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	☒	☐	1. Establish statewide HAI prevention leadership through the formation of multidisciplinary group or state HAI advisory council 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	
			Other activities or descriptions (not required): The following three target areas consistent with HHS priorities have been proposed by the state Health Department: MRSA (Methicillin-resistant *Staphylococcus aureus*), surgical-site infections (SSI), and central line-associated bloodstream infections (CLABSI). State is not planning to mandate reporting of HAI at this point. Instead we would prepare to voluntarily enroll an established number of hospitals into National Health Safety Network (NHSN) to get accurate and consistent data on target prevention areas as a group user. Collaboration with partners such as The South Dakota Foundation for Medical Care will provide us additional insight into the gaps of infection control and allows us to measure success using data shared through NHSN. The following targets are being proposed to the state advisory group: • MRSA: Reduce the facility-wide healthcare facility-onset MRSA bacteremia LabID event by at least 25% from baseline • SSI: Reduce the admission and readmission SSI by at least 25% from baseline • CLABSI: Reduce the facility-wide CLABSI by at least 50% from baseline.	
			2. Establish an HAI surveillance prevention and control program	

Planning Level	Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
	☒	☐	i. Designate a State HAI Prevention Coordinator	
	☐	☒	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)	February 2010
			Other activities or descriptions (not required): State will contract to oversee the HAI related activities and liaise between Health Department and the hospitals.	
	☐	☒	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 support, HL7 messaging of laboratory results)	February 2010-December 2011
			Other activities or descriptions (not required): • During outbreaks state health laboratory will perform PFGE subtyping of isolates to identify outbreak-associated strains. • Explore possibility of laboratory data sharing through HL7 messaging between hospital and commercial laboratories and the state health department. • Shipping isolates to CDC for further testing (e.g. PCR testing for specific resistance/virulence genes, phagetyping, etc) will be considered in case of an outbreak of unusual cases (e.g. outbreaks caused by multidrug-resistant organism, unusually severe cases among patients without underlying medical conditions, etc)	
Level II	☐	☐	4. Improve coordination among government agencies or organizations that share responsibility for assuring or overseeing HAI surveillance,	

Planning Level	Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
			prevention and control (e.g., State Survey agencies, Communicable Disease Control, state licensing boards)	
			Other activities or descriptions (not required):	
	☐	☐	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.	
			Other activities or descriptions (not required):	
Please also describe any additional activities, not listed above, that your state plans to undertake. Please include target dates for any new activities.				

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			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	February 2010- December 2011
	☐	☒	ii. Establish protocols and provide training for health department staff to investigate outbreaks, clusters or unusual cases of HAIs.	February 2010- December 2011
	☒	☐	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	
	☒	☐	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)	
			Other activities or descriptions (not required): The data shared with state health department will be disclosed to public only in the form of an aggregate state-wide report without hospital/patient identifiers.	
	☐	☒	2. Enhance laboratory capacity for state and local detection and response to new and emerging HAI issues.	
			Other activities or descriptions (not required):	February 2010- December

Planning Level	Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
			• During outbreaks state health laboratory will perform PFGE subtyping of isolates to identify outbreak-associated strains. • Explore possibility of laboratory data sharing through HL7 messaging between hospital and commercial laboratories and the state health department. • Shipping isolates to CDC for further testing (e.g. PCR testing for specific resistance/virulence genes, phagetyping, etc) will be considered in case of an outbreak of unusual cases (e.g. outbreaks caused by multidrug-resistant organism, unusually severe cases among patients with no underlying medical conditions, etc)	2011
Level II	☒ ☐	☐ ☒	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 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)	Contingent upon further funding
			Other activities or descriptions (not required): Outbreak represents an excess over the expected (endemic) level of a disease within facility. However, in several circumstances even one case may constitute an outbreak. Considering severity and the frequency of certain HAI target areas, the State Health Department proposed following criteria for outbreak reporting for collaborating hospitals: • Three and more cases of healthcare associated bloodstream MRSA in a facility	

Planning Level	Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
			• One case of CLABSI in a facility • Three and more cases of SSI in a facility Outbreak definitions for specific HAIs and the need for state's assistance will be determined by non-participating facilities on an individual basis. CDC will be contacted by the State Health Department on the special circumstances (unusually large number of outbreak-associated cases, outbreak of unusual severity/clinical features, etc) when the need for additional recourses exceeds state's capacity of adequate response.	
	☒ ☐ ☐ ☒ ☒ ☐	☐ ☒ ☐ ☐ ☐ ☐	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) ii. *Clostridium difficile* 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)	Contingent upon further funding
			Other activities or descriptions (not required): The Department of Health is proposing surveillance to occur in following target areas and will cover inpatients only: • CLABSI facility-wide • Facility-wide bloodstream infections caused by MRSA • SSI on <u>colon surgery</u> (NHSN code: COLO, ICD-9 codes: 17.31-17.36, 17.39, 45.03, 45.26, 45.41, 45.49, 45.52, 45.71-45.76, 45.79, 45.81-45.83, 45.92-45.95, 46.03, 46.04, 46.10, 46.11, 46.13, 46.14, 46.43, 46.52, 46.75, 46.76, 46.94). - <u>Coronary artery bypass graft</u> with **both** chest and donor	

Planning Level	Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
			site incisions (NHSN code: CBGB, ICD-9 codes: 36.10-36.14, 36.19). - Coronary artery bypass graft with chest incision only (NHSN code: CBGC, ICD-9 codes: 36.15-36.17, 36.2). Collaborating hospitals and the state health department will use NHSN protocols and definitions to ensure standardized and consistent reporting.	
	☐ ☐	☒ ☒	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	 February 2010-May 2010 February 2010-July 2011
			Other activities or descriptions (not required): Collaborating hospitals and the state health department will use NHSN protocols and definitions to ensure standardized and consistent reporting. Following metrics will be used to measure progress • CLABSI: Metric number and label: 1. CLABSI 1. (CLABSIs per 1000 device days by ICU and other locations). • MRSA: Metric number and label: 5b. MRSA 2. (Laboratory-identified (LabID) bloodstream MRSA events reported through laboratory detection method to measure facility-wide rate). • SSI: Metric number and label: 6. SSI 1. (Deep incision and organ space infection rates using NHSN definitions). Baseline measures will be established during the first 6 months of reporting.	

Planning Level	Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
	☐	☐	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	
			Other activities or descriptions (not required):	
	☐	☒	7. Develop tailored reports of data analyses for state or region prepared by state personnel	June 2010-September 2010
			Other activities or descriptions (not required): State personnel will prepare reports on three targeted HAI areas separately.	
Level III	☐	☒	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	
	☐	☒	i. Develop a validation plan	January 2011
	☐	☒	ii. Pilot test validation methods in a sample of healthcare facilities	February 2011
	☐	☒	iii. Modify validation plan and methods in accordance with findings from pilot project	March 2011
	☐	☒	iv. Implement validation plan and methods in all healthcare facilities participating in HAI surveillance	March 2011
	☐	☒	v. Analyze and report validation findings	April 2011
	☐	☒	vi. Use validation findings to provide operational guidance for healthcare facilities that targets any data	May 2011

Planning Level	Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
			shortcomings detected	
			Other activities or descriptions (not required): Validation plan will be developed in collaboration with our partners. Simple random sampling method will be used to select certain number of charts for review in each participating facility and for each HAI target area. Sampling will include all reported HAIs and a pre-determined number of patients without HAI. Validation study will be conducted once a year by trained staff. Data will be collected using standardized data collection form and entered into the database for analysis. We will calculate sensitivity, specificity, predictive value positive and predictive value negative for each HAI target area and for each participating facility. Findings will be shared with collaborating hospitals confidentially and will not be disclosed to other partners as well as general public. Validation findings will provide operational guidance for participating facilities and the state health department.	
	☐	☐	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	
			Other activities or descriptions (not required):	
	☐	☒	10. Collaborate with professional licensing organizations to identify and investigate complaints related to provider infection control practice in non-hospital settings, and to set standards for continuing education and training	Contingent upon further funding

Planning Level	Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
			Other activities or descriptions (not required): State Health Department will collaborate with the South Dakota Foundation for Medical Care to identify and investigate complaints related to provider infection control practice in non-hospital settings. Due to current limitations the state considers this activity as a future initiative contingent upon further funding.	
	☐ ☐	☐ ☐	11. Adopt integration and interoperability standards for HAI information systems and data sources i. Improve overall use of surveillance data to identify and prevent HAI outbreaks or transmission in HC settings (e.g., hepatitis B, 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.	
			Other activities or descriptions (not required):	
	☐	☐	12. Enhance electronic reporting and information technology for healthcare facilities to reduce reporting burden and increase timeliness, efficiency, comprehensiveness, and reliability of the data i. Report HAI data to the public	
			Other activities or descriptions (not required):	

Planning Level	Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
	☐	☒	13. Make available risk-adjusted HAI data that enables state agencies to make comparisons between hospitals.	June 2010- December 2011
			Other activities or descriptions (not required): Risk-adjusted HAI data as well as facility specific rates for each HAI target will be communicated with participating facilities confidentially.	
	☐	☒	14. Enhance surveillance and detection of HAIs in nonhospital settings	Contingent upon further funding
			Other activities or descriptions (not required): Enhancing surveillance and detection of HAIs in nonhospital settings will depend upon further funding. The current experience of state in the absence of mandatory reporting along with limited funding does not permit health department to expand its activities to non-hospital settings.	
Please also describe any additional activities, not listed above, that your state plans to undertake. Please include target dates for any new activities.				

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	☐	☒	1. Implement HICPAC recommendations. Develop strategies for implementation of HICPAC recommendations for at least 2 prevention targets specified by the state multidisciplinary group.	February 2010- December 2011
			Other activities or descriptions (not required):	

Planning Level	Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
			HICPAC recommendations will be implemented for two target areas such as SSI and CLABSI. This task will be carried out in collaboration with South Dakota Foundation for Medical Care which is the Quality Improvement Organization (QIO) for South Dakota.	
	☐	☒	• Establish prevention working group under the state HAI advisory council to coordinate state HAI collaboratives Assemble expertise to consult, advise, and coach inpatient healthcare facilities involved in HAI prevention collaboratives	February 2010-December 2011
			Other activities or descriptions (not required):	
	☐ ☐ ☐	☒ ☒ ☒	• Establish HAI collaboratives with at least 10 hospitals (i.e. this may require a multi-state or regional collaborative in low population density regions) Identify staff trained in project coordination, infection control, and collaborative coordination Develop a communication strategy to facilitate peer-to-peer learning and sharing of best practices Establish and adhere to feedback of a clear and standardized outcome data to track progress	February 2010-December 2011 February 2010-December 2011 February 2010-December 2011
			Other activities or descriptions (not required): HAI collaboratives will be established with X hospitals in the state. The early stage of the project, non-mandatory reporting, and the limited number of hospitals available in South Dakota prevents the State Health Department from having to establish collaboratives with required number (10) of hospitals. Communication strategy to facilitate peer-to-peer learning and sharing of best practices will be developed in collaboration with partners such as the QIO of the state. Feedback will be provided to all involved stakeholders in the form of clear and standardized aggregate outcome data. Individual facility-level data will be communicated confidentially with each involved facility. Date will be shared by involved facilities through	

Planning Level	Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
			NHSN to maintain accuracy and consistency.	
	☐	☒	• Develop state HAI prevention training competencies Consider establishing requirements for education and training of healthcare professionals in HAI prevention (e.g., certification requirements, public education campaigns and targeted provider education) or work with healthcare partners to establish best practices for training and certification	February 2010-December 2011
			Other activities or descriptions (not required): We are planning to develop education and training materials for healthcare professionals in HAI prevention through targeted provider education. The mentioned task will be carried out in collaboration with partners such as the QIO of the state.	
Level II			2. Implement strategies for compliance to promote adherence to HICPAC recommendations	
	☐	☒	i. Consider developing statutory or regulatory standards for healthcare infection control and prevention or work with healthcare partners to establish best practices to ensure adherence	Contingent upon further funding
	☐	☒	ii. Coordinate/liaise with regulation and oversight activities such as inpatient or outpatient facility licensing/accrediting bodies and professional licensing organizations to prevent HAIs	
	☐	☒	iii. Improve regulatory oversight of hospitals, enhancing surveyor training and tools, and adding sources and uses of infection control data	
	☐	☒	iv. Consider expanding regulation and oversight activities to currently unregulated settings where healthcare is delivered or work with healthcare partners to establish best practices to ensure adherence	
			Other activities or descriptions (not required):	

Planning Level	Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
	☐	☐	3. 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)	
			Other activities or descriptions (not required):	
	☐	☒	4. Establish collaborative to prevent HAIs in nonhospital settings (e.g., long term care, dialysis)	Contingent upon further funding
			Other activities or descriptions (not required): Enhancing collaborative to prevent HAIs in nonhospital settings will depend upon further funding. The current experience of state in the absence of mandatory reporting along with limited funding does not permit health department to expand its activities to non-hospital settings.	
Please also describe any additional activities, not listed above, that your state plans to undertake. Please include target dates for any new activities.				

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	☐	☒	1. Conduct needs assessment and/or evaluation of the state HAI program to learn how to increase impact Establish evaluation activity to measure progress towards targets and	February 2010-December 2011

	☐	☒	Establish systems for refining approaches based on data gathered	February 2010-December 2011
			Other activities or descriptions (not required): The newly implemented surveillance system will be evaluated for following characteristics: simplicity, flexibility, acceptability, sensitivity, predictive value positive, representativeness, and timeliness. NHSN data will be used to monitor progress towards targets in all 3 target areas.	
	☐	☒	Develop and implement a communication plan about the state's HAI program and progress to meet public and private stakeholders needs i. Disseminate state priorities for HAI prevention to healthcare organizations, professional provider organizations, governmental agencies, non-profit public health organizations, and the public	February 2010-December 2011
			Other activities or descriptions (not required): State priorities for HAI prevention will be disseminated to healthcare organizations and professional provider organizations through direct communications, monthly conference calls with stakeholders and through South Dakota Health Department's Public Health Bulletin.	
Level II	☐	☒	2. Provide consumers access to useful healthcare quality measures	February 2010-December 2011
			Other activities or descriptions (not required): The long term plan would be that consumers will access HAI data in the form of an aggregate state-wide report through the state Health Department website. Facility-specific data will be disclosed to participating facilities and will not be available to the general public.	
Level III	☐	☒	3. Identify priorities and provide input to partners to help guide patient safety initiatives and research aimed at reducing HAIs	Contingent upon further funding
			Other activities or descriptions (not required): To broaden our knowledge on HAIs	

Please also describe any additional activities, not listed above, that your state plans to undertake. Please include target dates for any new activities.			

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	Hospitalizations with *C. difficile* per 1000 patient discharges	Hospital discharge data	2008 (proposed 2008, in consultation with states)	At least 30% reduction in hospitalizations with *C. difficile* per 1000 patient discharges	AHRQ	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?
	Clostridium difficile Infections						
3b. C diff 2 (new)		*C. difficile* SIR	CDC NHSN MDRO/CDAD Module LabID‡	2009-2010	Reduce the facility-wide healthcare facility-onset *C. difficile* 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*
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¶

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?
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

$$\text{SIR} = \frac{\text{observed}}{\text{expected}} = \frac{170+58}{100000\times\left(\frac{2}{1000}\right)+58{,}000\times\left(\frac{1.5}{1000}\right)} = \frac{228}{200+87} = \frac{228}{287} = 0.79 \qquad 95\%\text{CI} = (0.628, 0.989)$$

*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

$$\text{SIR} = \frac{\text{observed}}{\text{expected}} = \frac{315+210+111}{12600\times\left(\frac{3.0}{100}\right)+7000\times\left(\frac{5.0}{100}\right)+7400\left(\frac{1.7}{100}\right)} = \frac{636}{378+350+125.8} = \frac{636}{853.8} = 0.74 \qquad 95\%\text{CI} = (0.649, 0.851)$$

† 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.

	Observed HAIs			Expected HAIs		
HAI Metric	**#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
$\text{SIR} = \frac{\text{observed}}{\text{expected}} = \frac{228+636}{287+853.8} = \frac{864}{1140.8} = 0.76$ 95%CI = (0.673,0.849)						

† SSI, surgical site infection