Colorado State Healthcare-Associated Infection Action Plan – October, 2015

Colorado Department
of Public Health
and Environment

1. Enhance HAI program infrastructure

Successful HAI prevention requires close integration and collaboration with state and local infection prevention activities and systems. Consistency and compatibility of HAI data collected across facilities will allow for greater success in reaching state and national goals. Please select areas for development or enhancement of state HAI surveillance, prevention, and control efforts.

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

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
☒ ☒ ☒	☐ ☐ ☐	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). ii. Include hospital preparedness partners (e.g., hospital/healthcare coalitions funded through the ASPR Hospital Preparedness Program). Additional representation from accrediting and/or licensing agency with surveyor authority is ideal. iii. Engage HAI advisory committee in potential roles and activities to improve antibiotic use in the state (antibiotic stewardship) iv. Engage HAI advisory committee in activities to increase health department's access to data and subsequently use those data in prevention efforts v. Identify specific HAI prevention targets consistent with HHS priorities	Ongoing

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
		Other activities or descriptions:	
		i. Colorado has a well-established state HAI advisory committee as defined by House Bill 1045, passed in 2006. Committee members represent the demographic composition of the facilities required to report into the National Healthcare Safety Network (NHSN): local hospital and ambulatory surgery center infection preventionists, members of the Association of Professionals in Infection Control (APIC) Mile High chapter, a medical statistician, an infectious disease doctor, a health insurer representative, a consumer advocate and a purchaser of health insurance. Representatives from the Colorado Hospital Association (CHA) and Telligen, our state Medicare Quality Improvement Organization attend committee meetings on a regular basis and provide updates to the committee on HAI projects underway. Colorado is expanding the role of the HAI advisory committee to advise the HAI Program on activities beyond NHSN reporting, which will include expanding membership on the committee to include representation from CHA, Telligen, and emergency preparedness. Other advisory committees in Colorado that advise or will advise the HAI Program include the Emerging Pathogens Committee, which includes Ebola treatment and assessment hospitals and their associated local public health agencies, and an antimicrobial stewardship and resistance committee, under development. ii. The Colorado HAI Program will expand the HAI advisory committee further by adding representatives from hospital preparedness and the Office of Emergency Preparedness (OEPR) at CDPHE. The HAI Program will also work with OEPR and CHA to determine if representation from healthcare coalitions in urban and rural/frontier areas is feasible. iii. The Colorado HAI Advisory Committee is expanding roles and positions into areas beyond statute-related HAI reporting including emerging infections, infection control assessment and readiness, outbreak reporting and response at state and facility levels, and antibiotic use and	

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		stewardship.	
		iv. Per Colorado statute, Colorado's HAI Program has access to facility-specific HAI data entered into NHSN, as well as access to Emerging Infections Program (EIP) data sources and reportable communicable disease data obtained through Colorado's Electronic Disease Reporting System (CEDRS). The Colorado HAI Program will continue to work with its HAI advisory committee to ensure continued access and promote expanded access to NHSN data, including antibiotic resistance and use for stewardship efforts. The HAI Program will also work with the advisory committee to prioritize prevention efforts based on data collected through these multiple sources.	
		v. Data on certain procedures, as determined by the Colorado HAI legislation and our advisory committee, are required to be submitted into NHSN by acute care hospitals, long-term acute care hospitals, rehabilitation hospitals, ambulatory surgery centers (ASC), and dialysis treatment centers. These procedures include breast, cardiac, orthopedic and abdominal operative procedures. Central lines are monitored in the following locations: adult medical/surgical critical care units, adult medical cardiac critical care units, adult surgical cardiothoracic critical care, adult medical critical care, adult surgical critical care, neonate critical care level II/III units, neonate critical care level III unit and long-term acute care units. CDPHE has aligned state reporting requirements with HHS HAI prevention priorities and federal CMS reporting requirements, including colon and abdominal hysterectomy surgeries, *Clostridium difficile* infections (CDI), methicillin-resistant *Staphylococcus aureus* (MRSA), outpatient-dialysis related infections, and healthcare worker influenza immunizations. Priorities for prevention will be determined in collaboration with the HAI Advisory Committee. Please see Table 2, number 4.	

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
☒	☐	2. Establish an HAI surveillance prevention and control program i. Designate a State HAI Prevention Coordinator	Ongoing
☒	☐	ii. Develop dedicated, trained HAI staff with at least one FTE (or contracted equivalent) to oversee HAI activities areas (Integration, Collaboration, and Capacity Building; Reporting, Detection, Response, and Surveillance; Prevention; Evaluation, Oversight, Communication, Infection Control)	
		Other activities or descriptions: i. Colorado's HAI Coordinator position has been in place since 2007 and previously supervised the Patient Safety Program in the Health Facilities/Emergency Medical Services Division (HFEMSD, the regulatory division which houses facility licensing and survey activity). At that time, the program worked primarily to implement Colorado's HAI Disclosure Statute. In 2009, the program received American Recovery and Reinvestment Act (ARRA) funding through the Epidemiology and Laboratory Capacity (ELC) grant to expand its focus from HAI reporting to data validation and HAI prevention initiatives. The current HAI Coordinator joined the Patient Safety program in January 2010 and has managed the program since January 2013. The HAI Coordinator has experience in disease control and prevention and data analysis, and provides oversight to the advisory committee, supervision to three staff members, serves as Colorado's NHSN group administrator, and provides NHSN-related training and technical assistance. ii. Also in 2009, ARRA funding through EIP supported the hiring of an HAI medical epidemiologist in the Communicable Disease Branch in the Disease Control and Environmental Epidemiology Division (DCEED) to begin HAI EIP activities. The Patient Safety Program in HFEMSD and the HAI EIP unit within DCEED's Communicable Disease Branch combined in 2014 into the Colorado HAI Program to improve coordination of HAI surveillance, reporting, data validation and prevention efforts and optimize staffing and collaboration. The HAI Program is composed of 3	

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		units: The Health Facility Infection Surveillance Unit (managed by the state HAI Coordinator), the Infection Prevention Unit, and the Emerging Infections Unit (including HAI EIP activities). The Program, which is supervised by an EIS-trained infectious diseases physician and senior epidemiologist, oversees the reporting of specified HAIs into NHSN, pathogen-specific population-based surveillance(e.g. CDI, carbapenem-resistant *Enterobacteriaceae* (CRE) and *Acinetobacter spp*. (CRAB)), outbreak investigations, infection control assessments and mitigation, and other HAI-related activities including antimicrobial stewardship. Given the importance of antimicrobial resistance prevention and antimicrobial stewardship, the HAI Program will explore ways to promote and support antimicrobial stewardship efforts throughout the state, even without a current dedicated source of funding.	
☒	☐	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)	Ongoing
		Other activities or descriptions: i. The state laboratory supports investigations of healthcare-associated infection outbreaks and surveillance of HAI-related pathogens and works closely with the Communicable Disease Branch in DCEED. The Colorado HAI Program will continue to work with healthcare facilities to ensure isolates from outbreak investigations and selected isolates from population-based surveillance are typed appropriately. Testing may be conducted by hospital labs, the state health department lab, or CDC, depending on the type of testing that is most appropriate for a given pathogen. This may include speciation and sub-typing, polymerase chain reaction (PCR) analysis, toxin testing, antibiotic sensitivity, pulsed-field gel electrophoresis (PFGE), multi-locus variable number of tandem repeat analysis (MLVA), or whole genome sequencing. High volume testing	

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		during an outbreak is possible for many organisms using PCR technology. The Colorado HAI Program will work with healthcare facilities to ensure specimens are tested at the appropriate laboratory. Testing at the state laboratory rather than at commercial or hospital lab, will allow for comparisons of isolates from multiple healthcare facilities, which will allow for a better understanding of the spread of HAIs through our communities. However, in the absence of dedicated funding the state laboratory currently has no capacity to confirm resistance through susceptibility testing.	
☒	☐	4. Improve coordination among government agencies or organizations that share responsibility for assuring or overseeing HAI surveillance, prevention, and control (e.g., State Survey agencies, Communicable Disease Control, state licensing boards)	Ongoing
		Other activities or descriptions: Previously, part of Colorado's HAI program was located in HFEMSD, which houses the state licensing board and state surveyors. This program moved into the HAI Program in DCEED as the Health Facility Infection Surveillance Unit. The HAI Program continues to work closely with HFEMSD. For example, in order for a facility's license to be renewed, the state HAI coordinator must sign off on the renewal indicating the facility is in compliance with HAI reporting through NHSN. If the facility is found to have violated the provisions of statute, the HAI Coordinator can cite the facility a deficiency through the state licensing group and the facility must write a plan of correction. Additionally, the facility may be subject to licensure termination or other sanctions. Since the State HAI Coordinator now reports to the HAI Program Manager, the coordination of state HAI and EIP efforts is maximized. The Colorado HAI Program will also continue to work closely with and strengthen relationships with related partners, including CHA, Telligen, and the OEPR within the state health department, and continue ongoing, regular meetings with CHA and Telligen to identify overlapping projects and priorities,	

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		which might include (but not be limited to) CDI and MDRO prevention, antimicrobial resistance and stewardship, and infection prevention activities.	
☒	☐	5. Facilitate use of standards-based formats (e.g., Clinical Document Architecture, electronic messages) by healthcare facilities for electronic reporting of HAI data. Provide technical assistance or other incentives for implementing standards-based reporting to develop capacity for HAI 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.	Ongoing
		Other activities or descriptions: The HAI Program regularly communicates with acute care hospitals, ASC and dialysis treatment facilities and provides guidance on how to interface infection prevention software with NHSN to allow electronic laboratory reporting into NHSN. The HAI Program works with closely with the Integrated Disease Reporting Program (IDRP), which handles disease reporting, on issues related to pathogen-based reporting for surveillance purposes. The HAI Program will continue to progress toward electronic laboratory reporting (ELR) for pathogen-based reporting, which is not currently in place for HAI pathogens including CDI, CRE, CRAB, and vancomycin-resistant *Staphylococcus aureus* (VRSA). The HAI Program will also continue to work with partners, including CDC, on methods to streamline reporting and medical record reviews, including the elimination of paper-based case report forms within Colorado EIP, facilitation	

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		of electronic uploads among Colorado and CDC data systems to replace current methods that require double data entry, and other data processes.	

2. Surveillance, Detection, Reporting, and Response

Timely and accurate monitoring remains necessary to gauge progress towards HAI elimination. Public health surveillance has been defined as the ongoing, systematic collection, analysis, and interpretation of data essential to the planning, implementation, and evaluation of public health practice, and timely dissemination to those responsible for prevention and control.[1] Increased participation in systems such as the National Healthcare Safety Network (NHSN) has been demonstrated to promote HAI reduction. This, combined with improvements to simplify and enhance data collection, and improve dissemination of results to healthcare providers and the public are essential steps toward increasing HAI prevention capacity.

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

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

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

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

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

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
☒	☐	1. Improve HAI outbreak detection and investigation i. Work with partners including CSTE, CDC, state legislatures, and providers across the healthcare continuum to improve outbreak reporting to state health departments	Ongoing
☒	☐	ii. Establish protocols and provide training for health department staff to investigate outbreaks, clusters, or unusual cases of HAIs.	
☒	☐	iii. Develop mechanisms to protect facility/provider/patient identity when investigating incidents and potential outbreaks during the initial evaluation phase, 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:
		i. All group outbreaks, including outbreaks of HAIs, are reportable conditions in the state of Colorado. The Colorado HAI Program will continue to work with partners including the local chapter of the Association for Professionals in Infection Control (APIC), health care facilities, and health care providers to promote the reporting of group outbreaks including outbreaks of HAIs.
		
		The Colorado HAI Program also plans to improve HAI outbreak reporting with the following steps:
		  1. Streamline HAI Program processes including how reports are received; how reports are triaged; how investigations are assigned, prioritized, and completed; how investigations are tracked; and how final reports are completed.
		  2. Work with partners to improve coordination of outbreak investigations, and encourage a culture of education among	

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
		facilities experiencing outbreaks. 3. Improve Colorado HAI Program use of surveillance data to identify outbreaks and increases in pathogens of interest. CDPHE will also continue to partner with CSTE and CDC on issues pertaining to HAI outbreaks. The HAI Program, which is part of the Communicable Disease Branch, assumes primary responsibility for investigation of HAI outbreaks. This program is currently managed by a medical epidemiologist (trained through the CDC Epidemic Intelligence Service) who has experience with investigating HAI outbreaks. This program also has the expertise of three trained infection perfectionists, two of whom are certified in infection control (CIC), and two HAI epidemiologists, one of whom is currently pursuing a CIC. ii. The HAI Program will establish protocols and providing training on the investigation of outbreaks or unusual cases of HAIs to department staff and regional epidemiologists as needed. These staff will consult with the HAI infection preventionists and other epidemiologists as needed. The HAI Program will also work to improve coordination with local public health agencies during HAI outbreak investigations. iii. Mechanisms to protect patient identities during surveillance and investigation of outbreaks are well-established. These same mechanisms are used for HAI surveillance and investigation of outbreaks. Regulations and Colorado state statues regarding the protection of this information can be found under the Rules and Regulations Pertaining to Epidemic and Communicable Disease Control (6 CCR 1009-1) and Colorado Revised Statutes 25-1-122(4) and Regulations Pertaining to Epidemic and Communicable Disease	

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		Control (6 CCR 1009-1) and Colorado Revised Statutes 25-1-122(4). The current policy in the Communicable Disease Branch is to maintain facility and provider confidentiality during an ongoing investigation, unless there is a public health reason to release this information, but this information is contained in the final outbreak reports, which are not published but available upon request. iv. The HAI Program is in the process of improving the use of surveillance data from pathogen-specific population-based reporting and HAI reporting through NHSN to identify outbreaks and notable increases in rates of disease. Population-based pathogen-specific reporting includes (but is not limited to): hepatitis B, hepatitis C, vancomycin-resistant *Staphylococcus aureus* (VRSA), *Clostridium difficile* (Denver metropolitan area), carbapenem-resistant *Enterobacteriaciae* (CRE) and carbapenem-resistant *Acinetobacter baumanii* (CRAB). HAI reporting through NHSN includes CLABSI, selected SSIs, dialysis events, MRSA, and CDI. The HAI Program will hire a dedicated epidemiologist who will work to determine how data from routine surveillance and data collected by healthcare facilities and reported to CDPHE through NHSN can be used jointly to improve both outbreak response and reduce incidence rates of HAIs in general.	
☒	☐	2. Enhance laboratory capacity for state and local detection and response to new and emerging HAI issues.	Ongoing
		Other activities or descriptions: The state laboratory supports investigations of healthcare-associated infection outbreaks and surveillance of HAI-related pathogens and works closely with the Communicable Disease Branch in DCEED. The Colorado HAI Program will continue to work with healthcare facilities to ensure isolates from outbreak investigations and selected isolates from population-based surveillance are typed appropriately. Testing	

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		may be conducted by hospital labs, the state health department lab, or CDC, depending on the type of testing that is most appropriate for a given pathogen. This may include speciation and sub-typing, polymerase chain reaction (PCR) analysis, toxin testing, antibiotic sensitivity, pulsed-field gel electrophoresis (PFGE), multi-locus variable number of tandem repeat analysis (MLVA), or whole genome sequencing. High volume testing during an outbreak is possible for many organisms using PCR technology. The Colorado HAI Program will work with healthcare facilities to ensure specimens are tested at the appropriate laboratory. Testing at the state laboratory rather than at commercial or hospital lab, will allow for comparisons of isolates from multiple healthcare facilities, which will allow for a better understanding of the spread of HAIs through our communities.	
☒ ☒	☐ ☐	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)	Ongoing
		Other activities or descriptions: i. Standard reporting criteria are currently in place for reporting long-term care facility influenza and norovirus outbreaks. The Communicable Disease Branch currently maintains records of HAI outbreak reports and investigations in a secure database. When HAI outbreaks occur, a standard report is distributed to facilities and health departments to enhance communication and ensure that facilities are notified, in writing, of appropriate control measures. The Colorado HAI program will also perform an assessment of	

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		outbreak response at the state health department, including outbreak receipt, triage, and investigation, as well as outbreak tracking and address identified gaps. The HAI Program will work to streamline and standardize reporting criteria of HAI outbreaks using assessment results, stakeholder input, and CDC-developed tools, as available. Analyses of reported outbreaks, response and outcome will be conducted to better understand gaps and areas for improvement. The development of an outbreak tracking database is underway, which will include healthcare-associated outbreaks, with elements to track outbreak response and outcome. The HAI Program will also use a CDC standardized outbreak assessment tool to assess capacity of facilities to detect, report, and respond to outbreaks/emerging threats, and mitigate gaps in consultation with the HAI advisory committee. Improvements will target communication between the state health department and facilities and outbreak detection/response through individual facility assessments/ consultation and trainings. ii. During an outbreak, the HAI Program communicates regularly with facilities involved, local health departments, regional epidemiologists and CDC, as necessary, to ensure consistent and accurate communication is occurring among all partners. The HAI Program also works with licensing and surveying entities in the Health Facilities and Emergency Management Services Division as needed.	

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		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
			Ongoing

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
☒ ☐	☐ ☐	v. Surgical Site Infections (SSI) vi. Ventilator-associated Pneumonia (VAP)	
		Other activities or descriptions: Certain procedures, as determined by the Colorado HAI legislation and our state HAI advisory committee, are required to be reported in NHSN by acute care hospitals, long-term acute care hospitals, rehabilitation hospitals, ambulatory surgery centers, and outpatient dialysis centers. These procedures include cardiac, breast, orthopedic, abdominal and vaginal surgeries and outpatient dialysis. In addition, central line infections are monitored in the following locations: adult medical/surgical critical care units, adult medical cardiac critical care units, adult surgical cardiothoracic critical care, adult medical critical care, adult surgical critical care, neonate critical care level II/III units, neonate critical care level III unit and long-term acute care units. CDPHE has aligned state reporting requirements with HHS HAI prevention priorities and federal CMS reporting requirements, including colon and abdominal hysterectomy surgeries, *Clostridium difficile* infections (CDI), methicillin-resistant *Staphylococcus aureus* (MRSA), outpatient-dialysis related infections, and healthcare worker influenza immunizations. The HAI Program has identified two initial priorities for prevention targets initially in 2015: the prevention of transmission of gram-negative multidrug-resistant organisms (including CRE) and CDI. These priorities might change depending on surveillance data analysis and HAI advisory committee input. The HAI Program will continue to provide targeted education for facilities with new cases of CRE. The program will also assess, in collaboration with the HAI advisory committee, the need for protocols for facility interventions for CRE, and for CDI in nursing homes. Finally, the program will continue to work with CHA and Telligen to identify prevention methods for CDI	

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
		and gram-negative MDROs when the state health department might not have resources.	
☒	☐	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).	January 31, 2016
☐	☒	ii. Establish baseline measurements for prevention targets	
		Other activities or descriptions: The state HAI Advisory Committee will identify metrics to measure progress toward national goals and HAI Program staff members will establish baseline measurements from the most recent year of data collected and publicly reported. The HAI Program will update pathogen-specific definitions to be in-line with national surveillance definitions. By January 2016, Colorado will adopt the CSTE CRE definition.	
☒	☐	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	Ongoing
		Other activities or descriptions: Colorado HAI Program staff will continue to deliver ongoing technical assistance and trainings to Colorado healthcare facilities statewide in HAI surveillance and reporting regarding surgical site infections (SSI), CLABSI, Dialysis, and MDRO. We will also continue offering an NHSN Data Analysis Workshop. The pathogen-specific Colorado Electronic Disease Reporting System (CEDRS) is in the process of an update, which will require training of local public health epidemiology staff and health care facility staff. Colorado Communicable Disease Branch staff will provide this	

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		training as the system is updated.	
☒	☐	7. Develop tailored reports of data analyses for state or region prepared by state personnel	Ongoing
		Other activities or descriptions: Colorado legislation requires CDPHE to publish and submit to the legislature an annual HAI disclosure report that shows HAI rates and standardized infection ratios (SIRs) for individual facilities. In addition, the legislation requires semi-annual bulletins that focus on HAI data and topics. To date, our bulletins have included topics such as central line-associated bloodstream infection rates in Colorado adult intensive care units, neonatal intensive care units, long-term acute care hospitals, hernia procedures in Colorado ASC, a comparison of surgical site infections rates in abdominal versus vaginal hysterectomies, and practice patterns in Colorado dialysis facilities. The Colorado HAI Program will continue to publish aggregate numbers of disease-specific cases (e.g. CRE, CRAB, CDI) on the state health department website. Using stakeholder and advisory committee input, the program will evaluate the need for additional reports and dissemination of surveillance data using population-based surveillance data and NHSN data, including what data are most useful and best methods and frequency of data dissemination.	
☒	☐	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	Ongoing
☒	☐	i. Develop a validation plan	
☒	☐	ii. Pilot test validation methods in a sample of healthcare facilities	
☒	☐	iii. Modify validation plan and methods in accordance with findings from pilot project	
☒	☐	iv. Implement validation plan and methods in all healthcare facilities participating in HAI surveillance	

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
☒ ☒	☐ ☐	v. Analyze and report validation findings vi. Use validation findings to provide operational guidance for healthcare facilities that targets any data shortcomings detected	
		Other activities or descriptions: The HAI Program has completed multiple successful data validation projects for CLABSI (twice), dialysis events (twice), SSI in ASC hernia procedures, and hip and knee surgeries and colon surgeries performed in hospitals. Currently, CDPHE is working with CDC and the National ASC Quality forum to conduct a validation of breast surgery data in ASC. Following CDC protocols, a combination of medical record review and interviews with infection prevention staff at facilities are used to assess data validity. CDPHE will work with the HAI Advisory Committee and CDC to identify future validation studies. The HAI Program will also evaluate the feasibility and need to use EIP and NHSN data to cross-validate.	
☒	☐	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.	Ongoing
		Other activities or descriptions: The Colorado HAI Program also plans to improve HAI outbreak reporting with the following steps: 1. Perform outreach to healthcare facilities and other stakeholders to improve outbreak reporting 2. Streamline HAI Program processes including how reports are received; how reports are triaged; how investigations are assigned, prioritized, and completed; how investigations are tracked; and how final reports are completed. 3. Work with partners to improve coordination of outbreak	

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
		investigations, and encourage a culture of education among facilities experiencing outbreaks. 4. Improve Colorado HAI Program use of surveillance data to identify outbreaks and increases in pathogens of interest. A triage process is already in place to handle reports of infection control breaches, including drug diversions. The HAI Program has infection prevention staff with the expertise to investigate these reports. Additionally, the HAI Program works closely with the Hepatitis Program to respond to healthcare-related cases of hepatitis B and C. Under Colorado Revised Statutes 25-1-124(2)(g) Each health care facility licensed pursuant to section 25-3-101 or certified pursuant to section 25-1.5-103(I)(a)(II) shall report to the department the following occurrences: . . . "Any occurrence in which drugs intended for use by patients or residences are diverted to use by other persons." Together the HFEMSD and DCEED established a protocol for investigating injectable diverted drugs and the divisions will continue partnering in investigations of other serious infection control breaches found through surveys, complaints, and NHSN data. The HAI Program's Injection Safety Unit has partnered with the Colorado School of Anthropology to produce a digital library of stories related to drug diversion.	
☒	☐	10. Collaborate with professional licensing organizations to identify and investigate complaints related to provider infection control practice in non-hospital settings and set standards for continuing education and training.	Ongoing
		Other activities or descriptions: The HAI Program and state surveyors work collaboratively to address infection control and reporting issues identified during state surveys at hospitals, LTACss, ASC, and dialysis facilities. The HAI Program	

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		plans to expand this part of the program by developing processes for conducting follow-up education and resolution of infection control issues.	
☒	☐	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	Ongoing
☒	☐	ii. Promote definitional alignment and data element standardization needed to link HAI data across the nation.	
		Other activities or descriptions: i. The HAI Program is in the process of improving the use of surveillance data from pathogen-specific population-based reporting and HAI reporting through NHSN to identify outbreaks and notable increases in rates of disease. Population-based pathogen-specific reporting includes (but is not limited to): hepatitis B, hepatitis C, vancomycin-resistant *Staphylococcus aureus* (VRSA),*Clostridium difficile* (Denver metropolitan area), carbapenem-resistant *Enterobacteriaciae* (CRE) and carbapenem-resistant *Acinetobacter bamauniiae* (CRAB). HAI reporting through NHSN includes CLABSI, selected SSIs, dialysis events, MRSA, and CDI. The HAI Program will hire a dedicated epidemiologist who will work to determine how data from routine surveillance and data collected by healthcare facilities and reported to CDPHE through NHSN can be used jointly to improve both outbreak response and reduce incidence rates of HAIs in general. ii. Our state legislation requires that HAI reporting by individual facilities be done through NHSN, which requires facilities to use NHSN's standard surveillance and reporting definitions. To ensure	

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		that Colorado facilities apply surveillance and reporting definitions uniformly, HAI program staff will continue to conduct ongoing data validation efforts that include education sessions to clarify surveillance and reporting issues identified, as well as continue to provide NHSN related training and technical assistance. The use of NHSN allows Colorado healthcare facilities to compare themselves to other facilities in Colorado and nationally. The HAI Program will update pathogen-specific definitions to be in-line with national surveillance definitions. By January 2016, Colorado will adopt the CSTE CRE definition.	
☒	☐	12. Enhance electronic reporting and information technology for healthcare facilities to reduce reporting burden and increase timeliness, efficiency, comprehensiveness, and data reliability. 　i. Report HAI data to the public	Ongoing
		Other activities or descriptions: As defined by our legislation, facilities must use the NHSN to report their HAI data. The HAI Program runs quarterly data checks to ensure facilities have entered data for the quarter. The department also uses these data to produce quarterly infection rate reports for dialysis facilities, semi-annual bulletins and an annual report. The bulletins target specific procedures or facility types. The annual report includes data from all healthcare facilities statewide that perform reportable medical procedures. Press releases are issued for each report and all reports are posted on our website. The Colorado HAI Program will continue to publish aggregate numbers of disease-specific cases (e.g. CRE, CRAB, CDI) on the state health department website, and work with stakeholders and the HAI advisory committee to improve the use of data within the program. Using stakeholder and advisory committee input, the program will	

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
		evaluate the need for additional reports and dissemination of surveillance data using population-based surveillance data and NHSN data, including what data are most useful and the best methods and frequency of data dissemination. This might reasonably include CRE and CDI data, and regional and facility-based rates will be considered. Additionally, the Colorado HAI Program will evaluate expanded uses of data currently collected and potential alternative data sources, and may include: 1) The use of alternative sources of data to begin to understand antibiotic use in Colorado 2) The use of population-based surveillance data to identify facilities that might need additional assistance with infection prevention efforts 3) The use of population-based and HAI NHSN surveillance data to identify priorities for antimicrobial stewardship efforts 4) The use of maps to identify regions of concern, particularly for MDROs 5) NHSN and population-based comparisons 6) Strategies to use current surveillance data to identify outbreaks	
☒	☐	13. Make available risk-adjusted HAI data that enable state agencies to make comparisons between hospitals.	Ongoing
		Other activities or descriptions: State legislation mandates the public reporting of facility-specific HAI data. All of our publicly released reports include risk-adjusted data with an explanation of the comparison between the facility rate and the national or state comparison.	
☒	☐	14. Enhance surveillance, detection of HAIs in nonhospital settings	Ongoing
		Other activities or descriptions: Per statute, Colorado ASCs began reporting through NHSN in October 2008, and currently report breast and hernia surgeries, hip and knee	

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
		prostheses, and abdominal and vaginal hysterectomies depending on procedures they perform. Outpatient dialysis centers began reporting bloodstream infections and vascular access infections into NHSN in March 2010.	

3. Prevention

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

Table 3: State planning for HAI prevention activities

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
☒	☐	1. Implement HICPAC recommendations i. Develop strategies for implementation of HICPAC recommendations for at least 2 prevention targets specified by the state multidisciplinary group.	May 2016
		The HAI Program will continue working with the state advisory committee and HAI stakeholders to develop and implement prevention strategies for two or more of the HAI monitored.	
☒	☐	2. Establish prevention working group under the state HAI advisory council to coordinate state HAI collaboratives i. Assemble expertise to consult, advise, and coach inpatient healthcare facilities involved in HAI prevention collaboratives	Ongoing

		Other activities or descriptions:
		Our established HAI advisory committee provides consultation and advice on prevention efforts. The HAI Program works with partners, such as CHA and Telligen who conduct HAI prevention collaboratives on an ongoing basis. The HAI Program conducts the following prevention activities:
		   1) Provides education and consultation to facilities with cases of CRE
		   2) Uses surveillance data to identify facilities with high rates of infections (HAI NHSN or population-based surveillance); the HAI Program is working to expand this role with the goals of providing	

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
		infection control support in the form of assessments and assistance with mitigation of identified gaps, or providing facilities with resources for prevention, such as access to ongoing prevention collaboratives led by CDPHE partners.	

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		3. Establish HAI collaboratives with at least 10 hospitals (this may require a multi-state or regional collaborative in low population density regions)
		   i. Identify staff trained in project coordination, infection control, and collaborative coordination
		   ii. Develop a communication strategy to facilitate peer-to-peer learning and sharing of best practices
		   iii. Establish and adhere to feedback from standardized outcome data to track progress	

		Other activities or descriptions: While CDPHE does not have dedicated resources to implement prevention collaboratives in the near future, we partner with CHA in their Antimicrobial Stewardship Collaborative, which helps hospitals/health systems form new antimicrobial stewardship programs or enhance existing ones. This collaborative focuses on proper prescribing practices for Urinary Tract Infections (UTIs) and Skin and Soft Tissue Infections (SSTIs) with the dual goal of improving the accurate diagnosis of UTIs and reducing the incidence of healthcare-associated CDI. The overarching purpose of this collaborative is to disseminate evidence-based strategies for antimicrobial stewardship and to assist member hospitals in embedding those strategies into daily clinical practice. We also partner with Telligen, Colorado's QIO, to provide support in their HAI Prevention Collaborative, which focuses on reducing CAUTI, CLABSI and CDI.	
☒	☐	4. Develop state HAI prevention training competencies i. Consider establishing requirements for education and training of healthcare professionals in HAI prevention (e.g., certification	Ongoing

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
		requirements, public education campaigns, and targeted provider education) or work with healthcare partners to establish best practices for training and certification	
		Other activities or descriptions: House Bill 1045 states that "an individual who collects data on hospital-acquired infection rates shall take the test for the appropriate national certification for infection control and become certified within six months after the individual becomes eligible to take the certification test. Mandatory national certification measures shall not apply to individuals collecting data on hospital-acquired infection in hospitals licensed for 50 beds or less. Qualifications for these individuals may be met through ongoing education, training, experience, or certification." House Bill 1025 that passed in early 2009 further eliminated the CIC requirement for ASC and dialysis center reporting personnel. In response to House Bill 1025, the advisory committee announced annual education requirements for non-certified reporting personnel that include: (1) taking the pre-requisite NHSN training courses before enrolling in NHSN; (2) completing ten hours of infection prevention education specific to the facility's specialty each year; and (3) keeping a log of the education completed as proof of attendance to show state surveyors when they visit the facility for re-licensure or complaints.	
☒	☐	5. Implement strategies for compliance to promote adherence to HICPAC recommendations i. Consider developing statutory or regulatory standards for HAI control and prevention or work with healthcare partners to establish best practices to ensure adherence	
☒	☐	ii. Coordinate/liaise with regulation and oversight activities such as inpatient or outpatient facility licensing/accrediting bodies and professional licensing organizations to prevent HAIs	
☒	☐	iii. Improve regulatory oversight of hospitals, enhance surveyor training and tools, and add sources and uses of infection control	Ongoing

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
☐	☒	data iv. Consider expanding regulation and oversight activities to currently unregulated settings where healthcare is delivered and work with healthcare partners to establish best practices to ensure adherence	
		Other activities or descriptions: The HAI Program has established an Infection Prevention Unit that employs an Infection Prevention Unit Manager and an Infection Control Assessment Specialist. These staff members will collaborate with HFEMSD, DORA, CHA and other partners to review and compile current infection control requirements for currently licensed facility and provider types and explore ways to expand regulatory oversight to include infection control capacity and competence and expand oversight into unregulated settings. Currently, our HAI Program works with the state advisory group and CHA to develop messaging about the importance of adhering to HAI surveillance, reporting and prevention guidelines. It also coordinates with state surveyors in HFEMSD and plans to expand our current work with the group. Currently surveyors inquire about the facility's (hospitals, LTACHs and ASCs) use of NHSN when they survey the facility and report back if they observe a possible infection control breach during a survey. We will implement additional strategies for compliance to promote adherence to HICPAC recommendations in our hospitals, ASCs, and dialysis facilities.	
☒	☐	6. Enhance prevention infrastructure by increasing joint collaboratives with at least 20 hospitals (i.e. this may require a multi-state or regional collaborative in low population density regions)	Ongoing
		Other activities or descriptions: The HAI Program coordinates with other patient safety organizations in the state (CHA, Telligen, APIC, CASCA, and Intermountain ESRD Network 15) to guide patient safety initiatives, such as prevention collaboratives. Bi-monthly collaborative meetings with CHA and Telligen are held to share information and provide input on their HAI prevention initiatives	

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
		and assist both agencies in promoting their HAI prevention collaboratives, and referring facilities as needed. We continually seek out additional patient safety organizations in the state in order to coordinate and focus our efforts and align our priorities. While CDPHE does not have dedicated resources to implement prevention collaboratives in the near future, we partner with CHA in their Antimicrobial Stewardship Collaborative, which helps hospitals/health systems form new antimicrobial stewardship programs or enhance existing ones. This collaborative focuses on proper prescribing practices for Urinary Tract Infections (UTIs) and Skin and Soft Tissue Infections (SSTIs) with the dual goal of improving the accurate diagnosis of UTIs and reduce the incidence of healthcare-associated CDI. The overarching purpose of this collaborative is to disseminate evidence and strategies for antimicrobial stewardship and to assist member hospitals in embedding those strategies into daily clinical practice. We also partner with Telligen, Colorado's QIO, in their HAI Prevention Collaborative, which focuses on reducing CAUTI, CLABSI and CDI.	
☒	☐	7. Establish collaborative(s) to prevent HAIs in nonhospital settings (e.g., long term care, dialysis)	Ongoing
		Other activities or descriptions: The HAI Program recently hired a Dialysis Infection Preventionist who works directly with outpatient dialysis centers to assess infection control gaps and implement CDC-recommended HAI prevention strategies. Education is performed on an individual facility basis, and not as a collaborative. In addition, the HAI Program coordinates with other patient safety organizations in the state (CHA, Telligen, APIC, CASCA, and Intermountain ESRD Network 15) to guide patient safety initiatives, such as prevention collaboratives. CDPHE is currently assisting Telligen in the implementation of an HAI Prevention Collaborative in nursing homes. Moreover, we hold	

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
		bi-monthly collaborative meetings with CHA and Telligen to share information and provide input on their HAI prevention initiatives and assisted both agencies in promoting their HAI prevention collaboratives. We continually seek out additional patient safety organizations in the state in order to coordinate and focus our efforts and align our priorities.	

4. Evaluation and Communication

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

Table 4: State HAI communication and evaluation planning

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation

☒ ☒	☐ ☐	1. Conduct needs assessment and/or evaluation of the state HAI program to learn how to increase impact
		  i. Establish evaluation activity to measure progress toward targets
		  ii. Establish systems for refining approaches based on data gathered
			Ongoing

		Other activities or descriptions (not required): i. Our legislation has tasked our advisory committee with continually evaluating the quality and accuracy of data reported by our healthcare facilities. The advisory committee does this by reviewing data in the semi-annual bulletins and annual report. Our ongoing validation efforts also serve as an evaluation of data quality ii. Validation project results allow the program and committee to identify educational needs and focus education efforts to areas with most need.	
☒	☐	2. Develop and implement a communication plan about the state's HAI program and about 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	Ongoing
		Other activities or descriptions: Our advisory committee includes a a consumer representative, an infectious disease physician, a medical statistician, a health insurer, infection preventionists from our public and private hospitals, members of the local APIC chapter, a Colorado	

		Ambulatory Surgical Center Association (CASCA) member, and a representative from the state assisted living association. The advisory committee takes information from our committee back to their respective organizations and boards to share our HAI plans. Select HAI program staff members are APIC members and attend the local chapter's monthly meetings. The state HAI Coordinator and HAI Program Manager work with the advisory committee, CHA, CASCA, End Stage Renal Disease Network 15 and Telligen (the state's QIO) to communicate our HAI plans and activities to these organizations.	
☒	☐	3. Provide consumers access to useful healthcare quality measures i. Disseminate HAI data to the public	Ongoing
		Other activities or descriptions: In addition to CDPHE's annual HAI Disclosure Report and biannual bulletins, House Bill 1278, passed in 2006, requires general hospitals in Colorado to report on clinical and quality measures that allow consumers to compare healthcare services across these facilities using the 'Colorado Hospital Report Card'. HAI data from CDPHE is one of the measures included. CHA produces the report with input from HAI Program staff, which serves as the final approval authority on new or modified measures. The Hospital Report Card is mentioned in our annual report and our website includes a link to the report card. The Colorado HAI Program will continue to publish aggregate numbers of disease-specific cases (e.g. CRE, CRAB, CDI) on the state health department website. The program will also evaluate the need for additional reports and dissemination of surveillance data using population-based surveillance data and NHSN data, based on stakeholder and HAI advisory committee input, including the best ways to disseminate data, what data is most useful for stakeholders, and the frequency of dissemination.	
☒	☐	4. Guide patient safety initiatives i. Identify priorities and provide input to partners to help guide patient safety initiatives and research aimed at reducing HAIs	Ongoing
		Other activities or descriptions: The HAI Program coordinates with other	

	stakeholders (CHA, Telligen, APIC, CASCA, and Intermountain ESRD Network 15) to guide patient safety initiatives. We hold bi-monthly collaborative meetings with CHA and Telligen to share information and provide input on HAI prevention initiatives. We assisted both agencies in promoting their HAI prevention collaboratives. We continually seek out additional patient safety organizations in the state in order to align priorities and coordinate efforts.	

Healthcare Infection Control and Response (Ebola-associated activities)

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

Table 5: Infection Control Assessment and Response

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
☒	☐	1. Create an inventory of all healthcare settings in state. List must include at least one infection control point of contact at the facility	Ongoing
☒	☐	2. Identify current regulatory/licensing oversight authorities for each healthcare facility and explore ways to expand oversight	
		Other activities or descriptions: 1. An inventory of healthcare facilities throughout Colorado will be created and maintained by the HAI Program. The inventory will include at minimum, infection control points of contact, available HAI-related data, and regulatory/licensing oversight for acute care, rehabilitation hospitals, skilled nursing facilities, ambulatory surgery/endoscopy centers, dialysis facilities, and outpatient rehabilitation centers. The HAI Program will add this inventory to an existing secure, web-based contact database which has an existing process for updates, is accessible to all CDPHE staff that work with healthcare facilities, and is easily modifiable. If data exists in current Colorado databases, the HAI Program will evaluate the need to duplicate this versus using existing databases.	

		2. CO will utilize the newly created healthcare inventory to assist with collaborative efforts with both internal and external partners including: HFEMSD, Colorado Department of Regulatory Agencies (DORA, oversee professional licenses) the HAI advisory committee, and CHA to review and compile current infection control requirements for all licensed facilities and providers as well as exploring ways to expand future oversight.	

☒ ☒ ☐	☐ ☐ ☒	3. Assess readiness of Ebola-designated facilities within the state
		   i. Use CDC readiness assessment tool and determine gaps in infection control
		  ii. Address gaps (mitigate gaps)
		 iii. Conduct follow-up assessments
			October 1, 2015

		Other activities or descriptions: In January 2014, three Ebola-designated facilities, all located within the Denver metropolitan area, participated in CDC Ebola readiness assessments. Gaps that were identified during the assessments were mitigated and facilities have since been designated as Ebola treatment facilities. Due to challenges with Colorado's geography, two additional facilities have been recruited to serve as Ebola assessment hospitals, one in the Southern region of the state and one on the Western slope. Facilities are currently utilizing CDC assessment tools to prepare for an on-site assessment by the Colorado Ebola assessment team.	

☐ ☐ ☐	☒ ☒ ☒	4. Assess outbreak reporting and response in healthcare facilities
		   i. Use standard assessment tool and determine gaps in outbreak reporting and response
		  ii. Address gaps (mitigate gaps)
		 iii. Track HAI outbreak response and outcome
			Ongoing

		Other activities or descriptions: All group outbreaks, including outbreaks of HAIs, are reportable conditions in the state of Colorado. The Colorado HAI Program will continue to work with partners including the local chapter of the Association for Professionals in Infection Control (APIC), health care	

	facilities, and health care providers to promote the reporting of group outbreaks including outbreaks of HAIs.	
	The Colorado HAI Program also plans to improve HAI outbreak reporting with the following steps: 1. Streamline HAI Program processes including how reports are received; how reports are triaged; how investigations are assigned, prioritized, and completed; how investigations are tracked; and how final reports are completed. 2. Work with partners to improve coordination of outbreak investigations, and encourage a culture of education among facilities experiencing outbreaks. 3. Improve Colorado HAI Program use of surveillance data to identify outbreaks and increases in pathogens of interest. CDPHE will also continue to partner with CSTE and CDC on issues pertaining to HAI outbreaks. The HAI Program, which is part of the Communicable Disease Branch, assumes primary responsibility for investigation of HAI outbreaks. The HAI Program will use CDC-developed assessment tools as appropriate and use internal expertise of epidemiologists, a physician, and infection preventionists to respond to outbreaks.	

Table 6: Targeted Healthcare Infection Prevention Programs

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation

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		1. Expand infection control assessments
		   i. Expand assessments to other additional facilities and other healthcare settings and determine gaps in infection control
		   ii. Address gaps (mitigate gaps)
		   iii. Conduct follow-up assessments
			Ongoing

		Other activities or descriptions: The Colorado HAI Program will expand infection control assessments beyond Ebola-specific assessments in content and breadth. Prioritized efforts will focus initially on acute-care, including critical access and long-term acute care hospitals, in collaboration with CHA in order to avoid duplication of efforts. Additional priority target facilities will be based on available surveillance data and with the input of the HAI Advisory Committee. CDC tools/ guidance will be utilized to create a self-assessment to be administered to facilities to assist in identifying gaps and training needs. In addition the assessment team will utilize survey/licensing data, disease/ outbreak reporting history, available NHSN and EIP surveillance data, and facility willingness to participate, in consultation with the HAI Advisory Committee, to identify specific facilities for participation. CDPHE will employ a hybrid approach to assessing facilities; utilizing phone consultations, and on-site assessments. CDPHE will partner with stakeholders (CHA, Telligen) to avoid duplication of efforts, will coordinate with HPP/PHEP-funded staff, and will consult with CDC when barriers are encountered and will conduct follow-up assessments as necessary.	

☒	☐	2. Increase infection control competency and practice in all healthcare settings through training 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.	Ongoing
☒	☐	ii. 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.	
		Other activities or descriptions: Using information gathered during on-site and self-assessments, and in consultation with the HAI Advisory Committee, the HAI Program will identify priority areas needed for IC trainings. Colorado will contract with a partner (not yet identified) experienced in infection control to provide trainings in key domains of infection control using CDC-developed content. Methods for provision of trainings could include, in consultation with CDC: train-the-trainer, meetings, webinars, and web-based material that is sustainable for the 3-year funding period and beyond. The incorporation of hands-on evaluations and competency assessments of best practices and a system to monitor ongoing compliance and competency will be explored.	

☒	☐	3. Enhance surveillance capacity to improve situational awareness, describe emerging threats, and target onsite assessments to implement prevention programs
		
		    i. Build capacity to analyze data reported by facilities in a defined region to allow for a comprehensive assessment of potential HAI threats, and communicate results with healthcare facilities.
		    ii. Work with CDC to guide analytic direction and identify facilities for
			Ongoing

☒ ☒ ☒	☐ ☐ ☐	prioritized assessments/response iii. Improve outbreak reporting capacity by developing an infrastructure that includes clear definitions of infectious threats of epidemiologic importance that are communicated to facilities iv. Implement a response plan to address potential emerging threats identified by using enhanced surveillance	

		Other activities or descriptions:
		i. The HAI Program will evaluate the need for additional reports and dissemination of surveillance data using population-based surveillance data and NHSN data, based on stakeholder and HAI advisory committee input, including the best ways to disseminate data, what data is most useful for stakeholders, and the frequency of dissemination. This might reasonably include CRE and CDI data, and regional and facility-based rates will be considered. Additionally, the Colorado HAI Program will evaluate other uses of current data collected, and possibilities for alternative data sources. This might include:
		   1) The use of alternative sources of data to begin to understand antibiotic use in Colorado
		   2) The use of population-based surveillance data to identify facilities that might need additional assistance with infection prevention efforts
		   3) The use of population-based and HAI NHSN surveillance data to identify priorities for antimicrobial stewardship efforts
		   4) The use of maps to identify regions of concern, particularly for MDROs
		   5) NHSN and population-based comparisons
		   6) Strategies to use current surveillance data to identify outbreaks
		
		ii. Prioritized efforts for infection control will focus initially on acute-care, including critical access and long-term acute care hospitals, in collaboration with CHA in order to avoid duplication of efforts.	

	Additional priority target facilities will be based on available surveillance data and with the input of the HAI Advisory Committee. CDC tools/ guidance will be utilized to create a self-assessment to be administered to facilities to assist in identifying gaps and training needs. In addition the assessment team will utilize survey/licensing data, disease/ outbreak reporting history, available NHSN and EIP surveillance data, and facility willingness to participate, in consultation with the HAI Advisory Committee, to identify specific facilities for participation. All group outbreaks, including outbreaks of HAIs, are reportable conditions in the state of Colorado. The Colorado HAI Program will continue to work with partners including the local chapter of the Association for Professionals in Infection Control (APIC), health care facilities, and health care providers to promote the reporting of group outbreaks including outbreaks of HAIs.
	
	iii. The Colorado HAI Program also plans to improve HAI outbreak reporting with the following steps:
	    1) Streamline HAI Program processes including how reports are received; how reports are triaged; how investigations are assigned, prioritized, and completed; how investigations are tracked; and how final reports are completed.
	    2) Work with partners to improve coordination of outbreak investigations, and encourage a culture of education among facilities experiencing outbreaks.
	    3) Improve Colorado HAI Program use of surveillance data to identify outbreaks and increases in pathogens of interest.
	
	As part of the assessment of outbreak response at the state health department, including how outbreaks are received, triaged, and investigated at the state level, the Colorado HAI Program will assess how outbreaks are tracked. The HAI Program has been working on improvements in HAI outbreak	

| | response, including the development of a database to track all reported outbreaks (including HAI). Currently, outbreak tracking has been limited to influenza outbreaks in facilities and enteric outbreaks; a database to track all types of outbreaks is currently under development. The HAI Program will add additional elements to this database to track response and outcome, as well as elements related to infection control assessments performed (when facilities reporting outbreaks have had assessments).

iv. The HAI Program includes staff working on emerging health threats, including Ebola. This staff, along with other Communicable Disease staff, works with OEPR staff on preparedness planning for infectious disease threats. Additionally, the HAI Program Manager leads the Emerging Pathogens Committee, which includes Ebola treatment and assessment hospitals and their associated local public health agencies, the purpose of which is to develop a health "system" to respond to emerging infectious threats, including Ebola. | |

Appendix 1

The HHS Action plan identifies metrics and 5-year national prevention targets. These metrics and prevention targets were developed by representatives from various federal agencies, the Healthcare Infection Control Practices Advisory Committee (HICPAC), professional and scientific organizations, researchers, and other stakeholders. The group of experts was charged with identifying potential targets and metrics for six categories of healthcare-associated infections:

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

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

Stakeholder feedback and revisions to the original draft Metrics

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

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

Below is a table of the revised metrics described in the HHS Action plan. Please select items or add additional items for state planning efforts.

Metric Number and Label	Original HAI Elimination Metric	HAI Comparison Metric	Measurement System	National Baseline Established (State Baselines Established)	National 5-Year Prevention Target	Coordinator of Measurement System	Is the metric NQF endorsed?
1. CLABSI 1	CLABSIs per 1000 device days by ICU and other locations	CLABSI SIR	CDC NHSN Device-Associated Module	2006-2008 (proposed 2009, in consultation with states)	Reduce the CLABSI SIR by at least 50% from baseline or to zero in ICU and other locations	CDC	Yes[*]
2. CLIP 1 (formerly CLABSI 4)	Central line bundle compliance	CLIP Adherence percentage	CDC NHSN CLIP in Device-Associated Module	2009 (proposed 2009, in consultation with states)	100% adherence with central line bundle	CDC	Yes[†]
3a. C diff 1	Case rate per patient days; administrative/discharge data for ICD-9 CM coded *Clostridium difficile* Infections	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
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[*]

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

[*] NHSN SIR metric is derived from NQF-endorsed metric data

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

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

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

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

Understanding the Relationship between HAI Rate and SIR Comparison Metrics

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

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

Risk Group Stratifier	Observed CLABSI Rates			NHSN CLABSI Rates for 2008 (Standard Population)		
Location Type	#CLABSI	#Central line-days	CLABSI rate*	#CLABSI	#Central line-days	CLABSI rate*
ICU	170	100,000	1.7	1200	600,000	2.0
WARD	58	58,000	1.0	600	400,000	1.5

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

*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.

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

[†] SSI (surgical site infection)