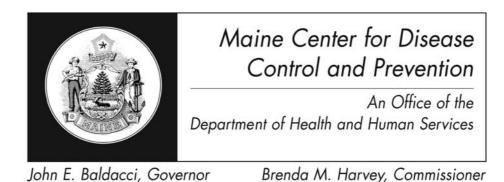# State of Maine

Healthcare Associated Infections Plan

January 1, 2010

Maine Center for Disease Control and Prevention
Division of Infectious Disease

Maine Center for Disease
Control and Prevention

An Office of the
Department of Health and Human Services

John E. Baldacci, Governor   Brenda M. Harvey, Commissioner

Executive Summary

On August 31, 2009, the Federal Centers for Disease Control and Prevention announced the award of funding to support the development of state public health programs for the prevention of healthcare associated infections. Maine Department of Health and Human Services, Maine Center for Disease Control and Prevention (Maine CDC) established the Healthcare Associated Infections (HAI) Program in the Division of Infectious Disease in October 2009. Three initial objectives were undertaken:

1. Establish a multidisciplinary advisory group to guide and support program prevention and surveillance activities;
2. Recruit and train HAI program staff; and
3. Develop a State HAI Prevention Plan.

During October – December 2009, Maine CDC convened a work group of members of the Maine Infection Prevention Collaborative to develop the Maine State HAI Prevention Plan. The work group included representatives from the Maine Quality Forum, Maine Hospital Association, Pine Tree Chapter of APIC, Northeast Health Care Quality Foundation, acute care hospitals, and Maine CDC.

The State of Maine HAI Plan was completed during December 2009. Key prevention targets were identified. These targets will allow the state to focus surveillance and prevention activities on specific healthcare associated infections. Maine will standardize the monitoring of the following targets during 2010 – 2011:

- Central Line-associated Blood Stream Infections (CLABSI)
- Methicillin-resistant *Staphylococcus aureus* (MRSA) Infections
- Surgical Site Infections (SSI)

Prevention initiatives will be undertaken using the Federal DHHS Healthcare Infection Control Practices Advisory Committee (HICPAC) evidence-based HAI prevention guidelines and Centers for Medicare and Medicaid Services (CMS) Surgical Care Improvement Project guidelines.

Maine CDC will provide leadership to coordinate and implement all HAI prevention and surveillance activities, as described in the State Plan. Program activities will be conducted in collaboration with a multi-disciplinary advisory committee, the Maine Infection Prevention Collaborative.

Acknowledgements

A successful Healthcare Associated Infections (HAI) control program is the responsibility of each individual care giver but needs a strong team to support, and advocate for preventing Healthcare Associated Infections. In Maine we are extremely fortunate to have dedicated care givers who are working together across the state to prevent Healthcare Associated Infections. The Maine Infection Prevention Collaborative (MIPC), a multidisciplinary group of stakeholders with a vested interest in healthcare associated infection prevention, was established in 2008. The MIPC collaborated with the Maine CDC in the development of the Maine State Healthcare Associated Infection Prevention Plan. The MIPC also agreed to partner with the Maine CDC to implement this plan. MIPC Mission is to improve the health of the people of Maine by preventing and controlling healthcare-associated infections and the burden of drug resistant organisms.

The MIPC is comprised of member teams from health care provider institutions throughout the state, Hospital CEOs from all 39 acute care hospitals in Maine, and Maine Health, Eastern Maine Healthcare and Maine General CEOs pledged support. Members of the MIPC include; Infection Preventionists from every acute care hospital, four infectious disease physicians, four senior administrators from hospitals and healthcare systems, one representative from each of the following; The Maine Chapter of the Association for Professionals in Infection Control and Epidemiology (Maine APIC); the Maine Hospital Association (MHA), Maine Quality Forum (MQF), the Organization of Maine Nurse Executives, Northeast Healthcare Quality Foundation and the Maine CDC. Two consumer advocates will be added in early 2010.

The Maine CDC is working collaborating with the MIPC and all the other providers in Maine who not only want to reduce the number of Healthcare Associated Infections but want to make Maine's Hospitals the safest in the nation. We are deeply indebted to all in the MIPC for their dedication, willingness to tackle challenges, and ability to work collaboratively. The risk of any acknowledgment is that we will inadvertently leave someone out. If we did then we apologize. The Maine CDC would like to thank all past, present, and future members at The Maine Infection Prevention Collaborative. Our goal is to reduce and try to eliminate all hospital acquired infections. We are so fortunate in Maine to have the MIPC team standing with us to achieve this goal.

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Mid Coast Hospital

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Background

In response to the increasing concerns about the public health impact of healthcare-associated infections (HAI), the Maine Department of Health and Human Services, Maine Center fir Disease Control and Prevention (Maine CDC) has developed a State Plan for Healthcare Association Infections (HAI). Three overarching priorities have been identified:

- Progress towards national HAI prevention targets;
- Improve use and quality of the metrics and supporting systems needed to assess progress towards meeting the targets; and
- Prioritization and broad implementation of current evidence-based prevention recommendations.

Initial emphasis for HAI prevention in Maine will focus on acute care, inpatient settings, yet the need for prevention activities for outpatient settings is recognized. Maine CDC recognizes the need to identify, respond to, and prevent HAI across the continuum of settings where healthcare is currently delivered. The public health model's population based perspective places Maine CDC in a unique and important role in this area, particularly given shifts in healthcare delivery from acute care settings to ambulatory and long term care settings.

Purpose of the State HAI Plan

The purpose of the State HAI Plan is to develop and enhance HAI prevention activities in the four areas identified above. HAI prevention efforts are identified by level: Level I indicates basic elements to begin HAI prevention efforts, Level II for intermediate and Level III more mature efforts. Four planning areas are identified:

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

For each section, activities are identified as current or planned. Current activities are those in which Maine is presently engaged and includes activities that are scheduled to begin using currently available resources. Planned activities represent future directions Maine would like to move in to meet currently unmet needs, contingent on available resources and competing priorities.

1. 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.

Table 1: HAI program infrastructure

Planning Level	Items Underway	Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
Level I	☒	☐	1. Establish statewide HAI prevention leadership through the formation of multidisciplinary group or state HAI advisory council i. Collaborate with local and regional partners (e.g., state hospital associations, professional societies for infection control and healthcare epidemiology, academic organizations, laboratorians and networks of acute care hospitals and long term care facilities (LTCFs))	11/08/09
	☐	☒	ii. Identify specific HAI prevention targets consistent with Federal DHHS priorities	2/28/10
			The Maine Infection Prevention Collaborative (MIPC) will serve as Maine CDC's HAI multi-disciplinary advisory council. MIPC was established in November of 2008 and consists of two groups: 1) the working group which includes representation from all of the hospitals in Maine, long-term care and rehabilitation facilities, home health, hospital based and reference laboratories; and 2) the coordinating group which includes representation from the working group, Maine Chapter of APIC, Maine Hospital Association, Infectious Disease Physicians, Maine Quality Forum, Northeast Health Care Quality Foundation, Maine Centers for Disease Control, executive administrative staff from the three tertiary care hospitals and the three healthcare systems. MIPC identified three initiatives during 2008-2009:	

Planning Level	Items Underway	Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
			1. Promotion of hand hygiene; 2. Healthcare associated MRSA transmission reduction in acute care hospitals; and 3. Evaluation of hospital resources associated with healthcare associated infection prevention. All Maine hospitals have committed to submitting hand hygiene observational data to the NHCQF for statewide process improvement activities. Five hospitals have submitting MRSA data using the Multi-drug Resistant Organisms (MDRO) module in the National Healthcare Safety Network (NHSN). The implementation of NHSN has expanded during 2009 with 19 hospitals completing the training program and 10 hospitals currently enrolled. Maine CDC, in collaboration with MIPC, has adopted and will implement during 2010-2011 the following national prevention targets: 1. Reduce CLABSI using the standard infection ratio (the standardized infection ratio 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) by at least 50% from baseline in critical care; 2. Reduce the incidence of healthcare associated invasive MRSA infections by 50%; and reduce facility-wide healthcare facility onset MRSA bacteremia LabID event standard infection ratio by 25% from baseline; and **3.** Rate of adherence to process measures to prevent surgical site infection at or above 95%.	
	☒	☐	2. Establish an HAI surveillance prevention and control program i. Designate a State HAI Prevention Coordinator	02/28/10

Planning Level	Items Underway	Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
	☒	☐	ii. Develop dedicated, trained HAI staff with at least one FTE (or contracted equivalent) to oversee the four major HAI activity areas (Integration, Collaboration, and Capacity Building; Reporting, Detection, Response and Surveillance; Prevention; Evaluation, Oversight and Communication)	03/31/10
			Maine CDC has received funding to support three full time equivalent (FTE) positions during 10/1/2009 – 12/31/2011: HAI Coordinator, Epidemiologist, and Management Analyst. Each position will have responsibilities related to developing, implementing, and evaluating HAI activities in the State. Maine CDC will seek to sustain at least one FTE after12/31/2011, dependent upon the availability of state and federal 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)	03/31/10
			The Maine Health and Environmental Laboratory (HETL) is the state public health laboratory. HETL performs molecular testing to identify emerging infectious diseases, contribute to public health surveillance, and provide rapid identification of pathogens that have a significant public health impact. Molecular testing is performed for selected conditions, including pertussis, influenza, and mumps. HETL also performs sub-typing and DNA fingerprinting on E. coli, Salmonella, Listeria and Shigella species. As an active participant in PulseNET, a national network of public health laboratories that perform DNA fingerprinting on food-borne bacteria, HETL can perform a rapid comparison of bacterial pathogens through a national electronic database.	

Planning Level	Items Underway	Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
			HETL also participates in the National Antimicrobial Resistance Monitoring System. Hospitals that require molecular testing for outbreak investigation will work with HETL to coordinate shipping specimens at Federal CDC. The ability for HETL to expand capacity and/or technology is dependent on the availability of funding. There are 37 clinical laboratories and 2 reference laboratories in Maine. These laboratories perform the majority of clinical testing associated with HAI. HETL works closely with clinical laboratories through the state laboratory response network (LRN). .All 39 laboratories participate in LRN established for bioterrorism surveillance in 2000-2001. As a communication and testing proficiency system, LRN may serve the State in promoting and integrating laboratory activities related to HAI. HETL works collaboratively with a statewide association of clinical microbiologists called MicroNet. Laboratory microbiology supervisors and Maine CDC Division of Infectious Disease epidemiologists participate in quarterly meetings to exchange information and discuss laboratory issues. Maine CDC will work with MicroNet to initiate discussion related to increasing laboratory capacity and collaboration for HAI surveillance in Maine.	
Level II	☐	☒	4. Facilitate use of standards-based formats (e.g., Clinical Document Architecture, electronic messages) by healthcare facilities for purposes of electronic reporting of HAI data. Providing technical assistance or other incentives for implementations of standards-based reporting can help develop capacity for HAI surveillance and other types of public health surveillance, such as for conditions deemed reportable to state and local health agencies using electronic laboratory reporting (ELR). Facilitating use of standards-based solutions for external reporting also can strengthen relationships between healthcare facilities and regional nodes of healthcare	12/31/11

Planning Level	Items Underway	Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
			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.	
			HealthInfoNet is a statewide electronic Health Information Exchange. It is an independent nonprofit 501(c)(3) corporation that began in 2004. Seven organizations (including 15 hospitals and about 2,000 physicians, collectively serving about 60% of the state) are participating in HealthInfoNet's 24-month demonstration project: • Central Maine Medical Center, Bridgton Hospital and Rumford Hospital; • Eastern Maine Medical Center, Aroostook Medical Center, Blue Hill Memorial Hospital, C.A. Dean Hospital, Inland Hospital, and Sebasticook Valley Hospital; • Maine Medical Center, Miles Memorial Hospital, Stephens Memorial Hospital and St. Andrews Hospital; • MaineGeneral Medical Center; • Franklin Memorial Hospital; • Martin's Point Health Care; and • Maine CDC At the end of the demonstration project in mid-2010, Health Info Net plans to expand use to all providers.	

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[1]Giardiasis; Pertussis; Salmonellosis; Campylobacteriosis; Crypotsporidiosis; Shiga Toxin Producing E. Coli; Syphilis; Legionellosis; Listeriosis; Shigellosis; Tuberculosis (active and presumptive); Vibrio Species including Cholera Yersiniosis; Chicken Pox; Hepatitis A, B and C (acute); Measles; Meningococcal Invasive Disease; Mumps; Rubella; Staphylococcus aureus, Methicillin-Resistant; Staphylococcus aureus with resistance (VRSA); Streptococcal invasive disease, Groups A and B; Streptococcus pneumoniae, invasive disease.

Planning Level	Items Underway	Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
			As of October 2009, the 589 registered users of HealthInfoNet served 52% of annual inpatient discharges, 50% of annual emergency department visits, and 42% of annual ambulatory visits. HealthInfoNet had 592,737 total lives in its Master Person Index, including 22,817 out-of- state residents. Of these, 67,654 (11.41%) had registration events in 2 or more participating organizations. Less than 0.4% (2,130) individuals have opted out. The data set for the HealthInfoNet demonstration includes: patient identifier and demographics, encounter history, laboratory results, radiology reports, patient consent management, adverse reactions and allergies, medication history, diagnoses and conditions, and dictated and transcribed documents. HealthInfoNet is also using the demonstration project to validate providers' access to the exchange from inside of their respective electronic medical records without having to search for the patient they are reviewing. This single sign-on feature is called "parameter-based launch." The partnership between Maine CDC and HealthInfoNet will automate reporting from healthcare to public health, shortening the time required to respond to and protect the public from health threats The information being automated between healthcare organizations and Maine CDC is already required by law to be reported to public health agencies in order to protect communities. Through HealthInfoNet, disease reporting will be quicker and more complete for about 90% of the volume of testing currently being reported by the participating healthcare laboratories. HealthInfoNet electronic laboratory reporting will occur for 30 of the 72 reportable diseases required by state law.[1] The Maine laboratories targeted for participation in the demonstration phase are Affiliated Laboratory Inc. (ALI)/Eastern Maine Health, Central Maine Medical	

Planning Level	Items Underway	Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
			Center, Franklin Memorial Hospital, MaineGeneral Medical Center, and NorDx/Maine Health. Maine CDC will continue to partner with HealthInfoNet to increase the State's capacity to receive electronic laboratory reports. Maine will explore methods of enhancing this relationship for the purposes of HAI surveillance.	

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.[2] 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 Federal DHHS Action Plan to Prevent Healthcare Associated Infections identifies targets and metrics for five categories of HAI (Appendix 1).

Maine has identified and will implement during 2010-2011 targets and metrics for three categories of HAI:

- Central Line-associated Blood Stream Infections (CLABSI)
- Methicillin-resistant *Staphylococcus aureus* (MRSA) Infections
- Surgical Site Infections (SSI)

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.

Table 2: Surveillance, detection, reporting, and response for HAIs

Planning Level	Items Underway	Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
Level I			1. Improve HAI outbreak detection and investigation	
	☒	☐	i. Work with partners including CSTE, CDC, state legislatures, and providers across the healthcare continuum to improve outbreak reporting to state health departments	09/30/10
	☒	☐	ii. Establish protocols and provide training	09/30/10

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

Planning Level	Items Underway	Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
			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	09/30/10
	☒	☐	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)	12/31/11
			Maine currently has rules for reporting notifiable diseases and conditions. Maine CDC requires reporting of certain diseases, clusters of unusual cases of a disease or outbreaks of a disease, epidemics and extreme public health emergencies. Organisms associated with HAI (i.e., invasive Methicillin Resistant *Staphylococcus aureus)* are reportable. The HAI Coordinator will function as a liaison with healthcare facilities to enhance and expand HAI outbreak reporting and investigation activities.	
	☐	☒	2. Enhance laboratory capacity for state and local detection and response to new and emerging HAI issues.	12/31/11
			The ability to expand laboratory capacity through the collaborative efforts of the clinical laboratories and HETL needs to be explored. The HAI Coordinator will have a significant role in organizing these efforts. MicroNet, an association of clinical microbiologists in the State, may also provide the structure for bringing key stakeholders and partners together to explore and	

Planning Level	Items Underway	Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
			strengthen the partnership between the State public health laboratory and clinical laboratories.	
Level II			3. Identify at least 2 priority prevention targets for surveillance in support of the HHS HAI Action Plan	
	☐	☒	i. Central Line-associated Bloodstream Infections (CLABSI)	01/31/10
	☐	☒	ii. Methicillin-resistant Staphylococcus aureus (MRSA) Infections	01/31/10
	☐	☒	iii. Surgical Site Infections (SSI)	01/31/10
			Three priority prevention targets for surveillance were chosen for implementation during 2010 -- 2011. Maine hospitals currently report central line associated bloodstream infection (CLABSI) data and central line insertion bundle compliance from critical care and mixed acuity units. Similar efforts are also in place to monitor MRSA and Surgical Site Infections. Maine CDC will standardize reporting of these targets using NHSN to monitor HAI statewide. Currently, nineteen of Maine's thirty-six acute care hospitals have met the training requirements to enroll in NHSN. Ten hospitals have enrolled in NHSN. Five hospitals are reporting MDRO metrics. MIPC will continue to provide support and training to implement NHSN in all acute care hospitals.	
			4. 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).	06/30/10
	☐	☒	ii. Establish baseline measurements for prevention targets	12/31/10
			Maine will primarily utilize NHSN to monitor HAI in the State.	

Planning Level	Items Underway	Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
			SSI will be reported through CMS. Maine CDC will work collaboratively with Maine Quality Forum and Northeast Health Care Quality Foundation (NHCQF) to identify opportunities to standardize HAI prevention target reporting through NHSN. Maine has identified the prevention targets to be implemented during 2010-2011, and will adopt national metrics to measure progress toward state and national goals for HASI prevention. When possible, Maine CDC will work with partners to obtain historical HAI data to establish baseline measures for prevention targets. A data analysis plan will be developed to obtain a baseline measure for prevention targets without historical data.	
	☒	☐	5. 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	12/31/09
			Through a grant awarded to MIPC by Medline Industries Inc., NHSN training was provided to acute care hospitals in Maine by Federal CDC, Division of Healthcare Quality Promotion (T. Horan) and NHCQF. Nineteen of Maine's thirty-six acute care hospitals have met the training requirements to enroll in NHSN. Ten hospitals have enrolled in NHSN. Five hospitals are reporting MDRO metrics. MIPC will continue to provide support and training to implement NHSN in all acute care hospitals.	
	☐	☒	6. Develop tailored reports of data analyses for state or region prepared by state personnel	12/31/11
			One of the first priorities for the HAI coordinator will be to complete the training necessary to enroll in NHSN and for the Maine CDC to become NHSN Group Facilitator. The HAI coordinator, with the HAI Program Epidemiologist, will be	

Planning Level	Items Underway	Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
			responsible for the development, analysis and reporting of HAI data.	
Level III	☐	☒	7. Validate data entered into HAI surveillance (e.g., through healthcare records review, parallel database comparison) to measure accuracy and reliability of HAI data collection	12/31/11
	☐	☒	i. Develop a validation plan	12/31/11
	☐	☒	ii. Pilot test validation methods in a sample of healthcare facilities	
	☐	☒	iii. Modify validation plan and methods in accordance with findings from pilot project	12/31/11
	☐	☒	iv. Implement validation plan and methods in all healthcare facilities participating in HAI surveillance	12/31/11
	☐	☒	v. Analyze and report validation findings	12/31/11
	☐	☒	vi. Use validation findings to provide operational guidance for healthcare facilities that targets any data shortcomings detected	12/31/11
			At this time there is no process in place to validate HAI data. The HAI Coordinator will lead the Maine CDC efforts to measure the accuracy and reliability of HAI data associated with Maine's infection prevention targets.	

3. Prevention

Maine will implement the Federal DHHS Healthcare Infection Control Practices Advisory Committee (HICPAC) evidence-based HAI prevention guidelines. Maine will also implement guidelines that have served as the basis the Centers for Medicare and Medicaid Services (CMS) Surgical Care Improvement Project. These evidence-based recommendations have also been incorporated into Joint Commission standards for accreditation of U.S. hospitals and have been endorsed by the National Quality Forum.

Table 3: State planning for HAI prevention activities

Planning Level	Items Underway	Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
Level I	☐	☒	1. Implement HICPAC recommendations. i. Develop strategies for implementation of HICPAC recommendations for at least 2 prevention targets specified by the state multidisciplinary group.	12/31/11
			The Maine Infection Prevention Collaborative, with the Maine CDC, will assist in the development of strategies to implement the multi drug resistant organisms, central line infection prevention and surgical site infection prevention recommendations using the Healthcare Infection Control Advisory Committee (HICPAC) guidelines.	
	☒	☐	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	01/31/10
			The Maine Infection Prevention Collaborative will provide the support necessary to bring the expertise to hospitals.	
	☒	☐	3. Establish HAI collaboratives with at least 10 hospitals (i.e. this may require a multi-state or regional collaborative in low population density regions) i. Identify staff trained in project coordination,	12/31/11 12/31/11

Planning Level	Items Underway	Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
	☒	☐	infection control, and collaborative coordination ii. Develop a communication strategy to facilitate peer-to-peer learning and sharing of best practices	12/31/11
	☒	☐	iii. Establish and adhere to feedback of a clear and standardized outcome data to track progress	12/31/11
			The Maine Infection Prevention Collaborate (MIPC) was established in November of 2008 and represents all acute care hospitals in the State. MIPC consists of two groups: 1. MIPC Work Group: Includes representation from hospitals, long-term care and rehabilitation facilities, home health, and hospital-based and reference laboratories; and 2. Coordinating Committee: Includes representation from the working group, Maine Chapter of APIC, Maine Hospital Association, Infectious Disease Physicians, Maine Quality Forum, Northeast Health Care Quality Foundation (NHCQF), Maine CDC, and executive administrative staff from the three tertiary care hospitals and the three healthcare systems. MIPC identified three initiatives to implement during 2008-2009: 1. Hand hygiene improvement; 2. Healthcare associated MRSA transmission reduction in acute care hospitals; and 3. Evaluation of hospital resources associated with healthcare associated infection prevention. Maine CDC will work with MIPC to implement HAI prevention activities in the State, as the committee is recognized for leadership in HAI prevention and surveillance activities and its membership	

Planning Level	Items Underway	Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
			well represents the key stakeholders critical to the success of this program. Maine CDC will also explore opportunities to collaborate with northeast regional (e.g. New Hampshire and Vermont) public health partners to implementation of prevention initiatives across several states.	
	☒	☐	4. Develop state HAI prevention training competencies 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	12/31/11
			The Maine chapter of the Association for Professionals in Infection Control and Epidemiology (APIC Maine) has 58 members representing acute care hospitals, long-term care, home health, rehabilitation facilities, behavior health and Maine CDC epidemiologists. 18 of the members are certified in infection control (CIC). APIC Maine provides quarterly educational meeting for healthcare and public health professionals. APIC Maine has focused infection prevention education for healthcare professional and provides review courses for preventionist interested in attaining certification in Infection Control. APIC Maine has identified the need for more comprehensive public education related to healthcare infection prevention and its members have expressed interest in the development of public educational campaigns. Maine CDC will work with APIC Maine to promote education and training for healthcare professionals in HAI prevention.	

4. Evaluation and Communications

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

Table 4: State HAI communication and evaluation planning

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

Level I	☐
	
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		☒
			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 towards targets and
			    ii. Establish systems for refining approaches based on data gathered
				12/31/10
				
				06/30/11

			This activity will be one of the initial priorities of the HAI Coordinator.	
	☐	☒	2. Develop and implement a communication plan about the state's HAI program and progress to meet public and private stakeholders needs i. Disseminate state priorities for HAI prevention to healthcare organizations, professional provider organizations, governmental agencies, non-profit public health organizations, and the public	06/31/10
			Communications about the State HAI Program will be coordinated by the State HAI Coordinator in collaboration with the Maine Infection Prevention Collaborative and other partners.	

Appendix 1.

The Federal Department of Health and Human Services (DHHS) Action Plan to Prevent Healthcare Associated Infections 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 Federal DHHS Action Plan in January 2009, DHHS 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 Federal DHHS Action Plan in January 2009 were reviewed and incorporated into revised metrics. While comments ranged from high level strategic observations to technical measurement details, commenters encouraged established baselines, both at the national and local level, use of standardized definitions and methods, engagement with the National Quality Forum, raised concerns regarding the use of a national targets for payment or accreditation purposes and of the validity of proposed measures, and would like to have both a target rate and a percent reduction for all metrics. Furthermore, commenters emphasized the need for flexibility in the metrics, to accommodate advances in electronic reporting and information technology and for advances in prevention of HAIs, in particular ventilator-associated pneumonia.

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

To address concerns regarding validity, DHHS is providing funding, utilizing Recovery Act of 2009 funds, to CDC to support states in validating

NHSN-related measures and to support reporting on DHHS metrics through NHSN. Also, most of the reporting metrics outlined here have already been endorsed by NQF and for population-based national measures on MRSA and *C. difficile*, work to develop hospital level measures will be conducted during 2010 utilizing DHHS support to CDC through funds available in the Recovery Act.

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

Below is a table of the revised metrics described in the DHHS Action plan.

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

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?
3b. C diff 2 (new)		*C. difficile* SIR	CDC NHSN MDRO/CDAD Module LabID[‡]	2009-2010	Reduce the facility-wide healthcare facility-onset *C. difficile* LabID event SIR by at least 30% from baseline or to zero	CDC	No
4. CAUTI 2	# of symptomatic UTI per 1,000 urinary catheter days	CAUTI SIR	CDC NHSN Device-Associated Module	2009 for ICUs and other locations 2009 for other hospital units (proposed 2009, in consultation with states)	Reduce the CAUTI SIR by at least 25% from baseline or to zero in ICU and other locations	CDC	Yes[*]
5a. MRSA 1	Incidence rate (number per 100,000 persons) of invasive MRSA infections	MRSA Incidence rate	CDC EIP/ABCs	2007-2008 (for non-EIP states, MRSA metric to be developed in collaboration with EIP states)	At least a 50% reduction in incidence of healthcare-associated invasive MRSA infections	CDC	No
5b. MRSA 2 (new)		MRSA bacteremia SIR	CDC NHSN MDRO/CDAD Module LabID[‡]	2009-2010	Reduce the facility-wide healthcare facility-onset MRSA bacteremia LabID event SIR by at least 25% from baseline or to zero	CDC	No
6. SSI 1	Deep incision and organ space infection rates using NHSN definitions (SCIP procedures)	SSI SIR	CDC NHSN Procedure-Associated Module	2006-2008 (proposed 2009, in consultation with states)	Reduce the admission and readmission SSI[§] SIR by at least 25% from baseline or to zero	CDC	Yes[¶]
7. SCIP 1	Adherence to	SCIP Adherence	CMS SCIP	To be determined by CMS	At least 95% adherence to	CMS	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?
(formerly SSI 2)	SCIP/NQF infection process measures	percentage			process measures to prevent surgical site infections		

* 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

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

[†] 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

$$SIR = \frac{observed}{expected} = \frac{228 + 636}{287 + 853.8} = \frac{864}{1140.8} = 0.76 \qquad 95\%\,CI = (0.673, 0.849)$$

[†] SSI, surgical site infection

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