Maine Quality Forum

MEASURING TO IMPROVE

TO: Senator Brakey, Representative Gattine and Members of the Joint Standing Committee on Health and Human Services

FROM: Karynlee Harrington, Maine Quality Forum

CC: Anna Broome, Legislative Analyst; Commissioner Mayhew, DHHS; Joseph Bruno, Chair MQF

DATE: March 31, 2016

RE: 2016 Annual Report of HealthCare Associated Infections in the State of Maine

On behalf of the Maine Quality Forum and in collaboration with the Maine CDC, I am pleased to submit to the Joint Standing Committee on Health and Human Services our 2016 Annual Report on Healthcare Associated Infections in Maine. The report provides a significant amount of information on the specific HAI data that the Maine Health Data Organization (MHDO) collects from Maine hospitals and from the National Health Safety Network (NHSN) per MHDO Rule Chapter 270, Uniform Reporting System for Health Care Quality Data Sets.

The data contained in this report reflects compliance and performance rates in the aggregate and by hospital by peer group for the most recent reporting period. The report also provides data on prior years (when available) in order to establish a trend line.

Consistent with our observation over the last several years, while there remain opportunities for improvement on some of the measures and by specific hospitals, the data that we collect and report on show that Maine hospitals continue to show progress in reducing the incidence of healthcare associated infections.

53 State House Station, Augusta ME 04330-0053 Phone: (207)287-9900

Maine Quality Forum

MEASURING TO IMPROVE

2016 Annual Report

Healthcare Associated Infections in Maine

Submitted to:

Joint Standing Committee on Health and Human Services

Submitted by:

Karynlee Harrington, Executive Director
Maine Quality Forum

March 31, 2016

This report is submitted by the Maine Quality Forum in collaboration with the Maine Centers for Disease Control as part of its legislative responsibility to provide an annual report to the Maine State Legislature on the status of healthcare associated infections in Maine.[1] The Muskie School of Public Service, under contract with the Maine Quality Forum, provided technical support in the preparation of the report.

[1] 24-A MRSA §6951.

Table of Contents

Executive Summary

Healthcare Associated Infections (HAIs) are harmful, costly, and largely preventable.

Healthcare Associated Infections (HAIs) – infections occurring during the course of healthcare treatment for other conditions – can lead to medical complications, prolonged hospital stays, and death. When the words "antibiotic resistance" and "superbug" make headline news,[2] the dangers of HAIs capture attention.

Major factors associated with HAIs include inadequate hand washing, uneven use of proven infection control procedures, patients who have weakened immune systems and bacteria becoming resistant to antibiotics. The good news is that these infections can largely be prevented. Many in Maine are working hard to prevent them.

The MQF's Annual HAI Report focuses on Maine hospital efforts and results.

Maine hospitals are required to report data to the Maine Health Data Organization (MHDO) on how often HAIs occur and how well they follow recognized best practices designed to prevent:

- Central line catheter-associated blood stream infections;
- Ventilator associated pneumonia infections and other complications;
- Lab-identified Methicillin-resistant Staphylococcus aureus (MRSA) events[3]; and
- Lab-identified *Clostridium difficile* (*C. difficile*) events.

There are a number of positive trends to report.

Maine has achieved progress in four specific areas over the past 5 years:

1. *Infections related to the use of central line catheters* in adult intensive care units. The overall trend reflects improved compliance with proven methods for preventing infections when central line catheters are used in adult intensive care units.
2. *Following sets of proven best practices to prevent central line catheter-related infections when central line catheters are used* in adult intensive care units or when they are inserted before, during or after surgery.
3. *Following guidelines to prevent ventilator associated pneumonia and other complications.* Maine hospitals are doing a better job of following all 5 recognized methods for preventing pneumonia infections and other ventilator-associated complications when intensive care patients are placed on breathing machines.
4. *Following guidelines to prevent infections related to surgery.* During the previous 2013-14 HAI data collection period, Maine hospitals had already achieved a success rate of 99%-or-better in following all four of the surgical infection prevention guidelines reported under Chapter 270. In light of this near-perfect success, the Maine Quality Forum (MQF) decided

[2] Bacteria with the Asian mcr-1 gene that makes them resistant to colistin, a "last resort" antibiotic, have been recently discovered in several European countries and in Canada. While no bacterium has yet been found to have universal resistance to all known antibiotics, the emergence of mcr-1 could bring that day closer.

[3] "LabID event" refers to the discovery of a given bacteria or virus found in a patient's laboratory sample.

last year to follow the federal government's lead in suspending mandatory data collection for these measures.

Infections to watch: MRSA and *C. Difficile*

Both *MRSA* and C. difficile bacteria can cause serious infections. They are of special concern because MRSA bacteria are resistant to antibiotics and new strains of *C. difficile* have become more virulent. As we wrote in our 2014 HAI Annual Report, Maine began using new measures two years ago to report the presence of MRSA and *C. difficile* in Maine hospitals. Therefore, it is too early to establish a long-term trend.

How to interpret the report's data charts for individual Maine hospitals

While we carefully collect and analyze data about healthcare associated infections, readers should understand that the HAI data reflected in this report:

- May reflect a very small number of cases. Among smaller hospitals, a large difference in rates may be due to 1 or 2 infections;
- Is not risk-adjusted;
- Is self-reported by each Maine hospital; and
- Counts success in complying with a process measure only if full compliance with all elements of the measure is properly documented in the hospital's own records.

Preventing and reducing HAIs require a team effort. State agencies, hospitals, consumers and other groups are working together in Maine to address the HAI challenge. Each group brings unique focus and expertise. Working together leads to collective success. Groups listed below are referenced in the full report.

Working Together in Maine to Prevent HAIs

Agency or Group	Mission/Action
Association for Professionals in Infection Control (APIC), Pine Tree Chapter	Includes infection prevention specialists from Maine hospitals who learn and share best practices in infection control with hospital care providers
HAI Collaborating Partners Committee	In 2015, with APIC's support, the MQF and Maine CDC established this Committee, for the purpose of assessing and analyzing the status of infection prevention and control in the state of Maine and make recommendations on state strategies for the reduction of healthcare associated infections across all healthcare settings. The Committee represents and calls upon the expertise of a broad range of experts and stakeholders.
Healthcentric Advisors	Provides education and technical assistance to prevent HAIs as part of its mission to improve care for Medicare beneficiaries as the New England Quality Innovation Network Quality Improvement Organization (QIN-QIO) under contract to CMS

Agency or Group	Mission/Action
Maine Centers for Disease Control and Prevention (Maine CDC)	Tracks national and state trends in HAIs, provides training to healthcare personnel, validates HAI data on MRSA and *C. difficile*, and develops the State HAI Prevention Plan. Serves as one of the Co-Chairs of the HAI Collaborating Partners Committee.
Maine Health Data Organization (MHDO)	Sets reporting standards and collects HAI data from Maine hospitals and hosts the new CompareMaine website where consumers can find information on cost and quality for specific healthcare services across a variety of providers.
Maine Hospital Association (MHA)	Offers education to encourage the adoption of best practices
Maine Quality Forum (MQF)	Publicly reports status of HAIs in Maine to the State legislature each year with support from the Maine CDC and the Muskie School of Public Service; Co-Chairs the HAI Collaborating Partners Committee and collaborates with the Maine Health Data Organization on promoting the transparency of health care cost and quality information. Supports the annual audit of the reporting of healthcare associated infections.

Maine consumers and legislators play important roles in HAI prevention

Consumers can:

- Speak up or bring an 'advocate' to the hospital to ask:
  - "What are the doctors and staff doing to protect me from HAIs?"
  - "How can I prepare for surgery to reduce my infection risk?"
  - "Do I still need this catheter, or can it be removed?"; and
  - about any other questions or worries you have.
- Remind everyone to clean their hands before they touch you;
- Not press for antibiotics if a doctor says they are *not* needed;
- If antibiotics are needed, ask your doctor to perform lab tests to make sure the right antibiotic is chosen;
- Tell your doctor if you've had diarrhea more than twice in the past 24 hours, especially if you're taking antibiotics;
- Tell your doctor if you have redness, pain or drainage around your IV catheter or surgery site;
- Make sure you get the flu vaccines and that all your other vaccines are up to date[4];
- Be proactive about managing your own healthcare;
- When shopping, look for the "No Antibiotics Administered" label to avoid buying meat and poultry raised on antibiotic animal feed to speed faster growth;
- Quit smoking, eat a balanced diet, maintain a healthy body weight; and
- Follow all pre-hospitalization instructions including bathing.

[4] "Healthcare-Associated Infections: What Patients Can Do", U.S. Centers for Disease Control and Prevention, (Atlanta: March 2014, accessed on April 13, 2015 at: http://www.cdc.gov/hai/pdfs/patientsafety/HAI-Patient-Empowerment.pdf

Legislators can:

- Educate themselves and their constituents about the importance of preventing HAIs; and
- Support the work of the organizations tackling these issues through effective policy development and adequate financing.

Preventing HAIs requires ongoing vigilance and resources

As bacteria become more drug-resistant, they grow more deadly and more difficult to prevent. The national CDC reports an emerging threat of carbapenem-resistant Enterobacteriaceae (CRE), a new family of germs even more difficult to treat than MRSA or C. difficile because they have high levels of resistance to antibiotics. Other types of bacteria having resistance to colistin, a "last resort" antibiotic, have not yet reached the United States, but have been reported in Asia, several European countries and, more recently, in Canada.

What are Healthcare Associated Infections (HAIs)?

Healthcare Associated Infections (HAIs) occur during the course of healthcare treatment for other conditions. They can be transmitted in hospitals, nursing facilities and rehabilitation centers as well as outpatient surgery centers, dialysis centers, community clinics and other healthcare settings. They may also occur during the course of treatment at home.

Four infections together account for nearly half (47%) of all HAIs across the U.S[5]:

- Surgical site infections;
- Catheter-associated urinary tract infections;
- Central line catheter-associated bloodstream infections; and
- Ventilator-associated pneumonia.

HAIs are caused by a wide variety of common and unusual bacteria, fungi, and viruses. The most serious HAI threats result from the emergence of difficult-to-treat, drug-resistant bacteria. The emergence of drug-resistant bacteria is accelerated by the widespread overuse and misuse of antibiotics. While over-prescribing of antibiotics represents a serious problem, about 80% (by weight) of all antibiotics sold in the United States are given to animals and the vast majority is used as additives in animal feed for livestock and poultry to promote faster growth. About 60% of the antibiotics used in agriculture are of the same types prescribed to treat human disease and their use directly contributes to dangerous antibiotic resistance.[6] Curbing antibiotic misuse has gained growing attention in Maine and nationally.

One of the most common drug-resistant bacteria is known as *Methicillin Resistant Staphylococcus aureus* (MRSA). The U.S. CDC estimates that MRSA caused nearly 11,300 U.S. deaths in 2011, and that

---

[5] Magill, Shelly S., et. al., Multistate Point Prevalence Survey of Healthcare Associated Infections, The New England Journal of Medicine, March 27, 2014, 370:1198-1208.

[6] Paulson, Jerome A. and Zaoutis, Theoklis, "Nontherapeutic Use of Antimicrobial Agents in Animal Agriculture: Implications for Pediatrics", Pediatrics, December 2015, 136:1671-1677, accessed from http://pediatrics.aappublications.org/content/136/6/e1670 on February 8, 2015.

about 3,100 of those deaths were due to infections originating in hospitals.[7] There are also serious concerns about infections from newly evolved, more virulent strains of *C. difficile,* now estimated to account for over 12% of hospital HAIs[8] and to have caused 29,000 deaths in the U.S. in 2011.[9]

In 2013, the federal Centers for Disease Control (CDC) and Prevention published advisories on the emerging threat of Carbapenem-resistant Enterobacteriaceae (CRE), a family of germs even more difficult to treat due to their higher levels of antibiotic resistance.[10] In 2015, an outbreak of CRE at two Los Angeles hospitals resulted in three deaths.[11]

CRE bacteria primarily affect patients in acute and long-term healthcare settings who have compromised immune systems or whose care requires the use of invasive devices such as catheters. Due to CRE's enhanced drug-resistance, emphasis has been placed on prevention and early identification. Although not yet common in Maine, CRE has been found across most of the country.

Why do HAIs matter?

Although the rate of HAIs occurs at relatively low frequency, their impact is significant—these infections are associated with morbidity, mortality, and excess health care costs. These complications often strike when a patient has already been weakened by the original disease, surgery or an underlying medical condition, which is why the resulting infections can be devastating. HAI prolong hospital stays and can create long term disability and decrease a patient's resistance to other diseases. As bacteria become more drug-resistant or more virulent, they also become more deadly. The federal CDC estimated the U.S. had 453,000 *C.difficile* infections in 2011, of which nearly two-thirds were healthcare-associated and nearly one-quarter were identified as hospital-onset infections. The CDC also estimated that *C.difficile* caused 29,300 deaths in the same year.[12]

Beyond the personal burden, HAIs contribute to higher healthcare costs. Citing the most recent study conducted in this area, the federal CDC estimated over 720,000 infections occurred in acute care hospitals in 2011 and that they contributed to 75,000 hospital patient deaths.[13] The CDC also reports

---

[7] "Active Bacterial Core Surveillance Report, Emerging Infections Program Network, *Methicillin-Resistant Staphylococcus aureus*, 2013", U.S. Centers for Disease Control and Prevention, March 16, 2015, accessed at: http://www.cdc.gov/abcs/reports-findings/survreports/mrsa13.pdf on March 72016.

[8] Op. cit., Magill

[9] "Healthcare-associated Infections (HAIs): *Clostridium difficile* Infection", U.S. Centers for Disease Control and Prevention, web page, February, 25, 2015, accessed at http://www.cdc.gov/HAI/organisms/cdiff/Cdiff_infect.html, May 5, 2015.

[10] "Antibiotic Resistance Threats in the United States, 2013", U.S. Centers for Disease Control and Prevention, April 23, 2013, accessed at http://www.cdc.gov/drugresistance/threat-report-2013/pdf/ar-threats-2013-508.pdf on January 29, 2014.

[11] Terhune, Chad, "Superbug outbreak extends to Cedars-Sinai hospital, linked to scope," Los Angeles Times, March 4, 2015.

[12] Lessa, Fernanda C., et.al., *Burden of* Clostridium difficile *Infection in the United States*, The New England Journal of Medicine, 372:825-834, Feb. 26, 2015.

[13] "Healthcare-associated infections (HAIs): Data and Statistics", U.S. Centers for Disease Control and Prevention, web page last updated January 12, 2015, accessed at http://www.cdc.gov/HAI/surveillance/ on January 4, 2016.

that in 2009, HAIs added an average $16,000 to $19,000 to each hospital patient's bill, and increased our national healthcare system's costs by an extra $28.4 to $33.8 billion.[14]

Although healthcare associated infections are a national and state problem, patients, caregivers and healthcare providers can employ some basic and effective strategies to reduce and even eliminate the threat. The initial focus of prevention has been directed toward hospitals where strong infection control practices have been instituted, such as:

- safer use and maintenance of medical devices (e.g., ventilators and catheters);
- training staff on proper procedures for post-surgical care;
- the physical layout of hospital rooms (e.g., movement to private rooms to reduce spread of infections); and
- greater emphasis on hand hygiene.

It is imperative to broaden these efforts beyond the hospital. Medical care that once occurred primarily in hospitals has branched out to ambulatory surgical centers, nursing facilities, and the home. Many of the HAIs in these additional settings occur due to poor basic infection-control.[15] The U.S. CDC has traced a number of recent HAI outbreaks in outpatient clinics, surgical centers and doctor's office to practices such as improper sterilization and disinfection methods, reuse of syringes and needles, and using single-use medication vials for multiple patients.[16]

How does Maine measure HAIs?

The Maine Quality Forum (MQF) is legislatively required to adopt a set of measures to evaluate and compare health care quality and provider performance. The quality measures adopted by the MQF are the basis for rules promulgated by the Maine Health Data Organization (MHDO). The rules under Chapter 270, the *Uniform Reporting System for Quality Data Sets*, define these sets of health care quality measures, including measures related to HAI, and the provisions for health care providers to submit these data to the MHDO. MQF makes recommendations and advises the MHDO Board about changes to Chapter 270, including the adoption of new measures. Rule Chapter 270 is a major substantive rule which means that changes must be reviewed and approved by the Maine Legislature.

Hospitals have been the central focus for HAI measurement and public reporting since the acute care setting because those infections typically tend to be more severe. Chapter 270 requires all Maine acute care and critical access hospitals (with the exception of the Togus Veterans Administration Medical

---

[14] Scott RD II. The Direct Medical Costs of Healthcare-Associated Infections in U.S. Hospitals and the Benefits of Prevention. Atlanta, GA: Centers for Disease Control and Prevention, Division of Healthcare Quality Promotion; March 2009. http://www.cdc.gov/HAI/pdfs/hai/Scott_CostPaper.pdf

[15] "HealthyPeople 2020 Topics & Objectives: Healthcare-Associated Infections", U.S. DHHS, Office of Disease Prevention and Health Promotion, last modified September 6, 2012, accessed on April 1, 2013 at: http://www.healthypeople.gov/2020/topicsobjectives2020/overview.aspx?topicid=17.

[16] "Outbreaks and Patient Notifications in Outpatient Settings, Selected Examples, 2010-2014", U.S. CDC, July 10, 2015, accessed on 3/16/2016 at: http://www.cdc.gov/HAI/settings/outpatient/outbreaks-patient-notifications.html

Center) to report quarterly data to the MHDO on each HAI measure using a consistent and standard format. Since 2009, these requirements have included two data sets related to healthcare acquired infections: the Healthcare Associated Infection Quality Data Set (HAI) and the recently retired Surgical Care Improvement Project (SCIP) measures.[17]

The rules include two types of HAI measures, process measures and outcome measures.

1. ***Process measures*** focus on a hospital's documented compliance with specific practices or "bundles" of practices that research has proven to be effective in preventing HAIs (*e.g.*, hand hygiene). Process measures are straightforward to collect and to interpret and require no data adjustment for the severity of a patient's condition.
2. ***Outcomes measures*** assess whether facilities and providers have succeeded in reducing their HAI infection rates. The MHDO collects the data required to calculate:
    - the rates of central line catheter-associated bloodstream infections (CLABSI) for adults in intensive care and in hospital mixed acuity units;
    - CLABSI infections in neonatal intensive care units;
    - MRSA LabID events[18]; and
    - *C. difficile* LabID events.

To preserve privacy and patient confidentiality, all HAI-related quality measure data reported directly to MHDO is collected at either the hospital-wide, or hospital unit level. In addition, hospitals report individual patient data on MRSA and *C. difficile* LabID events to the National Healthcare Safety Network (NHSN), a secure, internet-based surveillance system at the federal CDC. The Maine CDC then collects and compiles de-identified data from NHSN, and reports each hospital's aggregate numbers to MHDO. The MQF contracts with the Muskie School of Public Service to analyze the hospital data and prepare the results for this report.

TABLE 1 summarizes the process and outcome measures currently collected in Maine and the period for which data are available. APPENDIX B provides a more detailed discussion of each measure. All measures are collected at the hospital-specific or hospital unit level. The MRSA and C.difficile LabID event rates appearing in this report reflect the data as it was reported by each hospital to the NHSN.

[17] The Chapter 270 rule and the full list of hospital quality measures can be found at https://mhdo.maine.gov/_finalStatutesRules/Chapter%20270%20Quality%20Data.docx

[18] Instead of reporting the number of clinically diagnosed cases of MRSA or *C. difficile* infection, LabID event reporting counts the number of cases when the pathology lab identified the presence of MRSA or *C. difficile* in a patient sample. While the U.S. CDC recognizes LabID event rates (the ratio of LabID events to inpatient days) as a reasonably reliable proxy for infection rates, the reader should keep in mind that some patients can carry MRSA or *C. difficile* bacteria without developing an infection. Therefore, the LabID event rate will almost always appear higher than the actual infection rate.

Table 1 – Summary HAI Process and Outcome Measures Collected Under Chapter 270

Type of Infection	Data Availability	Process Measures	Outcome Measures
Central line catheter-associated bloodstream infections (CLABSI)	July 2006 – June 2015	• Percent compliance with the Institute for Healthcare Improvement's (IHI) bundle of 5 evidence-based interventions for patients with intravascular central catheters in intensive care units (**HAI-3**) • Percent compliance with the 4 insertion-related evidence-based interventions for patients with intravascular central catheters placed preoperatively, in pre-operative areas, operating rooms and recovery areas (**HAI-4**)	• The weighted average rate of central line catheter-associated blood stream infections per 1,000 intensive care unit central line days (**HAI-1**) • Number of catheter-related blood stream infections among neonatal intensive care unit patients per 1,000 central line catheter or umbilical days (**HAI-2**)
Ventilator associated pneumonia (VAP)	July 2008 – June 2015	Percent compliance with all five evidence-based interventions for patients with mechanical ventilation (ventilator bundle compliance) in intensive care units (**HAI-5**)	No outcome measures collected
Type of Bacteria	**Data Availability**	**Process Measures**	**Outcome Measures**
Methicillin-resistant Staphylococcus aureus (MRSA)	July 2011 – June 2015	No process measures collected	Number of hospital-onset MRSA LabID events per 1,000 patient days[19]
C. difficile	Oct 2011 – Sept 2015	No process measures collected	Number of hospital-onset *C. difficile* LabID events per 10,000 patient days

The HAI data collected by the MHDO and publically reported by the MQF is based on nationally recognized quality measures whose specifications have been developed by organizations such as the federal CDC's National Healthcare Safety Network (NHSN), and the Institute for Healthcare Improvement (IHI). The MQF will continue to work with the Maine CDC, the Pine Tree chapter of the Association for Professionals in Infection Control, the Maine HAI Collaborating Partners Committee and other stakeholders to add new measures that can provide reliable and actionable information on how Maine can reduce the impact of these infections.

[19] Beginning with the 12-month reporting period for the 2015 Annual Report, Maine CDC simplified hospital reporting specifications for MRSA by changing the measure from the number of clinically diagnosed cases of MRSA or *C. difficile* infection to laboratory-identified cases. LabID event reporting counts the number of cases when the pathology lab identified the presence of MRSA or *C. difficile* in a patient sample. While the U.S. CDC recognizes LabID event rates (the ratio of LabID events to inpatient days) as a reasonably reliable proxy for infection rates, the reader should keep in mind that some patients can carry MRSA or *C. difficile* bacteria without developing an infection. Therefore, the LabID event rate will almost always appear higher than the actual infection rate.

Measures that are not included in this year's Annual Report

As noted in the MQF's 2015 Annual HAI Report, CMS retired the collection of all four remaining Surgical Care Improvement Project (SCIP) measures, since nationwide hospital compliance with these measures had "topped out", leaving little room for further improvement. To stay in alignment with CMS, MHDO has also suspended data collection for the remaining SCIP measures. These measures included:

SCIP-inf-1a	Percent of all patients receiving an antibiotic within 1 hour prior to any surgery;
SCIP-inf-2a	Percent of surgery patients receiving the recommended antibiotic for their procedure;
SCIP-inf-3a	Percent of surgery patients whose preventive antibiotics were discontinued within 24 hours after anesthesia ended; and
SCIP-inf-9	Percent of surgery patients whose urinary catheters were removed on Postoperative Day 1 or Postoperative Day 2 with day of surgery being day zero.

In last year's Annual Report, we noted that Maine hospitals had achieved an overall, statewide compliance rate of 99.0%-or-better for all four measures.

How well is Maine preventing HAIs?

We have created four categories of performance measurement defined below as a way to quantify overall Maine hospital HAI prevention results. We assign each hospital outcome and process measure to one of four categories we've created:

- *Category 1* – *Exemplary performance* – The overall statewide average was at 98 percent or better in the most recent reporting period.
- *Category 2* – *Improved performance* – The overall statewide average has improved compared to five years ago.
- *Category 3* – *Declining performance* – The overall statewide average has declined over the past five years.
- *Category 4* – *Newer measures* – Data collection has been too brief to establish a trend.

The distribution of the overall statewide outcome and process measure results across these categories appears below. At the end of this section, we also summarize the most recent HAI results reported by the U.S. CDC. Although useful for comparing Maine's results to the national baseline, the federal data is not as current as the data presented in this report. To see how individual hospitals are performing under each measure, please refer to the page numbers identified in the following tables.

Category 1 Exemplary Performance: The overall statewide average was at 98 percent or better in the most recent reporting period.

This year's Annual Report has no process measures with a statewide average of 98%-or-above.

Category 2 Improved Performance: The overall statewide average has improved compared to five years ago

The overall statewide average is better now than it was five years ago across all measures for which we have data going back at least five years.

Measure Group	Description	Hospital-Specific Rates
Central line catheter-associated bloodstream infections (CLABSI)	Number of central line catheter-associated blood stream infections per 1,000 intensive care unit central line days (HAI-1)	Page 20
	Compliance with all 5 evidence-based interventions for patients with intravascular central catheters in intensive care units (HAI-3)	Page 24
	Compliance with the 4 insertion-related evidence-based interventions for patients with intravascular central catheters placed preoperatively, in pre-operative areas, operating rooms and recovery areas (HAI-4)	Page 26
Ventilator associated pneumonia (VAP)	Percent compliance with all five evidence-based interventions for patients with mechanical ventilation (ventilator bundle compliance) in intensive care units (HAI-5)	Page 28

Central line catheter-associated blood stream infections (CLABSI)

Outcome measures (HAI-1)

During the July-2014-to-June-2015 reporting period, the statewide rate of CLABSI infections per 1,000 central line days in hospital adult ICUs (HAI-1) fell to two-thirds of what it had been five years earlier. The overall rate is 1.0 infections per 1,000 catheter line days. Six of Maine's thirty-five acute care hospitals reported having CLABSI infections in their adult ICU or mixed acuity units during the 12-month period.

Process measures (HAI-3 and HAI-4)

Over the past five years, overall documented compliance with the HAI-3 process measure improved from 92.3% to 93.7%, and documented compliance with HAI-4 rose from 96.3% to 96.9%. In the latest reporting period, 24 out of 32 hospitals covered by the HAI-3 measure reported a perfect record of documented compliance with central line catheter best practices. Twenty-one hospitals reported a 100% rate of documented compliance with HAI-4.

Ventilator associated pneumonia

Process measure (HAI-5)

Maine hospital compliance with best practices for preventing pneumonia and other complications among ICU patients on ventilators to assist breathing (HAI-5) is now 4 percentage points higher than it had been five years earlier (94.9% vs. 90.6%) While only 63% of the 30 hospitals using ventilators reported a 100% level of compliance in July 2010 to June 2011, 73% of the 26 hospitals using ventilators are reporting 100% documented compliance five years later.

The goal for Category 2 measures is to target improvement within specific hospitals and to sustain the performance of the others.

Category 3 Declining Performance: The overall statewide average has declined over the past five years

The catheter-associated blood stream infection rate for high-risk neonatal patients rose in the past 12-month reporting period from 1.7 infections per 1,000 device days to 2.7 infections per 1,000 device days. This measure only applies to the three Maine hospitals that use central-line or umbilical catheters in a neonatal intensive care unit.

Measure Group	Description	Hospital-Specific Rates
Central line catheter-associated bloodstream infections (CLABSI)	Number of catheter-related blood stream infections among intensive care unit patients per 1,000 central line catheter or umbilical days (HAI-2)	Page 23

Category 4 Newer Measures: Data collection has been too brief to establish a trend

Measure Group	Description	Hospital-Specific Rates
Drug-resistant or virulent disease organisms	Methicillin-resistant Staphylococcus aureus (MRSA)	Page 31
	Clostridium difficile (C. difficile)	Page 34

MRSA and *C.difficile* Hospital Onset (HO) LabID event rates

As reported in the MQF's 2015 Annual HAI Report, beginning with the July 2013-to-June 2014 reporting period, a rule change was made to Chapter 270 to reduce the data collection burden on Maine hospitals by changing the MRSA measure from a comprehensive infection review to counting the number of HO LabID events as proxy for infection rates.[20] The MRSA and C.difficile LabID event rates appearing in this report reflect the data as it was reported by each hospital to the NHSN. With just two years of data, it is too early to establish a long-term trend. However, the MRSA rate per 1,000 patient days for the time period January to June 2014 was 0.27% and for the time period July 2014 to June 2015 was 0.31%. The *C.difficile* HO LabID event rate for the current reporting period remained unchanged from the year before.

More detailed information can be found in the appendices

Individual hospital performance across all outcome and process measures is displayed in the charts and tables in APPENDIX B and APPENDIX C. These two appendices provide a reference for identifying hospitals whose performance is at or above 95 percent compliance and where there are opportunities for continued improvement within a hospital and/or a measure.

The U.S. CDC's measures of Maine's HAI performance

The Federal CDC released its 2016 edition of the *National and State Healthcare-Associated Infections Progress Report* in early March. Their report measures the incidence of HAIs based on the Standard Infection Ratio (SIR), the ratio between the actual number of HAIs to a risk-adjusted, expected number of HAIs. The report can be found online at: http://www.cdc.gov/HAI/pdfs/progress-report/hai-progress-report.pdf

[20] LabID event reporting counts the number of cases when the pathology lab identified the presence of MRSA or *C. difficile* in a patient sample. While the U.S. CDC recognizes LabID event rates (the ratio of LabID events to inpatient days) as a reasonably reliable proxy for infection rates, the reader should keep in mind that some patients can carry MRSA or *C. difficile* bacteria without developing an infection. Therefore, the LabID event rate will almost always appear higher than the actual infection rate.

CMS includes data for several HAI measures in its Hospital Compare database

The federal Centers for Medicare & Medicaid Services (CMS) publish hospital quality data for larger hospitals, i.e., hospitals paid under the Medicare Prospective Payment System (PPS). This source includes data on additional healthcare-associated infection measures not included in Maine's Chapter 270, such as, catheter-associated urinary tract infections (CAUTI), and surgical site infections for colon surgery and abdominal hysterectomies. The inclusion of these measures is currently under consideration by MQF for next year's HAI Annual Report.

What prevention activities are underway in Maine?

Maine State Healthcare Associated Infection Prevention Plan

Maine CDC began its HAI program in 2010 with federal stimulus funds. It has continued since then with some support from the federal CDC. The Maine CDC HAI program:

- participates in monthly meetings with the Pine Tree Chapter of the Association for Professionals in Infection Control (APIC-PTC);
- Participates in regular meetings with the new HAI Collaborating Partners advisory group;
- analyzes process and outcome data for all Maine hospitals and reports findings to hospital management;
- has assisted Maine hospitals in reporting HAI infection data to the federal CDC;
- offers training sessions to long term care facilities throughout the state; and
- has expanded and improved the capacity of pathology labs to identify and confirm *C. difficile* infections.

Maine CDC continues to promote "antibiotic stewardship" to encourage hospitals, physicians and patients to reduce the overuse of antibiotics, one of the key causes of antibiotic resistant infectious agents. The Maine CDC is also increasing surveillance on newly emerging drug-resistant disease organisms.

The Maine CDC also collects and validates HAI data that Maine hospitals have submitted to the Federal CDC's National Healthcare Safety Network (NHSN). Validation verifies that the numerators and denominators reported to NHSN meet the U.S. CDC's complex and sometimes changing definitions and reporting criteria. It also assures the accuracy and reliability of data used for public reporting, quality improvement efforts and rate-based quality incentives.[21]

Each year, Maine CDC validates MRSA and C.difficile LabID event data for about one-half of Maine acute care hospitals on a rotating basis. This year, the Maine CDC conducted validation studies for hospitals not included in last year's validation study, and for hospitals with low validation scores in the prior year.

[21] National Healthcare Safety Network (NHSN) External Validation Guidance and Toolkit 2014, U.S. CDC, March 2015, p.1,, accessed at http://www.cdc.gov/nhsn/pdfs/validation/2014/2014-nhsn-ev-guidance.pdf

Advice and technical assistance based on issues raised by the validation study are shared with hospital infection preventionists from across the state.

More detailed information and results from this year's validation study are available in Appendix I, and the Maine CDC's new *HAI State Plan 2015-2018* can be found at Appendix E.

Association for Professionals in Infection Control, Pine Tree Chapter (APIC-PTC)

APIC's Pine Tree Chapter holds monthly meetings and supports infection preventionists across the continuum of care by offering training programs in areas such as *C. difficile*, Ebola preparedness, best practices for CAUTI prevention, and emerging infections. They also keep members informed about national infection prevention initiatives and federal reporting requirements. The APIC Pine Tree Chapter also participates in Maine's new HAI Collaborating Partners Committee (see below)

The APIC Pine Tree Chapter's annual report appears in Appendix F.

Maine HAI Collaborating Partners

The MQF and the Maine CDC convened the first meeting of the Maine HAI Collaborating Partners in March 2015 with the assistance of APIC-PTC. The HAI Collaborating Partners Committee will assess and analyze the status of infection prevention and control in the state of Maine and make recommendations on state strategies for the reduction of healthcare associated infections across all healthcare settings.

Committee Objectives:

1. Provide guidance to the Maine Quality Forum (MQF) for the reporting of metrics related to healthcare associated infections for Chapter 270.
    a. Evaluate the completeness and the accuracy of reporting requirements.
    b. Establish priorities for external validation studies.
    c. Recommend additions and deletions of HAI related metrics.
2. Evaluate successfulness of the State HAI Plan and update as needs/priorities demand.
    a. Review infection prevention and control data on a state level.
    b. Develop mitigation strategies for addressing identified gaps in infection prevention and control.
    c. Analyze healthcare associated infection data by region to assess infection/ pathogen threat.
    d. Provide guidance to address potential emerging threats.

The stakeholders that make up this group include infection preventionists from acute care and critical access hospitals and representatives from long term care, hospital pharmacists, laboratory pathologists, microbiologists, physicians, nurses, consumer representatives, the CMS-designated Quality Improvement Organization (QIO) for Maine, the Maine Hospital Association and the DHHS Division of Licensing and Regulatory Services. The MQF and Maine CDC co-chair this group with the support of Muskie staff. The Group actively advised Maine CDC in the development of the new HAI State Plan and will continue to advise MQF and Maine CDC on HAI-related issues.

The group's Annual Report appears in Appendix D.

Curriculum for Infection Preventionists in Nursing Facilities

As previously noted HAIs are not restricted to hospitals but can be found in other care settings, including nursing facilities. However, due to high turnover rates and other factors, many individuals charged with the infection preventionist role at skilled nursing facilities have had little preparation and coordinated training for their work in prevention, surveillance, control of active infections and performance improvement. In response, the MQF contracted with the Muskie School of Public Service to develop an online training core curriculum of general infection control and prevention practices, common infectious diseases, isolation/transmission precautions surveillance and data handling, performance improvement, and antibiotic stewardship. The Maine CDC and APIC-PTC have been actively involved in the development of the curriculum which will enter a pilot testing phase in early 2016. You can read more about the curriculum in Appendix G.

The new Compare Maine website reports hospital data for MRSA and C.difficile

The MQF has collaborated with the MHDO to provide the public with Maine healthcare cost and quality information via the new CompareMaine.org website, which went online in November 2015. The website, supported by federal grants of approximately $2 million, offers consumers easy access to provider-specific cost and quality information on a variety of healthcare services and procedures.

CompareMaine's quality measures include CMS-reported 2013-2014 HAI data on MRSA and *C.difficile* standardized infection ratios (SIRs), adjusted for differences in hospital characteristics. The SIR measures the ratio of the actual to expected number of infections. A SIR lower than 1.0 indicates a better-than-expected number of infections, while SIRs above 1.0 indicate worse than expected infection rates. MHDO intends to include additional HAI measures in the future.

Conclusions/Recommendations

Maine continues to show progress in addressing the risks associated with health care associated infections. The table below reports the status of the recommendations made in last year's Annual HAI Report.

Recommendations from the 2015 Annual Report	Status
1. Continue to support the work of the Maine HAI Collaborating Partners Committee and ask the group to evaluate Maine's HAI reporting efforts and to recommend changes or improvements to Chapter 270, including the feasibility of broadening its scope to other healthcare settings.	The HAI Collaborating Partners Committee held six meetings during 2015 and provided significant feedback in the development of Maine CDC's 2015-2018 State of Maine Healthcare-Associated Infections Plan. The Committee also discussed the HAI sections of Chapter 270 and the possibilities of expanding its application to outpatient surgical centers, dialysis treatment facilities and long term care settings. MHDO hosts a section on its website to serve as an HAI information resource and repository for the Collaborating Partner group. https://mhdo.maine.gov/haiCPcommittee.htm
2. Continue to identify, monitor, and propose data collection and public reporting of new HAI measures that are evidence-based and nationally recognized. Also request the HAI Collaborating Partners' advice on: • Whether the State should publicly report the Catheter Associated Urinary Tract Infection (CAUTI) data that prospective payment system hospitals currently submit to the National Healthcare Safety Network (NHSN); and • Amending Chapter 270 to require Critical Access Hospitals to report CAUTI data to NHSN.	There has been discussion at the HAI Collaborating Partners Committee that future HAI Annual Reports include publically available CAUTI data from the CMS Hospital Compare database. However, CMS reports CAUTI data for 9 of Maine's 35 acute care hospitals. Although not yet required, several Critical Access Hospitals in Maine are submitting CAUTI data to NHSN and the others are likely to follow.
3. Continue to support the development of new training programs for infection preventionists and other health care professionals in hospitals and other settings of care.	The Maine CDC and APIC-PTC continue to assist new hospital infection preventionists in learning how to accurately collect and report HAI data to the U.S. CDC's National Healthcare Safety Network. The Maine Quality Forum (MQF), with the support of the ME CDC and APIC-PTC, contracted with the Muskie School of Service to create an HAI online training curriculum for infection preventionists in the skilled nursing facility setting. The training program will be made available in 2016.

Recommendations from the 2015 Annual Report	Status
4. Continue to support the Maine CDC's work to validate HAI reporting data, and support Maine CDC's ongoing HAI prevention and surveillance efforts as described in the new Maine State Healthcare Associated Infection Prevention Plan currently under development.	Maine CDC submitted the new Maine HAI State Plan 2015-18 to the federal CDC in October 2015 (see Appendix E). Under the new Plan, Maine CDC, with MQF's support, will expand the validation of HAI data from MRSA and C.difficile to all HAI measures reportable to the NHSN.
5. Continue to assist in the development of MHDO's new public reporting website and provide periodic HAI quality measures data summaries once the site goes online.	The MQF is collaborating with the MHDO to promote public transparency of the quality and cost of healthcare in the State of Maine. With the support of two federal grants totaling approximately $3.7 million, MHDO's new CompareMaine.org website went online in November of 2015. CompareMaine provides consumers with easy access to provider-specific cost and quality information on a variety of healthcare procedures. Among a number of quality measures, CompareMaine includes HAI data on standardized infection ratios (SIRs) for MRSA and *C.difficile*. SIRs, which are risk-adjusted for differences in several hospital characteristics, measure the ratio between the actual and expected number of infections. A SIR lower than 1.0 reflects a better-than-expected infection rate while SIRs above 1.0 indicate a worse-than-expected number of infections. CompareMaine currently reports MRSA and C.difficile data from the 2013-2014 reporting period.

Maine Quality Forum Recommendations for 2016

1. Continue to support the HAI Collaborating Partners committee by asking it to review the choice of HAI-related quality measures included in Chapter 270 and by seeking its ongoing advice on the implementation of the new State HAI Plan.
2. Support some of the elements of the State HAI Plan, including the development of a statewide or regional conference to focus attention on HAI prevention.
3. Consider the feasibility of supporting the expansion of antibiotic stewardship efforts.
4. Expand the CompareMaine.org website with a new a consumer education component on antibiotics provide comparative information on pharmacy prescriptions prices via a link to the GoodRx.com website.
5. Collaborate with the Maine CDC in building a strategy to expand the scope of HAI measure validation to all Chapter 270's HAI outcomes measures.
6. Develop the road map for statewide implementation strategy and awareness campaign of the extended care facility HAI training module (see Appendix G) and provide support for continued maintenance and regular updating.

Appendix A: Maine hospitals listed by hospital peer group July 2014 to June 2015

The Maine hospital peer groups were created by the Maine Hospital Association to facilitate comparisons between similar hospitals.

Peer Group A

Central Maine Medical Center	Lewiston
Eastern Maine Medical Center	Bangor
Maine Medical Center	Portland
MaineGeneral Medical Center	Augusta/Waterville

Peer Group B

Aroostook Medical Center, The	Presque Isle/Fort Fairfield
Mercy Hospital	Portland/Westbrook
Mid Coast Hospital	Brunswick
Penobscot Bay Medical Center	Rockport
Southern Maine Health Care – Biddeford Campus	Biddeford
St Joseph Hospital	Bangor
St Mary's Regional Medical Center	Lewiston
York Hospital	York

Peer Group C

Cary Medical Center	Caribou
Franklin Memorial Hospital	Farmington
Southern Maine Health Care – Sanford Campus*	Sanford

Peer Group D

Maine Coast Memorial Hospital	Ellsworth
Inland Hospital	Waterville
Northern Maine Medical Center	Fort Kent
Parkview Adventist Medical Center†	Brunswick

Peer Group E

Blue Hill Memorial Hospital	Blue Hill
Bridgton Hospital	Bridgton
Calais Regional Hospital	Calais
Charles A. Dean Memorial Hospital & Nursing Home	Greenville
Down East Community Hospital	Machias
Houlton Regional Hospital	Houlton
LincolnHealth	Damariscotta
Mayo Regional Hospital	Dover-Foxcroft
Millinocket Regional Hospital	Millinocket
Mount Desert Island Hospital	Bar Harbor
Penobscot Valley Hospital	Lincoln
Redington-Fairview General Hospital	Skowhegan
Rumford Hospital	Rumford
Sebasticook Valley Hospital	Pittsfield
Stephens Memorial Hospital	Norway
Waldo County General	Belfast

* *SMHC's Sanford Campus stopped accepting inpatients in October 2015.*

† *Parkview Adventist closed its acute inpatient care units in June 2015.*

Appendix B: Maine trends in hospital-reported HAI measures

This appendix describes each of the following measures which hospitals are required to submit and includes charts comparing hospital-specific rates and trend lines for each measure.

I. Central line catheter associated bloodstream infections (CLABSI)

- The annual weighted average rate for central line catheter-associated blood stream infections per 1,000 intensive care unit central line days (HAI-1).
- Number of catheter-related blood stream infections among neonatal intensive care unit patients per 1,000 central line catheter or umbilical days (HAI-2).
- Documented compliance with all five evidence-based interventions for patients with intravascular central catheters (central line bundle compliance) in intensive care units (HAI-3).
- Documented compliance with the four insertion-related, evidence-based interventions for patients with intravascular central catheters (central line bundle compliance) placed preoperatively, in pre-operative areas, operating rooms, and recovery areas (HAI-4).

II. Ventilator associated pneumonia (VAP)

- Percent documented compliance with all five evidence-based interventions for patients with mechanical ventilation (ventilator bundle compliance) in intensive care units (HAI-5).

III. Methicillin-resistant Staphylococcus aureus (MRSA)

- Hospital onset MRSA LabID events per 1,000 patient days.

IV. C. difficile

- Hospital onset *C. difficile* LabID events per 10,000 patient days.

Central line catheter associated bloodstream infections (CLABSI)

HAI-1: The annual weighted average rate for central line catheter-associated blood stream infections per 1,000 intensive care unit central line days

HAI-2: Number of catheter-related blood stream infections among neonatal intensive care unit patients per 1,000 central line catheter or umbilical days

HAI-3: Documented compliance with all five evidence-based interventions for patients with intravascular central catheters (central line bundle compliance) in intensive care units

HAI-4: Documented compliance with the four insertion-related, evidence-based interventions for patients with intravascular central catheters (central line bundle compliance) placed preoperatively, in pre-operative areas, operating rooms, and recovery areas

Some patients need large intravenous (IV) catheters – sometimes called "central lines" – which are inserted into the body to deliver concentrated solutions of drugs, to monitor special types of pressures, or to measure certain aspects of heart performance. For adults, central line catheters are ordinarily inserted into the large veins of the chest or into the heart itself. Neonates can also have central lines, but these lines may enter the body through the umbilical cord.

A central line associated bloodstream infection (CLABSI) is defined as, "a laboratory-confirmed bloodstream infection where [the] central line or umbilical catheter", had been in place for more than two days and the catheter was still in place on the day or day before the blood sample was taken.[22] These types of infections lead to longer hospital stays, increase the costs of care, and even increase the risk of patient death. Hospitals can prevent CLABSI by ensuring the proper insertion and care of the central line. Tracking how often CLABSI occurs may identify some opportunities for improvement, especially given that CLABSI is a relatively rare event in healthcare settings.

The use of central lines to deliver medications and to monitor how well a patient's body is functioning is an important tool available to health care providers. But because central line bloodstream infections result in risk of morbidity and mortality to patients and because they result in longer and more costly hospital stays, it is important to take steps to effectively and efficiently reduce their incidence.

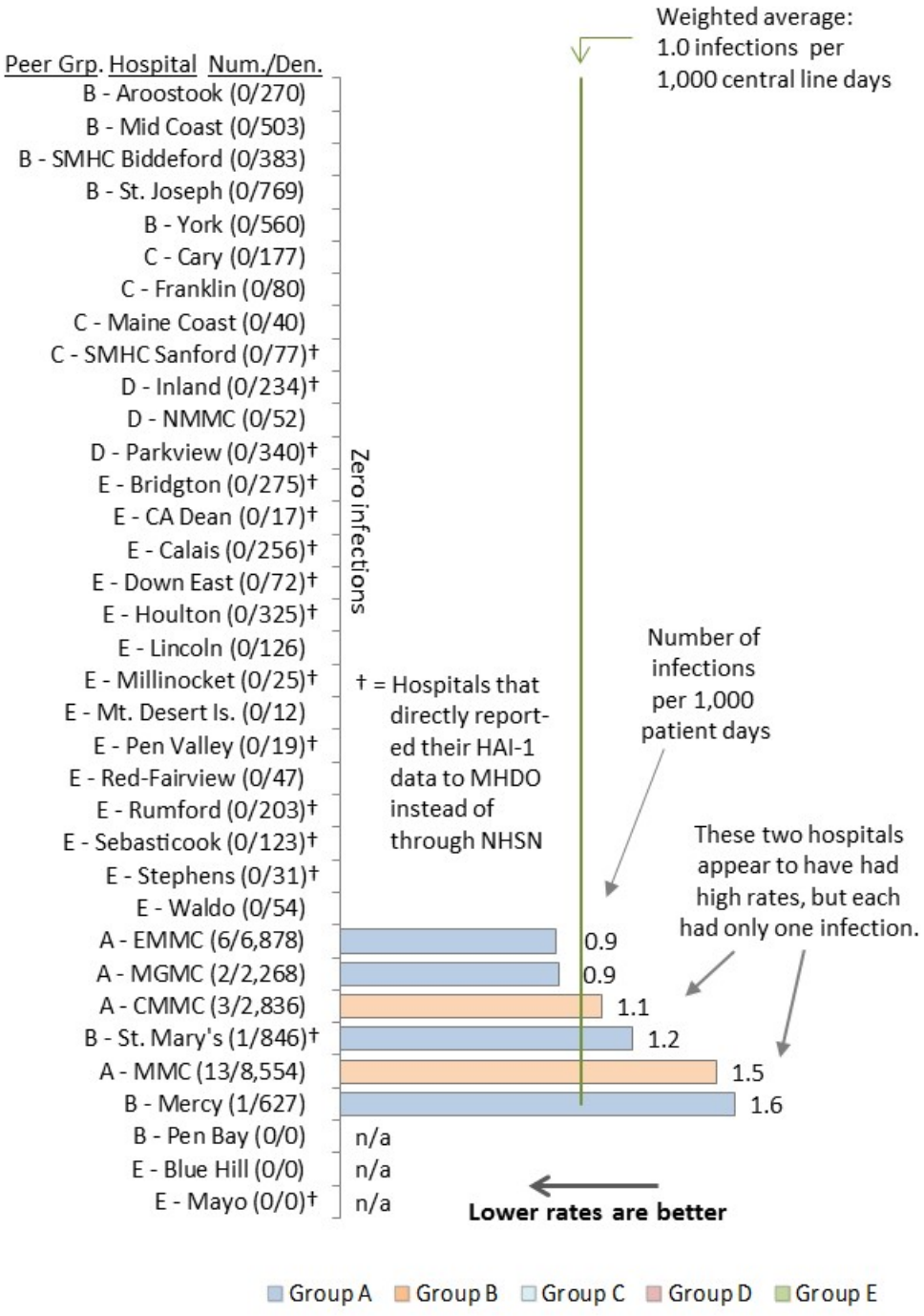
Clinicians and researchers have studied CLABSI carefully and have developed strategies designed to lower the risk of central line related infections. These strategies have been grouped into "bundles" of best practices – practices that will reduce the risk of infection before and during insertion of the central line, and strategies to minimize the risk of infection while the central line is still in place.[23] There are standard definitions for these bundles of best practices, which include the use of appropriate sterile barrier precautions, using chlorhexidine to cleanse the patient's skin prior to inserting the catheter, avoiding insertion of the central line in a femoral site, dressing the insertion site appropriately and removal of the catheter at the earliest possible point in time. It is important that hospital personnel responsible for caring for patients who need a central line use these best practices to help reduce those patients' risk of bloodstream infection.

---

[22] "CDC Device Associated Module: Bloodstream Infection Event (Central Line-Associated Bloodstream Infection and Non-central line-associated Bloodstream Infection", U.S. Centers for Disease Control and Prevention, April 2015, p. 4-3.

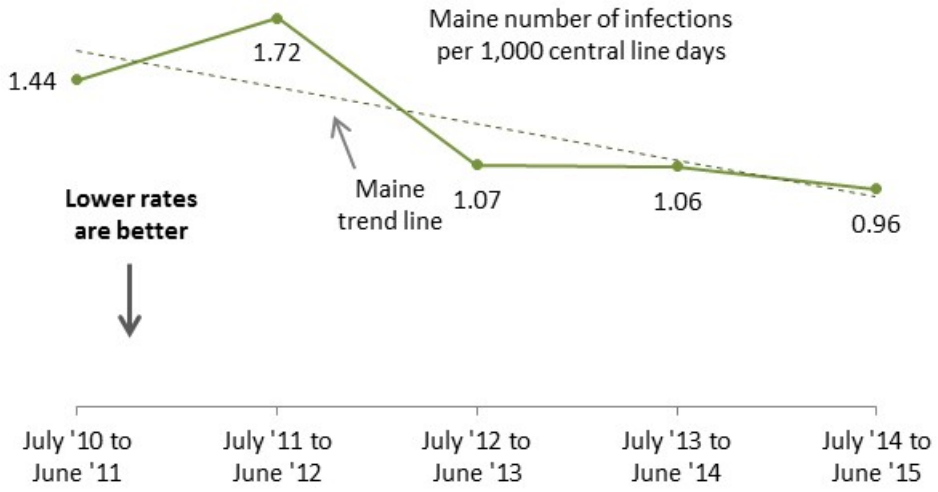
[23] "How-to Guide: Prevent Central Line-Associated Bloodstream Infections (CLABSI)". Cambridge, MA: Institute for Healthcare Improvement; 2012 accessed at: http://www.ihi.org/resources/Pages/Tools/HowtoGuidePreventCentralLineAssociatedBloodstreamInfection.aspx

HAI-1: Number of central line catheter-associated blood stream infections among intensive care unit (ICU) patients per 1,000 central line days, July 2014 to June 2015. Of the 33 Maine hospitals that used central line catheters in an ICU or mixed acuity unit 26 hospitals reported zero infections in 12 months.

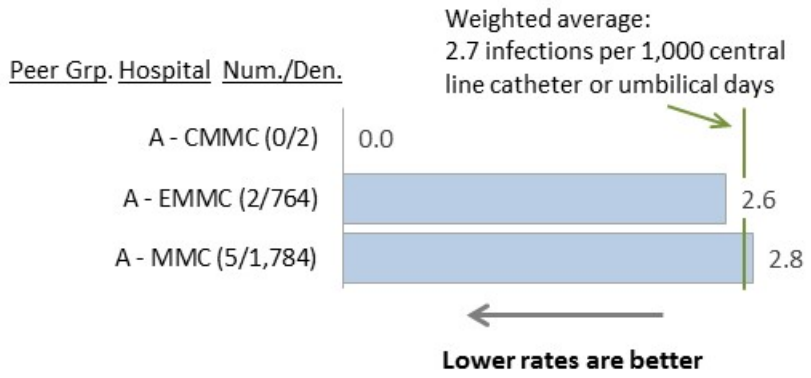


NOTE: Although the rates for St. Mary's Hospital and Mercy Hospital appear to be concerning, those two hospitals had only one CLABSI infection each. Their data sample size is too small to tell if they meaningfully differed from most hospitals in their CLASBI prevention efforts or if it's only a matter of random chance that a CLABSI infection happened to occur in their hospital.

HAI-1 five-year trend: The annual weighted average rate for central line catheter-associated blood stream infections (CLABSI) per 1,000 intensive care unit central line days for all Maine hospitals from July 2010 to June 2015 improved by about 0.4 fewer infections per 1,000 patient days.

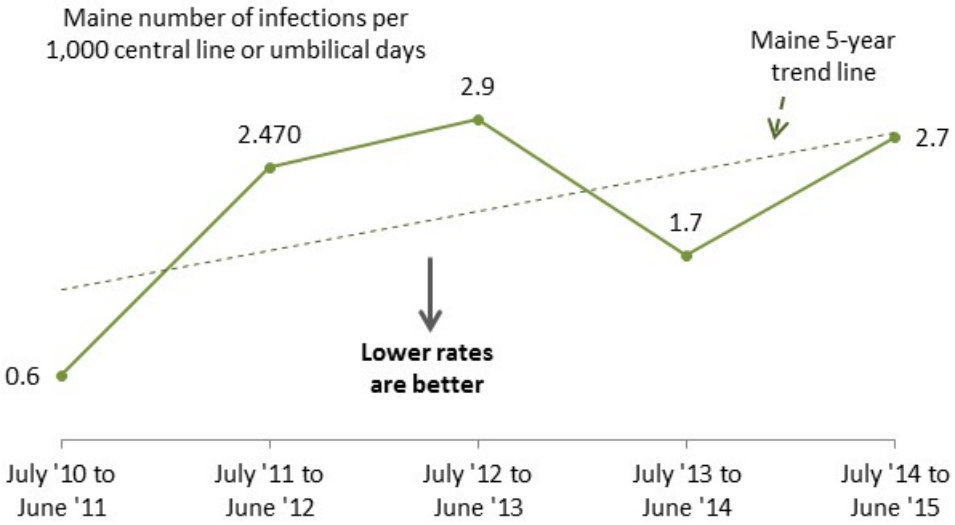


HAI-2: Number of catheter-related blood stream infections among high-risk nursery patients per 1,000 central-line or umbilical catheter days, for the two Maine hospitals that used central line catheters in their neonatal intensive care units (NICU), July 2014 to June 2015. Although the data is collected by five different birth weight categories, there are too few cases to measure any meaningful difference between them.
The numerators (number of infections) and denominators (number of catheter days) are in parentheses.

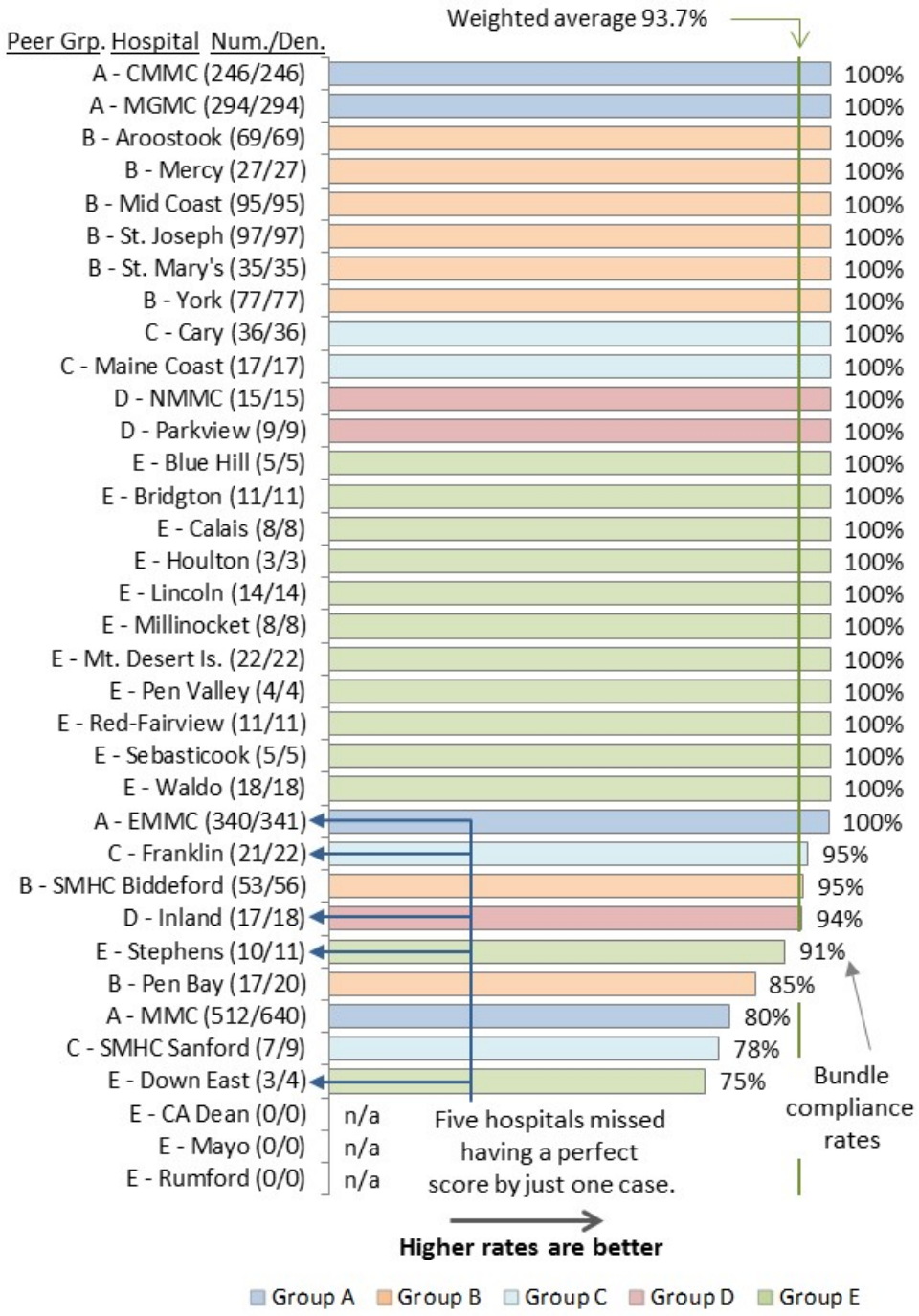


HAI-2 five-year trend: Number of catheter-related blood stream infections (CLABSI) among neonatal ICU patients per 1,000 central-line catheter or umbilical days by Maine hospitals with neonatal ICU's, from July 2010 to June 2015.

The overall HAI-2 infection rate rose compared to the previous year and was well above its low-point of just 0.6 infections per 1,000 catheter or umbilical days during the 2010-11 reporting period. Had that same rate been achieved last year, Maine would have had only 2 neonatal CLABSI infections instead of 7.

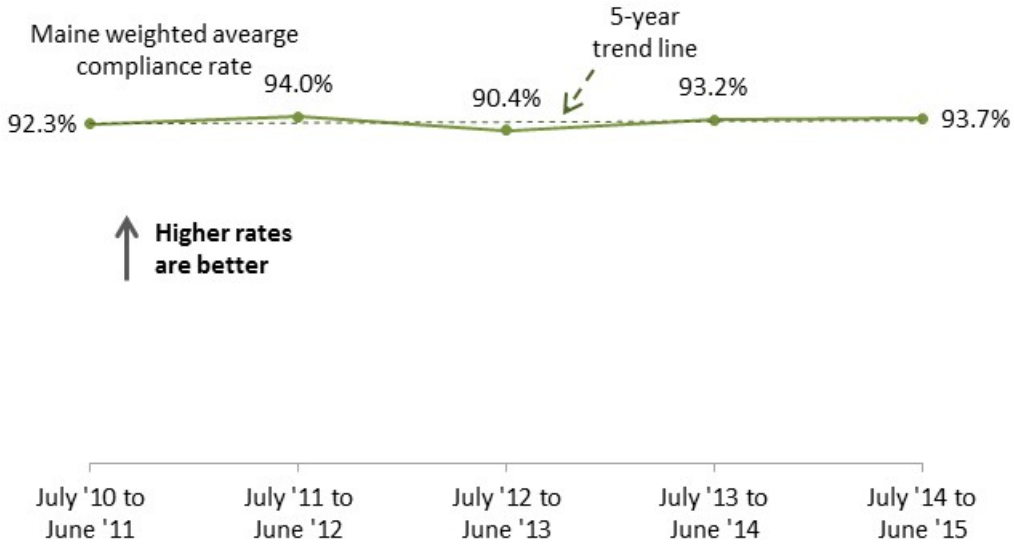


HAI-3: Percent documented compliance with all five evidence-based interventions for patients with intravascular central line catheters (central line bundle compliance) in intensive care units among Maine hospitals designated by peer group, July 2014 through June 2015.

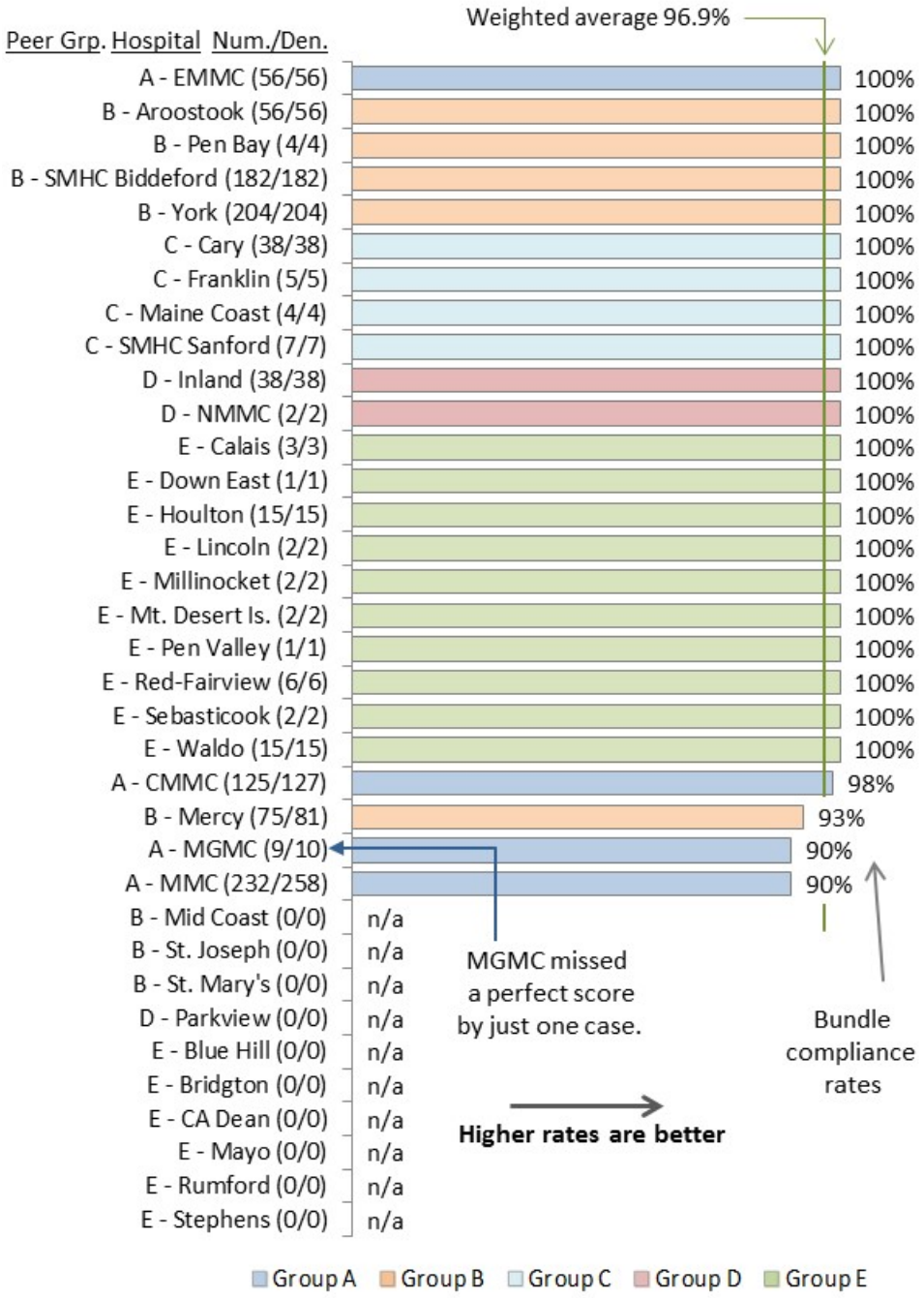


Note: Hospitals sorted by compliance rate, then by Peer Group, and within Peer Groups, alphabetically by name. Hospitals with a rate of "n/a" reported having no patients who fit this category from July 2014 through June 2015.

HAI-3 five-year trend: The annual weighted average percent documented compliance with all five evidence-based interventions for patients with intravascular central catheters (central line bundle compliance) in intensive care units across all Maine hospitals, July 2010 through June 2015. Overall performance in the last 12-month reporting period improved by 0.5% compared to the prior year and was 1.5% better than the level had been five years earlier.

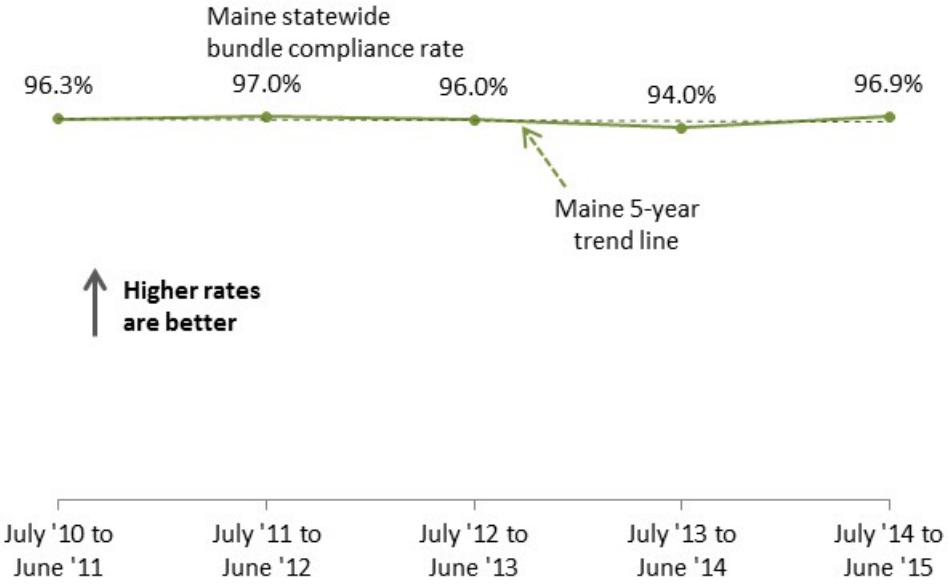


HAI-4: Percent documented compliance with the four insertion-related, evidence-based interventions for patients with intravascular central catheters (central line bundle compliance) placed preoperatively, in pre-operative areas, operating rooms, and recovery areas by Maine hospitals designated by peer group, July 2014 through June 2015.



Note: Hospitals sorted by compliance rate, then by Peer Group, and within Peer Groups, alphabetically by name. Hospitals with a rate of "n/a" reported having no patients who fit this category from July 2014 through June 2015.

HAI-4 five-year trend: The annual weighted average percent documented compliance with the four insertion-related, evidence-based interventions for patients with intravascular central catheters (central line bundle compliance) placed preoperatively, in pre-operative areas, operating rooms, and recovery areas across all Maine hospitals, July 2010 through June 2015. Maine's overall performance on this measure improved by 2.9% since the year before and was 0.5% above the performance level five years earlier.



Ventilator associated pneumonia (VAP)

HAI-5: Percent documented compliance with all five evidence-based interventions for patients with mechanical ventilation (ventilator bundle compliance) in intensive care units

At times, it is necessary for a doctor to take steps to open a patient's airway, to allow air to flow freely to the lungs. An endotracheal tube can be used for this purpose. Inserted into the trachea, it acts as a passage through a patient's upper airway – this is commonly called "intubation". During surgery, intubation is used to ensure that a patient is able to breathe properly while under anesthesia. In the case of some critically ill patients, the tube is connected to a mechanical ventilator to ensure respiration in patients who cannot breathe on their own. Sometimes, patients who are intubated get pneumonia; when the pneumonia occurs after the patient has been on mechanical ventilation it is referred to as "VAP" or ventilator associated pneumonia. On any given day, about 18 percent of hospital inpatients on mechanical ventilation have VAP[24] and VAP can lead to increased severity of illness, greater risk of death, and longer, more expensive hospital stays.[25]

The risk for VAP can be related to a patient's pre-existing condition. They may have a suppressed immune system, chronic obstructive lung disease or other acute respiratory distress syndrome, which can make a patient vulnerable to pneumonia. If a patient is heavily sedated while on a ventilator they may be at increased risk of pneumonia, which can also be influenced by the position the patient is lying in (whether they are flat on their back or with head raised).

There are device-related risk factors for VAP, particularly with regard to how a specific device might influence secretions or lead to aspiration of bacteria into a patient's lungs. Poor hand hygiene in care workers is the most significant personnel-related factor in the risk of VAP.[26]

Research has found that there are practices that can reduce the risk of VAP and other complications. When these practices are bundled and used together, they produce even better outcomes than if any one of them were used alone. The VAP bundle includes elevating the head of the patient's bed, deep vein thrombosis prevention, peptic ulcer disease prevention strategies, daily sedation "vacations" (moderating the level of sedation) and daily assessment of a patient's readiness for removal of mechanical ventilation.

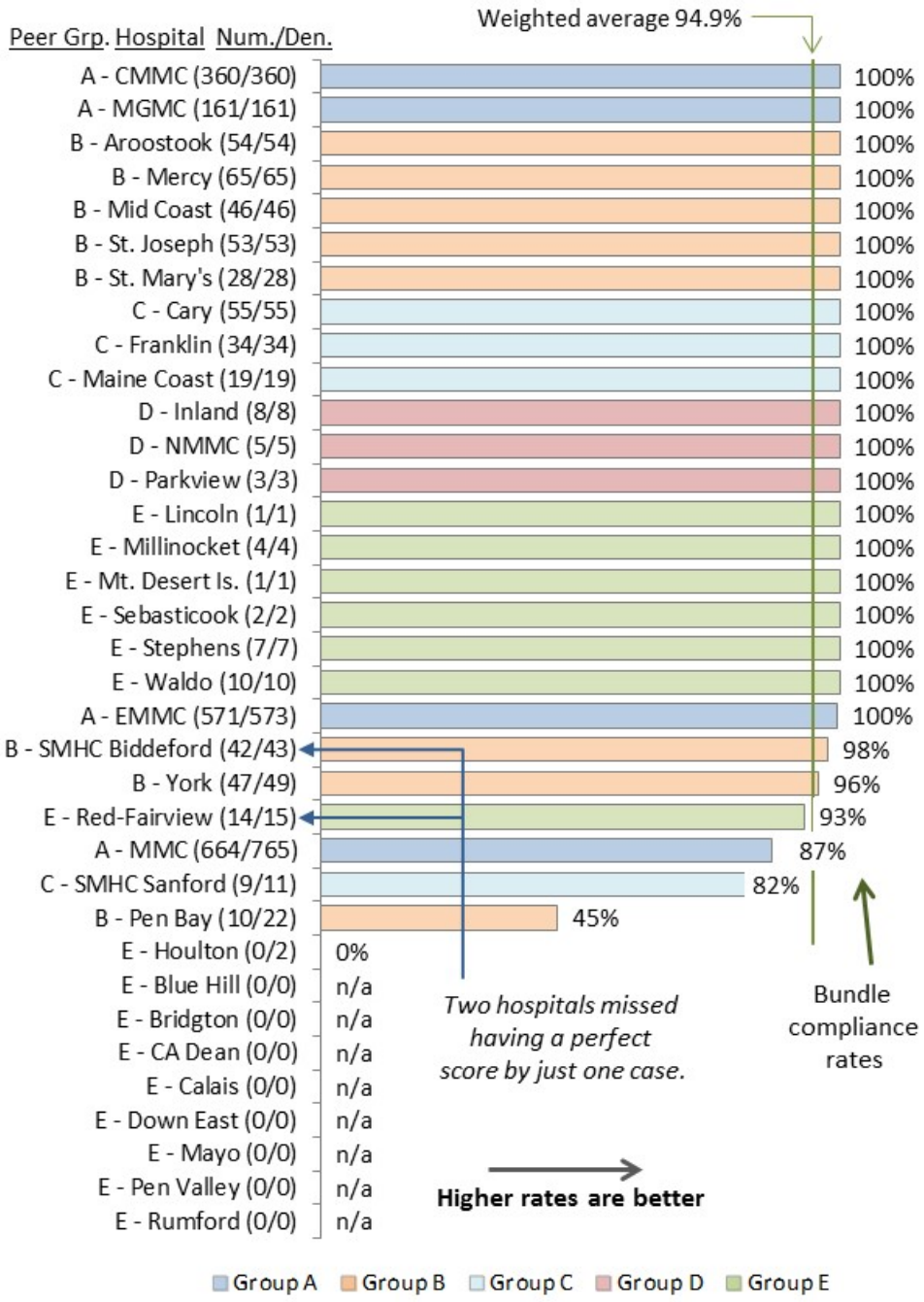
The charts below show, by peer group for each Maine hospital, the degree of adherence to the use of VAP preventive protocols.

[24] Magill, op. cit., Supplementary Appendix, p. 12.

[25] Koenig SM and Truwit JD. Ventilator-associated Pneumonia: Diagnosis, Treatment and Prevention. Clin Microbiol Rev. 2006 October; 19(4): 637–657. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1592694/

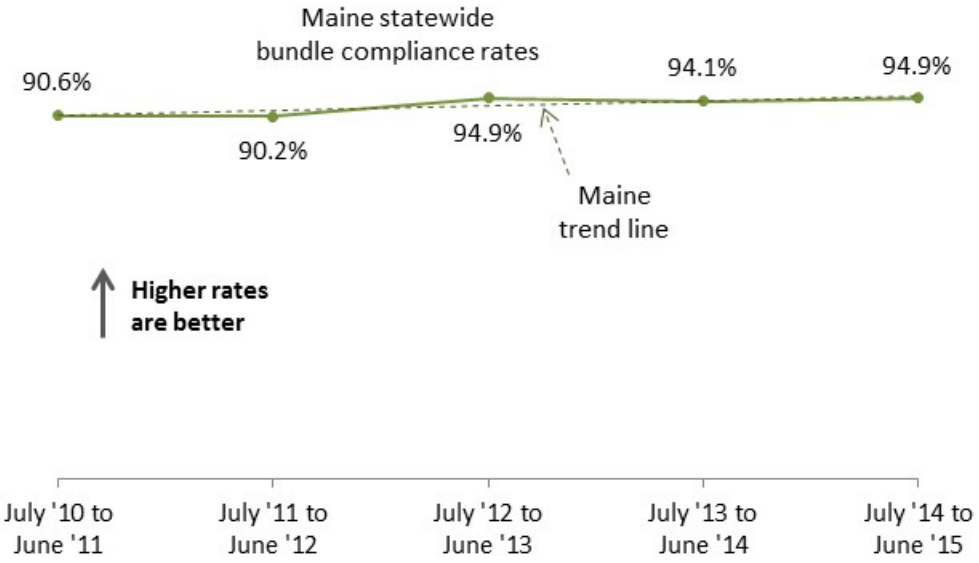
[26] Allegranzi B and Pittet D, Role of hand hygiene in healthcare-associated infection prevention, Journal of Hospital Infection, 2009; 73:305-315.

HAI-5: Percent documented compliance with all five evidence-based interventions for patients with mechanical ventilation (ventilator bundle compliance) in intensive care units, by Maine hospitals designated by peer group, July 2014 through June 2015.



Note: Hospitals sorted by compliance rate, then by Peer Group, and within Peer Groups, alphabetically by name
Hospitals with a rate of "n/a" reported having no patients who fit this category from July 2014 through June 2015.

HAI-5: The annual weighted average percent documented compliance with all five evidence-based interventions for patients with mechanical ventilation (ventilator bundle compliance) in intensive care units, across all Maine hospitals, July 2010 through June 2015. Maine's overall compliance rate improved by 0.7% compared to the prior year and had improved by 4.3% over five years.



Methicillin-resistant Staphylococcus aureus (MRSA)

Methicillin-**r**esistant ***S****taphylococcus* ***a****ureus* – or "MRSA", is a family of bacteria that can cause infection in human beings. "Regular" strains of staphylococcus aureus bacteria are often resistant to the effect of penicillin and other related drugs, but the antibiotic Methicillin is usually able to address a staph infection. However, over time, some strains of staph have also developed resistance to Methicillin and similar drugs; these bacteria are referred to as MRSA. MRSA's resistance to so many antibiotics makes it difficult to treat.

MRSA can be found in both the general community and health care facilities. A person can carry MRSA on their body without having an infection; this is called being "colonized" by the bacteria. MRSA infections are often seen in the form of relatively mild skin infections that cause sores or boils. In more serious cases it can infect wounds, surgical incisions and infect the bloodstream, the urinary tract and even the lungs.

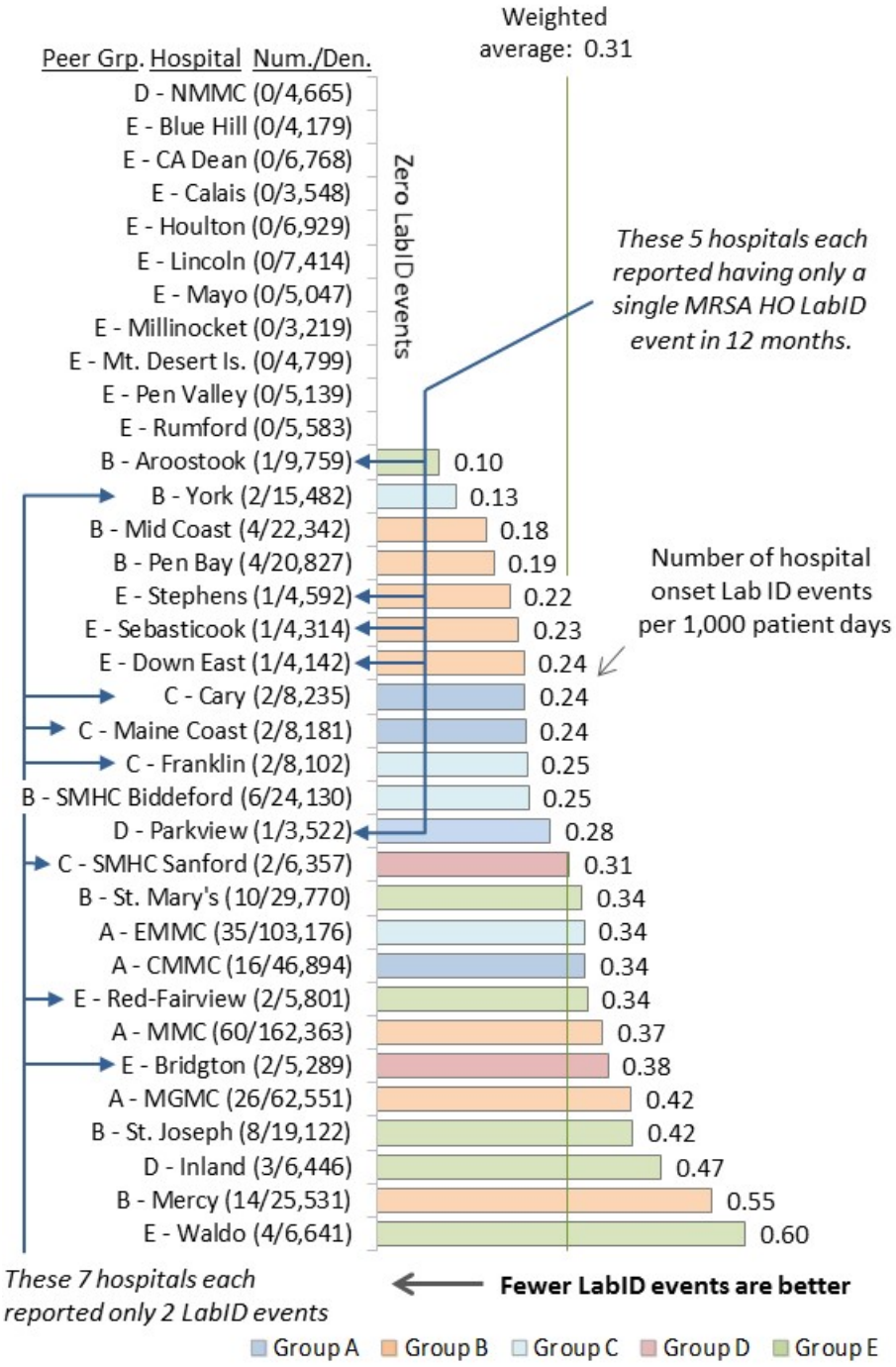
Much of the time, MRSA infections are not life threatening, but when a person is already weakened by illness or surgery – such as people in hospitals or nursing facilities – MRSA can cause more complicated illness, increasing risk of death. MRSA infections can also increase costs because of longer hospital stays and greater health care utilization.

Two years ago, MQF and Maine CDC agreed to simplify the way they report data on MRSA. Instead of requiring hospitals to report the results of comprehensive infection reviews, hospitals now report the number of hospital-onset (HO), laboratory identified (LabID) MRSA events. That is, they report the number of patients who had a lab sample test positive for the presence of MRSA.

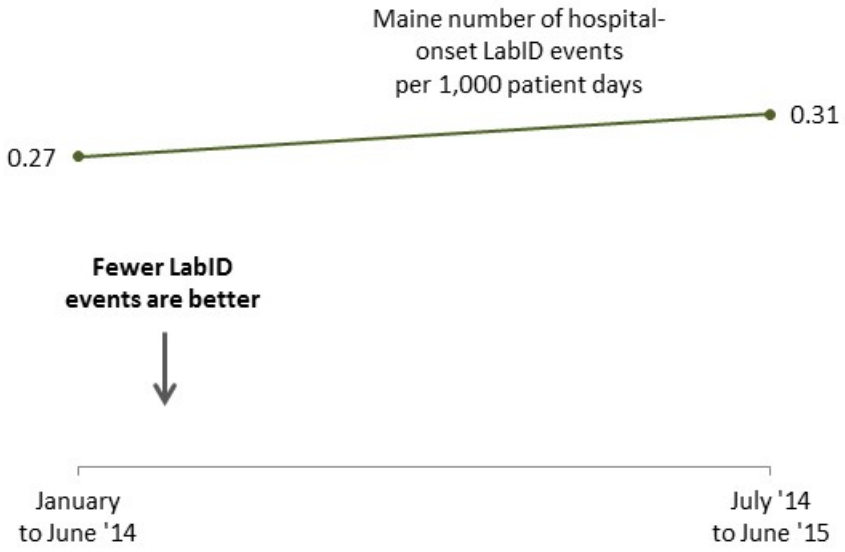
"Hospital Onset (HO)" is a classification that distinguishes MRSA bacteria most likely acquired during a hospital stay from MRSA acquired elsewhere. MRSA LabID events are classified as HO only when MRSA is first detected in a patient sample taken on or after the fourth day of an inpatient stay.

The LabID method is recognized by the federal CDC as a reasonably reliable proxy for MRSA infection rates. It is important to understand that while the LabID method detects the presence of MRSA bacteria in or on a patient's body, a patient can carry the bacteria without having an infection. Therefore, the number of MRSA LabID events is very likely to be greater than the number of actual MRSA infections. The MRSA LabID event rates appearing in this report reflect the data as it was reported by each hospital to the NHSN.

MRSA: Maine Hospital MRSA HO LabID Rates per 1,000 Patient Days for July 2014 through June 2015, by hospital peer groups.



MRSA: The statewide weighted average number of MRSA hospital-onset LabID events per 1,000 patient days rose from 0.27 during the six-months from January to June 2014, to 0.31 during July 2014 through June 2015.



C. difficile

The once easy-to-treat *Clostridium difficile ("C. difficile")* bacteria that causes diarrhea, fever, loss of appetite, nausea, belly pain and tenderness have now become more virulent, and sometimes fatal. Between 1997 and 2004, the death rate from *C. difficile* infections rose from 1.5% to 6.9%.[27] The U.S. had an estimated 453,000 *C.difficile* infections in 2011, of which nearly two-thirds were healthcare-associated and nearly one-quarter were identified as hospital-onset infections.[28]

Most cases occur in people on antibiotics; therefore, people already sick, those recovering from surgery and the elderly are at increased risk. *C. difficile* spores live for a very long time and are resistant to most disinfectants. They can be found on everyday items like bed linens and medical equipment, and transported on the hands of doctors, nurses, other care givers, visitors or others. This is why it is important to remind care givers and medical providers to wash their hands between seeing patients. However, it is also important to note that *C. difficile* infections are possible even when antibiotic use is appropriate and all of the infection prevention standards are met.

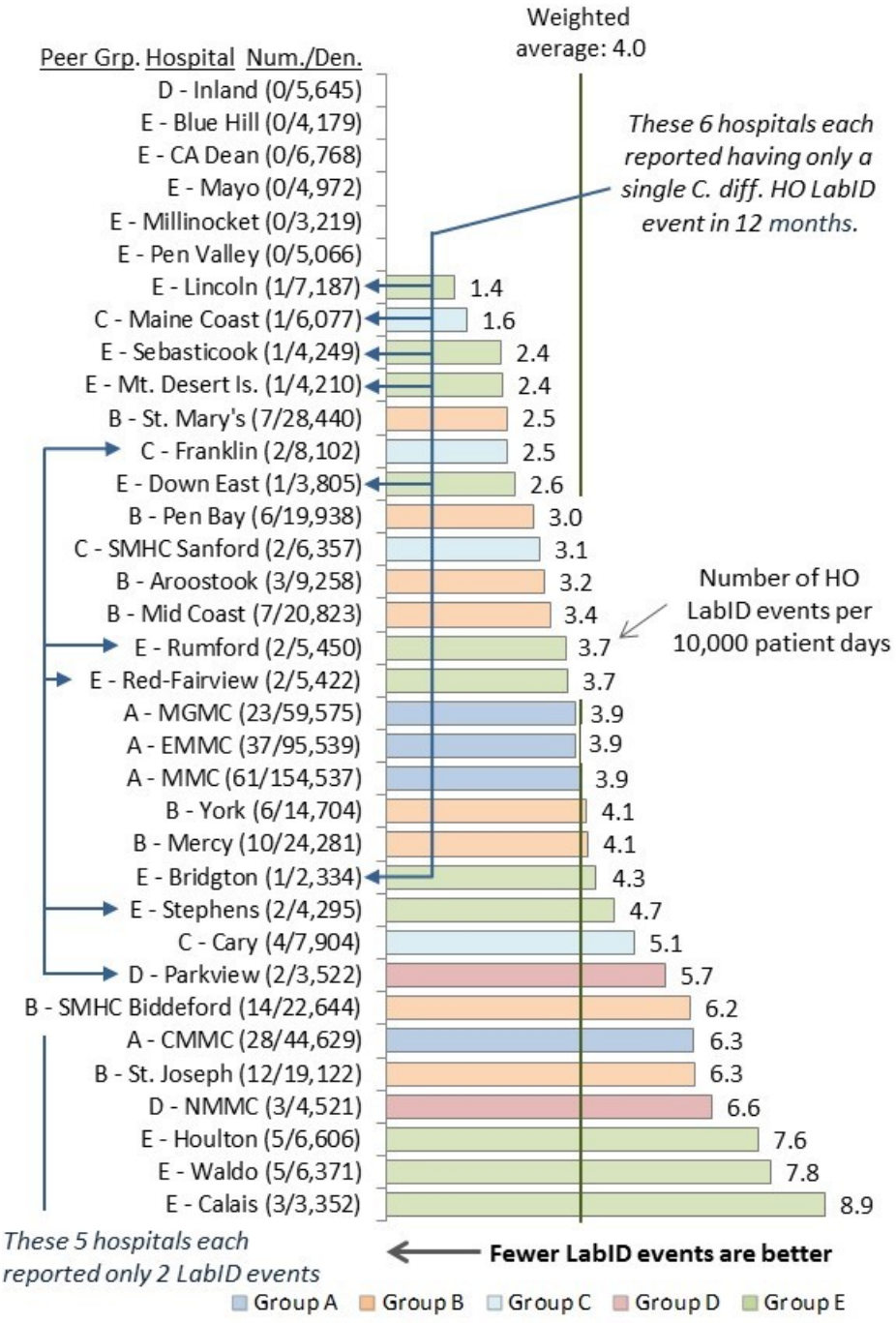
The *C. difficile* rates presented in this report are based on hospital onset (HO) LabID events (i.e., cases where a patient lab sample tested positive for the presence of *C. difficile* bacteria). While the LabID method is recognized by the federal CDC as a reasonably reliable proxy for *C. difficile* infection rates, it is important to understand that while the LabID method detects the presence of *C. difficile* bacteria in or on a patient's body, a patient can carry the bacteria without having an infection. Therefore, the number of *C. difficile* LabID events is very likely to be greater than the number of actual *C.difficile* infections. However, MQF and the Maine CDC agreed to allow hospitals to report LabID event data instead of numbers of actual infections, because it greatly reduces the data collection burden. The *C.difficile* LabID event rates appearing in this report reflect the data as it was reported by each hospital to the NHSN.

---

[27] Ghose, Chandrabali*, Clostridium difficile* infection in the twenty-first century, Emerging Microbes and Infections, vol. 2, p. 9, Sept. 2013. Accessed online on Feb. 4, 2015 at: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3820989/

[28] Lessa, Fernanda C., et.al., *Burden of* Clostridium difficile *Infection in the United States*, The New England Journal of Medicine, 372:825-834, Feb. 26, 2015.

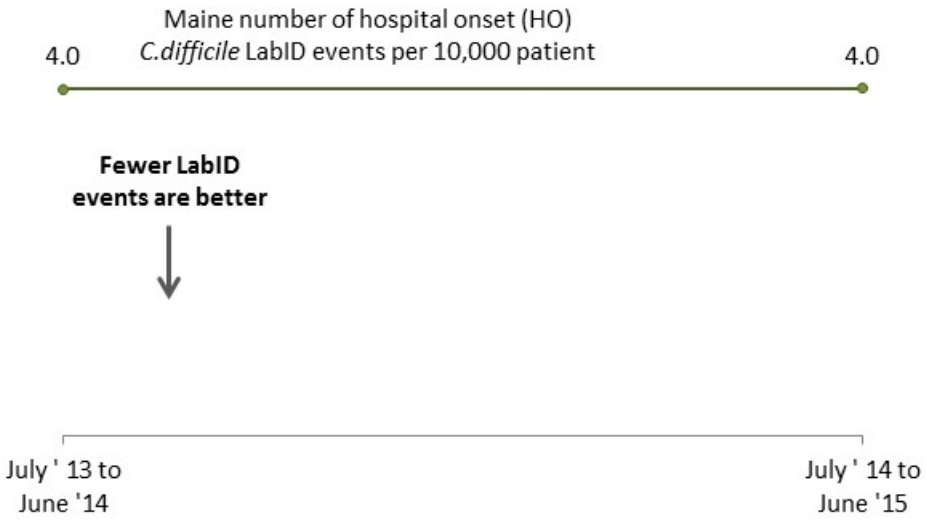
C. difficile: The *C.difficile* Hospital onset (HO) LabID event rate per 10,000 patient days for July 2014 through June 2015, by hospital peer groups.



Cases are categorized as "hospital onset" if first identified in a sample taken on or after the 4th day after hospital admission.

The reader should note that MRSA and *C. difficile* rates are traditionally measured on different scales. MRSA infections are measured in cases per 1,000 patient days, while *C. difficile* is measured in cases per 10,000 patient days.

C.difficile: The statewide weighted average number of *C.difficile* hospital-onset LabID events per 10,000 patient days remained at the same level as the year before. MQF and the Maine CDC changed their *C.difficile*-related hospital data reporting requirements from infection data to LabID events beginning in July 2013.



Appendix C: Outcomes and process measures

1. Summary of Maine Hospital Outcomes Measures, July 2014 to June 2015

The following table displays hospital infection or LabID event rates for four outcomes measures presented in Appendix B. For all four measures, lower rates are better. Hospitals with zero infections are highlighted in blue.

Peer Group	Hospital	Number of infections per:		Number of HO Lab ID events per:	
		1,000 central line days		1,000 patient days	10,000 patient days
		HAI-1 CLABSI (ICU)	HAI-2 Neonatal ICU	MRSA	*C. difficile*
A	CMMC	1.1	0.0	0.34	6.3
	EMMC	0.9	2.6	0.34	3.9
	MGMC	0.9	n/a	0.42	3.9
	MMC	1.5	2.8	0.37	3.9
B	Aroostook	0.0	n/a	0.10	3.2
	Mercy	1.6	n/a	0.55	4.1
	Mid Coast	0.0	n/a	0.18	3.4
	Pen Bay	n/a	n/a	0.19	3.0
	SMHC Biddeford	0.0	n/a	0.25	6.2
	St. Joseph	0.0	n/a	0.42	6.3
	St. Mary's	1.2†	n/a	0.34	2.5
	York	0.0	n/a	0.13	4.1
C	Cary	0.0	n/a	0.24	5.1
	Franklin	0.0	n/a	0.25	2.5
	Maine Coast	0.0	n/a	0.24	1.6†
	SMHC Sanford	0.0	n/a	0.31	3.1
D	Inland	0.0	n/a	0.47	0.0
	NMMC	0.0	n/a	0.00	6.6
	Parkview	0.0	n/a	0.28	5.7
E	Blue Hill	n/a	n/a	0.00	0.0
	Bridgton	0.0	n/a	0.38	4.3†
	CA Dean	0.0	n/a	0.00	0.0
	Calais	n/a	n/a	0.00	8.9
	Down East	0.0	n/a	0.24	2.6†
	Houlton	0.0	n/a	0.00	7.6
	Lincoln	0.0	n/a	0.00	1.4†
	Mayo	n/a	n/a	0.00	0.0
	Millinocket	0.0	n/a	0.00	0.0
	Mt. Desert Is.	0.0	n/a	0.00	2.4†
	Pen Valley	0.0	n/a	0.00	0.0
	Red-Fairview	0.0	n/a	0.34	3.7
	Rumford	0.0	n/a	0.00	3.7
	Sebasticook	0.0	n/a	0.23	2.4†
	Stephens	0.0	n/a	0.22	4.7
	Waldo	0.0	n/a	0.60	7.8
Statewide weighted average		1.0	2.7	0.31	4.0

† While this infection rate may seem high, it's due to only a single reported infection in 12 months.
n/a = hospital did not have any patients to whom the measure applied

2. Summary of Maine Hospital Compliance Rates for Process Measures, July 2014 to June 2015

The following table displays hospital documented compliance rates for three Healthcare Acquired Infection (HAI) process measures and six Surgical Care Improvement Project (SCIP) measures seen in APPENDIX B. For all seven measures, higher scores are better. All performance rates at 95%-or-better are highlighted in blue.

Peer Group	Hospital	HAI-3*	HAI-4	HAI-5
A	CMMC	100%	98%	100%
	EMMC	100%†	100%	100%
	MGMC	100%	90%†	100%
	MMC	80%	90%	87%
B	Aroostook	100%	100%	100%
	Mercy	100%	93%	100%
	Mid Coast	100%	n/a	100%
	Pen Bay	85%	100%	45%
	SMHC Biddeford	95%	100%	98%†
	St. Joseph	100%	n/a	100%
	St. Mary's	100%	n/a	100%
	York	100%	100%	96%
C	Cary	100%	100%	100%
	Franklin	95%†	100%	100%
	Maine Coast	100%	100%	100%
	SMHC Sanford	78%	100%	82%
D	Inland	94%†	100%	100%
	NMMC	100%	100%	100%
	Parkview	100%	n/a	100%
	Blue Hill	100%	n/a	n/a
	Bridgton	100%	n/a	n/a
	CA Dean	n/a	n/a	n/a
	Calais	100%	100%	n/a
	Down East	75%†	100%	n/a
	Houlton	100%	100%	0%
	Lincoln	100%	100%	100%
	Mayo	n/a	n/a	n/a
	Millinocket	100%	100%	100%
	Mt. Desert Is.	100%	100%	100%
	Pen Valley	100%	100%	n/a
	Red-Fairview	100%	100%	93%†
	Rumford	n/a	n/a	n/a
	Sebasticook	100%	100%	100%
	Stephens	91%†	n/a	100%
	Waldo	100%	100%	100%
Statewide weighted average		93.7%	98.8%	96.1%

† This hospital missed a perfect score due to only a single lapse in 12 months.

** See brief descriptions of each measure on the next page*

n/a = hospital did not have any patients to whom the measure applied

List of the Maine Chapter 270 quality indicators included in Appendix C: Outcomes and Process Measures

Summary of Maine Hospital Outcomes Measures

HAI-1	Central line catheter-associated blood stream infection rate for intensive care unit patients, per 1,000 central line days
HAI-2	Number of catheter-related blood stream infections among neonatal intensive care unit patients per 1,000 central line catheter or umbilical days
MRSA	Number of hospital onset associated Methicillin-resistant Staphylococcus aureus LabID events per 1,000 inpatient days
C. difficile	Number of hospital onset associated *Clostridium difficile* LabID events per 10,000 inpatient days

Summary of Maine Hospital Process Measures

HAI-3	Percent documented compliance with all five evidence-based interventions for patients with intravascular central catheters (central line bundle compliance) in intensive care units
HAI-4	Percent documented compliance with the four insertion-related, evidence-based interventions for patients with intravascular central catheters (central line bundle compliance) placed preoperatively, in pre-operative areas, operating rooms, and recovery areas
HAI-5	Percent documented compliance with all five evidence-based interventions for patients with mechanical ventilation (ventilator bundle compliance) in intensive care units

Appendix D: Annual Report of the Maine HAI Collaborating Partners Committee

The HAI Collaborating Partners Committee was formed in early 2015 under the joint auspices of the Maine Centers for Disease Control and Maine Quality Forum to subsume the responsibilities of MQF's HAI Subcommittee and to, "assess and analyze the status of infection prevention and control in the state of Maine and make recommendations on state strategies for the reduction of healthcare associated infections across all healthcare settings."[29] The voluntary membership represented a broad range of professions and organizations including hospital-based physicians and infection preventionists, pharmacists, disease prevention and control, nursing facilities, clinical pathology laboratories, accreditation and licensing, state healthcare associations and consumer groups.

The Committee met monthly during spring and summer and devoted most of its detailed discussions to advising and helping to develop a newly updated State HAI Plan for submission to the federal CDC. The Plan (which can been seen in its entirety in Appendix E) set annual goals and activities for 2015 through 2018 to build a comprehensive framework to detect, respond to, analyze and prevent HAI outbreaks across all healthcare settings. The Plan also addresses ways to improve preparedness for the prevention and control of emerging pathogens such as Ebola and the highly antibiotic-resistant Carbapenem-resistant Enterobacteriaceae (CRE) bacteria.

The Plan seeks to enhance epidemiological surveillance of HAI outbreaks, improve regional and statewide communication and coordination around outbreaks and other HAI issues, provide HAI prevention training across an expanded range of healthcare settings, build an online information resource for infection preventionists and other healthcare professionals, explore setting competency standards and establishing a bi-annual statewide or multi-state regional HAI prevention conference, reduce the overuse of antibiotics and promote public education on what patients, friends and families can do to prevent infection.

In coming years, the Committee will continue to advise MQF and the Maine CDC on the implementation of the State HAI Plan objectives. The Committee reviewed some sections of Maine Chapter 270 and will make recommendations, next year, on substantive amendments to the HAI quality measure reporting sections of the Chapter 270 Rules.

[29] HAI Collaborating Partners Committee Operating Guidelines, (Augusta: March 2015)

HAI Collaborating Partners Committee: Operating Guidelines

(adopted at the Committee's inaugural meeting, March 3, 2015)

Mission:

The HAI Collaborating Partners Committee will assess and analyze the status of infection prevention and control in the state of Maine and make recommendations on state strategies for the reduction of healthcare associated infections across all healthcare settings.

Objectives:

3. Provide guidance to the Maine Quality Forum (MQF) for the reporting of metrics related to healthcare associated infections for Chapter 270.
    a. Evaluate the completeness and the accuracy of reporting requirements.
    b. Establish priorities for external validation studies.
    c. Recommend additions and deletions of HAI related metrics.
4. Evaluate successfulness of the State HAI Plan and update as needs/priorities demand.
    a. Review infection prevention and control data on a state level.
    b. Develop mitigation strategies for addressing identified gaps in infection prevention and control.
    c. Analyze healthcare associated infection data by region to assess infection/pathogen threat.
    d. Provide guidance to address potential emerging threats.

Membership:

This volunteer committee shall include persons with expertise in the surveillance, prevention, and control of healthcare associated infections; safe and effective medication use; clinical laboratory testing, healthcare facility administration and nursing leadership; infectious disease and patient care; healthcare preparedness activities; accreditation and licensing; as well as representatives from applicable state healthcare associations and coalitions (see next page for list of members).

Staff:

This committee will be chaired by a representative from each of the following organizations:

- Maine Center for Disease Control (Maine CDC)
- Maine Quality Forum (MQF)

HAI Collaborating Partners Committee Membership List

Organization	Representative	Title
APIC-Pine Tree Chapter Acute Care, IPPS facility	Gwen Rogers	Infection Preventionist Maine Medical Center
APIC- Pine Tree Chapter Acute Care, CAH facility	Ann Graves	Infection Preventionist Waldo County General Hospital
Maine Healthcare Association, LTC	Lynn Johnston	Infection Preventionist Maine Veterans' Home
Home Health Representative	Bob Abel*	Chief Nursing Officer Home Health Visiting Nurses
Ambulatory Surgery Center Representative	Linda Ruterbories	Director Program Development OA Centers for Orthopaedics
Maine CDC	Dr. Siiri Bennett	State Epidemiologist
	Rita Owsiak	HAI Coordinator
Maine Hospital Association	Sandy Parker	VP & General Counsel
Maine Quality Forum / Maine Health Data Organization	Karynlee Harrington	Executive Director
Healthcentric Advisors (QIN-QIO)	Danielle Hersey	Acting State Director Hospital Coordinator
Husson Univ. School of Pharmacy / Eastern Maine Medical Center	Anthony Casapao, PharmD	Assistant Professor / Infectious Disease Clinical Pharmacy Specialist
Maine Society of Health Systems Pharmacists	Tyson Thornton	Director of Pharmacy Sebasticook Valley Hospital
	Frank Mack	Pharmacist, Mercy Hospital
Laboratory Representatives	Rick Danforth	Maine Health and Environmental Testing Laboratory:
	Cathy Dragoni	NorDx
Healthcare Systems and Districts	Dr. Jay Reynolds	Administration
	Dr. August Valenti	Infectious Disease Physician Maine Medical Center
	Dr. Sandy Harris	Infectious Disease Physician St. Mary's Regional Medical Center
	Dr. Josh Cutler	Physician, Maine Medical Center
OMNE – Nursing Leaders of ME	Bob Abel*	Chief Nursing Officer Home Health Visiting Nurses
Consumers for Affordable Healthcare	Emily Brostek	Executive Director
Consumer Representative	Kathy Day	Consumer Advocate
State of Maine: Public Health Emergency Preparedness	William Jenkins	Director Office of Public Health Emergency Preparedness, Maine CDC
State of Maine: Division of Licensing & Regulatory Services	Dale Payne	Health Surveyor Maine DHHS
Committee Staff	Rita Owsiak	Maine CDC HAI Program Coordinator
	Paul Livingston	Maine CDC
	Karynlee Harrington	Executive Director MQF & MHDO
	Stuart Bratesman Sherry Gildard	Muskie School of Public Service University of Southern Maine

* A member representing two organizations

Appendix E:

State of Maine Healthcare-Associated Infections Plan 2015-2018

Maine Center for Disease Control and Prevention
An Office of the Department of Health and Human Services

Paul R. LePage, Governor Mary C. Mayhew, Commissioner

Department of Health and Human Services
Maine Center for Disease Control and Prevention
Division of Infectious Disease

Healthcare Associated Infection Program

Introduction:

Healthcare-Associated infections (HAIs) are infections caused by a wide variety of common and unusual bacteria, fungi and viruses during the course of receiving medical care. Medical advances have brought lifesaving care to patients, yet many of those advances come with a risk of acquiring an HAI. These infections related to medical care can be devastating and even deadly.

On any given day, about one in 25 hospital patients have at least one HAI. There were an estimated 722,000 HAIs in United States acute care hospitals in 2011. About 75,000 hospital patients with HAIs died during their hospitalization.[30] As our ability to prevent HAIs grows, these infections are increasingly unacceptable.

Treatment for HAIs and other infections is becoming more challenging as antibiotic resistance increases. Several bacteria have gained the ability to generate enzymes that destroy antibiotics or can change their cell wall structure to block antibiotics. In these cases, antibiotic choices for treatment are becoming increasingly limited, expensive and in some cases, nonexistent.

Each year in the United States, at least 2 million people have an infection associated with bacteria that are resistant to antibiotics, and at least 23,000 people die each year because of these infections[2]. Antibiotic-resistant infections can happen anywhere. Data show that most happen in the community; however, most deaths related to antibiotic resistance happen in inpatient healthcare settings, such as hospitals and nursing homes. Antibiotic resistance is one of the most pressing threats facing the world today.[31]

The road to eliminating HAIs and combating antibiotic resistance is a road traveled by many. National leadership is issuing guidance in the form of action plans. Goals are established and annual reports monitor progress.

- Action plans:
  - *National Action Plan to Prevent Health Care-Associated Infections: Road Map to Elimination.* April 2013. (U.S. Department of Health and Human Services)
  - *National Action Plan for Combating Antibiotic Resistant Bacteria*. March 2015. (U.S. Government)
- Goals: *Healthy People 2020.* December 2010. (CDC)
- Progress Reports: *HAI Progress Report.* Annual Report. (CDC)

The State of Maine has an important role in this national movement. Numerous organizations across the state as well as healthcare facilities in acute care, extended care, and ambulatory care settings are working hard to eliminate HAIs and combat antibiotic resistance. Maine's HAI Plan is our State's action plan for this work over the next three years. This plan has three key areas of focus:

- Responding to threats of infectious disease transmission
- Analyzing data to target prevention activities
- Preventing future HAIs and antibiotic resistance through education and training, promoting best practices through group collaborative programs and expanding antimicrobial stewardship.

The Maine CDC developed this plan in consultation with the HAI Collaborating Partners advisory council, a group jointly convened by the Maine CDC and Maine Quality Forum (MQF) and composed of a broad range of stakeholders listed in Appendix A. The MQF will include an annual summary of the plan's activities and outcomes in Maine's State HAI Report.

---

[30] Magill SS, Edwards JR, Bamberg W, et al. *Multistate Point-Prevalence Survey of Health Care–Associated Infections*. *N Engl J Med* 2014;370:1198-208.

[31] Centers for Disease Control and Prevention. Antibiotic/Antimicrobial Resistance website.: http://www.cdc.gov/drugresistance.

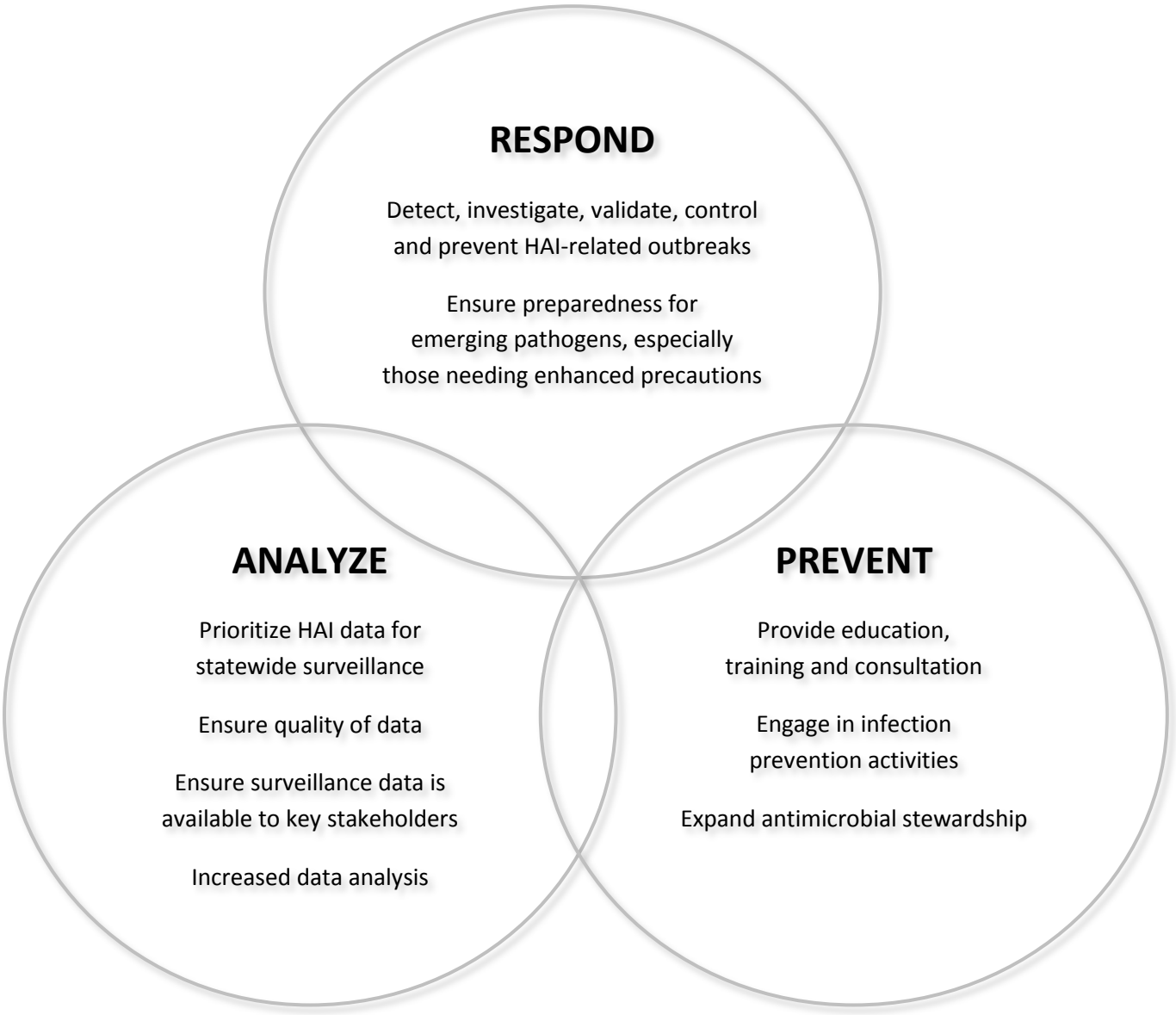
Acronyms

AR	Antibiotic Resistance
CAUTI	Catheter-Associated Urinary Tract Infection
CDC	federal Centers for Disease Control and Prevention
CDI	*Clostridium difficile* Infection
CEO	Chief Executive Officer
CLABSI	Central Line-Associated Blood Stream Infection
CRE	Carbapenem-Resistant Enterobacteriaceae
DART	Data Analysis by Region for Trends Program
DHHS	Department of Health and Human Services
DNA	Deoxyribonucleic acid
HAI	Healthcare Associated Infection
HETL	Health and Environmental Testing Laboratory
ICAP	Infection Control Assessment and Promotion Program
Maine CDC	Maine Center for Disease Control & Prevention
MDRO	Multidrug-Resistant Organism
MHA	Maine Hospital Association
MHDO	Maine Health Data Organization
MICIS	Maine Independent Clinical Information Service
MQF	Maine Quality Forum
MRSA	Methicillin-Resistant *Staphylococcus aureus*
NHSN	National Healthcare Safety Network
PTC-APIC	Pine Tree Chapter – Association for Professionals in Infection Control and Epidemiology
QIN-QIO	Quality Innovation Network – Quality Improvement Organization
VAE	Ventilator-Associated Event
VISA	Vancomycin-Intermediate resistant *Staphylococcus aureus*
VRE	Vancomycin-Resistant Enterococcus

GOAL

Maine will work to eliminate healthcare-associated infections and combat antibiotic resistance by collaborating with stakeholders across the healthcare continuum and the public to focus on three key actions:

Respond, Analyze, and Prevent.



RESPOND				
Priorities	**2015**	**2016**	**2017**	**2018**
Detect, investigate, validate, control and prevent HAI-related outbreaks	Define HAI outbreak for State of Maine, based on federal CDC epidemiological definitions. Design and implement a system to track HAI outbreak response and outcomes, for outbreaks reported to public health.	Assess capacities of healthcare facilities to detect, report and respond to potential outbreaks and emerging threats using standardized tool from federal CDC. Determine gaps in HAI outbreak reporting and response in all healthcare settings	Address gaps in outbreak investigation capacity by working with healthcare partners to develop a plan and infrastructure to improve outbreak reporting and response.	Explore public reporting of outbreak data, the need for validation of outbreak data prior to public reporting and which outbreaks are appropriate of public reporting, in real-time.
		Explore the need for additional laws related to State authority for public health to conduct investigations related to HAI outbreaks and lapses in infection prevention and control.	Explore communication plans among healthcare facilities to minimize the risk of transmission of infectious disease and/or outbreak.	
Ensure preparedness for emerging pathogens, especially those needing enhanced precautions	Assess Ebola readiness at all four Ebola-assessment hospitals in the state. DHHS to work collaboratively with these selected healthcare facilities to address any remaining gaps in readiness in order to achieve "capacity met" status in each of 11 domains of preparedness. Conduct webinar with all hospitals to share findings.	Explore state level emerging pathogen drill and/or table top exercise at HAI conference.		
	CRE should become a 'Notifiable Conditions' by the fall of 2015. All cases of CRE would be reportable to Maine CDC for epidemiologic study.	Analyze initial data from CRE as a Notifiable Condition in the state. Based on first year findings, determine the need for additional guidance for control of CRE beyond the federal CDC 2012 CRE Toolkit. Investigate having local labs send CRE specimens to HETL to store, in case funds for PCR become available in the future.	Include CRE data in the Maine CDC's *Reportable Infectious Diseases in Maine* annual summary report (include genotypic data).	

ANALYZE				
Priorities	**2015**	**2016**	**2017**	**2018**
Prioritize HAI data for statewide surveillance	Update HAI reporting requirements (Chapter 270) to bring it into alignment with state and federal HAI changes.	Review and revise state mandated HAI reporting requirements (Chapter 270).		
		Explore surveillance for LTC facilities, targeting MDROs, antibiotic usage, use of MHDO vs. NHSN for reporting.		
Ensure quality of HAI data	Conduct validation for NHSN reportable data on a rotating schedule, as needed.			
Ensure surveillance data is available to key stakeholders	Legislature and Public: State HAI Annual Report issued by MHDO/MQF.			
	Public: Comparisons of acute care hospital cost, patient satisfaction and HAI data provided through Compare Maine			
	Healthcare Facilities: Facility and region (six New England states) reports for facilities in QIN-QIO collaborative programs.			
	Acute Care: CEO Dashboard Reports issued annually by Maine CDC; facility specific trend of HAI and prevention data. *(to be expanded to other facilities types as they come on board with HAI reporting)*			
	The Maine Hospital Association (MHA) Board of Directors: Regularly reviewing hospital specific and statewide C. difficile and MRSA data obtained from the Maine CDC/MHDO.			
Increase data analysis	Develop and implement the Data Analysis by Region for Trends (DART) Program. • Create an inventory of all healthcare settings in the state. Include at least one infection control point of contact at each facility; identify current regulatory/licensing authority for each healthcare facility; explore obtaining infection control related regulatory survey findings. • Build capacity to analyze data reported by facilities in a defined region to allow for comprehensive assessment of potential HAI threat, and communicate results with healthcare facilities • Work with federal CDC to guide analytic direction and identify facilities for prioritized assessment/response.			

<table>
<tr><th colspan="5">PREVENT</th></tr>
<tr><th>Priorities</th><th>2015</th><th>2016</th><th>2017</th><th>2018</th></tr>
<tr><td rowspan="4">Provide education, training and consultation</td><td>Acute Care: Education webinars targeting CLABSI, CAUTI, CDI, VAE prevention (QIN-QIO).
Acute Care: Ebola preparedness training (federal CDC)</td><td>Build resource list or library of various educational tools, presentations, etc. that have been created. Share repository with healthcare facilities in state.</td><td>Promote patient education ‘What you can do to help prevent infection’. Explore media sources such as public service announcements, Facebook, Twitter, radio spots, newspapers, and websites.</td><td></td></tr>
<tr><td colspan="4">Offer Infection Preventionist mentorship program (PTC-APIC)</td></tr>
<tr><td></td><td colspan="2">Explore logistics of holding a bi-annual HAI prevention conference in 2016 or 2017. Explore partnership to host conference with APIC-PTC and/or the six New England states with potential public participation.</td><td></td></tr>
<tr><td></td><td>Explore Infection Prevention and Control staffing capacity levels. Explore infection control and prevention competency as part of licensing or credentialing for providers.</td><td><u>Extended Care Areas for Focus:</u>
• Enhance understanding of differences between acute and long term care environments, including patient and family education
• MDROs in long term care – recognition and management
• Accessibility to hand washing equipment/hand sanitizer & PPE
• IC issues with shared bathrooms, etc.</td></tr>
<tr><td rowspan="2">Engage in infection prevention activities.</td><td></td><td colspan="3">Develop and implement Infection Control Assessment and Promotion (ICAP) Program.
• Based on data from the DART Program, perform targeted assessments in infection prevention and control at healthcare facilities.
• Identify gaps and work through the HAI advisory council for state/region mitigation planning.
• Implement a response plan to address potential emerging threats identified by using enhanced surveillance.</td></tr>
<tr><td colspan="4">Acute Care: Collaborative programs hosted by Healthcentric Advisors [QIN-QIO], to reduce HAIs related to CLABSI, CAUTI, CDI, and VAE.</td></tr>
<tr><td rowspan="3">Expand antimicrobial stewardship</td><td>AMS education module and academic detailing continues for provider practices (MICIS).</td><td colspan="3">Engage HAI advisory council in developing state action plan for improving antibiotic usage in state.
• Begin with survey of healthcare facilities AMS surveillance programs.
• Explore impact of antibiotic shortage issues on AMS recommendations.
• Explore best practices for patient education that a specimen for culture obtained, results, and dosage of antibiotic regimen, if necessary. Choosing Wisely campaign materials may be useful.</td></tr>
<tr><td></td><td colspan="3">Promote Get Smart About Antibiotics Week (November) through public service announcements and media.</td></tr>
<tr><td></td><td colspan="2">State public health laboratory (HETL) to roll out study with clinical laboratories to conduct DNA analysis on isolates of multidrug resistant organisms (e.g. MRSA, VRE, CRE and VISA) in order to determine the resistance genes most frequently seen in Maine. The next class of antibiotics will target these resistance genes in bacteria. Share the findings with providers.</td><td></td></tr>
</table>

The Department of Health and Human Services (DHHS) does not discriminate on the basis of disability, race, color, creed, gender, age, sexual orientation, or national origin, in admission to, access to or operation of its programs, services, activities, or its hiring or employment practices. This notice is provided as required by Title II of the Americans with Disabilities Act of 1990 and in accordance with the Civil Rights Acts of 1964 as amended. Section 504 of the Rehabilitation Act of 1973 as amended, the Age Discrimination Act of 1975, Title IX of the Education Amendments of 1972 and the Maine Human Rights Act. Questions, concerns, complaints, or requests for additional information regarding civil rights may be forwarded to the DHHS' ADA Compliance/EEO Coordinator, State House Station #11, Augusta, Maine 04333, 207-287-4289 (V) or 207-287-3488 (V), TTY: 800-606-0215. Individuals who need auxiliary aids for effective communication in programs and services of DHHS are invited to make their needs and preferences known to the ADA Compliance/EEO Coordinator. This notice is available in alternate formats, upon request.

Appendix F: 2014 Annual Report of the Association for Professionals in Infection Control (APIC), Pine Tree Chapter

The Association for Professionals in Infection Prevention and Control (APIC) is a national organization dedicated to improving patient safety by decreasing infection associated with the provision of healthcare. Maine's Chapter was established in 1998. Organizational goals include:

- Demonstrate and support effective infection prevention and control as a key component of patient safety.
- Define, develop, strengthen, and sustain competencies of Infection Preventionists across the career span and support board certification in infection prevention and control (CIC).
- Influence and facilitate legislative, accreditation, and regulatory agenda for infection prevention with consumers, policy makers, health care leaders, and personnel across the care continuum.
- Promote and advocate for standardized, quality and comparable healthcare associated infection data.

APIC- Pine Tree Chapter (PTC) meets monthly and has several committees that developed to meet the needs of its members. Every member of the organization is required to participate in at least one committee. The monthly meetings provide education and interaction across the spectrum of care. Topics covered this past year include accreditation-lessons learned, government affairs-how a bill become law, catheter associated infections and nurse driven protocols, and water borne infections.

The multi-disciplinary committee is comprised of home health, long term care, behavioral health, and office based practices. The committee's immediate goal is to increase understanding of the diversity of agencies that have infection prevention responsibilities and extend a hand to those agencies. The group is planning an assessment of infection prevention needs in these agencies to guide APIC-PTC goals.

The Executive Committee, made up of the Past President, Current President, President-elect, Communication Director (Secretary) and Finance Director (Treasurer) established the goal of re-invigorating the Maine Infection Prevention Collaborative Committee – Coordinating Committee. January 16, 2015 the first Collaborating Partners Committee met at the Maine Hospital Association for a kick-off. A multi-disciplinary group that included laboratorians, physicians, infection preventionists, and representatives from supporting agencies discussed the need for on-going interaction, collaboration, and communication. In addition, the Executive Committee developed a succession structure for the top officers. Members who are elected to Treasurer or Secretary will spend one year in-training before taking office to insure continuity of operations.

The Membership Director of APIC-PTC is focused on providing membership tools and resources for Infection Preventionists across the continuum of care. Letters of welcome are extended to each new infection preventionist and they are encouraged to join the group for monthly meetings. A membership directory is being developed to connect the IPs throughout the state with each other for mentorship and best practice guidance.

Members, who are not able to attend the monthly meetings in person, are able to connect via conference call and see slides through See and Share provided by MaineGeneral Medical Center.

The Acute Care Initiatives Director is responsible for maintaining an awareness of state and national HAI initiatives and bringing that knowledge to the membership. The committee's work has focused on developing a catheter associated urinary tract infection best practices bundle and a review of best practices around Clostridium difficile patient care. The Acute Care committee reviewed the current recommendation for testing and patient care and compared the old recommendations with the new ones from Society for Healthcare Epidemiologists of America. We have also reviewed surveillance cases that were challenging and the responses from the National Healthcare Surveillance Network experts.

The finance committee is responsible for scholarships for education and presenting a detailed budget to the National organization. Each year two members receive scholarships to the national convention in return they bring back a presentation to the group. The finance committee also manages vendor relations and speaker compensation.

The Communication Committee is in the process of completing a website that will be available to all consumers and healthcare providers in early 2016. In addition, the committee is preparing a lending library to support facilities that are unable to purchase necessary reference materials. The Secretary is responsible for taking minutes of every meeting and distributing the minutes, agendas, and any additional materials to the membership. A separate listserve has been maintained for all other communication to connect members with each other to answer day-to-day infection prevention questions.

The APIC-PTC is continuing to grow. This year the members of the Chapter from the Critical Access Hospitals developed a working group to address the issues of Infection Prevention in our smallest facilities. Chapter members have participated in the preparation of the State HAI plan and given feedback on the proposed changes to Chapter 270.

Infection prevention is an evidenced based science and to promote understanding of evidence based practice, the Chapter has developed a journal club. Initially, members were educated on performance improvement and tools to complete intensive reviews of healthcare acquired infections. Then, the group was educated on how to read a scientific paper and assess the quality of the study being presented. Recent publications on methicillin-resistant staphylococcus (MRSA) and the use of precautions, and Prevnar 13 and Pneumovax 23 were critically reviewed and discussed.

The work of improving patient care by preventing the spread of infection remains an important focus of the work of the Pine Tree Chapter of APIC. Highly engaged professionals work day-to-day to in facilities throughout the State of Maine educating today's leaders, healthcare providers, and patients on ways to improve health and monitoring performance improvement.

Appendix G: The Skilled Nursing Infection Prevention Program

Under contract with the Maine Quality Forum, the Muskie School of Public Service e-Learning team is currently designing an online training curriculum to provide basic infection prevention and control training to Maine nursing facility staff charged with the infection preventionist (IP) role in their facilities. Currently, many individuals functioning in this role at Maine skilled nursing facilities (SNFs) have had little preparation and coordinated training for their work in prevention, surveillance, control of active infections and performance improvement.

The 8-hour core curriculum for nursing facility IPs will be delivered through an asynchronous 24-hour online distance education portal. Adequate and appropriate training for SNF IPs can decrease healthcare associated infections (HAI) in the SNF population. In particular, IPs play a key role in reducing catheter associated urinary tract infections, the transmission of *C. Difficile* within a facility, and also the development of drug-resistant organisms through a rigorous antibiotic stewardship program. Additionally, a strong infection prevention program can decrease the transmission of HAI from SNF patients to acute-care patients during hospitalizations.

The curriculum will be divided into 6 stand-alone modules that may be completed at the convenience of the participant. When the participant completes all modules, they will be issued a certificate of completion. The core content areas are general infection control and prevention practices, common infectious diseases, isolation/transmission precautions surveillance and data handling, performance improvement, and antibiotic stewardship. It is vital to community infection control and prevention that these staff are instructed in data collection techniques that ensure the validity and reliability of the data reported to the State.

There is significant interest and support for this project. In addition to the engagement of the HAI Coordinator at the Maine CDC, Division of Infectious Disease, the Maine chapter of APIC (Association of Professionals in Infection Control) has committed their support, engagement, and expertise to this initiative.

The new online curriculum will undergo pilot testing in early 2016 and will be made available later in the year.

Appendix H: Healthcentric Advisors' HAI prevention report

State of Maine Report – NE QIN-QIO Collaboration

The New England Quality Innovation Network / Quality Improvement Organization (NE QIN-QIO) is a part of a CMS collaborative to help prevent patients from developing healthcare-associated infections (HAIs) in the hospital. The NE QIN-QIO contract is administered by Healthcentric Advisors in partnership with Qualidigm. The Maine staff is located in Brunswick and works with a regional team across the 6 states in New England. The regional collaborative connects healthcare professions across New England to share best practices and improve patient safety.

The collaborative provides training and support (at no cost to the hospitals) on clinical topics to improve patient outcomes, reduce healthcare-acquired conditions (HAC) and improve hospital value-based purchasing (HVBP) scores. Educational offering include topics on central line-associated bloodstream infections (CLABSI), catheter-associated urinary tract infections (CAUTI), catheter utilization, clostridium difficile infections (CDI) and the CDC's ventilator-associated events (VAE) algorithm. A full offering of previous education events can be found on our website at http://www.healthcarefornewengland.org/providers/hospital/ . If you would like to be on the list serve for future webinar offerings please email Danielle Hersey, State Program Director, at dhersey@healthcentricadvisors.org .

The CMS contract requires that the NE QIN QIO work directly with 7 Maine hospitals on HAIs however the response in Maine was tremendous and we are currently working with 18 hospitals on HAI initiatives. The Maine staff is available for support on most of the CMS hospital initiatives. Part of the collaborative work is providing technical assistance to the hospitals in Maine on the National Healthcare Safety Network (NHSN), monitoring unit-level infection rates for CLABSI, CAUTI and facility-wide CDI; offering assistance to facilities struggling with higher than expected rates of infection. The goal is to improve patient satisfaction and promote a culture of safety through enhanced teamwork and communication. The NE QIN QIO also produces quarterly reports for the participating hospitals to assist with monitoring their infection rates.

The NE QIN QIO is here to support the efforts of the Maine's hospitals to reduce HAIs in the facilities. For more information please contact Danielle Hersey, State Program Director, at dhersey@healthcentricadvisors.org or by calling (207) 406-3960.

14 Maine Street, Suite 208, Brunswick, ME 04011 * (207) 406-3950

Appendix I: Maine CDC MRSA and C.difficile Validation Studies

See next page

Maine Center for Disease Control and Prevention
An Office of the Department of Health and Human Services
Paul R. LePage, Governor Mary C. Mayhew, Commissioner

Department of Health and Human Services
Maine Center for Disease Control and Prevention
286 Water Street
11 State House Station
Augusta, Maine 04333-0011
Tel.: (207) 287-8016; Fax: (207) 287-9058
TTY Users: Dial 711 (Maine Relay)

Data Validation 2016
Methicillin Resistant *Staphylococcus aureus* Lab ID Event
Data Range: July 2014 – June 2015

The acute care hospitals in Maine are charged by the Legislature to report Methicillin Resistant *Staphylococcus aureus* (MRSA) Lab ID events to a national database known as the National Healthcare Safety Network (NHSN). Every positive test result for MRSA obtained from an inpatient in an acute care hospital is eligible to be reported to this database. The admission date and specimen collection date are used to categorize the positive test result into one of following categories:

- CO (Community Onset) – positive test upon admission or within first three days of hospital stay.
- HO (Healthcare facility Onset) – positive test after third day of hospital stay.

It is important to note that the Lab ID surveillance methodology does not evaluate a positive test result against an established definition of infection related criteria to determine if that positive test should be labeled as a healthcare associated infection. Lab ID surveillance is a proxy measure, designed to ease the burden of data collection and evaluation, while producing data that can be used to target infection prevention measures.

In order to verify the accuracy of reporting, the Maine CDC is charged by the Legislature to validate this reported data. The method used and the findings are discussed below.

Validation Details:

Sampling time frame: 07/01/2014 – 06/30/2015
NHSN Surveillance Criteria: MDRO – MRSA – Lab ID Event
MRSA categories validated: All positive test results from the inpatient population. Facilities with greater than 100 positive tests were eligible for validation using a random sample size of at least 40 positive test results.
Number of Acute Care Hospitals Validated: 18
Hospital Selection Criteria: Approximately 50% of the acute care hospitals are selected each year for validation, on a rotating schedule. Hospitals selected this year included those that were not selected last year. In addition, if a facility had a lower validation score last year, it was included in this year's validation.
Number of Validators: 2
Validation Conducted: January – March 2016

Method:

1. Each selected hospital was asked to submit, to Maine CDC, a list of positive test results in the sampling time frame for their inpatient population, including Emergency Department and affiliated clinic patients admitted on the same calendar day in 2014 and all ED and 24-hour Observation unit patients, regardless of admission in 2015. This list was to include the following information: patient medical record number, patient name, date of admission, date of specimen collection, specimen source and patient location in the hospital at the time of the specimen collection. Hospitals were asked to obtain this data directly from the Laboratory software system instead of the Infection Prevention software system, in order to validate that Infection Prevention software systems capture all positive test results needed to conduct surveillance successfully.

2. Maine CDC produced a list of those positive test results reported to the national database, NHSN, for each of the selected hospitals. This list included the following information: NHSN event identification number, date of admission, date of specimen collection, specimen source and patient location in the hospital at the time of the specimen collection.
3. The HAI Coordinators compared the two lists to validate that all specimens on the hospital laboratory listing were reported in the national database, in accordance with the surveillance criteria as set forth by NHSN. Any discrepancies between these two lists were discussed with the Infection Preventionist(s) at the respective hospital to determine if the positive test result was missed, over-reported or did not meet NHSN criteria for reporting.
4. In addition, as the admission date and specimen collection date are used to categorize MRSA as CO or HO, the accuracy of the admission date and specimen collection date were checked for each entry.
5. MRSA Lab ID events can also be categorized by body site, or the location on the body from which the culture was taken. The specimen source can be helpful in targeting prevention measures and therefore was checked for accuracy as well.
6. Hospitals were asked to amend any missed or over-reported positive test results; or inaccurate admission dates, specimen collection dates or specimen sources in NHSN.

Validation Results:

Hospital	# Cases Reviewed	Missed Events	Over-reported Events	Sensitivity	PPV	Admission Date Accuracy	Specimen Date Accuracy	Specimen Source Accuracy
Biddeford	97	17	2	79%	97%	100%	96%	96%
Blue Hill	10	0	0	100%	100%	100%	100%	100%
Bridgton	18	1	0	94%	100%	100%	100%	100%
CA Dean	4	0	0	100%	100%		100%	100%
Downeast	9	1	0	88%	100%	100%	100%	100%
EMMC	53	0	1	100%	97%	98%	98%	100%
Franklin	45	1	0	97%	100%	100%	100%	100%
MDI	13	5	0	44%	100%	100%	100%	100%
Mid Coast	44	0	2	100%	94%	94%	97%	100%
Miles	51	1	0	95%	100%	93%	93%	100%
MMC	134	2	1	98%	99%	100%	100%	100%
Pen Valley	15	6	0	60%	100%	100%	100%	100%
RFGH	49	1	0	97%	100%	93%	100%	97%
Sebasticook	30	5	0	72%	100%	83%	83%	100%
St. Mary's	75	10	0	85%	100%	100%	100%	100%
TAMC	50	3	0	82%	100%	100%	100%	100%
Waldo	72	1	0	97%	100%	100%	93%	100%
York	22	4	4	69%	69%	92%	100%	100%
State of Maine	**791**	**58**	**10**	**89%**	**98%**	**98%**	**98%**	**99%**

Sensitivity: the ability to identify a positive test that should be reported without missing any positive tests that should have been reported.

PPV or Positive Predictive Value: the ability to identify a positive test that should be reported without over-reporting any positive test that did not meet the surveillance definition and should not have been reported.

If a facility has any missed or over-reported events AND the number of cases reviewed is less than 20, caution should be used when interpreting the validation results as there is insufficient data to produce a statistically valid score.

Note: Gray box signifies that date accuracy was not possible. Reasons for this may include the laboratory not being able to submit this information, or if a CMS data validation was performed, onset categories were check for accuracy vs. the admission and specimen collection dates.

This validation cycle identified a total of 68 discrepancies. Reasons for these discrepancies are:

- 58 events for MRSA that should have been reported but were not (Missed)
  - 25 = no reason identified/communication between laboratory and infection prevention
  - 11 = change in surveillance definitions between 2014 and 2015
  - 15 = use of duplicate rule
  - 7 = use of surveillance criteria
- 10 events for MRSA that should not have been reported were reported (Over-reported)
  - 5 = use of duplicate rule
  - 3 = use of surveillance criteria
  - 2 = reported the same event twice

Reasons for discrepancies were reviewed with all acute care facilities in the state. Facilities that did not undergo validation were encouraged to review their data for similar discrepancies.

Summary:

Maine's ability to identify and correctly report true MRSA Lab ID events is improving. The two measures used to determine this are sensitivity and positive predictive value. Sensitivity is a measure of well the State is able to identify a positive test result as a reportable event, without missing any positive test results that are truly reportable events. The sensitivity score increased from 83 percent last year to 89 percent this year. Positive predictive value is the measure of how well the State is able to identify positive test results that are reportable events, without over-reporting any positive test results that are truly not reportable events. The positive predictive value showed a marked increase from 74 percent last year to 98 percent this year.

HAI onset categories are determined by comparing the admission date to the specimen collection dates, therefore an accuracy check of these dates is conducted as part of the validation process. The accuracy for both admission dates and specimen collection dates was 98 percent. One facility was excluded from the accuracy measure, as the laboratory was not able to supply admission dates. Specimen source accuracy was very good at 99 percent.

Each year, a review of the reasons for missed and over-reported events occurs with all Infection Preventionists in the state, so that all facilities can review their surveillance practices for similar issues. The primary reason for missed events was related to communication of positive test results between laboratory and infection prevention. Possible resolutions for this were included in the review of validation results with Infection Preventionists. The second most common reason for missed events was related to a change in the surveillance definition between 2014 and 2015. The 2015 MRSA surveillance definition was also included in the review of validation results, along with a review of the duplicate rules, which are used to determine if a repeat specimen obtained within a specified timeframe should be a new reportable event or is considered a continuation of the previously reported event, a duplicate.

Submitted by: Maine CDC, Division of Infectious Disease, Medical Epidemiology, Healthcare Associated Infections Program
Date: March 14, 2016

Maine Center for Disease Control and Prevention
An Office of the Department of Health and Human Services
Paul R. LePage, Governor Mary C. Mayhew, Commissioner

Department of Health and Human Services
Maine Center for Disease Control and Prevention
286 Water Street
11 State House Station
Augusta, Maine 04333-0011
Tel.: (207) 287-8016; Fax: (207) 287-9058
TTY Users: Dial 711 (Maine Relay)

Data Validation 2016
Clostridium difficile Infection (CDI) Lab ID Event
Data Range: July 2014 – June 2015

The Maine Legislature has charged all acute care hospitals to report *Clostridium difficile* Infection (CDI) events to the National Healthcare Safety Network (NHSN) database. Every positive test result for *Clostridium difficile* obtained from an inpatient is eligible for reporting to this database, excluding babies. Admission dates and specimen collection dates determine which onset category is appropriate:

- CO (Community Onset) – Positive test upon admission or within first three days of hospital stay.
- CO-HCFA (Community Onset Healthcare Facility Associated) – Positive test with prior facility admission in last 4 weeks.
- HO (Healthcare Facility Onset) – Positive test after third day of hospital stay.

It is important to note that the Lab ID Event surveillance methodology does not evaluate a positive test result against an established definition of infection related criteria. Lab ID Event surveillance is a proxy measure, designed to ease the burden of data collection and evaluation, while producing data to aid in the targeting of infection prevention measures.

The Maine Legislature charges the Maine CDC to verify the accuracy of this data. The method used and the findings are discussed below.

Validation Details:

Sampling period: July 1, 2014 – June 30, 2015
NHSN surveillance criteria: Lab ID Event
CDI categories validated: All positive test results from the inpatient population, excluding babies. Facilities with greater than 100 positive tests were eligible for validation using a random sample size of at least 40 positive test results.
Number of Acute Care Hospitals validated: 18
Hospital selection criteria: Approximately 50% of the acute care hospitals are selected each year for validation, on a rotating schedule. Hospitals selected this year included those that were not selected last year. In addition, if a facility had a lower validation score last year, it was included in this year's validation.
Number of validators: 2
Validation conducted: January – March 2016

Method:

7. Each selected hospital submitted a list of positive test results in the sampling period for their inpatient population, including Emergency Department patients admitted on the same calendar day in 2014 and all ED and 24-hour Observation unit patients, regardless of admission in 2015. This list included the patient medical record number, patient name, date of admission, date of specimen collection, and patient location in the hospital at the time of the specimen collection. Hospitals were to obtain this data directly from the Laboratory software system in order

to validate that Infection Prevention software systems capture all positive test results needed to conduct surveillance successfully.

8. Maine CDC produced a list of those positive test results reported to the NHSN database for each of the selected hospitals. This list included the NHSN event identification number, date of admission, date of specimen collection and patient location in the hospital at the time of the specimen collection.
9. The Healthcare Associated Infections (HAI) Coordinators compared the two lists to validate that all specimens on the hospital laboratory listing were present in the national database, in accordance with the surveillance criteria as set forth by NHSN. The HAI Coordinators and an Infection Preventionist at the respective hospital reviewed the discrepancies between the two lists and determined the classification of the discrepancy (i.e. missed, over-reported, or did not meet NHSN criteria for reporting) and identified the reason for the discrepancy.
10. In addition, as the onset category assignment utilizes the admission date and specimen collection dates, this validation included an accuracy check of these dates.
11. Hospitals were asked to amend any missed or over-reported positive test results; or inaccurate admission or specimen collection dates in NHSN.

Validation Results:

Hospital	# Cases Reviewed	Missed Events	Over-reported Events	Sensitivity	PPV	Admission Date Accuracy	Specimen Date Accuracy
Blue Hill	6	0	0	100%	100%	100%	100%
Calais	12	1	0	88%	100%		83%
Cary	24	12	0	43%	100%	89%	100%
CMMC	119	0	0	100%	100%	98%	92%
Houlton	14	2	0	85%	100%	100%	91%
Inland**	2	0	0	100%	100%		
Maine Coast	16	0	0	100%	100%	100%	93%
Mayo	14	4	1	69%	90%	100%	100%
Mercy	42	2	4	94%	89%	95%	92%
MGMC**	10	0	0	100%	100%		
Miles	28	2	0	89%	100%		100%
Millinocket	11	1	0	90%	100%	100%	100%
MMC	47	3	0	93%	93%	98%	100%
NMMC	15	1	1	93%	93%	100%	100%
Pen Bay	24	0	0	100%	100%	100%	100%
St. Joseph	61	3	0	95%	100%	98%	98%
Stephens	6	0	0	100%	100%	100%	100%
TAMC	28	2	0	89%	100%	100%	94%
State of Maine *	**479**	**33**	**6**	**92%**	**98%**	**98%**	**96%**

**Facility selected for data validation by Centers for Medicare and Medicaid (CMS). These facilities were allowed to submit the CMS validation results in lieu of undergoing a second state validation. Admission data and specimen data accuracy was not included as part of the CMS validation process.

Sensitivity: the ability to identify a reportable test and report it, without missing positive tests that need reporting.

PPV or Positive Predictive Value: the ability to identify a reportable test and report it, without over-reporting positive tests that did not need reporting.

Note: If a facility has any missed or over-reported events AND the number of cases reviewed is less than 20, there is insufficient data to produce a statistically valid score.

Note: Gray box signifies that date accuracy was not possible. Reasons for this may include the laboratory not being able to submit this information, or if a CMS data validation was performed, onset categories were check for accuracy vs. the admission and specimen collection dates.

This validation cycle identified 39 discrepancies. Reasons for these discrepancies are:

- 33 events of CDI that should have been reported but were not (Missed)
  - 18 = no reason identified/communication between laboratory and infection prevention
  - 10 = use of surveillance criteria (ED reporting in 2014)
  - 4 = use of duplicate rule
  - 1 = interpretation of laboratory results
- 6 events of CDI that should not have been reported were reported (Over-reported)
  - 4 = same event entered twice
  - 1 = use of the duplicate rule
  - 1 = use of surveillance criteria

All acute care facilities participated in a review of the discrepancies identified. Facilities that did not undergo validation were encouraged to review their data for similar discrepancies.

Summary:

In Maine, the ability to identify and correctly report true CDI events is good. The two measures used to determine this are sensitivity and positive predictive value. Sensitivity is a measure of how well the State is able to identify a positive test result as a reportable event, without missing any positive test results that are truly reportable events. The sensitivity score for the validation cycle was 92 percent. Positive predictive value is the measure of how well the State is able to identify positive test results that are reportable events, without over-reporting any positive test results that are truly not reportable events. The positive predictive value for this validation cycle was 98 percent.

HAI onset categories are determined by comparing the admission date to the specimen collection dates, therefore an accuracy check of these dates is conducted as part of the validation process. The accuracy for admission dates was 98 percent, while and the accuracy for specimen collection dates was 96 percent. A few facilities were excluded from the accuracy check, reasons included 1) the laboratory was not able to supply admission dates or 2) the CMS validation process did not include this accuracy check, however it did include an accuracy check of the HAI onset category determination (i.e. HO, CO-HCFA, CO)

Each year, a review of the reasons for missed and over-reported events occurs with all Infection Preventionists in the state, so that all facilities can review their surveillance practices for similar issues. The primary reason for missed events was related to communication of positive test results between laboratory and infection prevention. Possible resolutions for this were included in the review of validation results with Infection Preventionists. The second most common reason for missed events was related to a change in the surveillance definition between 2014 and 2015. The 2015 CDI surveillance definition was also included in the review of validation results, along with a review of the duplicate rules, which are used to determine if a repeat specimen obtained within a specified timeframe should be a new reportable event or is considered a continuation of the previously reported event, a duplicate.

Submitted by: Maine CDC, Division of Infectious Disease, Medical Epidemiology, Healthcare Associated Infections Program
Date: March 14, 2016

Appendix J: Glossary of Terms

Antibiotic stewardship – programs and guidelines that promote the appropriate selection and use of antibiotics, to improve patient outcomes, reduce the emergence of multidrug-resistant organisms, and reduce the spread of multidrug-resistant infections. These programs aim to avoid the use of antibiotics for diseases they don't treat, such as the common cold. However, when it's appropriate to use antibiotics, it's very important to choose the correct antibiotic and to use it for the right length of time. Proper use of antibiotics leads to higher cure rates, reduced side-effects, shorter hospital stays, lower medical costs, and reduced risk of spreading of drug-resistant bacteria.[32]

Bloodstream infection – an infection caused by bacteria that have entered the bloodstream through a wound, injection, central-line catheter, surgical procedure or other infection. Bloodstream infections can cause a variety of symptoms including fever and in some cases, potentially life-threatening septic shock.

Catheter-Associated Urinary Tract Infections (CAUTI) – an infection that enters the body due of the insertion or continued use of a urinary catheter

Centers for Medicare & Medicaid Services (CMS) – The federal agency within U.S. Department of Health and Human Services responsible for running the Medicare program and for overseeing each states' Medicaid program (known here as MaineCare).

Central Line Catheter-Associated Bloodstream Infection (CLABSI) – an infection that enters the body through the insertion of a catheter that enters one of the major veins near the heart. See *"bloodstream infection"*.

Chapter 270 – The chapter of the Maine State Agency Rules formally known as "90-590 Chapter 270: Uniform Reporting System for Quality Data Sets". It specifies which organizations are required to report, identifies which quality measures they report, and defines methods and standards for data submission.

Clostridium difficile (C. difficile) – a particular type of spore-forming bacteria that can cause serious and sometimes fatal cases of diarrhea. It is the leading cause of stomach and intestinal-related death and was associated with nearly 30,000 U.S. deaths in 2011.[33] *C. difficile* can grow and thrive when competing intestinal bacteria are killed off by antibiotics.

Critical Access Hospitals (CAH) – a CMS designation for smaller and predominantly rural hospitals limited to no more than 25 beds or fewer and an annual average acute care length of stay of under four full days. Unlike Inpatient Prospective Payment Hospitals (see below), Medicare reimburses CAHs on a fee-for-service basis at one percent above reasonable costs.

---

[32] "Get Smart for Healthcare: Core Elements of Hospital Antibiotic Stewardship Programs", U.S. Centers for Disease Control and Prevention, March 4, 2014, web page accessed on May 7, 2015 at: http://www.cdc.gov/getsmart/healthcare/implementation/core-elements.html

[33] Lessa, Fernanda C., et. al, "Burden of *Clostridium difficile* Infection in the United States", New England Journal of Medicine, (2015), Vol. 370, pp. 825-834, accessed on May 7, 2015 at: http://www.nejm.org/doi/full/10.1056/NEJMoa1408913#t=articleTop

Drug-resistant bacteria – bacteria that are hard to treat because they have become immune to one-or-more types of antibiotics

HAI Data Set – the group of five quality indicators specified by Chapter 270 that measures the prevention of healthcare associated infections that can be caused by the use of a central-line catheter, umbilical catheter (in neonates), urinary catheter, or a mechanical device used to assist a patient's breathing. The two HAI indicators that measure the actual rate of infection were designed and maintained by the federal CDC. The three HAI indicators that measure documented compliance with best practices to prevent infection are maintained by the Institute for Healthcare Improvement (IHI).

Healthcare Associated Infection (HAI) – a disease that infects a patient while he or she is in a healthcare setting such as a hospital, outpatient care center, nursing home or doctor's office.

Hospital Peer Groups – The Maine Hospital Association uses bed size to categorize hospitals into five peer groups. Peer Group A currently represents the state's four largest hospitals, while Critical Access Hospitals belong to Peer Group E.

Infection preventionist (IP) – healthcare professionals working in hospitals or other healthcare settings who develop education, training and other programs for doctors, nurses, other hospital staff, patients, and visitors to prevent and reduce the spread of HAIs.

Institute for Healthcare Improvement (IHI) – a Massachusetts-based independent non-profit organization that operates worldwide to promote tested and proven methods to improve the quality of healthcare, patient safety, and to reduce costs through quality improvement. IHI developed some of the quality measures used in this report.

Inpatient Prospective Payment System (IPPS) – the method used by CMS to determine the amount of payment for each Medicare beneficiary inpatient stay at most acute care hospitals. The system calculates the size of the payment based on diagnoses and the severity of illness or injury.

Maine Centers for Disease Control and Prevention (Maine CDC) – is the public health agency for the State of Maine. Working in conjunction with health care providers, the federal CDC, and other partners, Maine CDC acts to keep Maine people healthy and to prevent the spread of disease.

Maine Health Data Organization (MHDO) – an independent state agency that created the nation's first all-payer claims database, a collection of all Maine medical claims paid by private insurers, MaineCare and Medicare, and the agency that collects the data for the Chapter 270 quality measures. When MHDO recognizes the need to make changes to Chapter 270, it submits their recommendations to the Maine Legislature.

Maine Quality Forum (MQF) – an independent state agency that provides the public with, "a reliable resource for information about health maintenance, health care and quality of health care services and health information." MQF also advises MHDO on the need to make changes in Chapter 270.

Methicillin-resistant Staphylococcus aureus (MRSA) – is a drug-resistant strain of staph bacteria that can cause a difficult-to-treat and sometimes deadly infections in the skin, respiratory tract, bloodstream, or at the site of surgical incisions.

National Healthcare Safety Network – the federal CDC's nationwide tracking system for HAIs. More than 12,000 hospitals and other medical facilities from around the country submit data on each and every HAI

infection identified in their facility. The data is used to uncover problem areas and to measure progress in HAI prevention. Some of the hospital data used in this report was obtained by Maine CDC from the NHSN.

Outcomes measures – quality indicators are designed to measure the percent of times that something turns out well or something turns out badly. The outcomes measures covered by Chapter 270 calculate how often patients get a bad infection while they are being treated in the hospital.

Process measures – quality indicators designed to measure how well or how often a hospital or provider follows proven and tested medical guidelines that are known to prevent harm or to improve health. The process measures required by Chapter 270 calculate how often hospitals follow proven medical guidelines to prevent patients from being infected during surgery or a hospital stay.

Ventilator-associated pneumonia (VAP) – a pneumonia infection occurring either while a patient's breathing was assisted by a machine that delivers oxygen through a tube placed in the patient's mouth, nose or through a hole in the patient's neck[34], or when the pneumonia develops within 48 hours after the ventilator use had been discontinued.[35]

[34] "Frequently Asked Questions about Ventilator-Associated Pneumonia", U.S. Centers for Disease Control and Prevention, web page accessed on May 7, 2015 at: http://www.cdc.gov/HAI/pdfs/vap/VAP_tagged.pdf

[35] "Measures: Ventilator-Associated Pneumonia (VAP) Rate per 1,000 Ventilator Days", Institute for Healthcare Improvement, web page accessed on May 7, 2015 at: http://www.ihi.org/resources/Pages/Measures/VentilatorAssociatedPneumoniaRateper1000VentilatorDays.aspx