

# Kansas Healthcare-Associated Infections State Plan



# Kansas Healthcare-Associated Infections

## *State Plan Summary*



Healthcare-Associated Infections (HAIs) are a major cause of morbidity, mortality, and excess cost in the U.S. According to the Centers for Disease Control and Prevention (CDC), there were an estimated 722,000 HAIs in U.S. acute care hospitals in 2011. About 75,000 hospital patients with HAIs died during hospitalizations. More than half of all HAIs occurred outside of the intensive care unit<sup>1</sup>. Since 2010, Kansas has worked to develop a sustainable infrastructure that supports surveillance, reporting and improvement by healthcare providers. Assisting hospitals with tracking, reporting, and subsequent reduction of HAIs within their facilities has been an important first step to reduction of the negative impact of HAIs on patients, their families, and the healthcare system. The estimated annual direct medical costs of HAIs to hospitals in the United States ranged from \$28.4 to \$45 billion (after adjusting based on the 2007 Consumer Price Index). Preventing just 20 percent of infections could result in a benefit of \$5.7 to \$6.8 billion<sup>2</sup>.

The public health model of population-based healthcare delivery places health departments in a unique and important role in the area of HAI prevention, particularly as healthcare delivery has shifted from the acute care setting to ambulatory and long term care settings. In non-hospital, infection prevention and surveillance has been lacking and has resulted in outbreaks which can have a wide ranging and substantial impact on affected communities. At the same time, the push toward mandatory reporting of HAIs by hospitals demonstrates an increasing demand for accountability from the public.

Kansas is one of the remaining 18 states that do not currently have mandatory reporting of HAI surveillance data. In the absence of a state mandate, the Kansas Department of Health and Environment has worked to increase reporting capacity through partnering with local stakeholders, such as the Kansas Hospital Association,



the QIN-QIO for the state of Kansas, the Kansas Healthcare Collaborative (Kansas Hospital Engagement Network), and local APIC Chapters. These organizations have aligned efforts to present a cohesive approach to building reporting capacity and HAI reduction in order to maximize available resources provided to Kansas healthcare organizations. Continued collaboration and coordination among these groups is critical to identifying and implementing sustainable solutions. Many Kansas hospitals, ambulatory surgical centers, skilled facilities and other healthcare facilities have broadened their surveillance and reporting efforts by leveraging involvement in these coordinated activities.

The contents of the Kansas plan, continues to be developed and enhanced by the Kansas Department of Health and Environment, Bureau of Epidemiology and Public Health Informatics in coordination with input from the stakeholder advisory group. This plan gives a historical record of what KDHE has been able to accomplish since the program was developed in 2009, as well as the continuing plans for 2015 through 2018. This plan provides the roadmap to ensure coordination, enhance evaluation of progress, incorporate changes and identify and leverage synergies. This plan ensures proactive efforts, rather than reactive efforts and will accomplish the goal of eliminating preventable HAIs without interfering with the delivery of healthcare.

<sup>1</sup> Magill S, Edwards J, et.al. Multistate Point-Prevalence Survey of Health Care-Associated Infections N Engl J Med 2014; 370:1198-208

<sup>2</sup> Scott, RD, The Direct Medical Costs of Healthcare-Associated Infections in U.S. Hospitals and the Benefits of Prevention, CDC, accessed on 09/23/2015 at: [http://www.cdc.gov/HAI/pdfs/hai/Scott\\_CostPaper.pdf](http://www.cdc.gov/HAI/pdfs/hai/Scott_CostPaper.pdf)

## State Plan Organization

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

Following a template provided by the CDC, the Kansas Plan is comprised of six major HAI activity areas: Enhanced HAI Program Infrastructure; Surveillance, Detection, Reporting and Response; Prevention; Evaluation, Oversight and Communications; Infection Control Assessment and Response; and Targeted Healthcare Infection Prevention Programs. A summary of the plan details for each of these topics is outlined in the subsequent text, followed by specific Work Plan objectives, activities, target dates, and current status.

**Table 1: Kansas program infrastructure planning for HAI surveillance, prevention, and control**

Element	Implementation Activities	Target Date	Status
<b>Establish state HAI Advisory Group</b>	Advisory group members are asked to support HAI activities by providing input in the identification of priorities to help guide patient safety initiatives and disseminating information regarding state HAI activities. As members of the advisory group, the state APIC chapters will also reach out to and encourage all providers in their region to become chapter members and become involved in the HAI statewide plan initiatives.  The HAI advisory committee was established in 2009 and continues to meet quarterly.	October 2009	✓ Completed
	Identify specific HAI prevention targets. <ul style="list-style-type: none"> <li>• Central Line-associated Blood Stream Infections (CLABSI)</li> <li>• <i>Clostridium difficile</i> Infections (CDI)</li> <li>• Catheter-associated Urinary Tract Infections (CAUTI)</li> <li>• Surgical Site Infections (SSI)</li> </ul>	October 2009	✓ Completed

<p><b>Establish state HAI Advisory Group (Cont...)</b></p>	<p><i>Include hospital preparedness partners (e.g. hospital/healthcare coalitions funded through the ASPR Hospital Preparedness Program). Additional representation from accrediting and/or licensing agency with surveyor authority is ideal.</i></p> <p>Membership currently includes additional representation, including Ambulatory Surgical Centers, Kansas preparedness representatives and the ESRD network. Proposed new members include:</p> <ul style="list-style-type: none"> <li>• Long Term Care Representation</li> <li>• Pharmacy Associations</li> <li>• Urgent Care Centers</li> <li>• Private health insurance companies</li> <li>• Veterinarians</li> <li>• Dentists</li> <li>• Laboratory biosafety officer/hospital safety officers</li> <li>• Environmental services/waste management</li> <li>• Dialysis Centers</li> <li>• Patient/Consumer</li> <li>• Pharmacy representation</li> <li>• Infectious Disease Physician</li> <li>• Emergency Medical Services – prehospital/community based</li> </ul>	<p>October 2015</p>	<p>In Progress</p>
	<p><i>Engage HAI advisory committee in potential roles and activities to improve antibiotic use in the state (antibiotic stewardship).</i></p> <p>In 2014-2015, the committee has discussed and reviewed antimicrobial stewardship as well as the state Ebola Plan, Kansas CRE proposed update and definition changes; travel history and assessment, resources and promotional campaign,, KQIP NHSN Position statement, and the proposed healthcare associated hepatitis investigation protocol. The Committee has discussed and will evaluate the establishment of the following relevant subcommittees:</p> <ul style="list-style-type: none"> <li>• Antimicrobial stewardship to include veterinarians, pediatricians, OP clinics, urgent care, family practice, consumer, etc.</li> <li>• HAI Infection Prevention education for healthcare workers, students – allied health, trainees, etc.</li> </ul>	<p>October 2015</p>	<p>In Progress</p>

<b>Establish state HAI Advisory Group (Cont...)</b>	<p><i>Engage HAI advisory committee in activities to increase health department's access to data and subsequently use those data in prevention efforts.</i></p> <p>The Kansas Quality Improvement Partnership (KQIP) is a group of leading health care organizations in Kansas, working together to coordinate, support and streamline quality reporting requirements for health care providers throughout the state. The group includes the Kansas Healthcare Collaborative (KHC), Kansas Hospital Association (KHA), Kansas Foundation for Medical Care (KFMC), Kansas Medical Society (KMS), and the Kansas Department of Health and Environment (KDHE). In June 2015, KQIP established a bold goal for 100 percent of Kansas hospitals (including critical access hospitals) to begin actively using NHSN for infection surveillance and reporting by the end of this year. KQIP has identified the KDHE and KFMC as the entities positioned to provide technical support and build capacity for NHSN reporting in Critical Access Hospitals, Ambulatory Surgery Centers, and Long Term Care facilities.</p>	<p>October 2015</p>	<p>In Progress</p>
<b>Establish a state HAI surveillance, prevention, and control program</b>	<p>Establish HAI Program Director position within KDHE to oversee the program activities.</p>	<p>January, 2010</p>	<p>✓ Completed</p>
	<p>Establish Epidemiologist position within KDHE.</p>	<p>February, 2010</p>	<p>✓ Completed</p>
	<p>Improve laboratory capacity to confirm emerging resistance in HAI pathogens and perform typing where appropriate (e.g., outbreak investigation support, HL7 messaging of laboratory results)</p> <ul style="list-style-type: none"> <li>• KDHE has the capacity to receive HL7 messages. 85% of the lab results currently received come in via HL7 messaging.</li> </ul>		<p>In progress</p>

<p><b>Improve coordination among government agencies or organizations that share responsibility for HAI</b></p>	<p>Advisory Group membership includes:</p> <ul style="list-style-type: none"> <li>• KDHE Health Facilities Program</li> <li>• KDHE Bureau of Community Health Systems</li> <li>• KDHE Bureau of Epidemiology and Public Health Informatics</li> <li>• KDHE Preparedness</li> <li>• Heartland Kidney Network (ESRD Network 11)</li> <li>• Kansas Foundation for Medical Care</li> <li>• Kansas Healthcare Coalitions</li> <li>• Kansas Healthcare Collaborative</li> <li>• Kansas Hospital Association</li> <li>• Kansas Medical Society</li> <li>• APIC Greater Kansas City</li> <li>• APIC Heart of America</li> <li>• APIC Wichita Chapter</li> <li>• Kansas Association of Ambulatory Surgery Centers</li> <li>• University of Kansas Medical Center</li> <li>• Hospital Infection Preventionists</li> </ul>	<p>October, 2009</p>	<p>✓ Completed / Ongoing activity</p>
<p><b>Improve coordination among government agencies or organizations that share responsibility for HAI (Cont....)</b></p>	<p><i>Explore opportunities to integrate HAI program activities into other KDHE and external partner projects to decrease duplication of efforts and requirements.</i></p> <p>In 2012, the Kansas Quality Improvement Partnership was established. This partnership was established to maximize resources dedicated to improving quality and to eliminate or reduce duplication of efforts by Kansas providers. KQIP includes the Kansas Hospital Association, the Kansas Healthcare Collaborative (Kansas HEN Contractor), the Kansas Foundation for Medical Care (QIN-QIO in Kansas) and the Kansas Department of Health and Environment. The partnership convenes regularly to discuss and coordinate events, activities and opportunities to maximize effectiveness and efficiency for health care providers. The partnership fosters a transparent, positive and cooperative working relationship and seeks opportunities to share knowledge to improve the patient experience.</p> <p>Activities conducted throughout Kansas:</p> <ul style="list-style-type: none"> <li>• Kansas on the CUSP: Stop CLABSI</li> <li>• Kansas on the CUSP: Stop CAUTI (Cohorts 2, 3, 5, 9 – ICU and ED)</li> <li>• Kansas <i>C diff</i> Reduction Collaborative</li> </ul>	<p>2012</p>	<p>✓ Completed / Ongoing activity</p>

<p><b>Facilitate use of standards-based formats by healthcare facilities for purposes of electronic reporting of HAI data</b></p>	<p>A statewide group was established in NHSN for participating Kansas providers. Technical assistance is provided to assist providers in registration and use of the NHSN reporting system.</p> <p>Currently 86 providers are consistently reporting data and have conferred rights to the KDHE NHSN group.</p>	<p>April, 2010 group established</p> <p>Recruitment ongoing 2010</p>	<p>✓ Completed / Ongoing activity</p>
	<p>Provide technical assistance for implementations of standards-based reporting in order to develop the capacity for HAI surveillance and other types of public health surveillance, such as for conditions deemed reportable to state and local health agencies using electronic laboratory reporting (ELR). Facilitating use of standards-based solutions for external reporting also can strengthen relationships between healthcare facilities and regional nodes of healthcare information, such as Regional Health Information Organizations. (RHIOs) and Health Information Exchanges (HIEs). These relationships, in turn, can yield broader benefits for public health by consolidating electronic reporting through regional nodes.</p>		<p>Ongoing Activity</p>

**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.<sup>3</sup> 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 increased prevention capacity.

Mandatory HAI reporting is not currently on the legislative policy agenda for KDHE, nor is it supported by the Advisory Group to increase provider HAI reporting in the near term. To accomplish the goal of a more robust data set for development of support and activities, facilities have been asked to voluntarily use the NHSN database NHSN has been identified by the KQIP as the standard dataset that all partners will use. The establishment of the bold goal of 100% of hospitals reporting to NHSN by the end of 2015 has elevated the importance of reporting for those facilities not currently doing so. Participation in NHSN reporting is a requirement for those participating in HAI initiatives statewide.

The HHS Action Plan identifies targets and metrics for six categories of HAIs and identified Ventilator-associated pneumonia as an HAI under development for metrics and targets.

- Central Line-associated Blood Stream Infections (CLABSI)
- *Clostridium difficile* Infections (CDI)
- Catheter-associated Urinary Tract Infections (CAUTI)

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

- Methicillin-resistant *Staphylococcus aureus* (MRSA) Infections
- Surgical Site Infections (SSI)
- Ventilator-associated Pneumonia (VAP)

The following table represents the metrics chosen by the HAI Advisory Group for implementation in Kansas. It is the intent of the Kansas HAI advisory group to align Kansas priorities with CMS reporting programs and to allow each setting the opportunity to add metrics as needed based on state risk assessments.

Metric	Original HAI Elimination Metric	National Baseline Established (State Baselines Established)	National 5-Year Prevention Target	Target Date	Care Unit/ Setting
CLABSI <sup>1</sup>	CLABSIs per 1000 device days by ICU and other locations	2006-2008 (proposed 2009, in consultation with states)	Reduce the CLABSI standardized infection ratio (SIR) by at least 50% from baseline or to zero in ICU and other locations	2010	ICU (excluding PICU or NICU) – either Medical or Surgical or combination ICU  2015 Expanded to house wide
CAUTI <sup>2</sup>	# of symptomatic UTI per 1,000 urinary catheter days	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	2010	ICU (excluding PICU or NICU) – either Medical or Surgical or combination ICU 2015 Expanded to house wide
C diff <sup>3</sup>	Case rate per patient days: administrative/discharge data for IDC-9 CM coded <i>Clostridium difficile</i> Infections	2008 (proposed 2008, in consultation with states)	AT least 30% reduction in hospitalizations with <i>C. difficile</i> per 1000 patient discharges.	2010	Medical or surgical, non-ICU unit
SSI <sup>4</sup>	Deep incision and organ space infection rates using NHSN definitions (SCIP procedures)	2006-2008 (proposed 2009, in consultation with states)	Reduce the admission and readmission SSI SIR by at least 25% from baseline or to zero	2012	Colorectal and Hysterectomy
<sup>1</sup> Central Line-associated Bloodstream Infections (CLABSI) <sup>2</sup> Catheter-associated Urinary Tract Infections (CAUTI) <sup>3</sup> <i>Clostridium difficile</i> Infections (CDI) <sup>4</sup> Surgical Site Infections (SSI)					

As previously discussed, participating hospitals will report the selected metrics in the table above through the NHSN. Provider support for collection and reporting provided by KDHE to assist hospitals in this effort will include:

- Individual site visits to assist with enrollment, training and first data abstraction and submission
- Training materials, tools and resources
- Technical and clinical expertise assistance for any HAI or NHSN related issues
- Communication methods for timely information dissemination (ex. Website tools, emails, newsletters)
- Assistance with monthly data submission monitoring and follow-up

KDHE has published aggregate level HAI data on the Bureau of Epidemiology and Health Informatics webpage at [www.kdheks.gov/epi/hai.htm](http://www.kdheks.gov/epi/hai.htm). At this time, facility-specific public reporting continues to not be a recommendation of the Advisory Group; however, there is consensus that this should be considered as a long-range goal and the group will continue to discuss the issue.

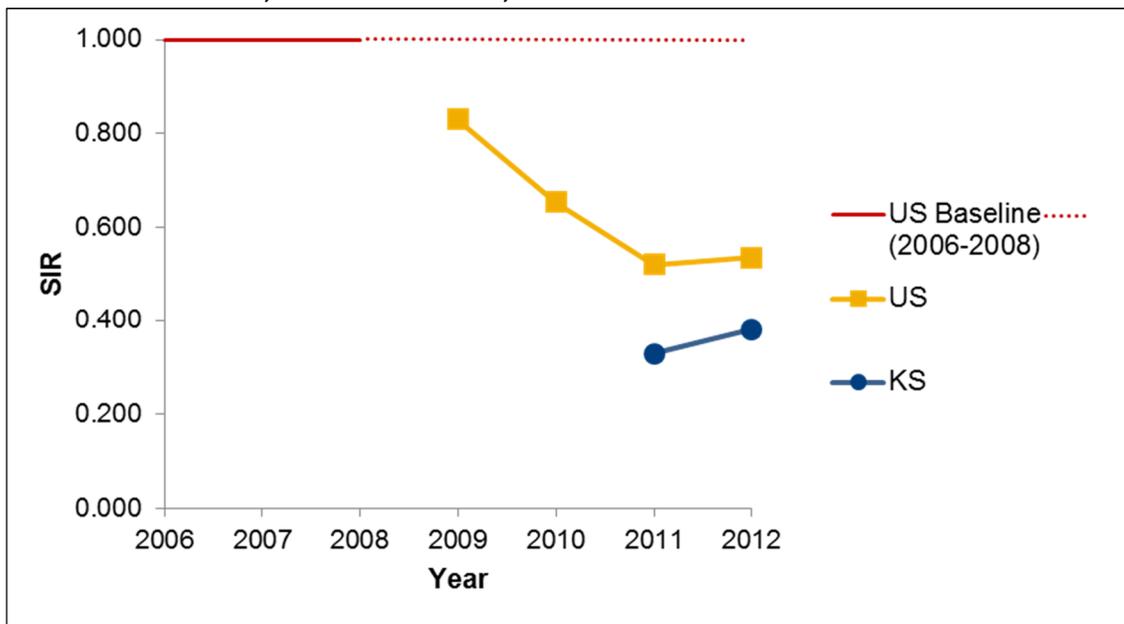
Kansas capacity for investigating and responding to outbreaks and emerging infections among patients and healthcare providers is central to HAI prevention. Investigation of outbreaks helps identify preventable causes of infections including issues with the improper use or handling of medical devices;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

**Table 2: Kansas plan for surveillance, detection, reporting, and response for HAIs**

Element	Implementation Activities	Target Date	Status
<p><b>Improve HAI outbreak detection and investigation</b></p>	<p><i>Work with partners including CSTE (Council of State and Territorial Epidemiologist), CDC (Centers for Disease Control and Prevention), state legislatures, and providers across the healthcare continuum to improve endemic and outbreak reporting to state health departments.</i></p> <p>KDHE has a reportable disease list that is developed by the State Epidemiologist in collaboration with CDC and CSTE. The list is capable of identifying diseases of interest, and can indicate an outbreak by review of numbers reported. KDHE participates in the HAI subcommittee of CSTE.</p>	<p>December, 2009</p>	<p>Ongoing activity</p>
<p><b>Improve HAI outbreak detection and investigation (Cont...)</b></p>	<p><i>Establish protocols and provide training for health department staff to investigate outbreaks, clusters or unusual cases of HAIs. The current established Kansas infectious disease investigation guidelines are the standard used to investigate HAI outbreaks</i></p> <p>The HAI program director and epidemiologist provide training for HAI outbreak response and HAI prevention.</p>	<p>May, 2010</p>	<p>Ongoing activity</p>
	<p><i>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</i></p> <p><a href="#">K.S.A. 65-118, 65-128 and 65-6001 through 65-6007; and by K.A.R. 28-1-2 and 28-1-18</a> provide guidance for protecting facility/provider/patient identity during investigation.</p>		<p>✓ Completed</p>

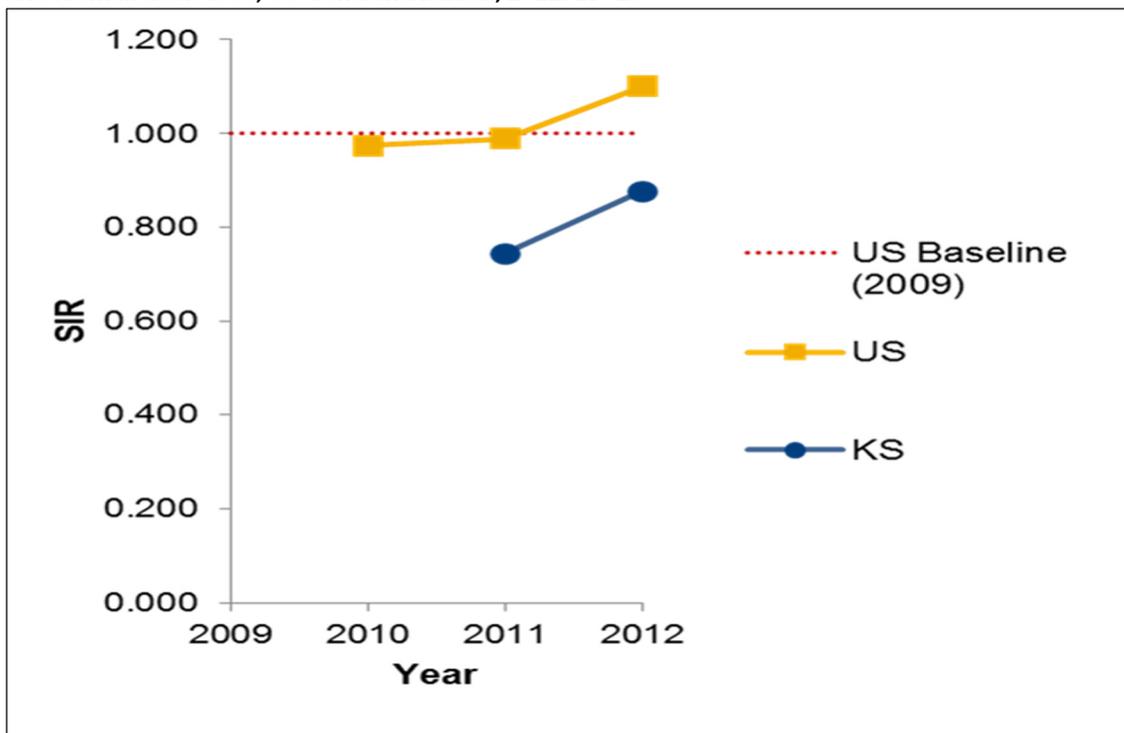
<b>Improve HAI outbreak detection and investigation (Cont...)</b>	<i>Improve overall use of surveillance data to identify and prevent HAI outbreaks or transmission in healthcare settings.</i> KDHE has identified several HAI related outbreaks and coordinated the investigation, reporting and provided recommendations		Ongoing Activity
<b>Enhance laboratory capacity for state and local detection and response to new and emerging HAI issues</b>	The HAI Program Director has met with the Kansas Health and Environment laboratory to assess current capabilities and capacity of the lab to respond to new and emerging HAI activities. Additional funding would be required for the state laboratory to perform confirmation testing for the purpose of quality control or providing technical assistance for difficult to identify organisms.	December, 2010	✓ Completed
<b>Improve communication of HAI outbreaks and infection control breaches</b>	<i>Develop standard reporting criteria including, number, size, and type of HAI outbreak for health departments and CDC.</i>  KDHE has conducted outreach to the Kansas APIC chapters regarding communicable disease reporting, HAI outbreak reporting and infection control breaches. While CRE is not currently on the communicable disease reporting list, facilities are encouraged to notify KDHE for any suspect CRE.	Ongoing activity	Ongoing activity
	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)  The HAI program is housed within the Bureau of Epidemiology and Public Health Informatics and routinely communicates with communicable disease staff. Additionally, HAI program staff participates in quarterly training sessions with the facility survey team. During HAI outbreak investigations, KDHE HAI program staff routinely consults with state licensing boards as appropriate.	Ongoing activity	Ongoing activity
<b>Identify at least 2 priority prevention targets for surveillance in support of the HHS HAI Action Plan</b>	I. CLABSI II. CDI III. CAUTI IV. MRSA V. SSI VI. VAP		✓ Completed I. 2010 II. 2010 III. 2010 IV. N/A V. 2012 VI. N/A

**CLABSI SIR in adult ICUs, US trend and Kansas, 2012. 15- 19**



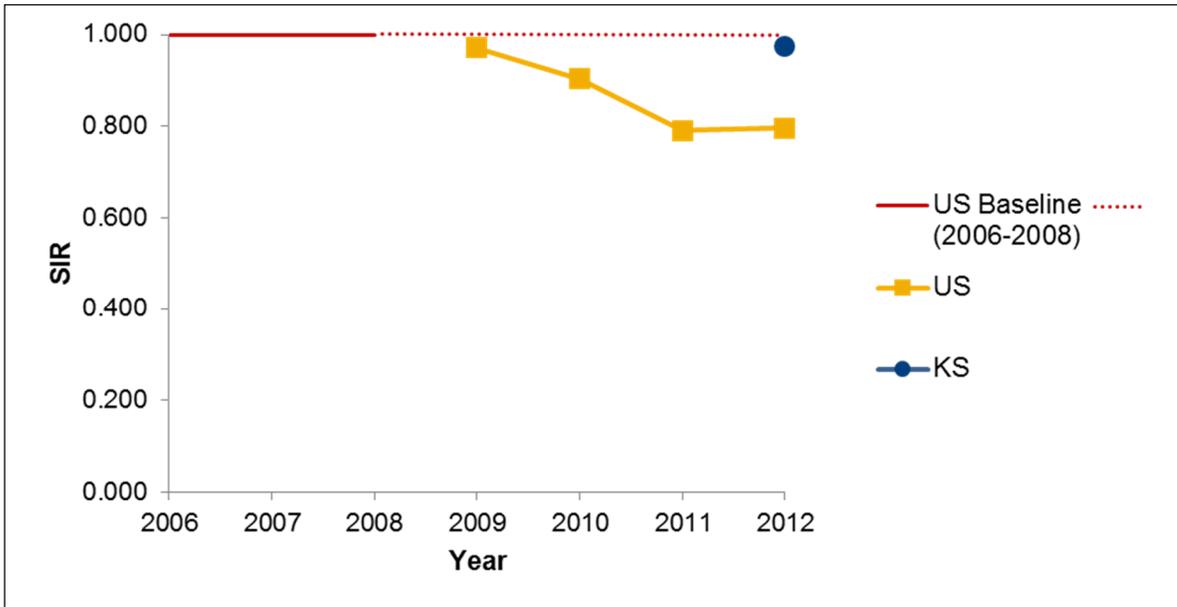
The use of central lines appeared to have increased in 2012 resulting in a higher device utilization rate largely driven by fewer patient days.

**CAUTI SIR in adult ICUs, US trend and Kansas, 2012. 17- 19**

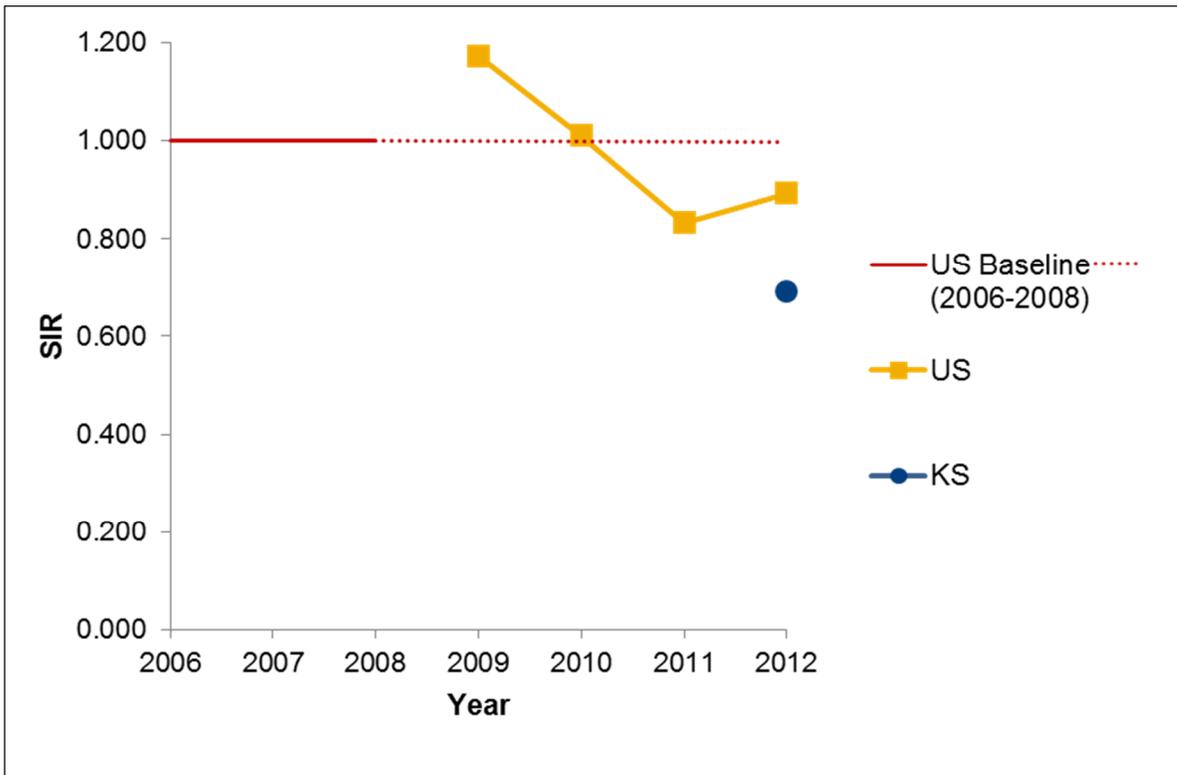


The use of urinary catheters increased in 2012

COLO SSI SIR in adult ICUs, US trend and Kansas, 2012. 15- 19



HYST SSI SIR in adult ICUs, US trend and Kansas, 2012. 15- 19



**Table 2: Kansas plan for surveillance, detection, reporting, and response for HAIs (Continued...)**

Element	Implementation Activities	Target Date	Status
<b>Adopt national standards for data and technology to track HAI</b>	<i>Develop metrics to measure progress towards national goals.</i>	October, 2009	✓ Completed
	<i>Establish baseline measurements for prevention targets utilizing NHSN surveillance definitions and methods.</i>	6 months after facilities begin reporting data to NHSN	✓ Completed
<b>Develop state surveillance training competencies</b>	<p><i>Conduct local training for appropriate use of NHSN surveillance system including facility and group enrollment, data collection, management, and analysis. Include training to promote data consistency (e.g., counting line days). Establish a KS NHSN user group to support participating providers.</i></p> <p>KDHE collaborates with KFMC to conduct annual NHSN update statewide webinars held in conjunction with APIC Wichita Chapter. To date those have been attended primarily by hospital infection preventionists and need to be expanded to the other care settings as metrics are added to the Centers for Medicaid and Medicare Services (CMS) reporting requirements.</p>	June, 2010 start conducting training	✓ Completed and ongoing annually
<b>Develop tailored reports of data analyses for state or region prepared by state personnel</b>	The KDHE HAI program has developed a state summary report of specific healthcare-associated infections based on available data.	6 months after facilities begin reporting data to NHSN; Initiated in 2011	✓ Completed

<p><b>Validate data entered into HAI surveillance to measure accuracy and reliability of HAI data collection</b></p>	<p><i>Develop a validation plan</i></p> <p>KDHE has sole sourced validation activities to KFMC. 2015 validation includes validating ICU CAUTI and FacWideIN CDI records for 40 IPPS hospitals not currently being validated as part of the CMS IQR program and those with ICU locations</p>	<p>September 2015</p>	<p>Ongoing</p>
<p><b>Validate data entered into HAI surveillance to measure accuracy and reliability of HAI data collection (Cont....)</b></p>	<p><i>Pilot test validation methods in a sample of healthcare facilities</i> See above.</p>	<p>September 2015</p>	<p>Ongoing</p>
	<p>Modify validation plan and methods in accordance with findings from pilot project</p>	<p>September 2015</p>	<p>Ongoing</p>
	<p><i>Implement validation plan and methods in all healthcare facilities participating in HAI surveillance</i></p> <p>KFMC is utilizing the CDC validation toolkit</p>	<p>September 2015</p>	<p>Ongoing</p>
	<p>Analyze and report validation findings</p>	<p>August 2016</p>	<p>Ongoing</p>
	<p>Use validation findings to provide operational guidance for healthcare facilities that targets any data shortcomings detected</p> <p>As part of the validation process, KFMC will incorporate validation findings into statewide training on common mismatches.</p>	<p>August 2016</p>	<p>Ongoing</p>
<p><b>Develop preparedness plans for improved response to HAI</b></p>	<p><i>Define processes and tiered response criteria to handle increased reports of serious infection control breaches, suspect cases/clusters, and outbreaks.</i></p> <p>The current established Kansas infectious disease investigation guidelines will be the standard template utilized for development of guidelines to be used for HAI clusters and revised to fit the hospital setting using NHSN benchmarks, tools and national guidelines. This has proven to be an effective strategy in several outbreaks including hepatitis associated with drug diversion, a large Listeria outbreak associated with ice cream, <i>Legionella</i> associated with a critical access facility, <i>Burkholderia sp.</i> associated with a med/surg unit, <i>Mucromycosis</i> associated with a BMT unit.</p>	<p>December, 2010</p>	<p>Ongoing</p>

<p><b>Collaborate with professional licensing organizations to identify and investigate complaints related to provider infection control practice in non-hospital settings and set standards for continuing education and training</b></p>	<p>The HAI program is housed within the Bureau of Epidemiology and Public Health Informatics and routinely communicates with communicable disease staff. Additionally, HAI program staff participates in quarterly training sessions with the facility survey team. During HAI outbreak investigations, KDHE HAI program staff routinely consults with state licensing boards as appropriate.</p>		<p>Ongoing</p>
<p><b>Adopt integration and interoperability standards for HAI information systems and data sources</b></p>	<p><i>Improve overall use of surveillance data to identify and prevent HAI outbreaks in healthcare settings across the spectrum of inpatient and outpatient healthcare settings.</i></p> <p>KDHE has strong representation from hospitals in Kansas voluntarily reporting to the KDHE group and are reasonably confident that the relationships that have been formed with the infection prevention community facilitate HAI surveillance and outbreak data.</p>	<p>January 2011</p>	<p>Ongoing</p>
<p><b>Enhance electronic reporting and information technology for healthcare facilities to reduce reporting burden and increase timeliness, efficiency, comprehensiveness, and reliability of the data</b></p>	<p><i>Develop a mechanism of reporting aggregate level data online via a KDHE website. Report HAI data to the public.</i></p> <p>NHSN data is reported to CMS and healthcare facilities throughout the state. Aggregate data reports are also available to the public on the <a href="http://www.kdheks.gov/epi/hai.htm">www.kdheks.gov/epi/hai.htm</a>, and Medicare Hospital Compare website.</p>	<p>December, 2011</p>	<p>Completed</p>
<p><b>Make available risk-adjusted HAI data that enable state agencies to make comparisons between hospitals.</b></p>	<p>HAI Advisory group is not endorsing facility level data at this time. Data is available via Hospital Compare.</p>	<p>Not started</p>	<p>Not started</p>
<p><b>Enhance surveillance and detection of HAIs in non-hospital settings.</b></p>	<p>Advisory group membership has been expanded to include dialysis centers/ESRD, ambulatory surgical centers and long term care is currently under consideration.</p>		<p>Ongoing Activity</p>

## Prevention

In an effort to support hospitals in the prevention of HAIs, the plan states that Kansas will support the use of the HICPAC (<http://www.cdc.gov/ncidod/dhqp/guidelines.html>) recommendations for urinary catheter use, aseptic urinary catheter insertion and maintenance, aseptic insertion and appropriate maintenance of vascular catheters. Additional activities to support hospitals in prevention of HAIs will be coordinated and developed with assistance requested from Advisory Group members, with input from hospitals, as tools and resources necessary to assist them are identified. Additionally, general information as well as resources developed for prevention of HAIs will be posted to the KDHE website

**Table 3: Kansas plan for HAI prevention activities**

Element	Implementation Activities	Target Dates	Status
<b>Implement HICPAC (Hospital Infection Control Practices Advisory Committee) recommendations for at least 2 prevention targets specified by the state multidisciplinary group</b>	<p><i>Develop strategies for implementation of HICPAC recommendations for at least 2 prevention targets specified by the state multidisciplinary group</i></p> <p>KDHE works in partnership with KQIP to facilitate sharing local and national best practices, tools and resources and strategies for implementing prevention initiatives. KDHE has participated in a number of seminars on infection prevention. KDHE maintains a database of over 600 IPs and related contacts working in acute care and long term facilities and routinely communicates training opportunities or changes in practice</p>	September, 2010	Ongoing
<b>Establish prevention working group under the state HAI advisory council to coordinate state HAI collaboratives</b>	<p><i>Assemble expertise to consult, advise, and coach inpatient healthcare facilities involved in HAI prevention collaboratives</i></p> <p>As part of KQIP, KDHE works in partnership with the Kansas Hospital Association and Kansas Foundation for Medical Care and the Kansas Healthcare Collaborative. Together they collaborate with healthcare providers to facilitate sharing local and national best practices, tools and resources, and strategies for implementing prevention initiatives and garnering leadership support.</p> <p>All hospitals licensed in Kansas have a hospital-wide program for the prevention, control, and investigation of infectious diseases. Hospitals collaborate via the KHA Infection Preventionists annual conference and other state-level initiatives.</p>		Ongoing Activity

<p><b>Establish HAI collaboratives with at least 10 hospitals (this may require a multi-state or regional collaborative in low population density regions)</b></p>	<p><i>Identify staff trained in project coordination, infection control, and collaborative coordination</i></p> <p>KDHE has existing contractual relationships with Kansas Foundation for Medical Care (KFMC), a healthcare consulting company that provides innovative and scientifically based solutions to transform and improve care delivery and patient outcomes through validate project and collaborative coordination models.</p>		<p>✓ Completed</p>
<p><b>Establish HAI collaboratives with at least 10 hospitals (this may require a multi-state or regional collaborative in low population density regions) (Cont...)</b></p>	<p><i>Develop a communication strategy to facilitate peer-to-peer learning and sharing of best practices</i></p> <p>In conjunction with KFMC, KDHE has developed a <i>Clostridium difficile</i> (CDI) prevention collaborative, working with 13 hospitals to reduce CDI using rapid cycle quality improvement techniques. This collaborative had a kick off meeting in December of 2014 that discussed the collaborative structure, team development, and how to get started. Participants also developed AIM statements and completed self-assessment tools utilizing APIC standards. Participants identified targeted areas for improvement such as hand hygiene, early diagnosis, rapid diagnostic testing, development or enhancement of antimicrobial stewardship program, nurse driven protocols and environmental cleaning.</p>		<p>Ongoing Activity</p>
	<p><i>Establish and adhere to feedback from standardized outcome data to track progress</i></p> <p>A report has been developed to share facility level data with facility participants; this report highlights progress and allows facilities to compare themselves with other collaborative participants and to the state as a whole.</p>		<p>Ongoing Activity</p>

<p><b>Develop state HAI prevention training competencies</b></p>	<p><i>Consider establishing requirements for education and training of healthcare professionals in HAI prevention (e.g., certification requirements, public education campaigns, and targeted provider education) or work with healthcare partners to establish best practices for training and certification.</i></p> <p>Given current funding resources are not available to support this activity although KDHE has approached the board of nursing to consider.</p>		<p>Not Started</p>
<p><b>Implement strategies for compliance to promote adherence to HICPAC recommendations</b></p>	<p><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</i></p> <p>KDHE partners with KQIP members to promote use of HICPAC recommendations consistently. Projects included are Kansas on the CUSP: CAUTI and CLABSI. Most recently discussions have begun to include CAH in NHSN reporting.</p>		<p>Ongoing Activity</p>
<p><b>Implement strategies for compliance to promote adherence to HICPAC recommendations (Cont....)</b></p>	<p><i>Coordinate/liaise with regulation and oversight activities such as inpatient or outpatient facility licensing/accrediting bodies and professional licensing organizations to prevent HAIs</i></p> <p>KDHE works with facility surveyors to investigate infection control breaches and regularly provide consultative services when surveyors are in the field.</p>		<p>Ongoing Activity</p>
	<p><i>Improve regulatory oversight of hospitals, enhance surveyor training and tools, and add sources and uses of infection control data</i></p> <p>KDHE works with facility surveyors to investigate infection control breaches and regularly provide consultative services when surveyors are in the field as well as providing quarterly training.</p>		<p>Ongoing Activity</p>
	<p><i>Consider expanding regulation and oversight activities to currently unregulated settings where healthcare is delivered and work with healthcare partners to establish best practices to ensure adherence</i></p>		<p>Ongoing Activity</p>

<p><b>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)</b></p>	<p>As part of KQIP, KDHE works in partnership with the Kansas Hospital Association and Kansas Foundation for Medical Care and the Kansas Healthcare Collaborative. Together they collaborate with healthcare providers to facilitate sharing local and national best practices, tools and resources, and strategies for implementing prevention initiatives and garnering leadership support.</p>		<p>Ongoing Activity</p>
<p><b>Establish collaborative(s) to prevent HAIs in nonhospital settings (e.g., long term care, dialysis)</b></p>	<p>KDHE provided NHSN training to the ESRD network through a 4 part webinar for their providers at the onset of required ESRD reporting.</p>	<p>Summer 2012</p>	<p>Ongoing Activity</p>

**Evaluation and Communications**

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

As stated previously, Kansas disseminates state priorities for HAI prevention to healthcare organizations, professional provider organizations, governmental agencies, non-profit public health organizations, and the public via the HAI Advisory group and KDHE website. Information will also be distributed through articles, published reports, media releases and other avenues.

The Advisory Group and other partners as identified by the Advisory Group is utilized to provide input in the identification of priorities to help guide patient safety initiatives and research aimed at reducing HAIs in Kansas in the future.

**Table 4: Kansas plan for HAI communication and evaluation**

Element	Implementation Activities	Target Date	Status
<p><b>Conduct needs assessment and/or evaluation of the state HAI program to learn how to increase impact</b></p>	<p><i>Establish evaluation activity to measure progress towards targets.</i>                      KDHE reviews relevant HAI topics with the advisory group quarterly to assess needs of the stakeholders and IP community.</p>	<p>2011</p>	<p>Ongoing Activity</p>
	<p><i>Establish systems for refining approaches based on data gathered.</i></p> <p>KDHE identifies facilities based on data to participate in the KFMC/KDHE C diff collaborative. With the KQIP position statement urging all facilities to utilize NHSN for reporting of HAI data, KDHE is planning a needs assessment for non-participating facilities to increase statewide participation.</p>	<p>Ongoing Activity</p>	<p>Ongoing Activity</p>
<p><b>Develop and implement a communication plan about the state’s HAI program and progress to meet public and private stakeholders needs</b></p>	<p><i>Disseminate state priorities for HAI prevention to healthcare organizations, professional provider organizations, governmental agencies, non-profit public health organizations, and the public.</i></p> <p>Information is distributed via the KDHE website, the Advisory Group and email communication using the acute care infection prevention and related contacts database.</p>	<p>March, 2010</p>	<p>Ongoing Activity</p>
<p><b>Provide consumers access to useful healthcare quality measures</b></p>	<p>State aggregate data is provided and posted on the KDHE website.</p>		<p>Initiated with 2011 summary report</p>
<p><b>Guide Patient Safety Initiatives: Identify priorities and provide input to partners to help guide patient safety initiatives and research aimed at reducing HAIs</b></p>	<p>KDHE utilizes input from the Advisory Group including members of hospitals, the hospital association (KHA) and the Kansas Healthcare Collaborative, along with other partners as identified by the Advisory Group to identify priorities.</p>		<p>Ongoing Activity</p>

## Healthcare Infection Control and Response (Ebola-associated activities)

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

**Table 5: Kansas plan Infection Control Assessment and Response**

Element	Implementation Activities	Target Date	Status
<b>Create an inventory of all healthcare settings in state. List must include at least one infection control point of contact at the facility</b>	Since 2010, KDHE has maintained a list of healthcare facilities reporting to NHSN. As of September 2015, 90 KS facilities report to NHSN.		Ongoing Activity
<b>Identify current regulatory/licensing oversight authorities for each healthcare facility and explore ways to expand oversight</b>	Quarterly the HAI program staff meets with the facility survey team to discuss infection control breaches and collaborate on strategies for mitigation.		Ongoing Activity
<b>Assess readiness of Ebola-designated facilities within the state</b>	<i>Use CDC readiness assessment tool and determine gaps in infection control</i>  There are no designated Ebola treatment centers in KS. The CDC is coming to Kansas in October 2015 to assess 2 hospitals for Ebola readiness as Assessment Facilities. From these evaluations, gaps will be identified, mitigated, and follow-up assessments will be conducted.	October 1, 2015	Initiated
	<i>Address gaps (mitigate gaps)</i>	October 1, 2015	Not started
	<i>Conduct follow-up assessments</i>	October 1, 2015	Not started
<b>Assess outbreak reporting and response in healthcare facilities</b>	<i>Use standard assessment tool and determine gaps in outbreak reporting and response</i> <i>Address gaps (mitigate gaps)</i>  Track HAI outbreak response and outcome KDHE has established strong relationships with facilities and routinely consults entities when outbreaks are identified. Examples of previous collaboration include: hepatitis associated with drug diversion, a large Listeria outbreak associated with ice cream, <i>Legionella</i> associated with a critical access facility, <i>Burkholderia sp.</i> associated with a med/surg unit, <i>Mucromycosis</i> associated with a BMT unit.	October 1, 2015	Not started

**Targeted Healthcare Infections Program**

**Table 6: Kansas targeted healthcare infections prevention programs**

Element	Implementation Activities	Target Date	Status
<p><b>Expand infection control assessments</b></p>	<p><i>Expand assessments to other additional facilities and other healthcare settings and determine gaps in infection control</i></p> <p>KS has 90 healthcare facilities reporting data to CMS/NHSN: 82 acute care hospitals, 0 Long Term Care Acute Care, 5 Inpatient Rehabilitation Facilities (IRFs), 0 End Stage Renal Dialysis facilities (ESRD), 1 Behavioral Health Facility and 2 Ambulatory Surgical Facilities.</p> <p>The HAI Program director sits on the board of Central Plains Expo, a statewide educational conference targeting the infection prevention community which assesses needs.</p> <p>By October 1, 2015, KDHE will be prepared to conduct NHSN training with up to 40 additional healthcare facilities to improve reporting compliance in Kansas absent a mandatory reporting statute.</p>	<p>October 1, 2015</p>	<p>Not started</p>
	<p><i>Address gaps (mitigate gaps)</i></p>	<p>October 1, 2015</p>	<p>Not started</p>
	<p><i>Conduct follow up assessments</i></p>	<p>October 1, 2015</p>	<p>Not started</p>

<p><b>Increase infection control competency and practice in all healthcare settings through training.</b></p>	<p><i>Incorporate general infection control knowledge and practice assessments of competency into state licensing board requirements, credentialing, and continuing education requirements for clinical care providers (e.g., medical license, admitting privileges) and/or licensing/accreditation requirements for healthcare facilities.</i></p> <p>Kansas is in the process of broadening the HAI Advisory Committee membership and adding additional members to the multidisciplinary team. By working closely with these new stakeholders, Kansas is provided the best opportunity to identify all improvement opportunities, develop more focused and targeted trainings around regulation/licensure/and privileges. Prospective additional members are:</p> <ul style="list-style-type: none"> <li>• KDHE laboratory officer</li> <li>• Waste Management</li> <li>• Survey and certification representation for Long Term Care</li> <li>• Kansas Health Care Association and Leading Age Kansas, the two Long Term Care associations</li> <li>• Regional dialysis HAI lead</li> <li>• Health care consumer</li> <li>• Hospital and community based pharmacy associations</li> <li>• Infectious Disease physician</li> <li>• Kansas board of EMS</li> </ul>	<p>October 1, 2015</p>	<p>Ongoing Activity</p>
---	--	------------------------	-------------------------

<p><b>Increase infection control competency and practice in all healthcare settings through training. (Cont...)</b></p>	<p><i>Develop a sustainable training program based on CDC guidance and technical assistance to perform training, prioritizing on-site train-the-trainer programs in key domains of infection control, including the incorporation of hands on evaluations and competency assessments of best practices and a system to monitor ongoing compliance and competency.</i></p> <p>KDHE is exploring this area and will need to build capacity in order to provide training. KDHE currently assists providers one on one in NHSN utilization and has worked with new IPs to develop their program and skill set.</p>		<p>Initiated</p>
<p><b>Enhance surveillance capacity to improve situational awareness, describe emerging threats, and target onsite assessments to implement prevention programs</b></p>	<p><i>Build capacity to analyze data reported by facilities in a defined region to allow for a comprehensive assessment of potential healthcare-associated infection threats, and communicate results with healthcare facilities.</i></p> <p>The ELC general epidemiologists provide support to the Kansas HAI program and regularly analyze data reported to NHSN for potential intervention.</p> <p>Through the work with the QIN-QIO in Kansas (KFMC), facility TAP reports are being used to analyze NHSN data</p>		<p>Ongoing Activity</p>
	<p><i>Work with CDC to guide analytic direction and identify facilities for prioritized assessments/response</i></p> <p>The ELC general epidemiologists provide support to the Kansas HAI program and regularly analyze data reported to NHSN for potential intervention. Program staff have initiated to EPI-Aid investigations when issues have been identified. When HAI program staff notice data anomalies they have reached out to facilities with assistance including partnering with KFMC for intervention strategies and project inclusion.</p>		<p>Ongoing Activity</p>
	<p><i>Improve outbreak reporting capacity by developing an infrastructure that includes clear definitions of infectious threats of epidemiologic importance that are communicated to facilities</i></p>		<p>Ongoing Activity</p>

<p><b>Enhance surveillance capacity to improve situational awareness, describe emerging threats, and target onsite assessments to implement prevention programs (Cont....)</b></p>	<p><i>Implement a response plan to address potential emerging threats identified by using enhanced surveillance</i></p> <p>There are no designated Ebola treatment centers in Kansas. There are currently two designated assessment hospitals in Kansas for Ebola and other highly infectious diseases. KDHE Routinely communicates information regarding public health threats to Kansas facilities.</p>		<p>Ongoing Activity</p>
--	---	--	-------------------------

For additional information regarding the Kansas HAI plan, please contact:

Kansas Department of Health and Environment  
 Bureau of Epidemiology and Public Health  
 Informatics  
 1000 SW Jackson St., Suite 210  
 Topeka, KS 66612-1274  
[epihotline@kdheks.gov](mailto:epihotline@kdheks.gov)

Appendix: Original Kansas Healthcare-associated Infections Plan Submitted to the U.S. Department of Health and Human Services

## 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)

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?	KS Selected Metric
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*	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 <sup>†</sup>	No
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	Yes
3b. C diff 2 (new)		<i>C. difficile</i> SIR	CDC NHSN MDRO/CDAD Module LabID <sup>‡</sup>	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	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?	KS Selected Metric
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*	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	No
5b. MRSA 2 (new)		MRSA bacteremia SIR	CDC NHSN MDRO/CDAD Module LabID <sup>‡</sup>	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	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 <sup>§</sup> SIR by at least 25% from baseline or to zero	CDC	Yes <sup>¶</sup>	No
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	No

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

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

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

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

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

## Understanding the Relationship between HAI Rate and SIR Comparison Metrics

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

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

Risk Group Stratifier	Observed CLABSI Rates			NHSN CLABSI Rates for 2008 (Standard Population)		
Location Type	#CLABSI	#Central line-days	CLABSI rate*	#CLABSI	#Central line-days	CLABSI rate*
ICU	170	100,000	1.7	1200	600,000	2.0
WARD	58	58,000	1.0	600	400,000	1.5
$\text{SIR} = \frac{\text{observed}}{\text{expected}} = \frac{170 + 58}{100000 \times \left(\frac{2}{1000}\right) + 58,000 \times \left(\frac{1.5}{1000}\right)} = \frac{228}{200 + 87} = \frac{228}{287} = 0.79 \quad 95\% \text{CI} = (0.628, 0.989)$						

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

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

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

The National 5-year prevention target for metric #1 could be implemented using the concept of an SIR equal to 0.25 as the goal. That is, an SIR value based on the observed CLABSI rate data at the 5-year mark could be calculated using NHSN CLABSI rate data stratified by location type as the baseline to assess whether the 75% reduction goal was met. There are statistical methods that allow for calculation of confidence intervals, hypothesis testing and graphical presentation using this HAI summary comparison metric called the SIR.

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

Risk Group Stratifiers		Observed SSI Rates			NHSN SSI Rates for 2008 (Standard Population)		
Procedure Code	Risk Index Category	#SSI <sup>†</sup>	#procedures	SSI rate <sup>*</sup>	#SSI <sup>†</sup>	#procedures	SSI rate <sup>*</sup>
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
		$\text{SIR} = \frac{\text{observed}}{\text{expected}} = \frac{315 + 210 + 111}{12600 \left  \left( \frac{3.0}{100} \right) + 7000 \left  \left( \frac{5.0}{100} \right) + 7400 \left( \frac{1.7}{100} \right) \right.} = \frac{636}{378 + 350 + 125.8} = \frac{636}{853.8} = 0.74 \quad 95\% \text{CI} = (0.649, 0.851)$					

<sup>†</sup> SSI, surgical site infection

<sup>\*</sup> 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 <sup>†</sup>	#Combined HAI	#CLABSI	#SSI <sup>†</sup>	#Combined HAI
CLABSI 1	228			287		
SSI 1		636			853.8	
Combined HAI			228 + 636 = 864			287+853.8 = 1140.8
$\text{SIR} = \frac{\text{observed}}{\text{expected}} = \frac{228 + 636}{287 + 853.8} = \frac{864}{1140.8} = 0.76 \quad 95\% \text{CI} = (0.673, 0.849)$						

<sup>†</sup> SSI, surgical site infection