

North Carolina Surveillance for Healthcare-Associated and Resistant Pathogens Patient Safety (SHARPPS) Program Plan

DRAFT revised April 2018

In response to the increasing concerns about the public health impact of healthcare-associated infections (HAIs), the US Department of Health and Human Services (HHS) has developed an Action Plan to help prevent Healthcare-associated Infections. The HHS Action Plan includes recommendations for surveillance, research, communication, and metrics for measuring progress toward national goals. Three overarching priorities have been identified:

- Progress toward 5-year national prevention targets (e.g., 50-70% reduction in bloodstream infections);
- 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

Background: The 2009 Omnibus bill required states who received Preventive Health and Health Services (PHHS) Block Grant funds to certify that they would submit a plan to reduce HAIs to the Secretary of Health and Human Services not later than January 1, 2010. In order to assist states in responding within the short timeline required by that language and to facilitate coordination with national HAI prevention efforts, the Centers for Disease Control and Prevention (CDC) created a template to assist state planning efforts.

This template helps to ensure progress toward national prevention targets as described in the HHS Action Plan. CDC is leading the implementation of recommendations on national prevention targets and metrics and states should tailor the plan to their state-specific needs.

Initial emphasis for HAI prevention focused on acute care, inpatient settings, and then expanded to outpatient settings. The public health model of population-based healthcare delivery places health departments in a unique and important role in this area, particularly given shifts in healthcare delivery from acute care settings to ambulatory and long term care settings. In non-hospital settings, infection control and oversight have been lacking which have resulted in outbreaks which can have a wide-ranging and substantial impact on affected communities. At the same time, trends toward mandatory reporting of HAIs from hospitals reflect increased demand for accountability from the public.

The State HAI Action Plan template targets the following areas:

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

With new Ebola-related, infection control activities, the following two tables have been added to reflect those activities:

5. Infection Control Assessment and Response (Ebola-associated activity from FOA Supplement, CK14-1401PPHFSUPP15, Project A)
6. Targeted Healthcare Infection Prevention Programs (Ebola-associated activity from FOA Supplement, CK14-1401PPHFSUPP15, Project B)

Framework and Funding for Prevention of HAIs

CDC’s framework for the prevention of HAIs builds on a coordinated effort of federal, state, and partner organizations and is based on a collaborative public health approach that includes surveillance, outbreak response, infection control, research, training, education, and systematic implementation of prevention practices. Legislation in support of HAI prevention provides a unique opportunity to strengthen existing state capacity for prevention efforts.

Template for developing HAI plan

The following template provides choices for enhancing state HAI prevention activities in the six areas identified above. For each section, please choose elements which best support current activities or planned activities. Current activities are those in which the state is presently engaged and includes activities that are scheduled to begin using currently available resources. Planned activities represent future directions the state would like to move in to meet currently unmet needs, contingent on available resources and competing priorities. A section for additional activities is included to accommodate plans beyond the principal categories.

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
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. Establish statewide HAI prevention leadership through the formation of multidisciplinary group or state HAI advisory council <ul style="list-style-type: none"> i. Collaborate with local and regional partners (e.g., state hospital associations, professional societies for infection control and healthcare epidemiology, academic organizations, laboratorians, and networks of acute care hospitals and long term care facilities). 	Implemented 2009 - Ongoing

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
		<p>government, infection control and healthcare quality organizations, hospital preparedness, laboratories, academic centers, regulatory agencies, and consumer advocates. The Advisory Group convenes quarterly.</p> <ul style="list-style-type: none"> • In 2014, North Carolina was invited to join the CDC campaign Get Smart: Know When Antibiotics Work, now known as Be Antibiotics Aware: Smart Use, Best Care. The SHARPPS Program is working with partners to assure establishment of antimicrobial stewardship programs in acute care hospitals and improve training on antimicrobial stewardship and appropriate use for healthcare students in the state. As part of this effort in early 2015, Advisory Group members were engaged to provide input to the HAI Program’s partnership with professional schools in NC (Medical, Dental, Physician’s Assistant, Nursing, Pharmacy). <p>Ongoing:</p> <ul style="list-style-type: none"> • Advisory Group members are fully engaged with public health preparedness efforts to mitigate threats associated with emerging disease threats to North Carolina’s citizens. • The SHARPPS Program under the guidance of the HAI Advisory Group continues to participate in the national Be Antibiotics Aware: Smart Use, Best Care campaign. • In 2017, the SHARPPS Program established the Antimicrobial Resistance / Antimicrobial Stewardship Subcommittee (of the Advisory Group) to assist in guiding stewardship efforts in NC. <ul style="list-style-type: none"> ○ One of the goals is to assure establishment of antimicrobial stewardship programs in all healthcare settings in a tiered approach targeting acute care hospitals first, followed by long-term care and outpatient settings. 	

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<p>2. Establish an HAI surveillance prevention and control program</p> <p style="padding-left: 40px;">i. Designate a State HAI Prevention Coordinator</p> <p style="padding-left: 40px;">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, and Infection Control)</p>	<p>Implemented 2009 (above)</p> <p>Implemented 2010</p> <p>Implemented 2010</p>
		<p><i>Other activities or descriptions:</i></p> <ul style="list-style-type: none"> • The prevention of healthcare-associated infections is a public health priority in North Carolina and is a collaborative effort among the healthcare and public health communities. The SHARPPS Program is located within NC Division of Public Health, Epidemiology Section, Communicable Disease Branch. • As of 2018, the NC DPH SHARPPS Program is comprised of 5 team members, including a Program Manager, Epidemiologists, Health Educator/Campaign Coordinator, Program Director and Medical Director. • For more information on the SHARPPS Program and related activities in North Carolina, please visit http://epi.publichealth.nc.gov/cd/diseases/hai. We welcome your feedback and inquiries at nchai@dhhs.nc.gov. 	
		<p>3. Integrate laboratory activities with HAI surveillance, prevention, and control efforts.</p>	<p>Ongoing</p>

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
☒	☐	<ul style="list-style-type: none"> • 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) • Laboratory partners (academic and public health) are active participants on the SHARPPS Advisory Group. • Hospital laboratories and NC State Laboratory of Public Health have been active partners in the ongoing CRE surveillance activities. 	
		<p><i>Other activities or descriptions:</i></p> <p>Context:</p> <ul style="list-style-type: none"> • Carbapenem-resistant <i>Enterobacteriaceae</i> (CRE) Sentinel Surveillance: <ul style="list-style-type: none"> ○ During March 2015 – September 2016, the NC DPH SHARPPS Program conducted a sentinel surveillance system, the goals of which were to: 1) describe the burden of CRE among patients admitted to North Carolina’s major medical centers; 2) assess for presence and prevalence of specific mechanisms of resistance among CRE isolates; and 3) to describe the geographic distribution of patients with CRE admitted to the state’s major medical centers. <p>Ongoing:</p> <ul style="list-style-type: none"> • The sentinel surveillance described above informed next steps for CRE surveillance activities in NC; namely, incorporation of CP-CRE into the reportable conditions list anticipated to be effective October 2018. • NC State Laboratory of Public Health has been an active partner in the ongoing CRE surveillance activities and proposed addition of CP-CRE to the reportable conditions list. • NC State Laboratory of Public Health has enhanced capacity to support CRE surveillance, conducting confirmatory testing of CRE isolates, and 	<p>Implemented March 2015 – September 2016</p> <p>Implemented 2017 - Ongoing</p>

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
		<p>mechanism of resistance testing including KPC, NDM, OXA, VIM, and IMP.</p> <ul style="list-style-type: none"> • NC DPH and the NC SLPH are collaborating with CDC and a regional network of laboratories (ARLN) to enhance testing and response to novel pathogens. • To date, surveillance for CP-CRE has focused on the three Enterobacteriaceae genera that are most often associated with healthcare-associated infections: <i>Klebsiella</i> spp., <i>Enterobacter</i> spp., and <i>E. coli</i>. However, the less common healthcare-associated CRE can still carry carbapenemases but the prevalence of carbapenemases in the less common Enterobacteriaceae is unknown. NC DPH collaborated with CDC for a short-term sentinel surveillance project to: 1) Determine the proportion of less common genera that are CP-CRE; 2) Determine the proportion of all CP-CRE that these less common genera represent; and 3) Describe the carbapenemase types among the less common Enterobacteriaceae genera. Between January 1, 2018 and April 30, 2018, sentinel sites were asked to submit all CRE identified to SLPH for mechanism testing. These isolates are then forwarded through ARLN for additional testing. 	Implemented January-April 2018
☒	☐	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
		<p><i>Other activities or descriptions:</i> Historical Context:</p> <ul style="list-style-type: none"> • The NC SHARPPS Advisory Group is the platform for coordination among various agencies engaged in HAI surveillance, prevention and control. This group provides feedback as well as recommendations for 	

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
		<p>better coordination or additional organizational involvement. These government agencies and organizations include the North Carolina Healthcare Association, the North Carolina Statewide Program for Infection Control and Epidemiology, the North Carolina Chapter of the Association for Professionals in Infection Control and Epidemiology, Alliant Quality, and the Adult Care Licensure and Nursing Home Licensure and Certification sections of the North Carolina Division of Health Service Regulation (DHSR), among others.</p> <ul style="list-style-type: none"> • NC DPH and its sister regulatory, the NC Division of Health Service Regulation (DHSR), collaborate closely on Infection Prevention Breaches identified in adult care homes during regulatory surveys. This partnership was established as a result of one such breach that resulted in the deaths of several residents. DHSR developed an infection control course that all nonsupervisory staff member designated to direct an adult care home’s infection control activities must complete (pursuant to G.S. 131D-4.5C.) <p>Ongoing:</p> <ul style="list-style-type: none"> • One & Only Safe Injection Practices Campaign: <ul style="list-style-type: none"> ○ NC DPH is a state member of the One & Only Injection Safety Campaign (www.oneandonlycampaign.org), led by the Centers for Disease Control and Prevention (CDC) and the Safe Injection Practices Coalition. ○ NC DPH is engaging stakeholders in an effort to increase awareness of drug diversion and its consequences for patient safety. An initial workgroup meeting was held August 18, 2015, with representation from the following agencies/boards: Medical Board, NC Nursing Board, NC Pharmacy Board, NC Dental Board, State Bureau of Investigation, NC Harm Reduction, FDA, Department of Veteran’s Affairs, Drug Enforcement Agency, and Coverys Insurance Company. 	<p>Implemented 2012</p> <p>Implemented 2013</p> <p>Implemented 2015</p>

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
☒	☐	<p>5. Facilitate use of standards-based formats (e.g., Clinical Document Architecture, electronic messages) by healthcare facilities for purposes of electronic reporting of HAI data. Providing technical assistance or other incentives for implementations of standards-based reporting can help develop capacity for HAI surveillance and other types of public health surveillance, such as for conditions deemed reportable to state and local health agencies using electronic laboratory reporting (ELR). Facilitating use of standards-based solutions for external reporting also can strengthen relationships between healthcare facilities and regional nodes of healthcare information, such as Regional Health Information Organizations (RHIOs) and Health Information Exchanges (HIEs). These relationships, in turn, can yield broader benefits for public health by consolidating electronic reporting through regional nodes.</p>	Ongoing
		<p><i>Other activities or descriptions:</i></p> <p>Context:</p> <ul style="list-style-type: none"> • Per 10A NCAC 41A .0106, the National Healthcare Safety Network (NHSN) is the state HAI surveillance reporting platform. The NC SHARPPS Program works with hospitals on a monthly basis to ensure their data are accurate and timely. • An integrated electronic communicable disease surveillance system, NCEDSS, is housed within NC DPH. Most hospital laboratories and select laboratory networks submit laboratory data electronically via Electronic Laboratory Reporting (ELR). 	

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.

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
<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<p>1. Improve HAI outbreak detection and investigation</p> <ul style="list-style-type: none"> i. Work with partners including CSTE, CDC, state legislators, and providers across the healthcare continuum to improve outbreak reporting to state health departments 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) 	<p>Ongoing</p>
		<p><i>Other activities or descriptions:</i></p> <p>Historical context:</p> <ul style="list-style-type: none"> • In addition to routine surveillance of HAIs, the Advisory Group has recommended that outbreaks originating in healthcare facilities be mandatorily reportable in situations where these outbreaks represent a threat to the health of the broader community. These events became mandatorily reportable in January 2012. Historically, the Epidemiology Section has been actively involved in collaborating with local health departments to respond to outbreaks of HAIs in several healthcare environments. <p>Ongoing:</p> <ul style="list-style-type: none"> • The NC SHARPPS Program continues to work closely with Advisory Group members and other partners including local 	

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
		<p>health departments to strengthen existing relationships and provide additional resources necessary to effectively respond to outbreaks of HAI significance.</p> <ul style="list-style-type: none"> • Representatives of the NC SHARPPS Program are members of CSTE and active participants on the subcommittees pertaining to HAI. Additionally, members contribute to CSTE Position Statements. • Education and outbreak training occurs on the individual, facility, and local health department level each time a possible healthcare-associated sentinel event or reportable disease is identified. • An educational curriculum for outbreak management and response was developed in 2012, revised in 2015, and is provided annually (at a minimum). • A strong partnership with the NC Division of Health and Service Regulation (DHSR) exists and serves as a platform to identify, report, and investigate infection control breaches in adult care homes. Training is provided annually to DHSR surveyors, facility staff, facility administrators, county Department of Social Services and others regarding incident investigations and outbreaks. • DHSR developed an infection control course that all nonsupervisory staff member designated to direct an adult care home's infection control activities must complete (pursuant to G.S. 131D-4.5C.) • Infection Prevention in Health Care Settings (10A NCAC 41A .0206) has been a NC law since 1992. This law requires a designated staff member for each noncontiguous healthcare facility to complete a state approved infection control course. • An Act to Protect Adult Care Home Residents (HB474) was signed into NC law in 2011. This law strengthened infection 	

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
		<p>prevention education and training requirements for nonsupervisory staff in adult care homes.</p> <ul style="list-style-type: none"> • One & Only Safe Injection Practices Campaign: NC DPH is a state member of the One & Only Injection Safety Campaign (www.oneandonlycampaign.org), led by the Centers for Disease Control and Prevention (CDC) and the Safe Injection Practices Coalition. As a partner, the SHARPPS Program provides training and education specific to safe injection practices. • A partner of NC DPH and the administrator of the state-approved courses to meet the requirements of the North Carolina infection control rule (10A NCAC 41A .0206), the North Carolina Statewide Program for Infection Control and Epidemiology (NC SPICE) provides training, education, and daily guidance to thousands of health care personnel. • In 2015, NC DPH contracted with NC SPICE to adapt an assessment tool and conduct assessments related to infection prevention and disease awareness, preparedness, and response. As a result of this contract, infection prevention assessments have been conducted in a total of 277 healthcare facilities across NC, including acute care hospitals (33), long-term care facilities (113), outpatient settings (91), and dialysis centers (40). • The SHARPPS Program is working with partners to provide education on infection prevention and response to multi-drug resistant organisms for local health departments and long-term care facilities. 	Implemented 2015 – 2018
☒	☐	2. Enhance laboratory capacity for state and local detection and response to new and emerging HAI issues.	Ongoing

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<p>3. Improve communication of HAI outbreaks and infection control breaches</p> <ul style="list-style-type: none"> 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
		<p><i>Other activities or descriptions:</i></p> <p>Historical Context:</p> <ul style="list-style-type: none"> • A standardized outbreak surveillance system was developed in 2012, revised in 2015, and was integrated into our NC electronic disease surveillance system in 2017. A situation report ('sitrep') is used to communicate essential details of the sentinel event or outbreak to partners. <p>Ongoing:</p> <ul style="list-style-type: none"> • A strong partnership with the NC Division of Health and Service Regulation (DHSR) exists to identify, report, and investigate infection control breaches in adult care homes. • The standardized communication report ('sitrep') is used for information exchange regarding reporting outbreaks and/or breaches through Division of Health Service Regulation (DHSR), NC DPH, and other partners. • When the Division of Health Service Regulation (DHSR) identifies suspected infection control breaches in adult care homes, they report directly to the SHARPPS Program for 	

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
		further investigation. The SHARPPS Program in turn contacts the local health department who investigates, provides education to the facility, and submits a report via standardized template to the NC SHARPPS Program within two weeks. Breaches are tracked and follow-up occurs as appropriate.	
<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<p>4. Identify at least 2 priority prevention targets for surveillance in support of the HHS HAI Action Plan</p> <ul style="list-style-type: none"> i. Central Line-associated Bloodstream Infections (CLABSI) ii. <i>Clostridium difficile</i> Infections (CDI) (Lab ID) iii. Catheter-associated Urinary Tract Infections (CAUTI) iv. Methicillin-resistant <i>Staphylococcus aureus</i> (MRSA) Infections (Lab ID) v. Surgical Site Infections (SSI) vi. Ventilator-associated Pneumonia (VAP) 	Ongoing
		<p><i>Other activities or descriptions:</i></p> <p>Historical Context:</p> <ul style="list-style-type: none"> • Reporting of select healthcare-associated infections (HAIs) became mandatory in North Carolina beginning January 1, 2012 (Session Law 2011-386, House Bill 809; 10A NCAC 41A .0106). Infections that are required to be reported are aligned with those of the Centers for Medicaid and Medicare Services' inpatient prospective payment system (IPPS) and include: <ul style="list-style-type: none"> • Central line-associated bloodstream infections (CLABSI), beginning January 2012 • Catheter-associated urinary tract infections (CAUTI), beginning January 2012 	Implemented voluntary reporting 2011; mandatory reporting 2012; Ongoing

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
		<ul style="list-style-type: none"> Quarterly and annual reports are used for targeting of prevention measures within healthcare facilities and across North Carolina. Targeted Assessment for Prevention (TAP) reports are created and disseminated for those facilities with SIRs ≥ 1. 	Implemented 2017
<input checked="" type="checkbox"/>	<input type="checkbox"/>	6. Develop state surveillance training competencies <ul style="list-style-type: none"> Conduct local training for appropriate use of surveillance systems (e.g., NHSN) including facility and group enrollment, data collection, management, and analysis 	Ongoing
		<p><i>Other activities or descriptions:</i></p> <p>Historical Context:</p> <ul style="list-style-type: none"> The SHARPPS Program and partners have been integral to the education and enrollment of facilities into NHSN (per 10A NCAC 41A.0106). A two-part webinar was created to assist healthcare facilities to learn how to start reporting through NHSN. A rebroadcast of the webinar is available through the NC SPICE website (http://www.unc.edu/depts/spice/). <p>Ongoing:</p> <ul style="list-style-type: none"> Ongoing training, education, and support for NHSN users is also available from the NC SHARPPS Program, the North Carolina Healthcare Association, NC Statewide Program for Infection Control and Epidemiology (NC SPICE), and the Division of Healthcare Quality and Promotion (DHQP) at CDC. Routine technical assistance is provided by SHARPPS Program epidemiologists. 	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	7. Develop tailored reports of data analyses for state or region	Ongoing

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
		prepared by state personnel	
		<p><i>Other activities or descriptions:</i></p> <p>Historical and ongoing:</p> <ul style="list-style-type: none"> • The SHARPPS Advisory Group provides input as to the content and format of the HAI public reports. • Per 10A NCAC 41A .0106, NC DPH releases public reports disclosing hospital-specific healthcare associated infection data to inform consumers and allow healthcare providers and government agencies to monitor progress towards eliminating HAIs. • Facility-specific data from North Carolina short-term acute care hospitals, long-term acute care hospitals, specialty hospitals, and inpatient rehabilitation facilities are published quarterly. • State-level and hospital-specific data from North Carolina short-term acute care hospitals are published annually. • The standardized infection ratio (SIR) is the key measure used to determine HAI progress in North Carolina as well as nationally. The SIR represents how a hospital did compared to the national average. • SIRs are presented for the state overall and for each hospital size group; SIR is also presented by unit where there may be differences across types of hospital units. • All SHARPPS HAI reports are available at http://epi.publichealth.nc.gov/cd/hai/figures.html. 	
<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<p>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</p> <ol style="list-style-type: none"> i. Develop a validation plan ii. Pilot test validation methods in a sample of healthcare facilities 	Ongoing

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<ul style="list-style-type: none"> 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 v. Analyze and report validation findings vi. Use validation findings to provide operational guidance for healthcare facilities that targets any data shortcomings detected 	
		<p><i>Other activities or descriptions:</i></p> <p>Historical Context:</p> <ul style="list-style-type: none"> • In 2009-2010, a limited targeted data validation was conducted of CLABSIs and CAUTIs in ICUs for those acute care hospitals voluntarily reporting data into NHSN. Twenty-three hospitals participated, with the following results: correct classification of a positive bloodstream infection 72% of the time (Sensitivity 0.72, 95% C.I.: 0.68, 0.77) and correct classification of a negative bloodstream infection 97% of the time (Specificity 0.97, 95% C.I.: 0.96, 0.98). Urinary tract infection surveillance was less accurate with facilities correctly classifying positive urinary tract infections 74% of the time (Sensitivity 0.74, 95% C.I.: 0.69, 0.80) and correctly classifying negative urinary tract infections 92% of the time (Specificity 0.92, 95% C.I.: 0.90, 0.93). <p>Ongoing:</p> <ul style="list-style-type: none"> • NC DPH and its partners agree that validation of data entered into NHSN is a crucial component of accurate statewide surveillance and reporting of HAIs. Ongoing validation of HAI data reported through NHSN will be a responsibility of the NC SHARPPS Program. 	<p>Implemented 2009-2010</p> <p>Ongoing</p>

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
		<ul style="list-style-type: none"> • For data validation, hospitals are selected based on suspected over- or under-reporting of HAIs for data entered into NHSN. <ul style="list-style-type: none"> ○ In 2015, the SHARPPS Program conducted targeted data validation of CLABSIs and LabID CDIs. ○ In 2016, the SHARPPS Program conducted targeted data validation of CAUTI data for 11 selected facilities. ○ In 2017, the SHARPPS Program conducted targeted data validation of CLABSI and LabID MRSA data for 16 selected facilities. ○ In 2018, the SHARPPS Program is continuing with targeted data validation of CLABSI and LabID CDI data for 14 selected facilities. 	
☒	☐	9. Develop preparedness plans for improved response to HAI <ul style="list-style-type: none"> i. Define processes and tiered response criteria to handle increased reports of serious infection control breaches (e.g., syringe reuse), suspect cases/clusters, and outbreaks 	Ongoing
		<p><i>Other activities or descriptions:</i></p> <p>Historical context and ongoing:</p> <ul style="list-style-type: none"> • A strong partnership with the NC Division of Health and Service Regulation (DHSR) exists to identify, report, and investigate infection control breaches in adult care homes. • The standardized communication report ('sitrep') is used for information exchange regarding reporting outbreaks and/or breaches through Division of Health Service Regulation (DHSR), NC DPH, and other partners. • When the Division of Health Service Regulation (DHSR) identifies suspected infection control breaches in adult care homes, they report directly to the SHARPPS Program for further investigation. The SHARPPS Program in turn contacts 	

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
		<p>the local health department who investigates, provides education to the facility, and submits a report via standardized template to the NC SHARPPS Program within two weeks. Breaches are tracked and follow-up occurs as appropriate.</p> <ul style="list-style-type: none"> • One & Only Safe Injection Practices Campaign: NC DPH is a state member of the One & Only Injection Safety Campaign (www.oneandonlycampaign.org), led by the Centers for Disease Control and Prevention (CDC) and the Safe Injection Practices Coalition. As a partner, the SHARPPS Program provides training and education specific to safe injection practices. • A standardized outbreak surveillance system was developed in 2012, revised in 2015, and was integrated into our NC electronic disease surveillance system in 2017. A situation report ('sitrep') is used to communicate essential details of the sentinel event or outbreak to partners. • Beginning in 2017, the SHARPPS Program is working with partners to provide education on infection prevention and response to multi-drug resistant organisms for local health departments and long-term care facilities. 	
☒	☐	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
	<p><i>Other activities or descriptions:</i> Historical context and ongoing:</p> <ul style="list-style-type: none"> • Infection Prevention in Health Care Settings (10A NCAC 41A .0206) has been a NC law since 1992. This law requires a designated staff member for each noncontiguous healthcare 		

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
		<p>facility to complete a state approved infection control course.</p> <ul style="list-style-type: none"> In collaboration with our sister regulatory agency, the Division of Health Services Regulation (DHSR), an Act to Protect Adult Care Home Residents (HB474) was signed into NC law in 2011. This law strengthened infection prevention education and training requirements for nonsupervisory staff in adult care homes (pursuant to G.S. 131D-4.5C.). 	
<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<p>11. Adopt integration and interoperability standards for HAI information systems and data sources</p> <ul style="list-style-type: none"> i. Improve overall use of surveillance data to identify and prevent HAI outbreaks or transmission in HC settings (e.g., hepatitis B, hepatitis C, multi-drug resistant organisms (MDRO), and other reportable HAIs) across the spectrum of inpatient and outpatient healthcare settings ii. Promote definitional alignment and data element standardization needed to link HAI data across the nation. 	Ongoing
		<p><i>Other activities or descriptions:</i> Historical context and ongoing:</p> <ul style="list-style-type: none"> In 2017, our standardized outbreak surveillance system was integrated into the NC electronic disease surveillance system (NCEDSS). This system allows for statewide secure electronic communication on individual events and outbreaks. In 2017, we initiated work to develop and optimize surveillance for MDROs in NCEDSS. 	
		12. Enhance electronic reporting and information technology for	Ongoing

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<p>healthcare facilities to reduce reporting burden and increase timeliness, efficiency, comprehensiveness, and reliability of the data</p> <p style="text-align: center;">i. Report HAI data to the public</p>	Ongoing
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<p><i>Other activities or descriptions:</i></p> <p>Historical context and ongoing:</p> <ul style="list-style-type: none"> • Per 10A NCAC 41A .0106, NC DPH releases public reports disclosing hospital-specific healthcare associated infection data to inform consumers and allow healthcare providers and government agencies to monitor progress towards eliminating HAIs. • Facility-specific data from North Carolina short-term acute care hospitals, long-term acute care hospitals, specialty hospitals, and inpatient rehabilitation facilities are published quarterly. • State-level and hospital-specific data from North Carolina short-term acute care hospitals are published annually. • All SHARPPS HAI reports are available at http://epi.publichealth.nc.gov/cd/hai/figures.html. 	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<p>13. Make available risk-adjusted HAI data that enable state agencies to make comparisons between hospitals.</p>	Ongoing
		<p><i>Other activities or descriptions:</i></p> <p>Historical context and ongoing:</p> <ul style="list-style-type: none"> • Per 10A NCAC 41A .0106, NC DPH releases public reports disclosing hospital-specific healthcare associated infection data. • The standardized infection ratio (SIR) is the key measure used to determine HAI progress in North Carolina as well as nationally. The SIR represents how a hospital did compared to the national average. • SIRs are presented for the state overall and for each hospital 	

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
		<p>size group; SIR is also presented by unit where there may be differences across types of hospital units.</p> <ul style="list-style-type: none"> All SHARPPS HAI reports are available at http://epi.publichealth.nc.gov/cd/hai/figures.html. 	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	14. Enhance surveillance and detection of HAIs in nonhospital settings	Ongoing
		<p><i>Other activities or descriptions:</i></p> <p>Historical context and ongoing:</p> <ul style="list-style-type: none"> Per 10A NCAC 41A .0106, NC DPH releases public reports disclosing hospital-specific healthcare associated infection data. Facility-specific data from North Carolina short-term acute care hospitals, long-term acute care hospitals, specialty hospitals, and inpatient rehabilitation facilities are published quarterly. State-level and hospital-specific data from North Carolina short-term acute care hospitals are published annually. All SHARPPS HAI reports are available at http://epi.publichealth.nc.gov/cd/hai/figures.html. In collaboration with our sister regulatory agency, the Division of Health Services Regulation (DHSR), an Act to Protect Adult Care Home Residents (HB474) was signed into NC law in 2011. This law not only strengthened infection prevention education and training requirements for nonsupervisory staff in adult care homes, but requires reporting of outbreaks (pursuant to G.S. 131D-4.5C.). Per 10A NCAC 41A .0103, outbreaks are reportable in any setting. Annual outbreak summary data indicate that on average, 70% 	Ongoing

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
		<p>of reported outbreaks in NC occur in long-term care settings. All NC DPH outbreak reports are available at http://epi.publichealth.nc.gov/cd/figures.html.</p>	

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 <ul style="list-style-type: none"> i. Develop strategies for implementation of HICPAC recommendations for at least 2 prevention targets specified by the state multidisciplinary group. 	Ongoing
		<i>Other activities or descriptions:</i> Historical context and ongoing: <ul style="list-style-type: none"> • NC DPH and the SHARPPS Program conduct all activities on evidenced-based practices, including CDC and HICPAC recommendations. • Over the years, SHARPPS Program activities have evolved based on resources and guidance from the Advisory Group. • In 2018, the SHARPPS Program is collaborating with partners to engage hospitals in decreasing the CLABSI rate in NC. 	
☒	☐	2. Establish prevention working group under the state HAI advisory council to coordinate state HAI collaboratives <ul style="list-style-type: none"> i. Assemble expertise to consult, advise, and coach inpatient healthcare facilities involved in HAI 	Ongoing

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
		prevention collaboratives	
		<p><i>Other activities or descriptions:</i></p> <p>Historical context and ongoing:</p> <ul style="list-style-type: none"> • Historically, prevention collaboratives in NC have been led by the QIN/QIO, NC Hospital Association - now the NC Healthcare Association, and the Hospital Engagement Networks (HENs) - now the Hospital Improvement Innovation Network (HIINs). Representatives from the QIN/QIO and NCHA sit on our Advisory Group. • Over the years, the SHARPPS Program has joined in prevention efforts with these partners when targeting specific HAIs during collaboratives. • In 2018, the SHARPPS Program is working with the NC Healthcare Association (NCHA) and 2 of the 3 NC HIINs (Vizient and Premier) to engage hospitals in decreasing the CLABSI rate in NC. 	
<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<p>3. Establish HAI collaboratives with at least 10 hospitals (this may require a multi-state or regional collaborative in low population density regions)</p> <ul style="list-style-type: none"> 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 	Ongoing
		<p><i>Other activities or descriptions:</i></p> <p>Historical context and ongoing:</p> <ul style="list-style-type: none"> • In 2018, the SHARPPS Program is working with the NC Healthcare Association (NCHA) and 2 of the 3 NC HIINs (Vizient and Premier) to 	

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
		engage hospitals in decreasing the CLABSI rate in NC. We have targeted ~20 acute care hospitals with increased SIRs (standardized infection ratio) or CADs (cumulative attributable difference).	
☒	☐	4. Develop state HAI prevention training competencies <ol style="list-style-type: none"> 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 	Ongoing
		<p><i>Other activities or descriptions:</i></p> <p>Historical context and ongoing:</p> <ul style="list-style-type: none"> • Infection Prevention in Health Care Settings (10A NCAC 41A .0206) has been a NC law since 1992. This law requires a designated staff member for each noncontiguous healthcare facility to complete a state approved infection control course. • In collaboration with our sister regulatory agency, the Division of Health Services Regulation (DHSR), an Act to Protect Adult Care Home Residents (HB474) was signed into NC law in 2011. This law strengthened infection prevention education and training requirements for nonsupervisory staff in adult care homes, and also requires reporting of outbreaks (pursuant to G.S. 131D-4.5C.). 	
☒	☐	5. Implement strategies for compliance to promote adherence to HICPAC recommendations <ol style="list-style-type: none"> i. Consider developing statutory or regulatory standards for healthcare infection control and 	Ongoing

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<p>prevention or work with healthcare partners to establish best practices to ensure adherence</p> <p>ii. Coordinate/liaise with regulation and oversight activities such as inpatient or outpatient facility licensing/accrediting bodies and professional licensing organizations to prevent HAIs</p> <p>iii. Improve regulatory oversight of hospitals, enhance surveyor training and tools, and add sources and uses of infection control data</p> <p>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</p>	
		<p><i>Other activities or descriptions:</i></p> <p>Historical context and ongoing:</p> <ul style="list-style-type: none"> • Infection Prevention in Health Care Settings (10A NCAC 41A .0206) has been a NC law since 1992. This law requires a designated staff member for each noncontiguous healthcare facility to complete a state approved infection control course. • A partner of NC DPH and the administrator of the state-approved courses to meet the requirements of the North Carolina infection control rule (10A NCAC 41A .0206), the North Carolina Statewide Program for Infection Control and Epidemiology (NC SPICE) provides training, education, and daily guidance to thousands of health care personnel. • In collaboration with our sister regulatory agency, the Division of Health Services Regulation (DHSR), an Act to Protect Adult Care Home Residents (HB474) was signed into NC law in 2011. This law strengthened infection prevention education and training requirements for nonsupervisory staff in adult care homes, and 	

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
		also requires reporting of outbreaks (pursuant to G.S. 131D-4.5C.).	
☒	☐	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
		<p><i>Other activities or descriptions:</i></p> <p>Context and ongoing:</p> <ul style="list-style-type: none"> • See (2) above for historical context. • In 2018, the SHARPPS Program is working with the NC Healthcare Association (NCHA) and 2 of the 3 NC HIINs (Vizient and Premier) to engage hospitals in decreasing the CLABSI rate in NC. We have targeted ~20 acute care hospitals with increased SIRs (standardized infection ratio) or CADs (cumulative attributable difference). 	
☒	☐	7. Establish collaborative(s) to prevent HAIs in nonhospital settings (e.g., long term care, dialysis)	Ongoing
		<p><i>Other activities or descriptions:</i></p> <p>Context and ongoing:</p> <ul style="list-style-type: none"> • In 2015, NC DPH contracted with NC SPICE to adapt a tool to assess infection prevention and disease awareness, preparedness, and response. • As of 2018, infection prevention assessments have been conducted in a total of 277 healthcare facilities across NC, including acute care hospitals (33), long-term care facilities (113), outpatient settings (91), and dialysis centers (40). These data will be used to highlight and mitigate infection prevention gaps. • The SHARPPS Program is working with partners to provide education on infection prevention and response to multi-drug resistant organisms for local health departments and long-term care facilities. 	

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

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
<input type="checkbox"/> <input type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	1. Conduct needs assessment and/or evaluation of the state HAI program to learn how to increase impact <ul style="list-style-type: none"> i. Establish evaluation activity to measure progress toward targets and ii. Establish systems for refining approaches based on data gathered 	
		<i>Other activities or descriptions (not required):</i>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. Develop and implement a communication plan about the state’s HAI program and about progress to meet public and private stakeholders needs <ul style="list-style-type: none"> i. Disseminate state priorities for HAI prevention to healthcare organizations, professional provider organizations, governmental agencies, non-profit public health organizations, and the public 	Ongoing
		<i>Other activities or descriptions:</i> Historical context and ongoing: <ul style="list-style-type: none"> • Per 10A NCAC 41A .0106, NC DPH releases public reports disclosing hospital-specific healthcare associated infection data to inform consumers and allow healthcare providers and 	

		<p>government agencies to monitor progress towards eliminating HAIs.</p> <ul style="list-style-type: none"> • State-level and hospital-specific data from North Carolina short-term acute care hospitals are published annually. These annual reports highlight program and partner accomplishments. • All SHARPPS HAI reports are available at http://epi.publichealth.nc.gov/cd/hai/figures.html. • Program information is available at http://epi.publichealth.nc.gov/cd/diseases/hai.html. • In 2016, the SHARPPS Program began publishing a quarterly newsletter, providing updates on activities and initiatives related to the reduction of healthcare-associated infections in North Carolina. 	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<p>3. Provide consumers access to useful healthcare quality measures</p> <p>i. Disseminate HAI data to the public</p>	Ongoing
		<p><i>Other activities or descriptions:</i></p> <p>Historical context and ongoing:</p> <ul style="list-style-type: none"> • Per 10A NCAC 41A .0106, NC DPH releases public reports disclosing hospital-specific healthcare associated infection data to inform consumers and allow healthcare providers and government agencies to monitor progress towards eliminating HAIs. • Facility-specific data from North Carolina short-term acute care hospitals, long-term acute care hospitals, specialty hospitals, and inpatient rehabilitation facilities are published quarterly. • State-level and hospital-specific data from North Carolina short-term acute care hospitals are published annually. • All SHARPPS HAI reports are available at http://epi.publichealth.nc.gov/cd/hai/figures.html. 	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<p>4. Guide patient safety initiatives</p> <p>i. Identify priorities and provide input to partners to help guide patient safety initiatives and research aimed at reducing HAIs</p>	Ongoing

	<p><i>Other activities or descriptions:</i></p> <p>Context and ongoing:</p> <ul style="list-style-type: none"> • NC and the SHARPPS Program has a strong history of working with partners to identify and initiate infection prevention best practices. Examples include: <ul style="list-style-type: none"> ○ Publication of hospital-specific and state-level healthcare associated infections data. ○ Data validation of NC HAI data reported to NHSN. ○ Passing a law in 1992 (prior to the SHARPPS Program) requiring a designated staff member for each noncontiguous healthcare facility to complete a state approved infection control course. (Infection Prevention in Health Care Settings [10A NCAC 41A .0206]). ○ Passing regulation in 2011 (in collaboration with our sister regulatory agency, the Division of Health Services Regulation [DHSR]), an Act to Protect Adult Care Home Residents (HB474), strengthening infection prevention education and training requirements for nonsupervisory staff in adult care homes. ○ Working with partners to identify and mitigate infection prevention gaps in response to emerging infections. ○ Working with partners to provide education on infection prevention and response to multi-drug resistant organisms for local health departments and long-term care facilities. 	
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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	Ongoing
		<p><i>Other activities or descriptions:</i></p> <p>Context and ongoing:</p> <ul style="list-style-type: none"> • As part of the response to Ebola and other emerging infections, NC DPH contracted with a partner (NC SPICE) to establish an inventory of all healthcare settings in NC. This remains underway; many entities do not have regulatory oversight. • Infection Prevention in Health Care Settings (10A NCAC 41A .0206) has been a NC law since 1992. This law requires a designated staff member for each noncontiguous healthcare facility to complete a state approved infection control course. Thus for those facilities that are licensed or have regulatory oversight, we have an identified infection prevention point of contact. 	

<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<p>3. Assess readiness of Ebola-designated facilities within the state</p> <p>i. Use CDC readiness assessment tool and determine gaps in infection control</p> <p>ii. Address gaps (mitigate gaps)</p> <p>iii. Conduct follow-up assessments</p>	<p>Implemented 2014-2015</p>
		<p><i>Other activities or descriptions:</i></p> <p>Context and ongoing:</p> <ul style="list-style-type: none"> North Carolina does not have designated Ebola facilities. During 2014-2015, assessments were conducted at tertiary care medical centers across the state to review the preparedness, identify and mitigate infection prevention gaps, and identify best practices. Infection prevention assessments, gap identification and mitigation took place during 2014-2018. 	<p>2014-2018</p>
<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<p>4. Assess outbreak reporting and response in healthcare facilities</p> <p>i. Use standard assessment tool and determine gaps in outbreak reporting and response</p> <p>ii. Address gaps (mitigate gaps)</p> <p>iii. Track HAI outbreak response and outcome</p>	<p>Ongoing</p>
		<p><i>Other activities or descriptions:</i></p> <p>Context and ongoing:</p> <ul style="list-style-type: none"> As part of the infection prevention assessments, gap identification and mitigation that took place during 2014-2018, outbreak reporting and response was assessed. Currently, the SHARPPS Program is working closely with health departments to strengthen existing relationships and provide additional resources necessary to effectively respond to outbreaks of HAI significance. 	<p>Ongoing</p>

	<ul style="list-style-type: none"> • Education and outbreak training occurs on the individual, facility, and local health department level each time a possible healthcare-associated sentinel event or reportable disease is identified. • A strong partnership with the NC Division of Health and Service Regulation (DHSR) exists and serves as a platform to identify, report, and investigate outbreaks. Training is provided annually to DHSR surveyors, facility staff, facility administrators, county Department of Social Services and others regarding incident investigations and outbreaks. • An educational curriculum for outbreak management and response was developed in 2012, revised in 2015, and is provided annually (at a minimum). • In 2017, our standardized outbreak surveillance system was integrated into the NC electronic disease surveillance system (NCEDSS). This system allows for statewide secure electronic communication on individual events and outbreaks. • In 2017, SHARPPS Program staff responded to 33 HAI outbreaks or blood borne pathogen exposure events. In partnership with team members from across DPH’s communicable disease branch, the SHARPPS Program consulted on an additional 220 norovirus and influenza outbreaks, most of which occurred in long-term care settings. 	
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Table 6: Targeted Healthcare Infection Prevention Programs

Check Items Underway	Check Items Planned	Items Planned for Implementation (or currently underway)	Target Dates for Implementation
<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<ol style="list-style-type: none"> 1. Expand infection control assessments <ol style="list-style-type: none"> 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 	Implemented 2016

		<p><i>Other activities or descriptions:</i></p> <p>Context and ongoing:</p> <ul style="list-style-type: none"> During 2016-2018, infection prevention assessments have been conducted in a total of 277 healthcare facilities across NC, including acute care hospitals (33), long-term care facilities (113), outpatient settings (91), and dialysis centers (40). 	Ongoing
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<p>2. Increase infection control competency and practice in all healthcare settings through training</p> <p>i. Incorporate general infection control knowledge and practice assessments of competency into state licensing board requirements, credentialing, and continuing education requirements for clinical care providers (e.g., medical license, admitting privileges) and/or licensing/accreditation requirements for healthcare facilities.</p>	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<p>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.</p>	
		<p><i>Other activities or descriptions:</i></p> <p>Context and ongoing:</p> <ul style="list-style-type: none"> NC DPH and the SHARPPS Program see the value of expanding infection prevention awareness and training, including incorporation into licensing and credentialing. Currently, 2 laws exist that do strengthen infection prevention competency and practices in NC: <ul style="list-style-type: none"> Infection Prevention in Health Care Settings (10A NCAC 41A .0206) has been a NC law since 1992. This law requires a designated staff member for each 	

	<p>blood borne pathogen exposure events. In partnership with team members from across DPH's communicable disease branch, the SHARPPS Program consulted on an additional 220 norovirus and influenza outbreaks, most of which occurred in long-term care settings.</p>	
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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 <i>Clostridium difficile</i> Infections	Hospitalizations with <i>C. difficile</i> per 1000 patient discharges	Hospital discharge data	2008 (proposed 2008, in consultation with states)	At least 30% reduction in hospitalizations with <i>C. difficile</i> per 1000 patient discharges	AHRQ	No
3b. C diff 2 (new)		<i>C. difficile</i> SIR	CDC NHSN MDRO/CDAD Module LabID‡	2009-2010	Reduce the facility-wide healthcare facility-onset <i>C. difficile</i> LabID event SIR by at least 30% from baseline or to zero	CDC	No
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
$\text{SIR} = \frac{\text{observed}}{\text{expected}} = \frac{170 + 58}{100000 \times \left(\frac{2}{1000}\right) + 58,000 \times \left(\frac{1.5}{1000}\right)} = \frac{228}{200 + 87} = \frac{228}{287} = 0.79 \quad 95\% \text{CI} = (0.628, 0.989)$						

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

In the table above, there are two strata to illustrate risk-adjustment by location type for which national data exist from NHSN. The SIR calculation is based on dividing the total number of observed CLABSI events by an “expected” number using the CLABSI rates from the standard population. This “expected” number is calculated by multiplying the national CLABSI rate from the standard population by the observed number of central line-days for each stratum

which can also be understood as a prediction or projection. If the observed data represented a follow-up period such as 2009 one would state that an SIR of 0.79 implies that there was a 21% reduction in CLABSIs overall for the nation, region or facility.

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

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

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

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

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

† SSI (surgical site infection)