NH DIVISION OF
Public Health Services
Improving health, preventing disease, reducing costs *for all*
Department of Health and Human Services

STATE OF NEW HAMPSHIRE
HEALTHCARE-ASSOCIATED INFECTIONS PLAN
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New Hampshire Department of Health and Human Services
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ACRONYMS AND ABBREVIATIONS

AR	Antibiotic Resistance
ASA Score	American Society of Anesthesiologists (ASA) Classification of Physical Status
ASC	Ambulatory surgical center(s)
BSI	Bloodstream infection(s)
CABG	Coronary artery bypass graft procedure(s)
CAUTI	Catheter-associated urinary tract infection(s)
CCN	CMS Certification Number
CDC	U.S. Centers for Disease Control and Prevention
CDI	*Clostridium difficile* Infection
CLABSI	Central line-associated bloodstream infection(s)
CLIP	Central line insertion practices
CMS	Centers for Medicare and Medicaid Services
CRE	*Carbapenem-Resistant Enterobacteriaceae*
DHHS	New Hampshire Department of Health and Human Services
HAI	Healthcare-associated infection(s)
HCP	Healthcare personnel
HICPAC	Healthcare Infection Control Practices Advisory Committee
HHS	U.S. Department of Health and Human Services
ICAR	Infection Control Assessment and Response Program
ICU	Intensive care unit(s)
MDRO	Multidrug-Resistant Organism
NH	New Hampshire
NHHCQAC	New Hampshire Healthcare Quality Assurance Commission
NHSN	National Healthcare Safety Network
RSA	Revised Statutes Annotated
SIR	Standardized infection ratio(s)
SSI	Surgical site infection(s)
TAW	Healthcare-Associated Infections Technical Advisory Workgroup
VAP	Ventilator-associated pneumonia(s)

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I. INTRODUCTION

A. Purpose

This report represents the third New Hampshire plan to respond and prevent healthcare-associated infections (HAI). This plan will primarily be used by the HAI Program and other stakeholders in the state to identify current progress, guide future initiatives, and identify areas for improvement. This plan focuses on three primary actions: 1) RESPOND to threats of infectious disease transmission, 2) ANALYZE data to target prevention activities and 3) PREVENT future HAIs, infection control breaches, and antibiotic resistance through education and training and promoting best practices through group collaborative programs. This plan can also be used by healthcare facilities and consumers to understand current and planned future HAI prevention and response activities.

B. Audience

The intended audience may include, but is not limited to: public health personnel, infection control and prevention staff, healthcare personnel (HCP), facility leadership and management, clinicians, and healthcare consumers.

C. How do use this document

This document includes implemented, current, and future plans and consists of four sections:

I) Introduction
II) Past, current and future HAI Program plans
    A. Enhance HAI program infrastructure
    B. Surveillance, detection, reporting, and response
    C. Prevention
    D. Evaluation and communications
    E. Healthcare infection control and response to highly pathogenic infectious diseases, including high threat antimicrobial resistant organisms
III) Conclusions
IV) Appendices
    A. New Hampshire HAI Technical Advisory Committee
    B. HHS action plan, targets, and metrics
    C. References

Please contact the NH Department of Health and Human Services (DHHS) Healthcare-Associated Infections Program (603-271-4496) with any questions about the content or how to use this document.

D. Background on Healthcare-Associated Infections

An HAI is an infection that a patient acquires during the course of receiving treatment for another condition within a healthcare setting. An estimated 687,000 HAI and 72,000 associated deaths occurred in United States (U.S.) acute care hospitals in 2015.[i] By these estimates, 3% of hospitalized patients in the 2015 survey had one or more HAI. HAI are among the top 10 leading causes of death in the U.S., and 5–10% of all hospital admissions are complicated by HAI.[ii] The economic burden of HAI is substantial and increasing. The total cost of HAI has been estimated at $33 billion per year in U.S. hospitals.[iii] The most common HAI are pneumonia, gastrointestinal illness, primary bloodstream infections (BSI), and SSI. [ii]

E. Background on the New Hampshire Healthcare-Associated Infection Program

The New Hampshire Department of Health and Human Services (NH DHHS) has been actively engaged in developing a healthcare-associated infections (HAI) surveillance program since 2007. During the 2006 legislative season, the New Hampshire legislature passed a bill creating NH RSA 151:32-35, which requires hospitals to identify, track, and report HAI to NH DHHS effective July 1, 2007. RSA 151:33 specifically requires reporting of central line-associated blood stream infections (CLABSI), surgical site infections (SSI), central line insertion practices (CLIP), surgical antimicrobial prophylaxis (SCIP), and influenza vaccination coverage of healthcare personnel. The intent of the law is to provide HAI data by hospital in a publicly accessible forum for hospital comparison. The passage of the 2006 bill did not include funding to carry out these activities, and as such, mandatory reporting was not implemented in July 2007 as directed. In 2007, after passage of the 2006 bill mandating reporting of HAI to NH DHHS without providing funding or positions to implement the activities, NH DHHS engaged partners to consider possible approaches on implementing the law.

In the spring of 2009, NH DHHS formed a HAI Technical Advisory Workgroup (TAW). The purpose of the TAW is to provide scientific and infection prevention expertise to the NH DHHS HAI Reporting Program. The TAW is not intended to be an oversight group, but instead a forum for stakeholder participation in decision making around the NH HAI Program. The TAW is currently a 21-member group that includes representation from stakeholders across NH and includes representatives from various sizes and types of hospitals, infection control associations, the NH Hospital Association, and the NH Healthcare Quality Assurance Commission.

During the 2019 legislative season, NH DHHS updated the administrative rules (He-P 309) that implement the HAI Reporting law (RSA 151: 33-36). The law more broadly requires HAI reporting and the rules are intended to provide specific detail on what exactly is reportable and how to report. End-stage renal dialysis facilities will report dialysis events that are already required under the CMS ESRD-Quality Incentive Program (QIP). To align with RSA 151:9-b, all licenced long term care facilities were added to report HCP influenza vaccination data. Hospitals that currently report antibiotic use, antibiotic resistance and Clostridium difficile (CDI) labID events into NHSN are asked to confer rights to NH DHHS to view the data.

In August 2019, NH DHHS was awarded Epidemiology Laboratory and Capacity funds. The NH DHHSreceived $414,348 in federal funding from CDC to further develop and support NH's Healthcare-Associated Infections Program's infrastruction, prevention and response activities. Many of the planned activities described in this document were and are only made possible by federal funding from the CDC. Any changes in funding or personnel would affect the State's ability to continue and complete planned activities.

F. State of New Hampshire Healthcare-Associated Infections Plan

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) developed an Action Plan to help prevent healthcare-ssociated 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: 1) Improve HAI and antimicrobial resistance surveillance, detection and response 2) Improve facility level and state level prevention and intervention stratigies 3) Coordinate communications with partners on HAI/AR.

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 and patient notification, which can have a wide-ranging and substantial impact on affected communities. Concurrently, 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:

A. Surveillance, Detection and Response
B. Prevention and Intervention
C. Communications, Coordination and Partnerships

II. CURRENT AND FUTURE HEALTHCARE-ASSOCIATED INFECTION PROGRAM PLANS

A. 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.[iv] 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 focus will be on the following:

- Central Line-associated Blood Stream Infections (CLABSI)
- Catheter-associated Urinary Tract Infections (CAUTI)
- Surgical Site Infections (SSI)
- Influenza vaccination
- Carbapenem Resistance Enterobacteriaceae (CRE)
- Antimicrobial resistance (AR)
- *Clostridium difficile* Infections (CDI)
- Antimicrobial use (AU)
- Bloodstream infection (BSI);
- Local access site infection (LASI);
- Access-related bloodstream infection (ARBSI); and
- Vascular access infection (VAI);

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.

<u>Strategy and Activities I:</u>

Support containment of novel or high-concern antibiotic-resistant organisms. This includes prompt detection of and response to certain targeted resistant organisms (e.g., pan-resistant organisms) or mechanisms (e.g., mcr-1-producing Enterobacteriaceae) and implementation of regional control strategies for certain resistance mechanisms in geographic areas where these mechanisms are more commonly encountered (e.g., New Delhi metallo-β-lactamase (NDM)-producing Enterobacteriaceae in areas where this mechanism is endemic). Organisms included in each containment tier or targeted for regional intervention may vary by region depending on the local epidemiology.

Activities include but not limited to:

a. In collaboration with public health laboratories, provide technical expertise and support to clinical laboratories, infection prevention networks, and healthcare facilities.
b. Conduct colonization screenings and continue until spread is controlled. Refer to CDC guidance to determine when colonization screening is recommended. Facilitate timely sharing of colonization screening results and incorporate findings in recommendations to affected healthcare facilities and providers.

Strategy and Activities II:

Support rapid response. Response refers to efforts to control newly identified HAIs and AR risks not described in section I and includes but is not limited to investigation of possible outbreaks or serious infection control breaches. Conduct response-driven onsite infection control assessments and evaluations and provide recommendations for containment and other responses.

Activities include but not limited to:

a. Provide technical expertise to healthcare facilities.
b. Facilitate timely sharing of laboratory results and incorporate findings in recommendations to affected healthcare facilities and providers.

Strategy and Activities III:

a. Conduct onsite infection control assessments at facilities where targeted organisms or resistance mechanisms have been identified (i.e., as part of the containment described in Strategy I). Assessments may require direct observation and ongoing monitoring of infection prevention practices in affected areas/units.
b. Conduct onsite infection control assessments at facilities where outbreaks have occurred. Assessments may require direct observation and ongoing monitoring of infection prevention practices in affected areas/units.
c. Provide continued assistance until infection control gaps have been addressed.

Strategy and Activities IV:

Enhance other aspects of epi-lab coordination.

Activities include but not limited to:

a. Using elements and guidance provided by CDC, collaborate with public health labs (local, state, and regional) to develop coordinated work plans to improve coordination and information flow.
b. Facilitate connections between facilities or clinical laboratories and public health labs to ensure appropriate isolates are forwarded to the regional AR laboratory for targeted surveillance activities

Strategy and Activities V:
Use data for action.

Activities include but not limited to:

a. Identify and use data sources to inform prevention and response activities.
b. Identify and implement mechanisms to detect emerging MDROs within the jurisdiction (e.g., sentinel lab/facility surveillance) and to define local and regional epidemiology.
c. Use data to inform TAW and ARAW committee structure, membership, and priorities.

B. Prevention and Intervention

Strategy and Activities VI:
Implement data-driven prevention strategies.

Activities include but not limited to:

a. Conduct ongoing onsite assessments and gap mitigation in long length-of-stay. The goal to improve infection control practices to reduce transmission of selected MDROs or reduce HAIs. Assessments will require direct observation.

Strategy and Activities VII:
Facilitate core element implementation in designated settings. Core elements should be applied in the setting for which they were designed

Activities include but not limited to:

a. Assist the implementation of core elements in acute care hospitals, long term care, dental, and dialysis facilties.

C. Communications, Coordination and Partnerships

Strategies and Activities VIII:
Sustain HAI/AR capacity to implement program.

Activities include but not limited to:

a. The HAI coordinator should assure HAI prevention through coordination throughout the jurisdiction (including for containment and response); epi-lab collaboration, including but not limited to coordination with the AR Lab Network regional lab, and use of the Targeted Assessment for Prevention; serve on the ELC governance team to monitor HAI program performance and spending; and serve as the primary point of contact for HAI communications with and reporting to CDC.
b. The AR/AS expert should provide senior-level expertise (e.g., doctoral level or equivalent experience) in epidemiology and infection prevention with proficiency in AR/AS and data for action. The expert should lead program and policy development to reduce AR infections and implement AS; provide expertise in infectious diseases, HAIs, and AR; lead and oversee in the development and implementation of locally relevant public health

interventions and prevention guidelines that include AS and control of CDI, CRE, or MDROs; and lead the development and implementation of containment strategies for the jurisdiction.

Strategies and Activities IX:
Engage public health and healthcare providers.

Activities include but not limited to:

a. Building upon work previously funded through the Ebola supplement, maintain and update as needed an inventory of all healthcare settings in the jurisdiction. Use this inventory to guide outreach for containment, response, and prevention activities.
b. Provide education/training on infection control for healthcare facilities on prevention of HAIs and control of targeted MDROs.
c. Providing training and support for local health departments in investigations in healthcare settings, control of targeted MDROs, and prevention of HAIs.
d. Improve onsite assessment capacity by developing expertise in facility assessment designed to improve infection prevention and control in outpatient or high-acuity, post-acute care settings. Examples of activities include training staff in conducting assessments or hiring, contracting with, or collaborating with infection prevention experts.

Strategies and Activities X:
Coordinate prevention activities with partners (e.g., health systems, hospital associations, quality improvement programs such as QIN-QIOs and HIINs, Epicenters, EIP, local health departments, regulatory/licensing entities, ESRD networks)

Activities include but not limited to:

a. Identify and engage with partners for prevention activities. Strong applications will define specific roles and responsibilities of the Recipient and those of the partners.

Strategies and Activities XI:
Convene HAI advisory committee. The committee should include local stakeholders, and representatives from the state and/or regional public health laboratories, state survey agency, hospital/emergency preparedness, and patient representatives.

Activities include but not limited to:

a. Assign strategies, roles, and responsibilities of members.
b. Update the HAI plan regularly.

APPENDIX I: HHS action plan, metrics, and prevention targets

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, professional and scientific organizations, researchers, and other stakeholders. The group of experts was charged with identifying potential targets and metrics for eight categories of healthcare-associated infections:

- Central Line-Associated Bloodstream Infections (CLABSI)
- Catheter-associated Urinary Tract Infections (CAUTI)
- Surgical Site Infections (SSI)
- Clostridioides Difficile Infections (CDI)
- Antimicrobial Use (AU) and Resisance (AR)
- Vascular Asccess Site Infections (VASI)
- Positive Blood Cultures
- Intravenous Antimicrobial Timing

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

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

95%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

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

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.

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

† SSI (surgical site infection)

APPENDIX II: References

[i] Magill SS, et al. Emerging Infections Program Hospital Prevalence Survey Team. Changes in Prevalence of Health Care-Associated Infections in U.S. Hospitals.external icon N Eng J Med. 2018 Nov 1;379(18):1732-1744. doi: 10.1056/NEJMoa1801550.

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