</i>	

Planning Level	Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
			<p><i>Other activities or descriptions (not required):</i> <i>The CDC guidelines have already been established in the health facility rules and regulations and will be the basis for hospitals. These are all part of the regulatory oversight for the survey activities with regards to infection control and surveillance. Expanding regulation and oversight to unregulated settings would be very difficult due to the issue with physician offices and ADH oversight of those.</i></p>	
	X	<input type="checkbox"/> 6.	Enhance prevention infrastructure by increasing joint collaboratives with at least 20 hospitals (i.e. this may require a multi-state or regional collaborative in low population density regions)	2009 – 2011
			<p><i>Other activities or descriptions (not required):</i> <i>The Arkansas Hospital Association is currently involved with a joint collaborative that involves 20 hospitals throughout the state. The HAI program is going to partner with AHA to learn more about their efforts and provide any assistance needed to enhance their current efforts.</i></p>	
	<input type="checkbox"/>	<input type="checkbox"/>	7. Establish collaborative to prevent HAIs in nonhospital settings (e.g., long term care, dialysis)	
			<p><i>Other activities or descriptions (not required):</i> <i>The HAI Advisory Committee needs further clarification from CDC on this particular area.</i></p>	
<p>Please also describe any additional activities, not listed above, that your state plans to undertake. Please include target dates for any new activities.</p>				

4. Evaluation and Communications

Program evaluation is an essential organizational practice in public health. Continuous evaluation and communication of practice 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 to occur. 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

Planning Level	Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
Level I	<input type="checkbox"/>	X	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 towards targets and ii. Establish systems for refining approaches based on data gathered 	2009 – 2010
	<input type="checkbox"/>	X		
				<i>Other activities or descriptions (not required): The evaluation component of the HAI program will be developed as the state plan and activities are also being developed. It may be challenging to establish an evaluation component for each element in the HAI plan, so further instruction and guidance from the CDC will be needed. It will be important to review other state evaluation plans to see how they can be adapted to Arkansas. The Advisory Committee suggested that Texas would be a good resource and recommended contacting the Texas HAI program for additional information on their evaluation process.</i>
	<input type="checkbox"/>		2. Develop and implement a communication plan about the state’s HAI program and progress to meet public and private stakeholders needs <ul style="list-style-type: none"> i. Disseminate state priorities for HAI 	August 2010

			prevention to healthcare organizations, professional provider organizations, governmental agencies, non-profit public health organizations, and the public	
			<p><i>Other activities or descriptions (not required):</i> <i>AFMC has established methodologies associated with these activities and will be a major resource for the HAI program. An HAI website will be developed in association with the ADH main website, where the public will have access to HAI FAQ's, the state plan, current activities within the state, infection control trainings and other HAI resource materials. The HAI program will coordinate with the AHA and other organizations such as APIC to provide links to the new website on their existing websites. Once the plan has been approved, a press release will be written to alert the media to this new program and the progress that is already underway within the state. The HAI program will be a presence at local and regional infection control and other related meetings throughout the state. It will be important to cultivate working relationships with these organizations so that the HAI prevention message can be disseminated to those who are already working within the field. This will be accomplished by attending meetings, hosting booths and speaking at these meetings.</i></p>	
	<input type="checkbox"/>	X	3. Provide consumers access to useful healthcare quality measures	Ongoing
Level II			<p><i>Other activities or descriptions (not required):</i> <i>It will be important to build upon what has already proven successful. Consumers are not very comfortable asking probing questions about what risks are really involved in hospital care. Patients need to be educated on how to ask the important questions and nurses need to be empowered to answer those questions and address patients concerns. This will involve some</i></p>	

		<i>very specific education and training for both consumers and health care providers. The current Speak Up for Safety campaign is an example of such a program.</i>	
Level III	<input type="checkbox"/>	4. Identify priorities and provide input to partners to help guide patient safety initiatives and research aimed at reducing HAIs	2011
	X	<i>Other activities or descriptions (not required): The HAI Advisory Committee stated the need to identify partners to assist with this aspect of HAI prevention. It will be important to find out what research other organizations such as Arkansas Children's Hospital (ACH) and the University of Arkansas for Medical Sciences (UAMS) are doing in this area. The committee suggested that the Agency for Healthcare Research and Quality (AHRQ), the Food and Drug Administration (FDA) or the National Center for Toxicological Research (NCTR) may be potential avenues for funding. Other resources will need to be explored as well.</i>	
Please also describe any additional activities, not listed above, that your state plans to undertake. Please include target dates for any new activities.			

by Pam Brown, RN, BSN, CPHQ; Elisa White, JD; and J. Gary Wheeler, MD, MPS

Healthcare-Associated Infections:

Arkansas Hospitals Work to Improve Patient Care and Cut Costs Through Prevention

Healthcare-associated infections (HAIs) have received increasing attention since the Institute of Medicine published its landmark 1999 report¹ highlighting the impact of HAIs on patients. An HAI is defined as an infection that was not present or incubating in the patient at the time of admission to a healthcare facility.

According to the Centers for Disease Control and Prevention, HAIs account for more than 1.7 million infections and 99,000 deaths annually and affect 5 percent to 10 percent of hospitalized patients.² Estimates of the overall annual direct medical costs to U.S. hospitals of all HAIs range from \$28.4 billion to \$45 billion.³

The most common site-associated HAIs are catheter-associated urinary tract infections (UTI), central line-associated bloodstream infections (CLABSI), surgical site infections and ventilator-associated pneumonia (VAP). Organism-specific pathogens that are increasing in number and contributing to the cost of HAIs include methicillin resistant *Staphylococcus aureus* (MRSA), *Clostridium difficile* (C. diff.) and extended spectrum beta-lactamase-producing gram negatives. Urinary tract infections are by far the most common, and bloodstream infections are the most costly. (See table.)

As the national focus on HAIs has intensified, Arkansas has also increased its efforts to reduce HAIs. In 2007, the Arkansas legislature reviewed a bill that would have mandated infection reporting by Arkansas hospitals. During that legislative session, however, the direction changed from mandated to voluntary reporting of a specific list

of healthcare-associated infections by hospitals and ambulatory surgery centers. Act 845 of 2007 created a task force, under the oversight of the Arkansas Department of Health, that was charged with determining the logistics of compiling reports for the state. Importantly, the act specifies that any data released publicly must not identify any specific health facility, patient, employee or healthcare professional.

included a component for recruiting hospitals to report MRSA data to the NHSN. The Arkansas Foundation for Medical Care was charged with recruiting two hospitals to report data and reduce MRSA through targeted strategies. Thirteen Arkansas hospitals signed up to participate.

Further, in January 2009, CMS began requiring that hospitals use "present on admission" coding for certain infectious conditions, includ-

Estimated Annual Hospital Cost of HAI by Site of Infection

MAJOR SITE OF INFECTION	TOTAL INFECTIONS	HOSPITAL COST PER INFECTION (2002 DOLLARS)	TOTAL ANNUAL HOSPITAL COST (IN MILLIONS)	DEATHS PER YEAR
Surgical site infection	290,485	\$25,546	\$7,421	13,088
Central line-associated bloodstream infection	248,678	\$36,441	\$9,062	30,665
Ventilator-associated pneumonia	250,205	\$9,969	\$2,494	35,967
Catheter-associated urinary tract infection	561,667	\$1,006	\$565	8,205

1. Klevens RM, Edwards JR, Richards CL, Horan T, Gaynes R, Pollock D, Cando D. Estimating healthcare-associated infections in U.S. hospitals, 2002. *Public Health Reviews* (in press).
2. Stone PW, Braccio D, Larson E. Systematic review of economic analysis of health care-associated infections. *Am J Infect Control* 2005;33:501-9.
3. Roberts RR, Scott RD, Cordell R, Solomon SL, Steele L, Kampe LM, Trick WE, Weinstein RA. The use of economic modeling to determine the hospital costs associated with nosocomial infections. *Clin Infect Dis* 2003;36:1424-32.

SOURCE: U.S. Department of Health and Human Services

It was decided that the Arkansas reporting initiative would use the CDC's National Healthcare Surveillance Network (NHSN), a national data bank for infection reporting. This will provide a means for reporting and could also provide national benchmarking for hospitals in Arkansas.

In August 2008, the Centers for Medicare & Medicaid Services (CMS) began the ninth Scope of Work, which

ing CLABSI, catheter-associated UTIs and surgical site infections. Those not documented by the physician as present on admission will not be considered for payment by Medicare.

AFMC and the Arkansas Hospital Association have supported Arkansas hospitals in their efforts to reduce HAIs through the Institute of Healthcare Improvement's

continued on page 34

100,000 Lives and 5 Million Lives campaigns. Interventions focused on a central line bundle, which has five components: hand hygiene, maximal barrier precautions, chlorhexidine skin antisepsis, optimal catheter site selection (the subclavian vein is the preferred site for non-tunneled catheters in adults), and daily review of line necessity.

challenge, and an adaptive component, which provides a framework for patient safety improvement at the local unit level. Specific interventions in the project will include: educating staff on evidence-based practices to reduce CLABSI; creating a standardized central line checklist based on these practices; empowering nurses and other staff members to

Pamela Brown is assistant vice president for healthcare quality improvement for AFMC. Elisa White is vice president and general counsel for the AHA. J. Gary Wheeler is AFMC's associate medical director of quality and a professor of pediatrics at the University of Arkansas for Medical Sciences.



Thirty-four Arkansas hospitals have joined the AHA's "Stop BSI" project, which kicked off in July.⁴ The aim of the project, which is being conducted in conjunction with the Johns Hopkins Research and Safety Group and led by Peter Pronovost, MD, PhD, is to dramatically improve patient safety, quality and costs by reducing CLABSI rates. Arkansas' project hopes to replicate the success of the Michigan Health & Hospital Association's Keystone Project, which lowered that state's CLABSI rate to nearly undetectable over five years. The Stop BSI project recognizes that patient safety should be approached in the same way as curing a disease – through rigorous scientific research that produces hard data with clear, measurable results.⁵

The project has a technical component, which provides concise evidence-based recommendations on how to address a specific clinical

improve communication and ensure effective use of the checklist; and holding monthly team meetings to assess progress. Data will be collected from participating hospitals monthly.

During the course of the two-year project, the AHA will act as the liaison between the hospitals and Johns Hopkins, and AFMC will provide monetary and other support. Clinical personnel will interact with local teams through conference calls and workshops in Little Rock.

Arkansas hospitals have enthusiastically embraced HAI projects and reporting and will continue to do so as new initiatives present themselves. As AFMC, AHA and the Arkansas Department of Health continue to support providers and hospitals in their efforts, we expect to see improved care for all Arkansas patients. For more information, contact Pamela Brown at 501-212-5310 or Elisa White at 501-224-7878.

References

1. Institute of Medicine. *To Err is Human: Building a Safer Health System*. Kohn L, Corrigan J, Donaldson M, eds. 1999.
2. Centers for Disease Control and Prevention. Estimates of healthcare-associated infections. Available at: www.cdc.gov/ncidod/dhqp/hai.html.
3. Scott RD. *The Direct Medical Costs of Healthcare-Associated Infections in U.S. Hospitals and the Benefits of Prevention*. National Center for Preparedness, Detection, and Control of Infectious Diseases, Centers for Disease Control and Prevention. 2009. Available online at: http://www.cdc.gov/ncidod/dhqp/pdf/Scott_CostPaper.pdf.
4. Participants in the Arkansas "Stop BSI" project as of July 23, 2009: Allegiance Specialty Hospital of Little Rock, Arkansas Heart Hospital, Arkansas Methodist Medical Center, Ashley County Medical Center, Baptist Health Extended Care, Baptist Health Medical Center-Heber Springs, BHMC-Little Rock, Bradley County Medical Center, Conway Regional Medical Center, Crittenden Regional Hospital, Cross Ridge Community Hospital, Drew Memorial Hospital, Five Rivers Medical Center, Lawrence Memorial Hospital, Mercy Medical Center, NEA Baptist Memorial Hospital, North Arkansas Regional Medical Center, North Metro Medical Center, Ouachita Medical Center, Ozark Health Medical Center, Saline Memorial Hospital, St. Bernards Medical Center, St. Joseph's Mercy Health Center, UAMS Medical Center, Washington Regional Medical Center, White County Medical Center, White River Medical Center.
5. Pronovost P. Testimony before the United States Senate Committee on Health, Education, Labor and Pensions' hearing, "Implementing Best Patient Care Practices."

This article was originally published in the October 2009 issue of the Journal of the Arkansas Medical Society. ●

Dr. Peter Pronovost Hosts Arkansas' First Face-to-Face "Stop BSI" Project Workshop

Dr. Peter Pronovost, who currently leads the Stop BSI project in the United States, and who led the Michigan Keystone Project that was the forerunner of this initiative, was the featured presenter at Arkansas' first face-to-face meeting of those participating in the state's "Stop BSI" (Bloodstream Infections) project.

Dr. Pronovost is an internationally renowned expert in the fields of patient safety, quality healthcare and evidence-based medicine. He currently chairs The Joint Commission's ICU Advisory Panel for Quality Measures and the ICU Physician Staffing Committee for the Leapfrog Group, serves on the Quality Measures Work Group of the National Quality Forum and is an advisor to the World Health Organization's World Alliance for Patient Safety.

The project began July 7 with the first of a series of educational calls, recordings of which are available at no charge on the project's dedicated Web site, www.safercare.net. However, the real "hands on" work began after the project's first face-to-face meeting, which took place in Little Rock August 27. The meeting was well-attended and generated interest not only from



Arkansas hospitals but also from the Arkansas Foundation for Medical Care (AFMC), which provided financial support for the meeting, and the Arkansas Department of Health.

The following thirty-four Arkansas hospitals have joined the Arkansas Hospital Association's "Stop BSI" project:

Allegiance Specialty Hospital of Little Rock
Arkansas Heart Hospital
Arkansas Methodist Medical Center
Ashley County Medical Center
Baptist Health Extended Care Hospital
Baptist Health Medical Center – *Arkadelphia*
Baptist Health Medical Center – *Heber Springs*
Baptist Health Medical Center – *Little Rock*
Baptist Health Medical Center – *North Little Rock*
Baptist Health Medical Center – *Stuttgart*
Baxter Regional Medical Center
Bradley County Medical Center
Conway Regional Medical Center
Crittenden Regional Hospital
CrossRidge Community Hospital
Drew Memorial Hospital

Five Rivers Medical Center
Lawrence Memorial Hospital
Mercy Medical Center
NEA Baptist Memorial Hospital
North Arkansas Regional Medical Center
North Metro Medical Center
Ouachita County Medical Center
Ozark Health Medical Center
Saint Mary's Regional Medical Center
Saline Memorial Hospital
St. Bernards Medical Center
St. Edward Mercy Medical Center
St. Joseph's Mercy Health Center
Stone County Medical Center
UAMS Medical Center
Washington Regional Medical Center
White County Medical Center
White River Medical Center

As they implement the initiative's programs, the teams from these participating hospitals will begin coaching calls with Johns Hopkins personnel in October. For more information on the project contact Elisa White at (501) 224-7878 or elisawhite@arkhospitals.org. ●

BSI Program Labeled "Model" Initiative

Announcing the first in a series of reports on model health reform initiatives, Health and Human Services Secretary Kathleen Sebelius has called the Michigan Keystone ICU Project an example of "how health reform can improve the quality of care for all Americans."

The partnership between the Michigan Health & Hospital Association and Johns Hopkins University resulted in Michigan hospitals saving an estimated 1,500 lives and \$175 million per year by voluntarily participating in the evidence-based program to reduce catheter-associated blood-

stream infections (BSIs).

This is the same infection reduction project now being replicated in 28 other states, including Arkansas, where 34 hospitals and the Arkansas Hospital Association have begun working in conjunction with Johns Hopkins to implement a similar program. ●

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.

To address concerns regarding validity, HHS is providing funding, utilizing Recovery Act of 2009 funds, to CDC to support states in validating NHSN-related measures and to support reporting on HHS metrics through NHSN. Also, most of the reporting metrics outlined here have already

been endorsed by NQF and for population-based national measures on MRSA and *C. difficile*, work to develop hospital level measures will be conducted in the next year utilizing HHS support to CDC through funds available in the Recovery Act.

Finally, to address concerns regarding flexibility in accommodating new measures, reviewing progress on current measures, and incorporating new sources of measure data (e.g., electronic data, administrative data) or new measures, HHS and its constituent agencies will commit to an annual review and update of the HHS Action Plan Targets and Metrics.

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

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?
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
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
$\text{SIR} = \frac{\text{observed}}{\text{expected}} = \frac{170 + 58}{100000 \times \left(\frac{2}{1000}\right) + 58,000 \times \left(\frac{1.5}{1000}\right)} = \frac{228}{200 + 87} = \frac{228}{287} = 0.79$ <p style="text-align: right;">95% CI = (0.628, 0.989)</p>						

* 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
$\text{SIR} = \frac{\text{observed}}{\text{expected}} = \frac{315 + 210 + 111}{12600 \times \left(\frac{3.0}{100}\right) + 7000 \times \left(\frac{5.0}{100}\right) + 7400 \left(\frac{1.7}{100}\right)} = \frac{636}{378 + 350 + 125.8} = \frac{636}{853.8} = 0.74$ <p style="text-align: right;">95% CI = (0.649, 0.851)</p>							

[†] 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					
SSI 1						
Combined HAI			228 + 636 = 864			287+853.8 = 1140.8
$\text{SIR} = \frac{\text{observed}}{\text{expected}} = \frac{228 + 636}{287 + 853.8} = \frac{864}{1140.8} = 0.76$						

[†] SSI, surgical site infection

95% CI = (0.673, 0.849)