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2015 Annual Report

Healthcare Associated Infections in Maine

Submitted to:

Joint Standing Committee on Health and Human Services

Submitted by:

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Maine Quality Forum

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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.

Corrections

The table in Appendix C on page 43 of the original version of this report displayed the rate of hospital-onset MRSA LabID events based on a denominator of per 10,000 patient days instead of per 1,000 patient days. Therefore, the rates originally published were higher than they should have been. On the same table, Eastern Maine Medical Center's rate of MRSA Lab ID events per 1,000 patient days was incorrectly rounded from 0.349 to 0.4. The number has been corrected to 0.3 events per 1,000 patient days.

The HAI-1 chart on page 20 (the number of central line catheter-associated blood stream infections per 1,000 central line days) for the Southern Maine Health Care (SMHC) Biddeford campus has been corrected from zero per 1,000 to 1.9 per thousand. Note, the rate for SMHC Biddeford campus is based on one single infection in the 12-month reporting period. The HAI-1 denominators have been updated for several small hospitals, however all of their infection rates remain at zero. The HAI-1 statewide average, originally reported at 1.1 infections per 1,000 central line days, has been corrected to 1.0 infections, which is 0.4 lower (better) than the same rate five years earlier. The HAI-1 chart has been updated to indicate which hospitals reported their HAI-1 data via the U.S. CDC's National Healthcare Safety Network and which ones reported their data directly to the Maine Health Data Organization.

The HAI-3 chart on page 23 (compliance with all five evidence-based [best practice] interventions for patients with intravascular central catheters) for Down East Hospital has been corrected from 100% to 50%. The hospital reported full compliance for one of the two patients eligible to be included in the measure between July 2013 and June 2014.

On pages 40 and 43, the data collection period for MRSA LabID events has been corrected to read "January to June 2014", instead of "July 2013 to June 2014". This change does not affect the rates.

The HAI-1 hospital chart was replaced with a new one that has the missing set of "+" symbols to indicate which hospitals reported their data directly to MHDO instead of via NHSN.

Table of Contents

Executive Summary.....	i
What are Healthcare Associated Infections (HAIs)?	1
Why do HAIs matter?	2
How does Maine measure HAIs?	3
What’s new in this year’s Annual Report?	5
How does Maine collect and analyze HAI data?	7
How well is Maine preventing HAIs?	7
What prevention activities are underway in Maine?	12
Conclusions/Recommendations	14
Appendix A: Maine hospitals listed by hospital peer group	17
Appendix B: Maine trends in hospital-reported HAI measures	18
<i>Central line catheter associated bloodstream infections (CLABSI)</i>	19
<i>Surgical Care Improvement Program (SCIP) quality measures</i>	27
<i>Ventilator associated pneumonia (VAP)</i>	36
<i>Methicillin-resistant Staphylococcus aureus (MRSA)</i>	39
<i>C. difficile</i>	41
Appendix C: Outcomes and process measures	43
1. <i>Summary of Maine Hospital Outcomes Measures, July 2013 to June 2014</i>	43
2. <i>Summary of Maine Hospital Compliance Rates for Process Measures, July 2013 to June 2014</i>	44
Appendix D: The Charter of the Maine HAI Collaborating Partners Committee	46
Appendix E: Overview of the Maine State Healthcare Associated Infection Prevention Plan, 2015...48	
Appendix F: 2014 Annual Report of the Association for Professionals in Infection Control (APIC), Pine Tree Chapter	50
Appendix G: Maine CDC MRSA LabID Event Validation Report.....	52
Appendix H: Maine CDC <i>C. difficile</i> LabID Event Validation Report	55
Appendix I: The Skilled Nursing Infection Prevention Program.....	58
Glossary of Terms	59

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 “superbug” and “antibiotic resistance” make headline news, such as they did during the recent outbreak of drug-resistant bacteria infections in Los Angeles, the dangers of HAIs capture attention.

Major causes of healthcare associated infections 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.

This HAI report focuses on Maine hospital efforts and results.

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

- Surgical site infections;
- Central line catheter-associated blood stream infections;
- Ventilator associated pneumonia infections and other complications;
- Cases of MRSA (Methicillin-resistant *Staphylococcus aureus*); and
- Cases of *C. difficile* (*Clostridium difficile*)

There are a number of positive trends to report.

In three specific areas the statewide average for Maine hospitals has improved over the past 5 years. In fact, we can report that the Maine hospital 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.

1. *Surgical site infections.* Maine hospitals have improved compliance with 4 proven methods for preventing surgical site infections and Maine's overall compliance rate for all 4 is at 99%-or-above.
2. *Infections related to the use of central line catheters* in adult and newborn intensive care units. The overall trend reflects improved compliance with proven methods for preventing infections when central line catheters are used in adult and newborn intensive care units.
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 complications when intensive care patients are placed on breathing machines.

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 reported in our 2014 HAI Annual Report, Maine began using new measures this year to report the presence of *MRSA* and *C. difficile* in Maine hospitals. Therefore, it is too early to report a 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 be aware 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 just 1 or 2 infections;
- Is not risk-adjusted. Some hospitals may be at risk for higher rates of HAI infections, simply because they treat sicker, more vulnerable patients; and
- Is self-reported by each Maine hospital. In this year's report, only the rates for *MRSA* and *C. Difficile* have been independently validated by the Maine CDC. State agencies, hospitals, and consumers are working together to tackle HAIs in Maine; and
- Counts each instance of compliance with a process measure's criteria only if full compliance is properly documented in the hospital's own records.

When hospitals report data on their rate of compliance with the criteria for the various process measures, each element of compliance must be properly documented within the hospital's own records in order for the compliance to count.

Preventing and reducing HAIs require a team effort. Public, private, non-profit groups, and consumers in Maine collaborate to address this challenge. Each group brings unique focus and expertise. Working together leads to collective success. Groups listed below are referenced in the full report.

Agency or Group	Mission/Action
Association for Professionals in Infection Control, Pine Tree Chapter	Includes infection control specialists from Maine hospitals who learn and share best practices in infection control with hospital care providers (formerly known as the Maine Infection Prevention Collaborative)
HAI Collaborating Partners Committee	Helps to develop and promote HAI prevention strategies and represents the interests of consumers and other stakeholders related to HAIs
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
Maine Centers for Disease Control and Prevention	Tracks national and state trends in HAIs, provides training to healthcare personnel, validates HAI data on <i>MRSA</i> and <i>C. difficile</i> , and develops the State HAI Prevention Plan
Maine Health Data Organization	Sets reporting standards and collects HAI data from Maine hospitals
Maine Hospital Association	Offers education to encourage the adoption of best practices
Maine Quality Forum	Publicly reports status of HAIs in Maine to the State legislature each year with support from the Muskie School of Public Service

Maine consumers and legislators also 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?";
 - each day, "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 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 date²; and
- Be proactive about managing your own healthcare.

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.

Maine still ranks first in the Leapfrog Group national hospital safety ratings

For the third year in a row, the Leapfrog Group, a national employer-based coalition which advocates for patient safety, ranked Maine best in the country for overall hospital safety.³ HAI prevention counts for more than a quarter of Leapfrog's scoring method. We take pride in this ranking, but understand that there is opportunity for improvement. Only constant vigilance and continued support for HAI prevention efforts will protect us when we most depend on it.

² "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>

³ "Hospital Safety Score: State Rankings", The Leapfrog Group, accessed April 1, 2015 at: <http://www.hospitalsafetyscore.org/state-rankings>.

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.S⁴:

- 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. Curbing this 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). While still a serious threat, MRSA HAIs have begun to decline nationally, and in Maine.

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 HAIs⁵ and to have caused 29,000 deaths in the U.S. in 2011.⁶

More recently, the federal Centers for Disease Control (CDC) and Prevention have 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.⁷ A recently reported outbreak at two Los Angeles hospitals resulted in three deaths.⁸

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.

⁴ 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.

⁵ Ibid.

⁶ "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 on May 5, 2015

⁷ "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.

⁸ Terhune, Chad, "Superbug outbreak extends to Cedars-Sinai hospital, linked to scope," Los Angeles Times, March 4, 2015.

Why do HAIs matter?

Although the rate of HAI infections 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 infections 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. Between 1997 and 2004, the national death rate for *C. difficile* infections rose nearly five-fold from 1.5% to 6.9%.⁹

Beyond the personal burden, HAIs contribute to higher healthcare costs. Citing the most recent study conducted in this area, the federal CDC states that 75,000 hospital patients lost their lives to these infections in 2011.¹⁰ The CDC also reports 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.¹¹

Healthcare associated infections are a serious national and state problem, but we have learned that there are basic and effective strategies that consumers, their caregivers and healthcare providers can take to reduce and even eliminate their incidence. The initial focus for 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 of health care workers 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.

Medical care that once occurred primarily in hospitals has branched out to ambulatory surgical centers, nursing facilities, and the home. Many HAIs in these settings are due to poor basic infection-control practices such as improper sterilization and disinfection methods, reuse of syringes and needles, and using single-use medication vials for multiple patients.¹²

⁹ Ghose, Chandrabali, *Clostridium difficile* infection in the twenty-first century, Emerging Microbes and Infections, vol. 2, p. 9, Sept. 2013. Accessed online on February 4, 2014 at: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3820989/>

¹⁰ "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 May 5, 2015.

¹¹ 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

¹² "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>.

How does Maine measure HAIs?

Hospitals have been the central focus for HAI measurement since the acute care setting is where infections are most common and where there is the greatest opportunity for prevention. The Maine Quality Forum (MQF) is 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). Rule Chapter 270 defines the health care quality data sets, including measures related to HAI, and the provisions for filing data by health care providers to the MHDO. Under Chapter 270 Maine hospitals are required to report data to the Maine Health Data Organization on each HAI measure using a consistent and standard format.

There are two types of HAI measures, process measures and outcome measures.

1. **Process measures** focus on a hospital's 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 the HAI infection rates. Maine 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 newborn intensive care units;
 - MRSA LabID events¹³; and
 - *C. difficile* LabID events.

The data used in this report for MRSA and *C. difficile* have been validated by the Maine CDC.

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 level.

¹³ 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 a disease 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 2014	<ul style="list-style-type: none"> • 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) • 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) 	<ul style="list-style-type: none"> • 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 newborn intensive care unit patients per 1,000 central line catheter or umbilical days (HAI-2)
Surgical site infections (SSI)	July 2006 – June 2014 (except SCIP-inf-9 for which data are available for only two years – July 2012 thru June 2014)	<ul style="list-style-type: none"> • Percent of all patients receiving an antibiotic within 1 hour prior to selected surgeries (SCIP-inf-1a) • Percent of surgery patients receiving the recommended preventive antibiotic for their procedure (SCIP-inf-2a) • Percent of surgery patients whose preventive antibiotics were discontinued within 24 hours after anesthesia ended (SCIP-inf-3a) • Percent of surgery patients whose urinary catheters were removed on Postoperative Day 1 or Postoperative Day 2 with day of surgery being day zero (SCIP-inf-9) <p>NOTE: Two SCIP measures we reported in former years were suspended by CMS and are no longer collected by MHDO. <i>SCIP-inf-4</i> (Blood glucose control after cardiac surgery) is no longer considered good clinical practice. <i>SCIP-inf-10</i> (body temperature management before, during, and after surgery) was dropped because so many hospitals had achieved perfect or near-perfect compliance.</p>	No outcome measures collected
Ventilator associated pneumonia (VAP)	July 2008 – June 2014	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

Bacteria	Data Availability	Process Measures	Outcome Measures
Methicillin-resistant Staphylococcus aureus (MRSA)	July 2011 – June 2014	No process measures collected	Number of hospital-onset MRSA LabID events per 1,000 patient days ¹⁴
<i>C. difficile</i>	Oct 2011 – Sept 2013	No process measures collected	Number of hospital-onset <i>C. difficile</i> LabID events per 10,000 patient days

The practice and science of measuring HAIs is still evolving. The Maine Quality Forum is committed to using the most current evidence to examine how well Maine hospitals are doing in preventing HAIs. The Maine Quality Forum will continue to work with the Maine CDC, the Pine Tree chapter of the Association for Professionals in Infection Control and other stakeholders to add new measures that can provide reliable and actionable information on how Maine can reduce the impact of these infections.

What's new in this year's Annual Report?

This year's report marks the retirement of two Surgical Care Improvement Project (SCIP) measures (SCIP-inf-4 and SCIP-inf-10), and a change in the way we report data on MRSA and *C. difficile*.

SCIP-inf-10 Surgery patients with perioperative temperature management

As of January 1, 2014, CMS retired the SCIP-inf-10 measure because many hospitals had achieved perfect or near-perfect compliance with the measure. To stay in alignment with CMS, MHDO has also suspended data collection for SCIP-inf-10. Hospitals are no longer required to report SCIP-inf-10 to MHDO, and the measure is no longer included in the Annual Report. However, during the last six months that Maine hospitals were still required to report, 31 of the 33 hospitals that performed surgeries covered by the SCIP-inf-10 measure had achieved perfect performance and the other two were performing at the 98% level.

SCIP-inf-4 Cardiac Surgery Patients with Controlled Postoperative Blood Glucose

As of July 1, 2014, CMS suspended the data collection and reporting of the SCIP-inf-4 measure because it no longer, "reflect[s] current clinical guidelines, and there are concerns that it may adversely affect the way clinicians and hospitals provide care."¹⁵ To stay in alignment with CMS, MHDO has also suspended data collection for SCIP-inf-4.

¹⁴ Beginning with the 12-month reporting period for the 2015 Annual Report, Maine CDC is simplifying hospital reporting specifications for MRSA by changing the measure to laboratory-identified cases.

¹⁵ "Effective immediately: Suspension of data collection for performance measure SCIP-SCIP-Inf-inf-4", The Joint Commission, retrieved on March 29, 2015 from the Joint Commission website at: <http://www.jointcommission.org/issues/article.aspx?Article=9pJAqf7SESeND8V6LQR1qrIQXwgxpzMc4UzkDSE5UXI%3D>

Remaining SCIP Measures

As of January 1, 2015, CMS retired the remaining 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. This year's report includes these remaining measures but next year's report will not.

Methicillin Resistant Staphylococcus aureus (MRSA)

As noted in last year's annual report, through a major substantive rule making process, a change was made to collect hospital-onset (HO), laboratory identified (LabID) MRSA data. LabID event reporting allows laboratory testing of specimens to be used without clinical evaluation of the patient, allowing for a much less labor intensive method to track MRSA.

The U.S. CDC recognizes the LabID method 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 a disease infection. Therefore, the number of MRSA LabID events is very likely to be greater than the number of actual MRSA infections.

Advantages of LabID Event Reporting include objective laboratory-based metrics that can do the following without extensive chart review:

- Identify vulnerable patient populations;
- Estimate infection burden;
- Estimate exposure burden; and
- Assess need for and effectiveness of interventions.

Each LabID event is assigned one of three sources as defined by the U.S. CDC:

- *Healthcare Facility-Onset (HO)*: LabID Event specimen collected more than 3 days after admission to the facility (i.e., on or after day 4);
- *Community-Onset (CO)*: LabID Event specimen collected as an inpatient at 3 or fewer days after admission to the facility (i.e., days 1 (admission), 2, or 3); or
- *Community-Onset Health Care Facility-Associated (CO-HCFA)*: CO LabID Event specimen collected from a patient who was discharged from the facility 4 or fewer weeks prior to current date of specimen collection.

C. difficile

While last year's Annual Report presented *C. difficile* rates based on LabID events, it included all hospital LabID events, whether classified as HO or CO-HCFA. This year we are focusing our reporting on the HO-LabID events because they better reflect opportunities for hospitals to reduce their incidence.

Performance Ratings

In last year's Annual Report we defined Category 1 to include any measure for which every Maine hospital had attained 98% compliance or better. However, under that definition, a lack of compliance in a single case at one small hospital could prevent a measure from meeting our Category 1 criterion even if all other Maine hospitals had achieved 100% compliance. Therefore we concluded it would be more

reasonable to base the criterion on the statewide average using the total number of qualifying cases as the denominator.

How does Maine collect and analyze HAI data?

The State of Maine rules under Chapter 270, the *Uniform Reporting System for Quality Data Sets*, require all Maine hospitals (with the exception of the Togus Veterans Administration Medical Center) to report data for a variety of health care quality measures to the Maine Health Data Organization on a quarterly basis. Since 2009, these requirements have included two data sets related to healthcare acquired infections, the Healthcare Associated Infection Quality Data Set (HAI) and the Surgical Care Improvement Project (SCIP) measures.¹⁶

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.

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.

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 this data from NHSN, validates the data for a sample of hospitals, and reports each hospital's aggregate numbers to MHDO.

The Maine Quality Forum contracts with the Muskie School of Public Service to analyze the hospital data and prepare the results for this report.

How well is Maine preventing HAIs?

To summarize overall Maine hospital HAI prevention results, we assign each 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.

¹⁶ 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>

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 up-to-date as the data we report here. 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.

Maine's overall statewide average has risen to 99%-or-better across all four process measures designed to prevent surgical site infections.

Measure Group	Description	Hospital-Specific Rates
Surgical Site Infections (SSI)	Percent of all patients receiving an antibiotic within 1 hour prior to any surgery (SCIP-inf-1a)	Page 27
	Percent of surgery patients receiving the recommended antibiotic for their procedure (SCIP-inf-2a)	Page 30
	Percent of surgery patients whose preventive antibiotics were discontinued within 24 hours after anesthesia ended (SCIP-inf-3a)	Page 32
	Percent of surgery patients whose urinary catheters were removed on Postoperative Day 1 or Postoperative Day 2 with day of surgery being day zero (SCIP-inf-9)	Page 34

Surgical Site Infections

Process measures (SCIP-inf-1a, SCIP-inf-2a, SCIP-inf-3a, and SCIP-inf-9)

Maine showed five-year improvement across all four Surgical Site Infection process measures. Overall compliance with the SCIP-inf-1a climbed from 97.9% to 99.3%, SCIP-inf-2a went from 98.7% compliance to 99.5%, and SCIP-inf-3a improved from 97.3% to 99.5%.

Over the two 12-month periods that the SCIP-inf-9 measure has been collected, statewide compliance rose from 98.5% to 99.0%.

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 19
	Number of catheter-related blood stream infections among newborn intensive care unit patients per 1,000 central line catheter or umbilical days (HAI-2)	Page 22
	Compliance with all 5 evidence-based interventions for patients with intravascular central catheters in intensive care units (HAI-3)	Page 23
	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 25
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 36

Central line catheter-associated blood stream infections (CLABSI)

Outcome measures (HAI-1 and HAI-2)

During the July-2013-to-June-2014 reporting period, the statewide rate of CLABSI infections per 1,000 central line days in hospital adult ICUs (HAI-1) had fallen to just two-thirds of what it had been five years earlier. The overall rate is now just 1.1 infections per 1,000 catheter line days. Only seven Maine hospitals reported having one-or-more CLABSI infections in their adult ICU or mixed acuity units during the current 12-month reporting period. That is down from nine hospitals the year before.

Process measures (HAI-3 and HAI-4)

Over the past five years, overall compliance with the HAI-3 process measure improved from 83.9% to 93.2%, and compliance with HAI-4 improved 92.7% to 94.0%. In the latest reporting period, 21 out of 32 hospitals covered by the HAI-3 measure reported a perfect record of compliance with central line catheter best practices. Twenty-one hospitals reported a 100% rate of 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 5 percentage points higher than it had been five years earlier (94.1% vs. 88.9%) While only 57% of the 28 hospitals using ventilators reported a 100% level of compliance in July 2009 to June 2010, 67% of the 27 hospitals using ventilators were reporting perfect 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

None of the current HAI quality measures that MHDO has collected for more than one year fit the criteria for inclusion in this year's Declining Performance category.

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 39
	<i>Clostridium difficile</i> (<i>C. difficile</i>)	Page 6

MRSA and *C. difficile* LabID event rates

As described above with the change this year in our methods of collecting data for MRSA and *C. difficile* we will make our first year-to-year comparisons in next year’s annual HAI report.

More detailed information can be found in the appendices

Detailed 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 2015 edition of its [National and State Healthcare-Associated Infections Progress Report](#) in January. It's difficult to compare the federal report to Maine's Annual Report because the national report is based on older 2013 data, it tends to only include the larger hospitals, and it calculates its numbers in a very different way. While the Maine Annual Report measures the number of infections or hospital onset LabID events per 1,000 or 10,000 patient days, the national report calculates a risk-adjusted Standardized Infection Ratio (SIR). The risk adjustment takes into account the fact that different healthcare facilities treat different types of patients.¹⁷ **Lower SIRs are better.**

¹⁷ Each measure's SIR (example: the SIR for CLABSI) is calculated in three steps:
 1) The federal CDC computes a national baseline infection rate based on an earlier year's nationwide reported hospital data.

CLABSI, MRSA and C. difficile

According to this year's *National and State HAI Progress Report*, Maine hospitals are doing well compared to the rest of the country. Maine reported a significantly lower CLABSI rate in 2013 than in 2012, and Maine's CLABSI SIR was 34% lower than the national baseline. Maine's SIR for laboratory-confirmed MRSA bacterium infections was 28% lower compared to the national baseline, and the Maine SIR for laboratory-confirmed *C. difficile* was 47% lower.

Catheter Associated Urinary Tract Infections (CAUTI)

While CMS requires acute care hospitals (except Critical Access Hospitals) to submit CAUTI data to the National Healthcare Safety Network (NHSN), MHDO currently does not report data on CAUTI. According to the federal CDC, Maine's 2013 CAUTI SIR was 72% higher than the national baseline. They also report that Maine's acute care hospitals displayed no significant improvement between 2012 and 2013.¹⁸

The Leapfrog Group ranks Maine best in the country on overall hospital safety

HAI prevention is part of each hospital's broader effort to promote patient safety. The Leapfrog Group, a nonprofit quality-improvement organization, gives each hospital a letter grade based on its own voluntary survey and 28 outcome and process measures based on publicly available hospital safety data.

Leapfrog's outcome measures include hospital patient falls, central line-associated bloodstream infections, severe pressure ulcers, and preventable complications from surgery. Rankings also assess hospital performance on hand hygiene, the same SCIP measures used in the Maine Annual Report, and if the hospital has good nursing leadership and the right level of intensive care unit staffing, as well as measures of hospital leadership and staffing issues. HAI-related measures account for well over a quarter of Leapfrog's hospital safety score.¹⁹

This year, Leapfrog assigned safety grades to over 2,500 hospitals across the country, including 18 of Maine's large and mid-size hospitals. For the third consecutive year, the Leapfrog Group ranked Maine first in the country for having the highest percentage of hospitals earning an "A" rating for safety.²⁰

2) Then, they calculate a hospital or state's expected number of infections for the current reporting year by applying the national baseline infection rate to the number of patient days reported by the hospital or the state.

3) The SIR is the ratio of the actual number of reported infections to the expected number of infections.

If the actual number of infections is higher (worse) than the expected number, the SIR will be greater than 1. If the actual number of infections is lower (better) than the expected number, then the SIR will be less than 1.

¹⁸ National and State Healthcare-Associated Infections Progress Report, U.S. CDC, (Atlanta: January 2015), p. 62.

¹⁹ "Hospital Safety Score: Scoring Methodology", The Leapfrog Group, October 2014, accessed April 1, 2015 at: http://www.hospitalsafetyscore.org/media/file/HospitalSafetyScore_ScoringMethodology_October2014_Final.pdf

²⁰ "Hospital Safety Score: State Rankings", The Leapfrog Group, accessed May 1, 2015 at: <http://www.hospitalsafetyscore.org/state-rankings>.

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), 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.

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

What was formerly the Maine Infection Prevention Collaborative (MIPC), merged last year with APIC's Pine Tree Chapter. The 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 on Maine's new HAI Collaborating Partners Committee (see below), which is currently advising the Maine CDC on the development of a new State HAI Plan.

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

Maine Hospital CAUTI and SSI Validation Study

The MQF has partnered with the Maine CDC and has contracted with John Snow Inc. (JSI) to verify the completeness and accuracy of the CAUTI and SSI data that is submitted by Maine Inpatient Prospective Payment System (IPPS) hospitals to the National Healthcare Safety Network (NHSN) (critical access hospitals are not mandated to report CAUTI and SSI data at this time). As this data is used to target prevention activities in the state, external validation is necessary to verify that the data is being collected and submitted in a standardized method per NHSN surveillance definitions. External validation is often viewed as a beneficial educational opportunity for a hospital's Infection Prevention and Control Department as it is a way to measure their compliance with mandated reporting requirements.

Maine HAI Collaborating Partners

In early 2015, with the support of APIC and the MQF HAI Subcommittee, the MQF and the Maine CDC convened the Maine HAI Collaborating Partners. The stakeholders and experts that make up this group include infection preventionists from acute care and critical access hospitals and long term care, hospital pharmacists, laboratory pathologists, physicians, nurses, consumer representatives, the CMS-designated

Quality Improvement Organization (QIO) for Maine, 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 Charge of this group and its current members are described in APPENDIX D.

Training for Infection Preventionists in Maine Nursing Facilities

The Maine Quality Forum has contracted with the Muskie School of Public Service e-Learning team to design an infection prevention online training curriculum for Maine nursing facility staff charged with the infection preventionist (IP) role in their facilities. APIC and the Maine CDC are both advising the e-Learning team on the development of the curriculum.

Adequate and appropriate training for nursing facility IPs can decrease healthcare associated infections in the nursing facility setting. In particular, IPs play a key role in reducing urinary tract infections, and the transmission of *C. Difficile* within a facility. Additionally, a strong infection prevention program can decrease the transmission of HAIs from nursing facility residents to acute-care patients during hospitalizations.

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 2014 Annual Report	Status
<p>1. Continue to identify, monitor, and propose new HAI measures for data collection that are evidence-based and nationally recognized.</p>	<p>MQF continues to monitor national developments in HAI measurement and reporting. No new measures were recommended to the MHDO Board in the past year. In order to align with national reporting requirements, the MHDO Board did approve the suspension of the collection of the SCIP measures. Per a rule change to Chapter 270 any future healthcare associated infection measures mandated by the CMS HAI Inpatient Prospective Payment System Hospital Inpatient Quality Reporting Program for reporting to the CDC's NHSN for full Medicare inpatient reimbursements, each participating hospital shall authorize the ME CDC to have this data for public health surveillance purposes. Each participating hospital shall also authorize the MHDO to have access to the NHSN for facility-specific reports of this data for public reporting purposes.</p>
<p>2. Continue working with the MIPC to identify ways to improve hospital infection prevention efforts.</p>	<p>The MIPC merged last year with the Pine Tree Chapter of APIC. APIC has two representatives on the new HAI Collaborating Partners committee.</p>
<p>3. Work with the HAI Subcommittee to develop and act upon its recommendations to coordinate and broaden the scope of Maine's HAI prevention efforts. Subcommittee members have already made suggestions to create an easy-to-access web-based repository of HAI prevention advice aimed at consumers and professionals, extend the reach of antibiotic stewardship efforts, expand HAI prevention efforts and training in long term care facilities, and others.</p>	<p>a. The work of the former HAI Subcommittee has been subsumed by the new HAI Collaborating Partners committee. This new group is co-chaired by MQF and the Maine CDC. The Collaborating Partners group is currently meeting monthly to advise Maine CDC on the development of the new State HAI Prevention Plan.</p> <p>b. MHDO now hosts a new section on its website to serve as an HAI information resource and repository for the Collaborating Partner group. The new section will be made available to healthcare professionals and the general public. https://mhdo.maine.gov/haiCPcommittee.htm</p>

Recommendations from the 2014 Annual Report	Status
(3. continued)	<p>c. Maine CDC continues to work with hospitals and hospital pharmacists to promote antibiotic stewardship, and is working to improve awareness and adoption across the broader medical community. Antibiotic Stewardship will play a key role in the new State HAI Prevention Plan.</p> <p>d. MQF has contracted with the Muskie School of Public Service with the support of the ME CDC and APIC to develop an online training curriculum for infection preventionists in nursing facilities.</p>
4. Continue to support Maine CDC's ongoing prevention and surveillance efforts around HAI as described in the Maine State Healthcare Associated Infection Prevention Plan, 2013.	MQF has partnered with the Maine CDC and has contracted with John Snow Inc. (JSI) to verify the completeness and accuracy of the CAUTI and SSI data that is submitted by Maine Inpatient Prospective Payment System (IPPS) hospitals to the National Healthcare Safety Network (NHSN) (critical access hospitals are not mandated to report CAUTI and SSI data at this time).
<p>5. Continue to work with the Maine CDC to support the work of the Maine Infection Prevention Collaborative (MIPC). Maine CDC continues to:</p> <ul style="list-style-type: none"> • Update each MIPC meeting on the State's current HAI activities and also support and help new hospital Infection Preventionists; and • Help new hospital Infection Preventionists learn how to accurately submit HAI data to the federal CDC's National Healthcare Safety Network. 	<p>a. Since the MIPC merged last year to become part of APIC's Pine Tree Chapter, the Maine CDC's HAI Coordinator continues to attend their regular meetings and to update APIC members on the State's current HAI activities and recent state and national HAI-related developments.</p> <p>b. APIC also participates in the new HAI Collaborating Partners committee.</p> <p>c. The Maine CDC and APIC 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.</p>
6. Cooperate with the Maine Health Data Organization to make HAI quality indicator results more publicly available through the redesign of MHDO's website.	a. The MQF is working with the MHDO to promote public transparency of the quality and cost of healthcare in the State of Maine. In fact, with the support of two federal grants totaling approximately \$3.7 million, the organizations are building a website that will integrate health care cost and quality information.

New Recommendations

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 advisability of broadening its scope to other healthcare settings.

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.
3. Continue to support the development of new training programs for infection preventionists and other health care professionals.
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.
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.

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

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 newborn intensive care unit patients per 1,000 central line catheter or umbilical days (HAI-2).
- Compliance with all five evidence-based interventions for patients with intravascular central catheters (central line bundle compliance) in intensive care units (HAI-3).
- 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. Surgical site infections (SSI)

- Percent of all patients receiving an antibiotic within one hour prior to selected surgeries (SCIP-inf-1a).
- Percent of all surgery patients receiving the recommended antibiotic for their procedure (SCIP-inf-2a).
- Percent of all surgery patients whose preventive antibiotics were discontinued within 24 hours after anesthesia ended (SCIP-inf-3a).
- Percent of surgical patients whose urinary catheter was removed on postoperative day 1 or postoperative day 2 (SCIP-inf-9)

III. 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).

IV. Methicillin-resistant *Staphylococcus aureus* (MRSA)

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

V. *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 newborn intensive care unit patients per 1,000 central line catheter or umbilical days

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

HAI-4: 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. Newborns 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.²¹ 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.

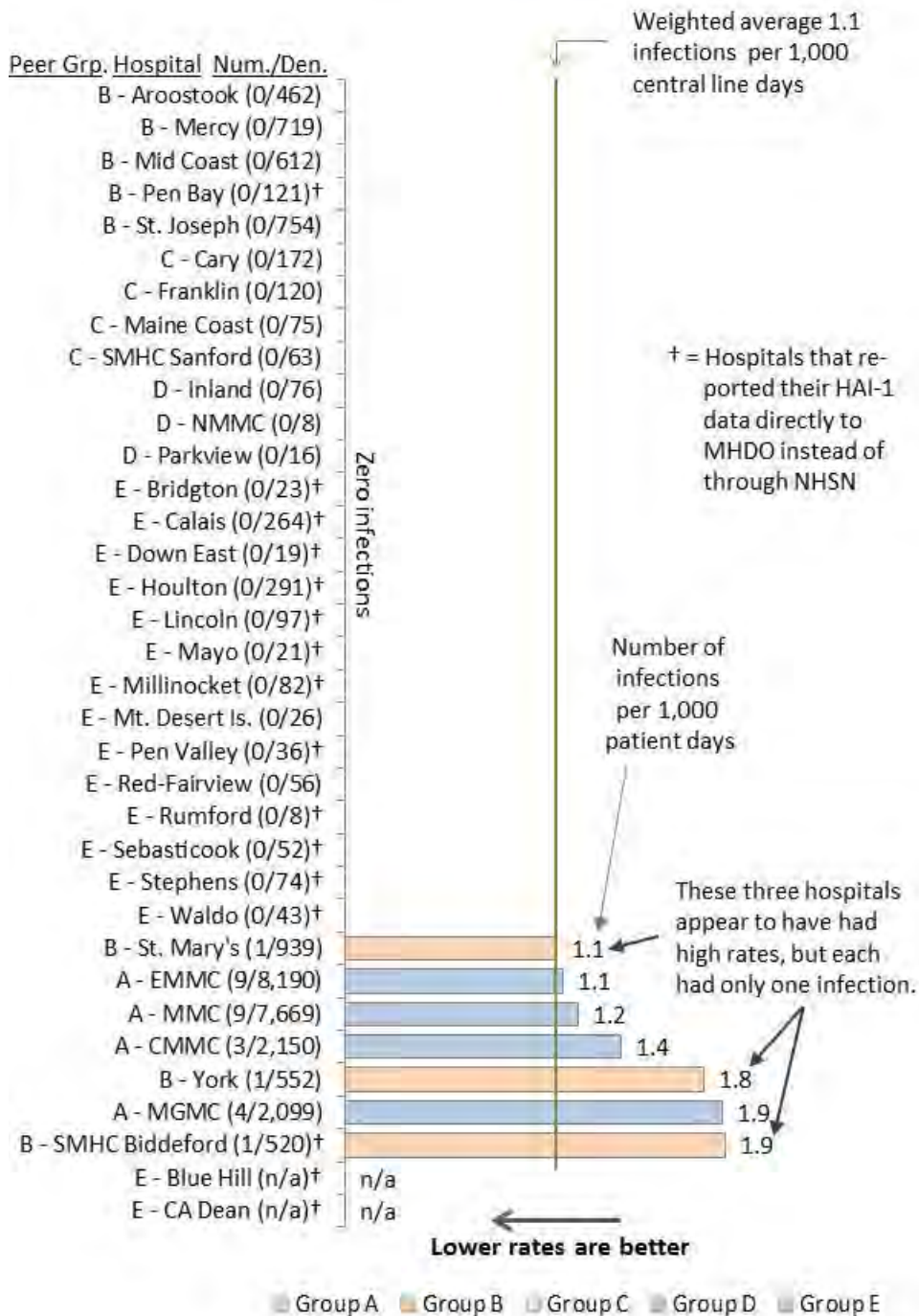
The use of central lines to deliver medications and to monitor how well a patient’s body is functioning is an important tool available to health care providers. But because central line bloodstream infections result in risk of morbidity and mortality to patients and because they result in longer and 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.²² 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.

²¹ "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.

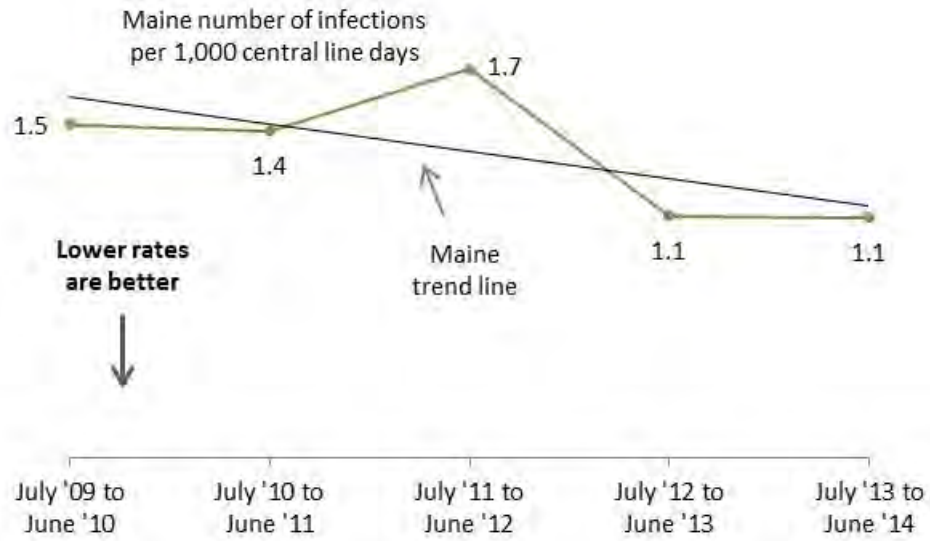
²² "How-to Guide: Prevent Central Line-Associated Bloodstream Infections (CLABSI)". Cambridge, MA: Institute for Healthcare Improvement; 2012 accessed at: <http://www.ihc.org/resources/Pages/Tools/HowtoGuidePreventCentralLineAssociatedBloodstreamInfection.aspx>

HAI-1: Number of central line catheter-associated blood stream infections among intensive care unit (ICU) patients per 1,000 central line days, July 2013 to June 2014. 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.



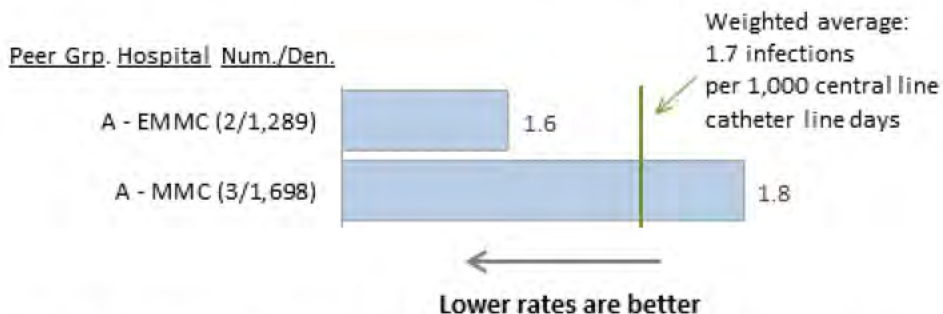
NOTE: Although the rates for St. Mary's Hospital and York Hospital appear to be concerning, those two hospitals had only one CLABSI infection each. Their data sample size is too small to tell us that they meaningfully differed from most hospitals in their CLASBI prevention efforts or if it's only a matter 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 2009 to June 2014 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 newborn intensive care units (NICU), July 2013 to June 2014. Although the data is collected by five different birth weight categories, there are too few cases to measure any meaningful difference between them.

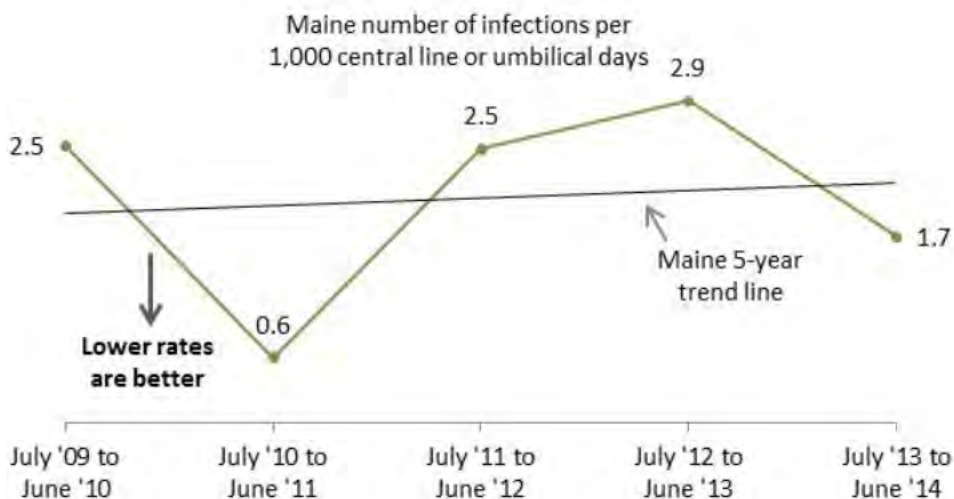
The numerators (number of infections) and denominators (number of catheter days) are in parentheses.



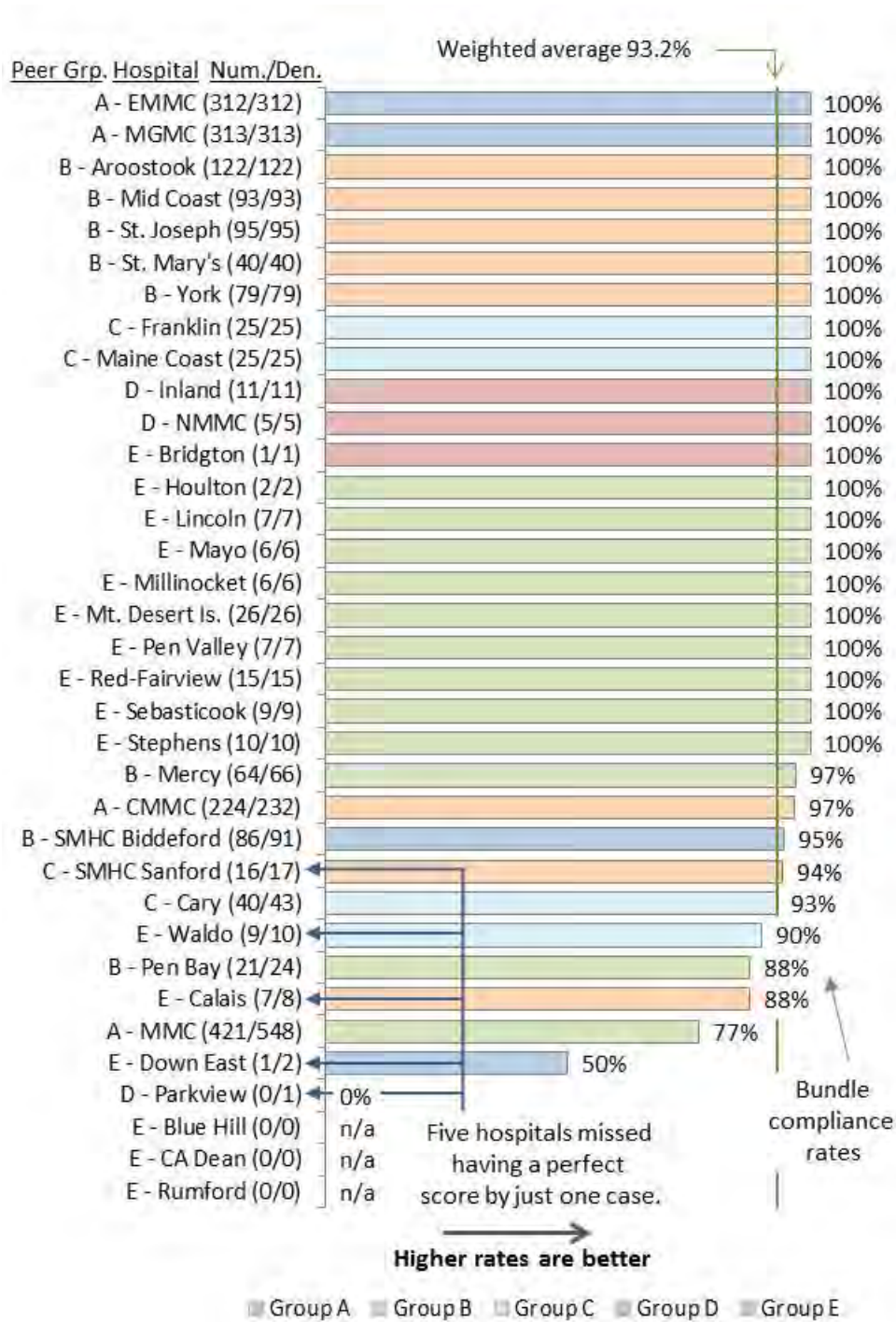
Note: While CMMC has a NICU, they reported zero central line days during the reporting period.

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 newborn ICU's, from July 2009 to June 2014.

Although the overall HAI-2 infection rate improved compared to the previous year and was better than five years before, it remained 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 2 newborn CLABSI infections instead of 5.

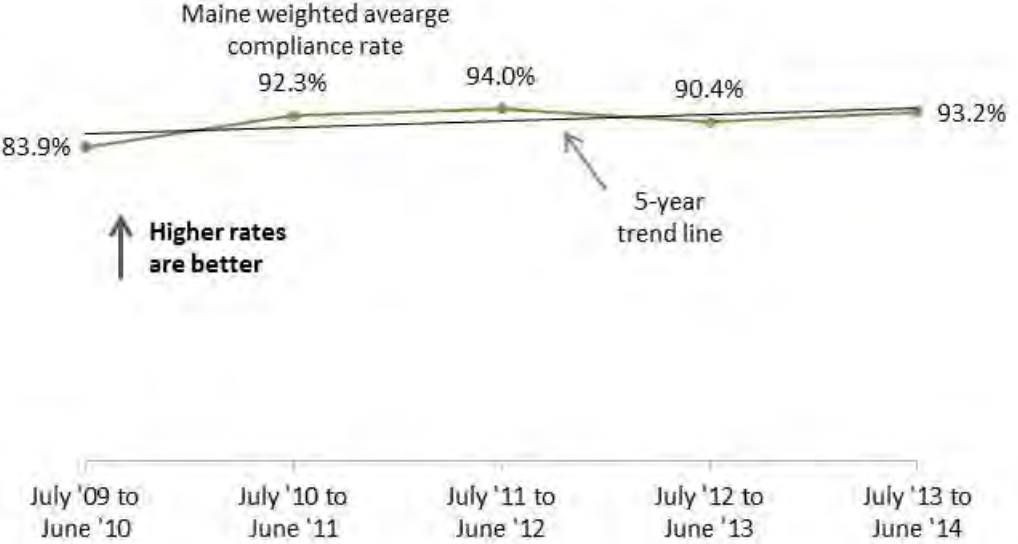


HAI-3: Percent compliance with all five evidence-based interventions for patients with intravascular central line catheters (central line bundle compliance) in intensive care units among Maine hospitals designated by peer group, July 2013 through June 2014.

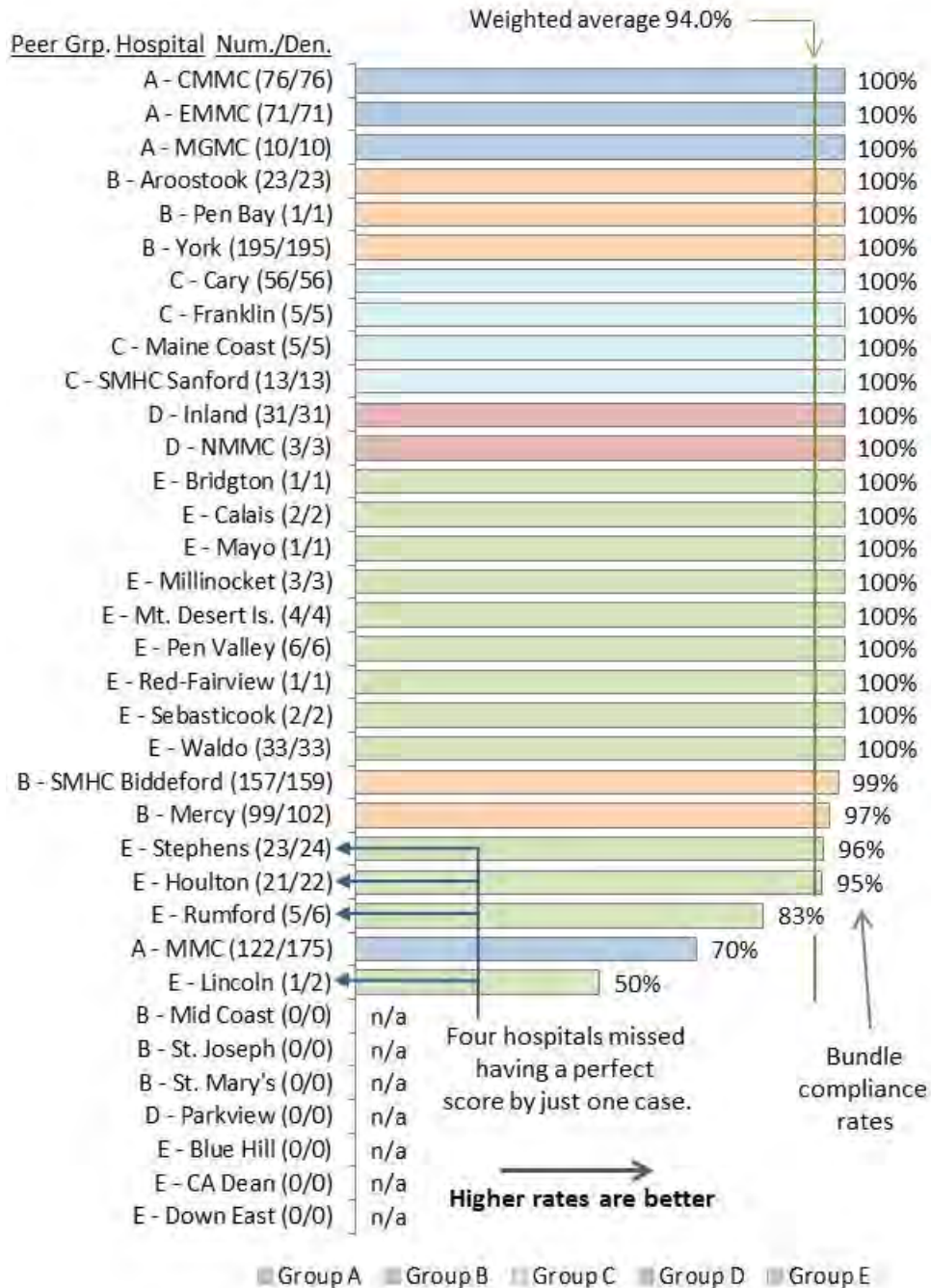


Note: Hospitals sorted by compliance rate, then by Peer Group, and within Peer Groups, alphabetically by name. Hospitals with a rate of "n/a" reported having no patients who fit this category from July 2013 through June 2014.

HAI-3 five-year trend: The annual weighted average percent 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 2009 through June 2014. Overall performance in the last 12-month reporting period was well above the level of five years ago and rebounded from a decline in the prior year.

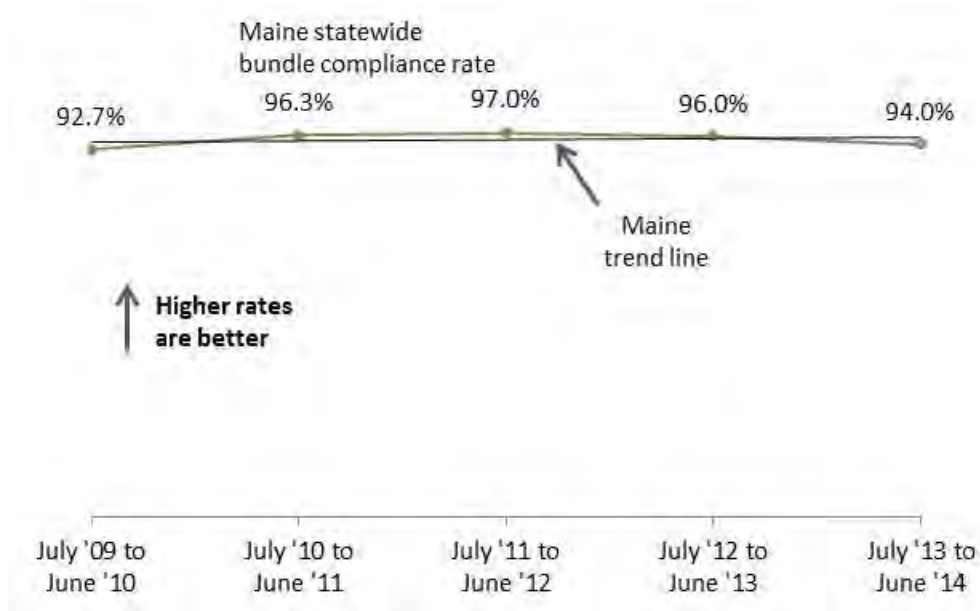


HAI-4: Percent compliance with the four insertion-related, evidence-based interventions for patients with intravascular central catheters (central line bundle compliance) placed preoperatively, in pre-operative areas, operating rooms, and recovery areas by Maine hospitals designated by peer group, July 2013 through June 2014.



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 2013 through June 2014.

HAI-4 five-year trend: The annual weighted average percent 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 2009 through June 2014. Maine's overall performance on this measure has declined over the past two years but improved from five years ago.



Surgical Care Improvement Program (SCIP) quality measures

SCIP-inf-1a: Percent of all patients receiving an antibiotic within one hour prior to specified surgeries

SCIP-inf-2a: Percent of all specified surgery patients receiving the recommended antibiotic for their procedure

SCIP-inf-3a: Percent of all specified surgery patients whose preventive antibiotics were discontinued within 24 hours after anesthesia ended

SCIP-inf-9: Percent of specified surgical patients whose urinary catheter was removed on postoperative day 1 (POD 1) or postoperative day 2 (POD 2)

Note: All four measures apply to a specified list of surgeries including cardiac surgery, hip or knee arthroplasty, colon surgery, hysterectomy and vascular surgery.

Because antibiotic drugs kill bacteria that can cause infection, patients are routinely given a preventive antibiotic prior to surgery. However, timing is important. Medical research has shown that antibiotics are most effective in reducing the risk of infection when they are given to the patient as close to surgery time as possible and not more than one hour prior to surgery.²³ The SCIP-inf-1a measure looks at the percent of surgical patients in Maine hospitals who received an antibiotic within one hour prior to surgery – more specifically, within one hour prior to the first incision. This measure reports how well a hospital adheres to a specific process of care that is considered to be the best, evidence-based care.

In addition to good timing, it's also important to follow national guidelines for choosing the antibiotic that's best for both the patient and the type of surgery to be performed. While one drug might be best for patients about to undergo a hip replacement, a different drug may be indicated for heart surgery. However, if the patient is allergic to that drug, a different one must be chosen. SCIP-inf-2a measures how often each hospital followed the national guidelines.

Timing also makes a difference after the surgery is completed. While antibiotics help to prevent infection during surgery, they offer no additional benefit more than a few hours after surgery. Ironically, prolonged use of preventive antibiotics after surgery can increase a patient's risk for infection by drug-resistant *C. difficile* bacteria. Unnecessary use of antibiotics contributes to the development of bacteria with greater resistance to antibiotics.²⁴ SCIP-inf-3a measures how often hospitals discontinue preventive antibiotics within 24 hours after surgery.

Patients who have a urinary catheter left in place more than two days after surgery have twice the risk of developing a urinary tract infection (UTI), compared to surgical patients with urinary catheters that had been removed within two days. Failure to remove the catheter within two days also increases the risk of re-hospitalization for a UTI.²⁵ SCIP-inf-9 measures how often urinary catheters have been removed by the second day after surgery.

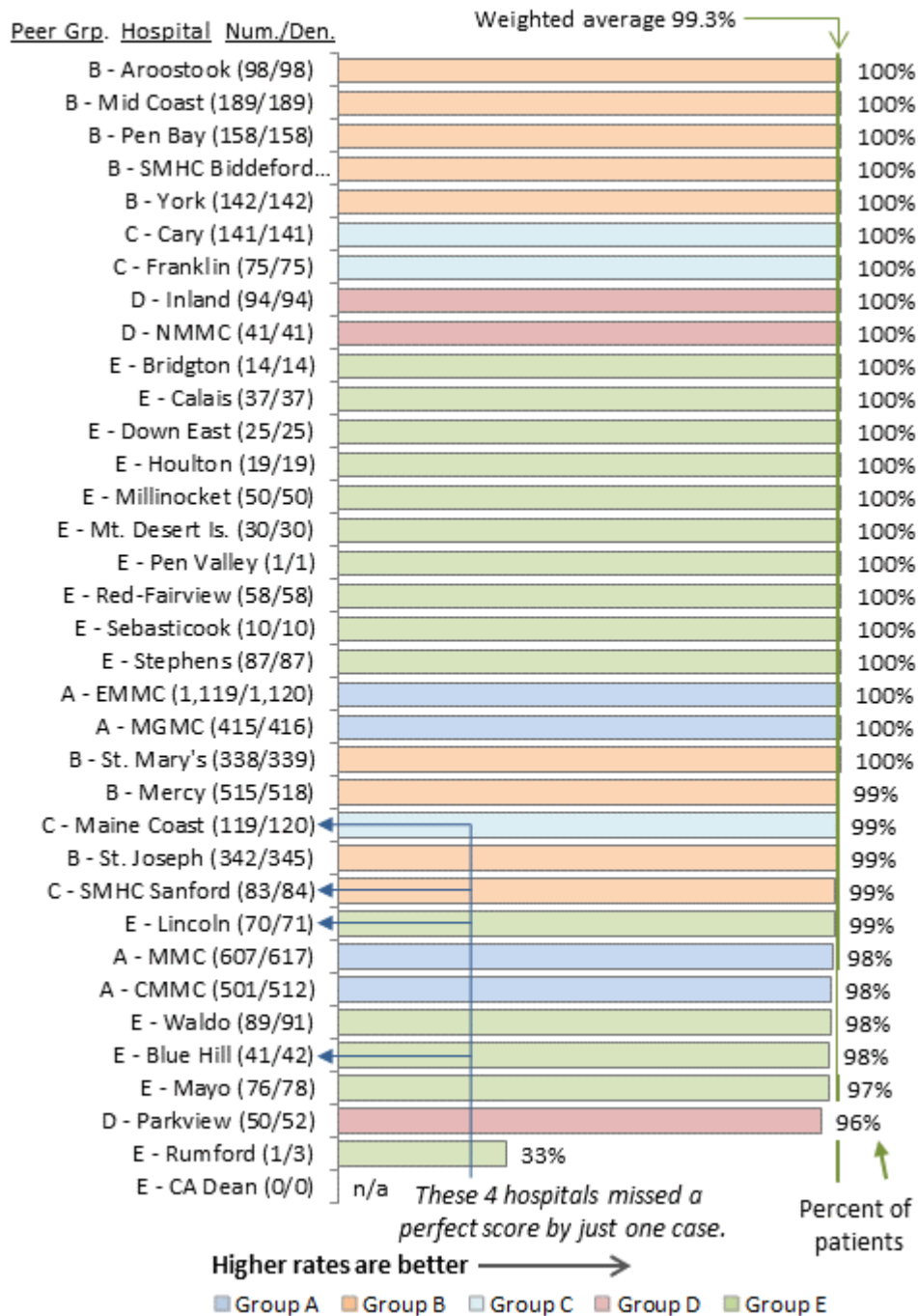
NOTE: MHDO has followed suit with CMS' decision to retire the SCIP measures as of Jan. 1, 2015. CMS had determined that nationwide performance on the measures had topped out, leaving little room for improvement. They are reported here for the last time.

²³ Note that there are some prophylactic antibiotics used that require a slow infusion of the drug; some such drugs may take longer to act than others. These drugs will be appropriately administered more than one hour prior to surgery, to allow time for proper infusion. Not all patients will receive an antibiotic before surgery as some types of operations do not require pre-surgical antibiotics.

²⁴ Sometimes doctors may prescribe an antibiotic for a post-surgical patient for a number of reasons, such as signs of infection.

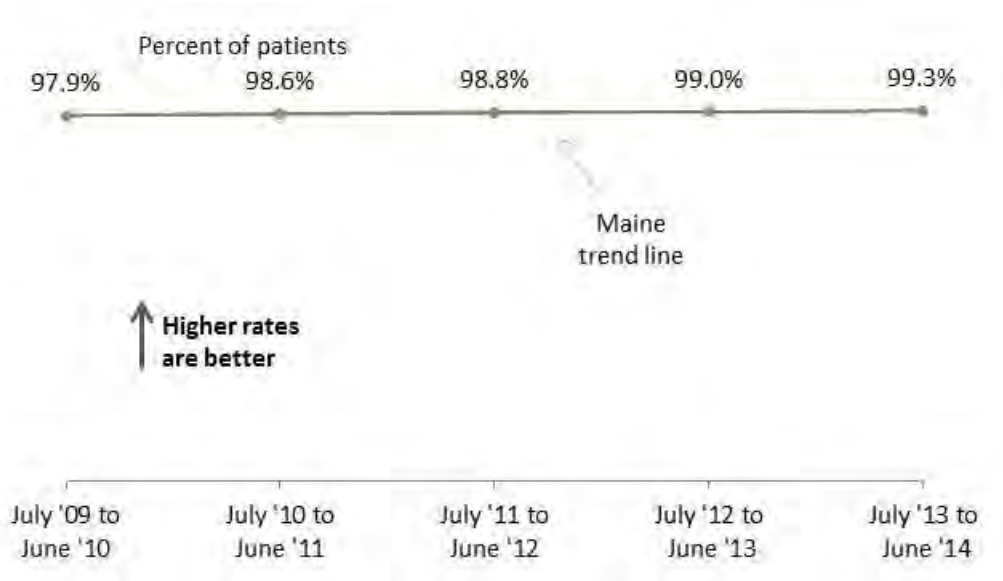
²⁵ Agency for Healthcare Research and Quality (AHRQ) National Quality Measures Clearinghouse SCIP-inf-9 "Measure Summary" web page, accessed at <http://www.qualitymeasures.ahrq.gov/content.aspx?id=46453> on May 5, 2015.

SCIP-inf-1a: Percent of all patients receiving an antibiotic within one hour prior to any specified surgery, by Maine hospitals designated by peer group, July 2013 through June 2014. The measure applies to patients having cardiac surgery, hip or knee arthroplasty, colon surgery, hysterectomy or vascular surgery.

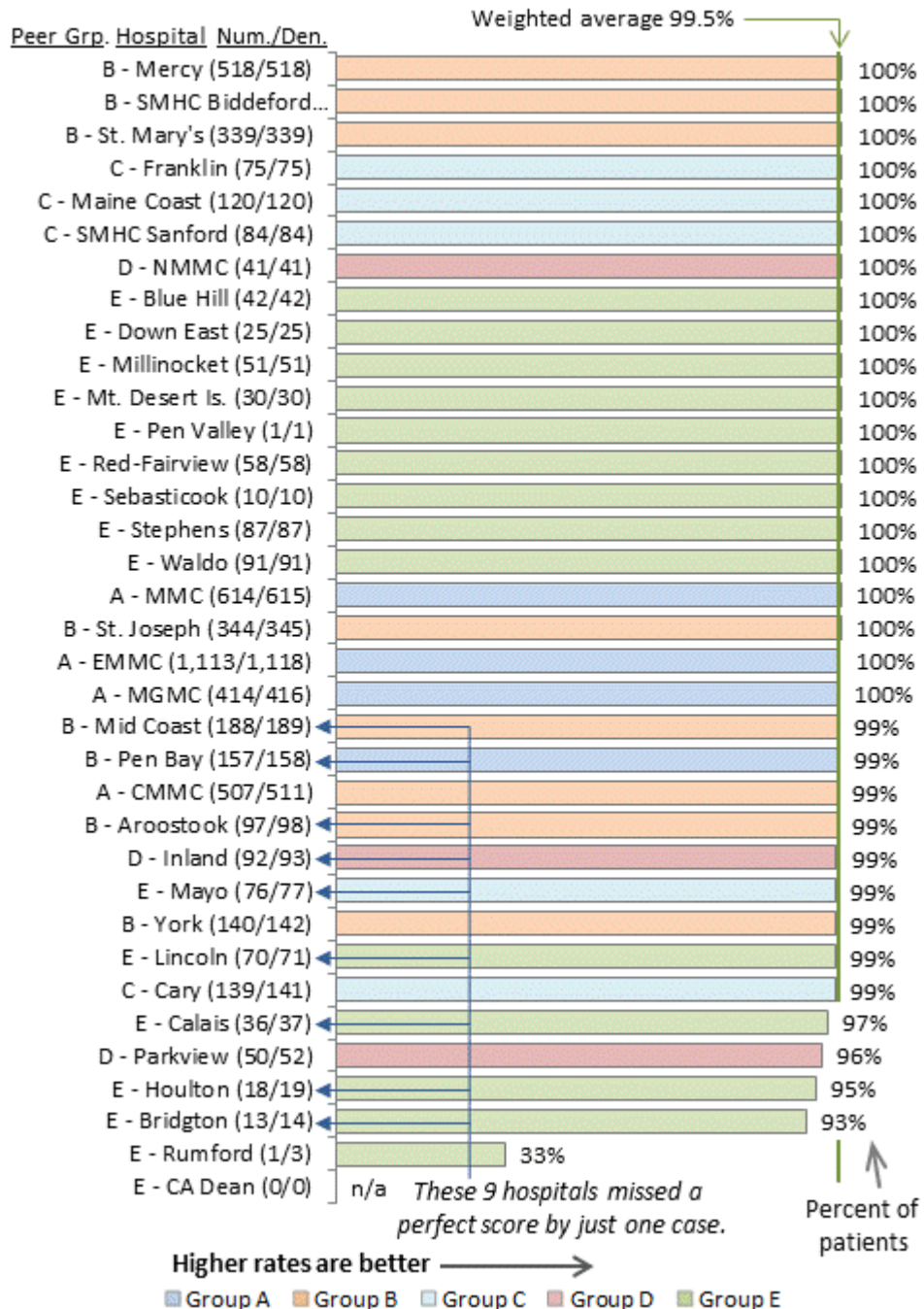


Note: Hospitals sorted by compliance rate, then by Peer Group, and within Peer Groups, alphabetically by name. St. Andrews hospital reported having had no patients in this category during July 2013 through June 2014.

SCIP-inf-1a five-year trend: The annual weighted average percent of all patients receiving an antibiotic within one hour prior to any specified surgery, across all Maine hospitals, July 2009 through June 2014. Although Maine's overall rate has been near-perfect, it's also been improving year-by-year. The measure applies to patients having cardiac surgery, hip or knee arthroplasty, colon surgery, hysterectomy or vascular surgery.

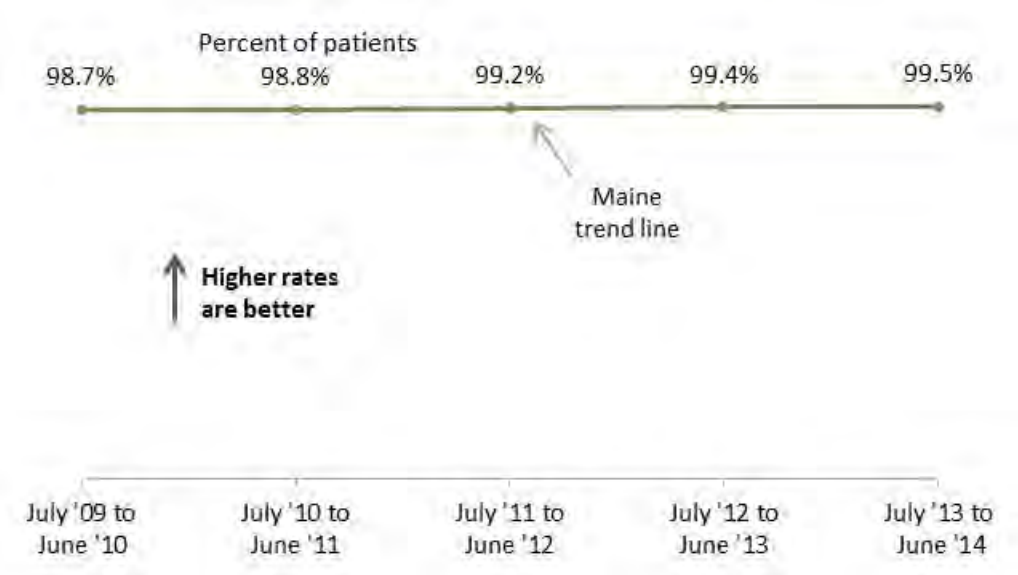


SCIP-inf-2a: Percent of all specified surgery patients receiving the recommended antibiotic for their procedure, by Maine hospitals designated by peer group, July 2013 through June 2014. The measure applies to patients having cardiac surgery, hip or knee arthroplasty, colon surgery, hysterectomy or vascular surgery.

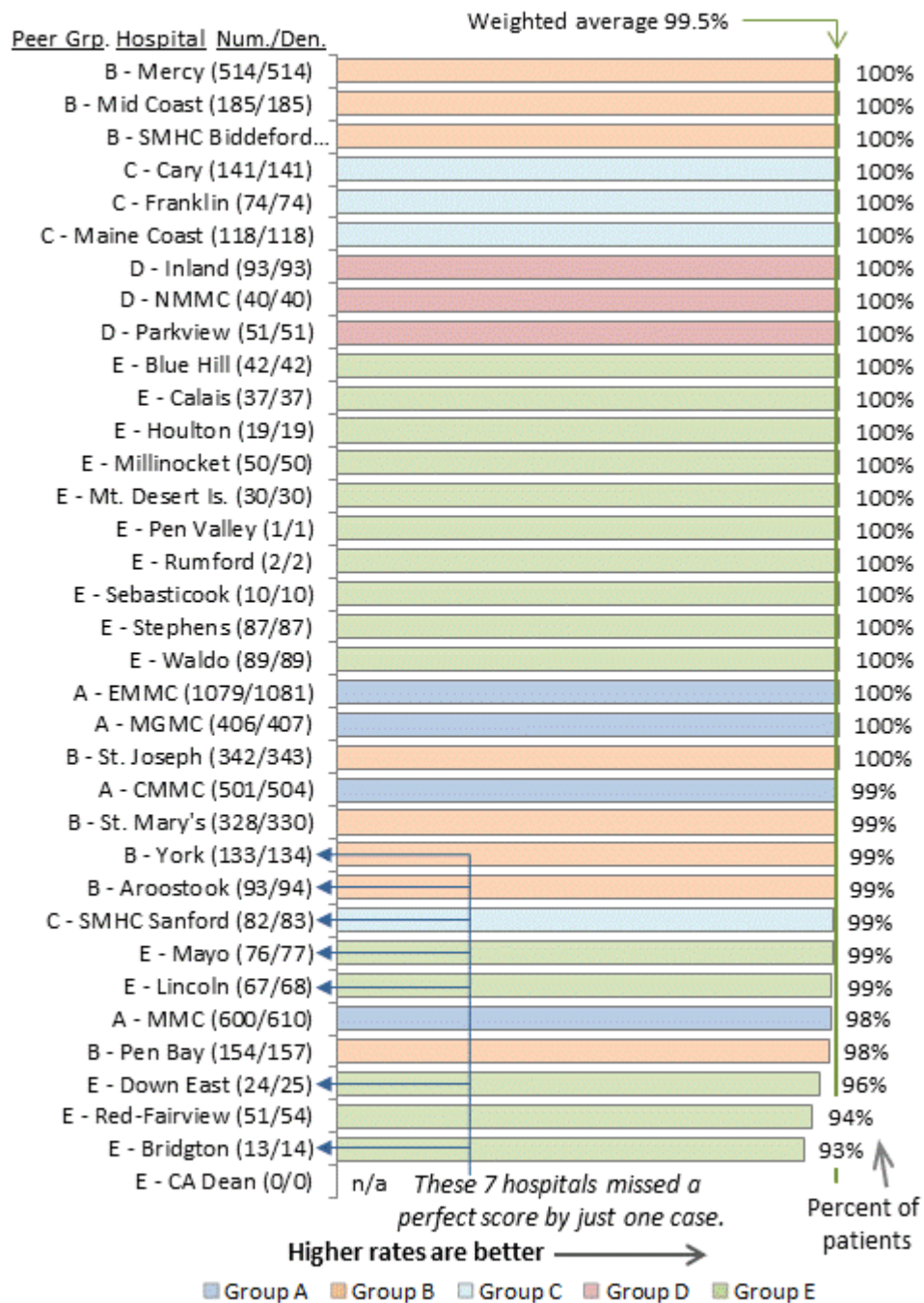


Note: Hospitals sorted by compliance rate, then by Peer Group, and within Peer Groups, alphabetically by name. St. Andrews hospital reported having had no patients in this category during July 2013 through June 2014.

SCIP-inf-2a five-year trend: The annual weighted average percent of all specified surgery patients receiving the recommended antibiotic for their procedure, across all Maine hospitals, July 2009 through June 2014. Just as we see in the five-year trend for the SCIP-inf-1a measure, Maine's overall performance in the SCIP-inf-2a measure has also been near-perfect over the past five years, and steadily improving. The measure applies to patients having cardiac surgery, hip or knee arthroplasty, colon surgery, hysterectomy or vascular surgery.

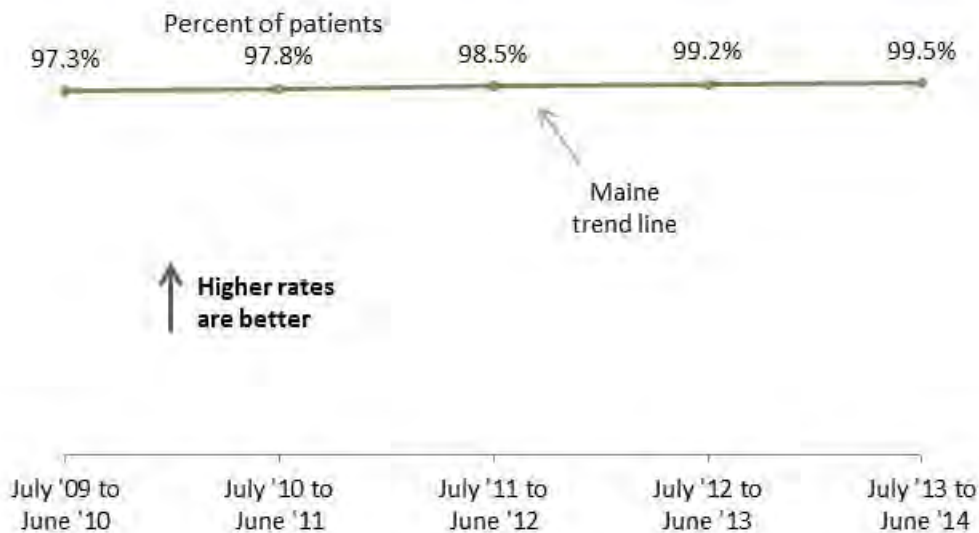


SCIP-inf-3a: Percent of all specified surgery patients whose preventive antibiotics were discontinued within 24 hours after anesthesia ended, by Maine hospitals designated by peer group, July 2013 through June 2014. The measure applies to patients having cardiac surgery, hip or knee arthroplasty, colon surgery, hysterectomy or vascular surgery.

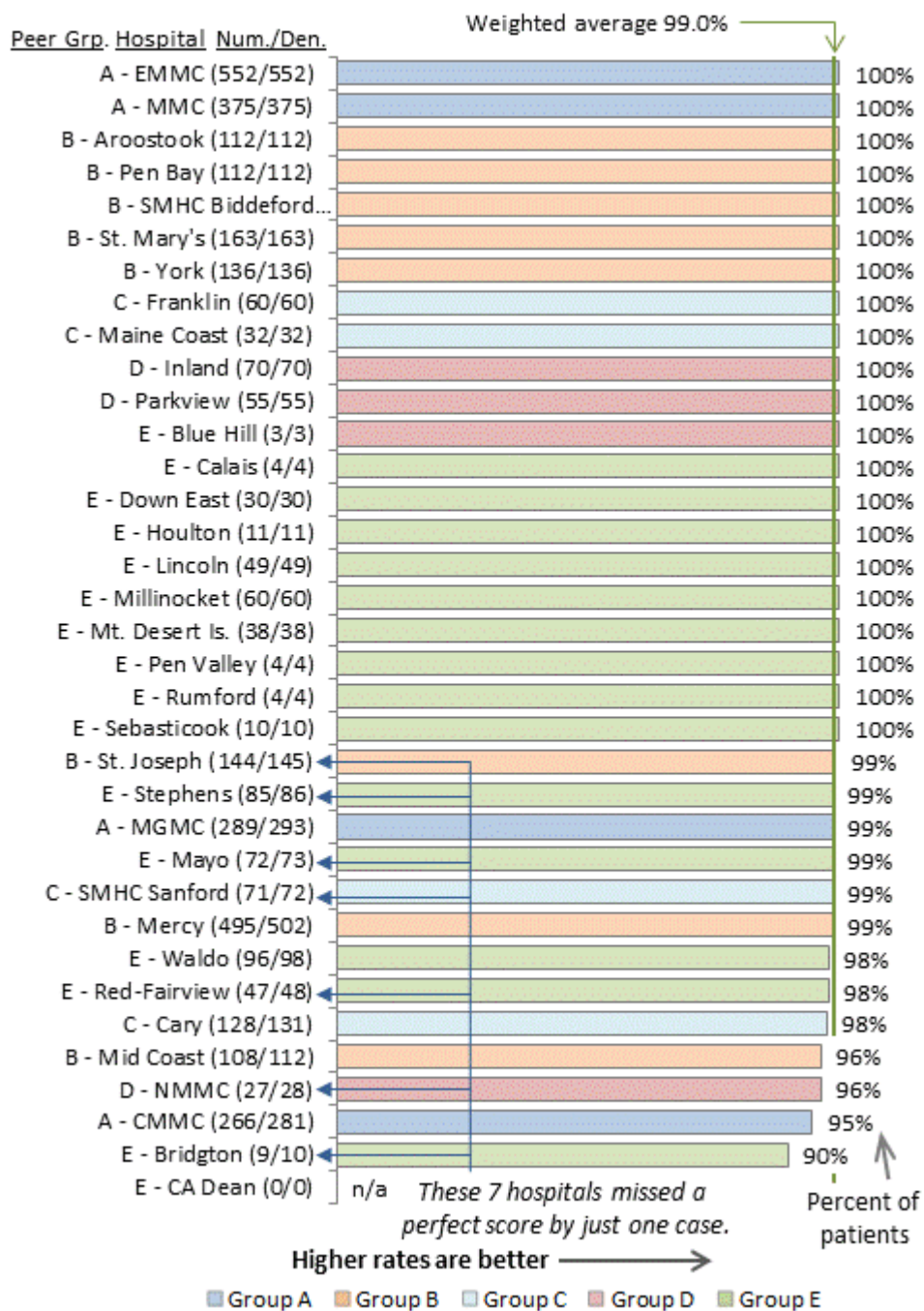


Note: Hospitals sorted by compliance rate, then by Peer Group, and within Peer Groups, alphabetically by name. St. Andrews hospital reported having had no patients in this category during July 2013 through June 2014.

SCIP-inf-3a five-year trend: The annual weighted average percent of all specified surgery patients whose preventive antibiotics were discontinued within 24 hours after anesthesia ended, across all Maine hospitals, July 2009 through June 2014. Maine's performance on this measure has improved each year over the past five years. During the June 2013-to-July-2104 reporting period, hospitals failed to discontinue preventive antibiotic on time after just 32 of the 5,870 surgeries covered by this measure. The measure applies to patients having cardiac surgery, hip or knee arthroplasty, colon surgery, hysterectomy or vascular surgery.

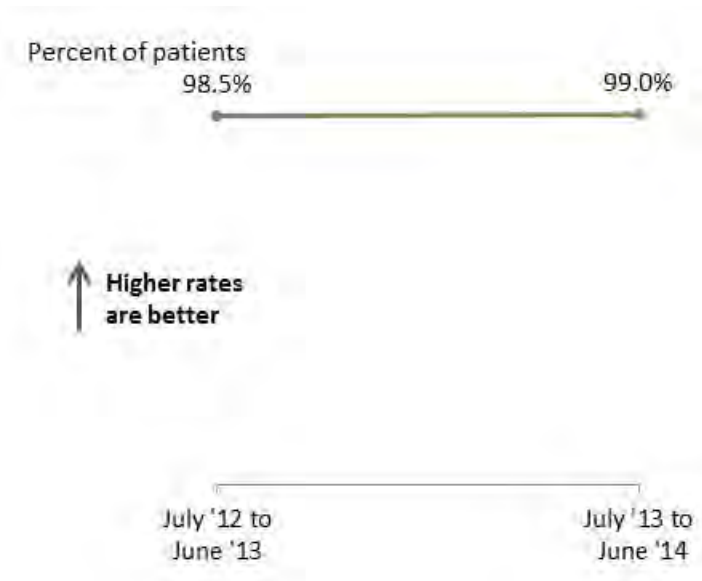


SCIP-inf-9: Percent of specified surgical patients whose urinary catheter was removed on postoperative day 1 (POD 1) or postoperative day 2 (POD 2), by Maine hospitals designated by peer group, July 2013 through June 2014. The measure applies to patients having cardiac surgery, hip or knee arthroplasty, colon surgery, hysterectomy or vascular surgery.



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 2013 through June 2014.

SCIP-inf-9 two-year trend: Percent of specified surgical patients whose urinary catheter was removed on postoperative day 1 (POD 1) or postoperative day 2 (POD 2), by Maine hospitals designated by peer group, July 2013 through June 2014. Nearly all Maine hospitals have done very well on this newer quality measure and the overall statewide average reached 99.0% in the last reporting period. The measure applies to patients having cardiac surgery, hip or knee arthroplasty, colon surgery, hysterectomy or vascular surgery.



Ventilator associated pneumonia (VAP)

HAI-5: Percent 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 VAP²⁶ and VAP can lead to increased severity of illness, greater risk of death, and longer, more expensive hospital stays.²⁷

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.²⁸

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.

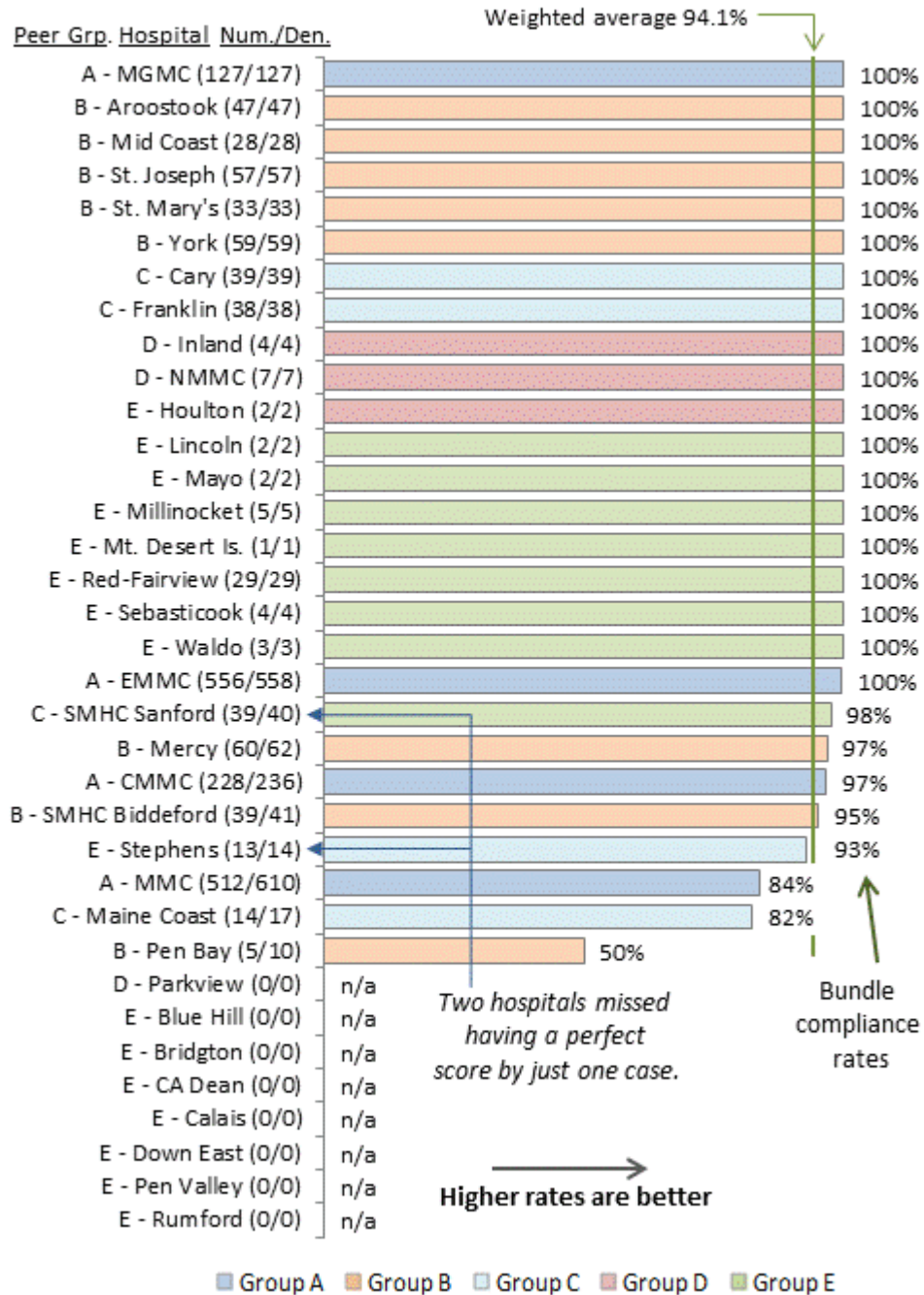
The charts below show, by peer group for each Maine hospital, the degree of adherence to the use of VAP preventive protocols.

²⁶ Magill, op. cit., Supplementary Appendix, p. 12.

²⁷ Koenig SM and Truitt 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/>

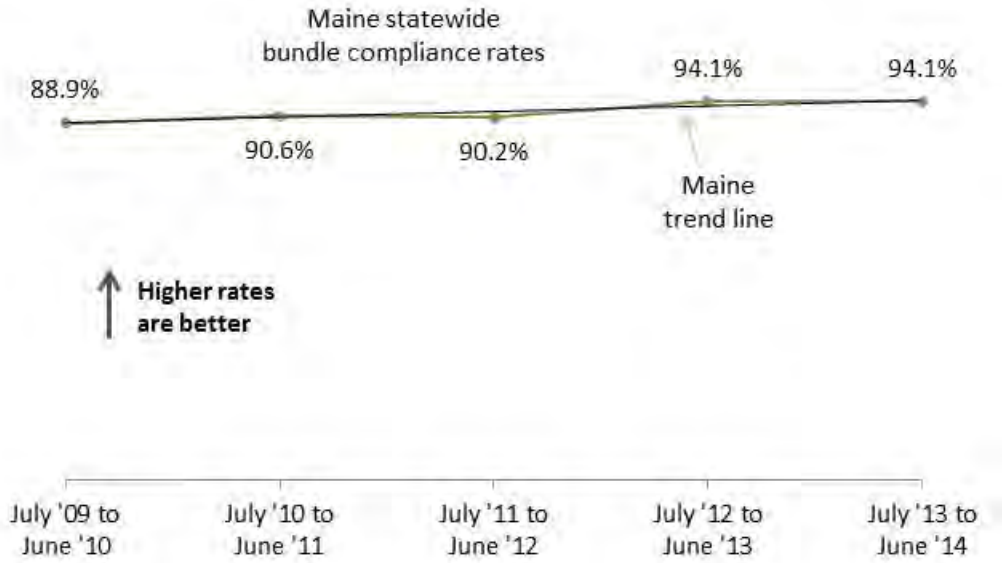
²⁸ Allegranzi B and Pittet D, Role of hand hygiene in healthcare-associated infection prevention, Journal of Hospital Infection, 2009; 73:305-315.

HAI-5: Percent 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 2013 through June 2014.



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 2013 through June 2014.

HAI-5: The annual weighted average percent compliance with all five evidence-based interventions for patients with mechanical ventilation (ventilator bundle compliance) in intensive care units, across all Maine hospitals, July 2009 through June 2014. Maine's overall compliance is better than it was five years ago, but there is still room for improvement.



Methicillin-resistant *Staphylococcus aureus* (MRSA)

Methicillin-resistant *Staphylococcus aureus* – or "MRSA", is a family of bacteria that can cause disease 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.

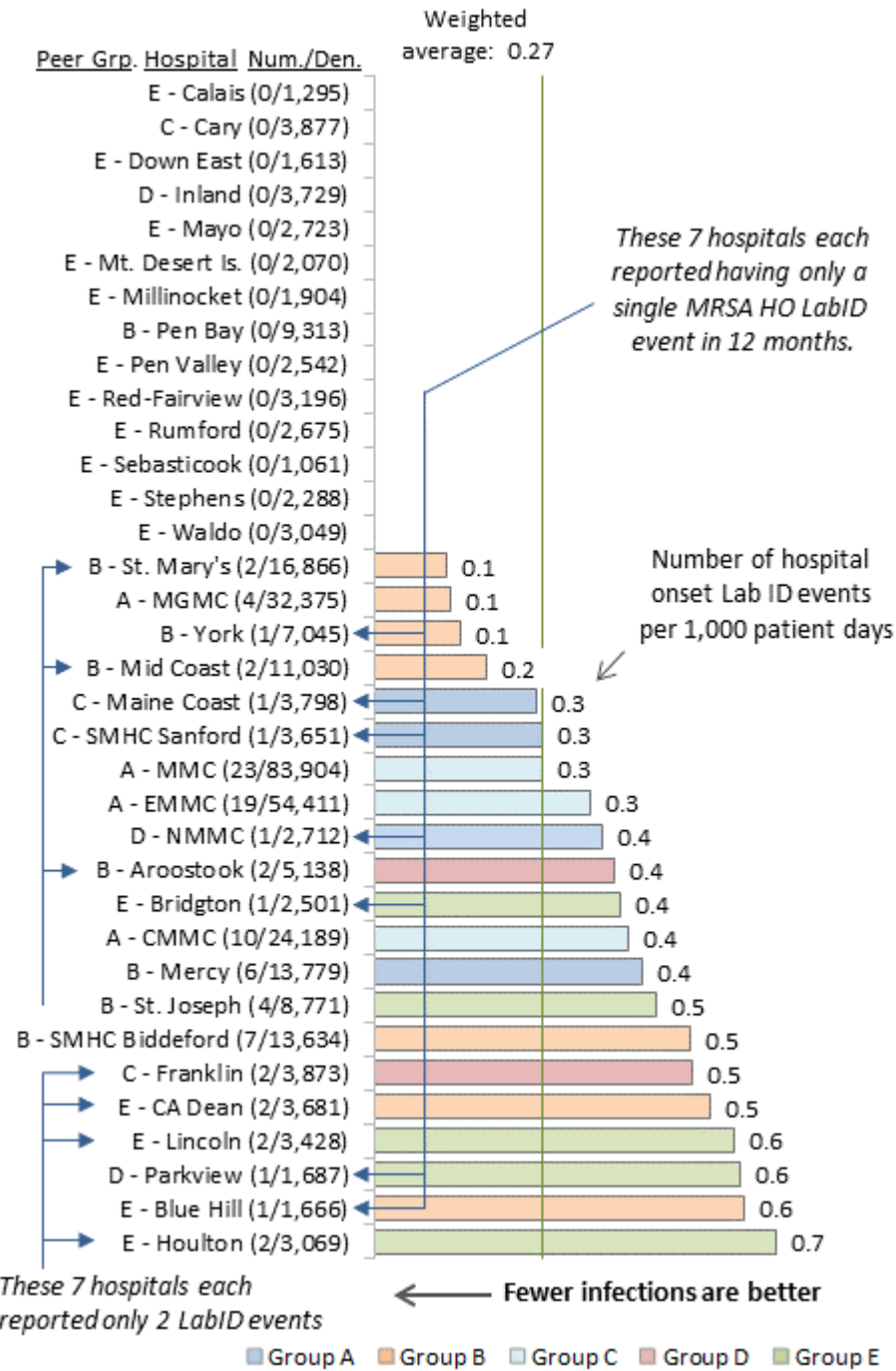
A little over a year ago, MQF and Maine CDC agreed to simplify the way they report data on MRSA. Instead of requiring hospitals to report clinically diagnosed and documented cases of MRSA disease infections, hospitals now report the number of hospital-onset (HO), laboratory identified (LabID) MRSA events. That is, they report the number of cases that a hospital patient's lab sample tests 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. If MRSA is detected in a patient sample taken before the fourth day, then it is either classified as Community Onset (CO) or Health Care Facility Associated (HCFA) if the patient had been discharged from the same facility within four weeks prior to the current admission.

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 a disease infection. Therefore, the number of MRSA LabID events is very likely to be greater than the number of actual MRSA infections.

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 a disease infection. Therefore, the number of MRSA LabID events is very likely to be greater than the number of actual MRSA infections. (See [Appendix H](#) for more information.)

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



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. In just the seven years between 1997 and 2004, the death rate from *C. difficile* infections rose from 1.5% to 6.9%.²⁹

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.

While last year’s Annual Report presented *C. difficile* rates based on LabID events (i.e., cases where a patient lab sample tested positive for the presence of *C. difficile* bacteria), it included all hospital LabID events, whether classified as hospital onset (HO), or community onset-health care facility associated (CO-HCFA)³⁰. Several hospital infection preventionists raised concerns about being held accountable in cases where patients had been exposed to *C. difficile* before they arrived at the hospital. In response to those concerns, MQF and Maine CDC agreed to limit reporting on individual hospital *C. difficile* LabID rates in this year’s Annual Report, to HO LabID events.

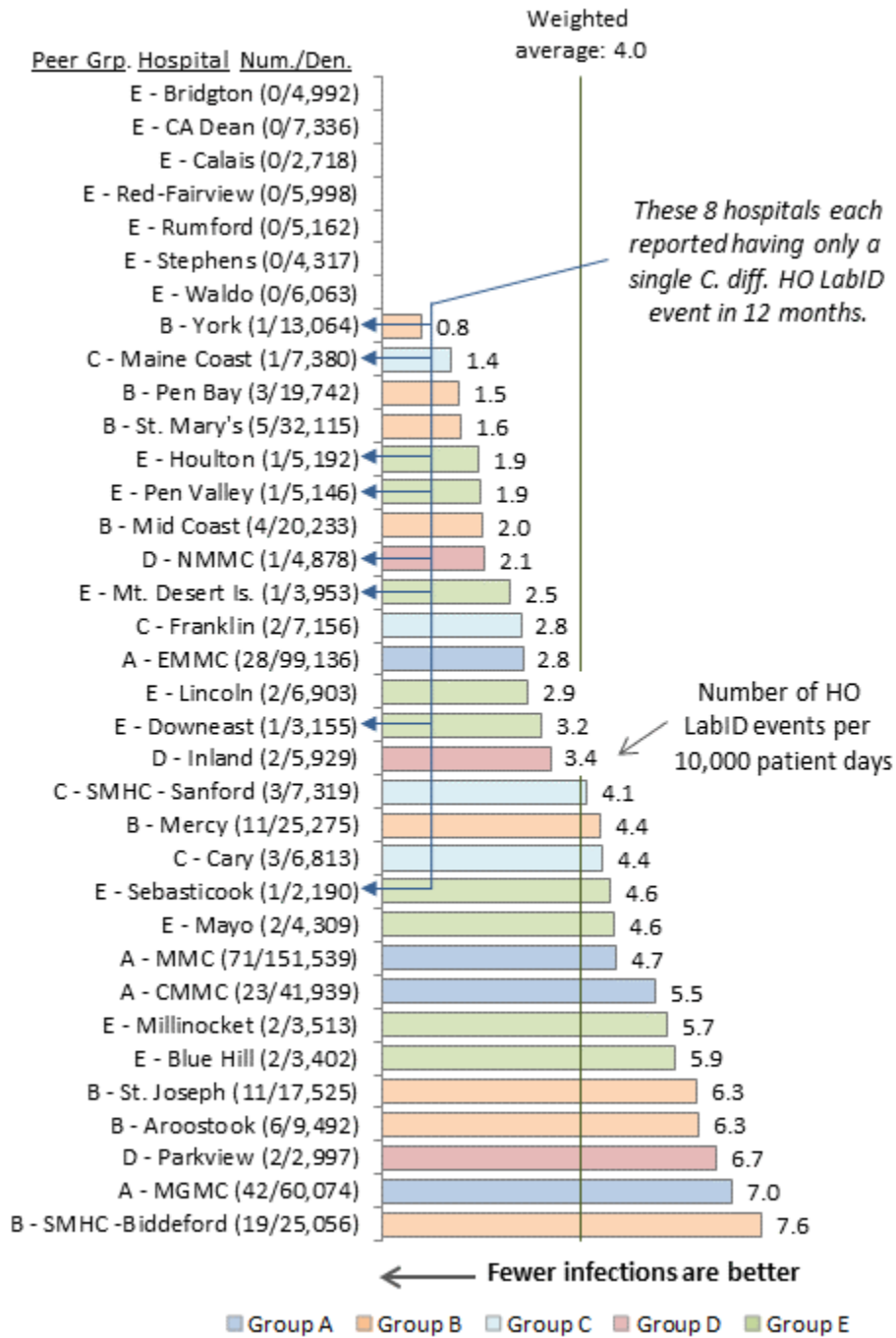
Just as we wrote about LabID and MRSA, it is important to understand that while the LabID method detects the presence of *C. difficile* bacteria in or on a patient’s body, a patient can carry the bacteria without having a disease infection. Therefore, the number of *C. difficile* LabID events is very likely to be greater than the number of actual *C. difficile* infections.

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 MRSA bacteria in or on a patient’s body, a patient can carry the bacteria without having a disease infection. Therefore, the number of *C. difficile* LabID events is very likely to be greater than the number of actual *C. difficile* infections.

²⁹ 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/>

³⁰ LabID events are classified as "hospital onset" when *C. difficile* has only first been detected after the third day of a patient's hospital stay. If a patient is readmitted to the same health care facility within 30 days of discharge and a lab sample tests positive for *C. difficile* during the first three days of the patient's new stay, the LabID event is classified as health care facility associated. Any other patient samples that test positive in the lab are classified as community onset.

C. difficile: Hospital onset (HO) *C. difficile* rate per 10,000 patient days for July 2013 through June 2014, 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.

Appendix C: Outcomes and process measures

1. Summary of Maine Hospital Outcomes Measures, July 2013 to June 2014

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.

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 Newborn ICU	MRSA (Jan.-Jun. 2014)	<i>C. difficile</i>
A	CMMC	1.4	n/a	0.4	5.5
	EMMC	1.1	1.6	0.3	2.8
	MGMC	1.9	n/a	0.1	7.0
	MMC	1.2	1.8	0.3	4.7
B	Aroostook	0.0	n/a	0.4	6.3
	Mercy	0.0	n/a	0.4	4.4
	Mid Coast	0.0	n/a	0.2	2.0
	Pen Bay	0.0	n/a	0.0	1.5
	SMHC Biddeford	1.9	n/a	0.5	7.6
	St. Joseph	0.0	n/a	0.5	6.3
	St. Mary's	1.1 [†]	n/a	0.1	1.6
	York	1.8 [†]	n/a	0.1 [†]	0.8 [†]
C	Cary	0.0	n/a	0.0	4.4
	Franklin	0.0	n/a	0.5	2.8
	Maine Coast	0.0	n/a	0.3 [†]	1.4 [†]
	SMHC Sanford	0.0	n/a	0.3 [†]	4.1
D	Inland	0.0	n/a	0.0	3.4
	Lincoln	0.0	n/a	0.6	2.9
	NMMC	0.0	n/a	0.4 [†]	2.1 [†]
	Parkview	n/a	n/a	0.6 [†]	6.7
E	Blue Hill	0.0	n/a	0.6 [†]	5.9
	Bridgton	n/a	n/a	0.4 [†]	0.0
	CA Dean	0.0	n/a	0.5	0.0
	Calais	0.0	n/a	0.0	0.0
	Down East	0.0	n/a	0.0	3.2 [†]
	Houlton	0.0	n/a	0.7	1.9 [†]
	Mayo	0.0	n/a	0.0	4.6
	Millinocket	0.0	n/a	0.0	5.7
	Mt. Desert Is.	0.0	n/a	0.0	2.5 [†]
	Pen Valley	0.0	n/a	0.0	1.9 [†]
	Red-Fairview	0.0	n/a	0.0	0.0
	Rumford	0.0	n/a	0.0	0.0
	Sebasticook	0.0	n/a	0.0	4.6 [†]
	Stephens	0.0	n/a	0.0	0.0
	Waldo	0.0	n/a	0.0	0.0
Statewide weighted average		1.11.0	1.7	0.3	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 2013 to June 2014

The following table displays hospital 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	SCIP-INF-1a	SCIP-INF-2a	SCIP-INF-3a	SCIP-INF-9
A	CMMC	97%	100%	97%	98%	99%	99%	95%
	EMMC	100%	100%	100%	100%	100%	100%	100%
	MGMC	100%	100%	100%	100%	100%	100%	99%
	MMC	77%	70%	84%	98%	100%	98%	100%
B	Aroostook	100%	100%	100%	100%	99% [†]	99% [†]	100%
	Mercy	97%	97%	97%	99%	100%	100%	99%
	Mid Coast	100%	n/a	100%	100%	99% [†]	100%	96%
	Pen Bay	88%	100%	50%	100%	99% [†]	98%	100%
	SMHC Biddeford	95%	99%	95%	100%	100%	100%	100%
	St. Joseph	100%	n/a	100%	99%	100%	100%	99% [†]
	St. Mary's	100%	n/a	100%	100%	100%	99%	100%
	York	100%	100%	100%	100%	99%	99% [†]	100%
C	Cary	93%	100%	100%	100%	99%	100%	98%
	Franklin	100%	100%	100%	100%	100%	100%	100%
	Maine Coast	100%	100%	82%	99% [†]	100%	100%	100%
	SMHC Sanford	94% [†]	100%	98% [†]	99% [†]	100%	99% [†]	99% [†]
D	Inland	100%	100%	100%	100%	99% [†]	100%	100%
	Lincoln	100%	50% [†]	100%	99% [†]	99% [†]	99% [†]	100%
	NMMC	100%	100%	100%	100%	100%	100%	96% [†]
	Parkview	0% [†]	n/a	n/a	96%	96%	100%	100%
E	Blue Hill	n/a	n/a	n/a	98% [†]	100%	100%	100%
	Bridgton	100%	100%	n/a	100%	93% [†]	93% [†]	90% [†]
	CA Dean	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Calais	88% [†]	100%	n/a	100%	97% [†]	100%	100%
	Down East	50%	n/a	n/a	100%	100%	96% [†]	100%
	Houlton	100%	95% [†]	100%	100%	95% [†]	100%	100%
	Mayo	100%	100%	100%	97%	99% [†]	99% [†]	99% [†]
	Millinocket	100%	100%	100%	100%	100%	100%	100%
	Mt. Desert Is.	100%	100%	100%	100%	100%	100%	100%
	Pen Valley	100%	100%	n/a	100%	100%	100%	100%
	Red-Fairview	100%	100%	100%	100%	100%	94%	98% [†]
	Rumford	n/a	83% [†]	n/a	33%	33%	100%	100%
	Sebasticook	100%	100%	100%	100%	100%	100%	100%
	Stephens	100%	96% [†]	93% [†]	100%	100%	100%	99% [†]
	Waldo	90% [†]	100%	100%	98%	100%	100%	98%
Statewide weighted average		93.2%	94.0%	94.1%	99.3%	99.5%	99.5%	99.0%

[†] 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 newborn 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
<i>C. difficile</i>	Number of hospital onset associated <i>Clostridium difficile</i> LabID events per 10,000 inpatient days

Summary of Maine Hospital Compliance Rates for Process Measures

HAI-3	Percent compliance with all five evidence-based interventions for patients with intravascular central catheters (central line bundle compliance) in intensive care units
HAI-4	Percent 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 compliance with all five evidence-based interventions for patients with mechanical ventilation (ventilator bundle compliance) in intensive care units
SCIP-inf-1a	Percent of all surgery patients receiving an antibiotic within one hour prior to specified ³¹ surgeries
SCIP-inf-2a	Percent of all specified surgery patients receiving the recommended antibiotic for their procedure
SCIP-inf-3a	Percent of all specified surgery patients whose preventive antibiotics were discontinued within 24 hours after anesthesia ended
SCIP-inf-9	Percent of specified surgical patients whose urinary catheter was removed on postoperative day 1 or postoperative day 2

³¹ The specified list of selected surgeries for all four SCIP measures includes cardiac surgery, hip or knee arthroplasty, colon surgery, hysterectomy and vascular surgery.

Appendix D: The Charter of the Maine HAI Collaborating Partners Committee

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:

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.

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

Category, Organization and Title	Representative
<i>Hospital Infection Preventionists (APIC-PTC):</i> Prospective Payment System (PPS) Non-PPS facility / Critical Access Hospitals	Gwen Rogers Ann Graves
Long Term Care (Maine Healthcare Association)	Lynn Johnston
Outpatient Home Care Ambulatory Surgical Center Dialysis Center	Bob Abel* Linda Ruterbories (open)
Maine CDC State Epidemiologist HAI Coordinator Director, Office of Public Health Emergency Preparedness (OPHEP)	(vacant) Rita Owsiak William Jenkins
Maine DHHS Div. of Licensing and Regulatory Services Health Surveyor	Dale Payne
Maine Hospital Assoc. VP & General Counsel	Sandy Parker
MQF/MHDO Executive Director	Karynlee Harrington
Quality Innovation Network-Quality Improvement Organization (QIN-QIO) Healthcentric Advisors Acting State Director & Hospital Coordinator	Danielle Hersey
Maine Society of Health Systems Pharmacists Director of Pharmacy -Sebasticook Valley Hospital	Tyson Thornton
Pharmacist -Mercy Hospital	Frank Mack
Clinical Laboratories Maine Health & Environmental Testing Laboratory (HETL) Nordx ALI	Rick Danforth Cathy Dragoni (open)
Healthcare Systems and Districts Administration ID Physician - South ME ID Physician – Middle ME Physician – South ME	(open) Dr. August Valenti Dr. Sandy Harris Dr. Josh Cutler
OMNE – Nursing Leaders of ME, Nursing Executive	Bob Abel*
Consumer Representatives Organization: Consumers for Affordable Healthcare Individual	Emily Brostek Kathy Day

*Person representing more than one position.

Appendix E: Overview of the Maine State Healthcare Associated Infection Prevention Plan, 2015

The Maine Department of Health and Human Services, Division of Infectious Disease, Maine Center for Disease Control and Prevention (Maine CDC), established the Healthcare Associated Infections (HAI) Program in 2009. The focus of this program is to work with healthcare facilities to ultimately reduce healthcare associated infections. To guide this work, a State HAI Plan was approved January 1, 2010. Below is a brief summary of our work in this last year.

Infrastructure:

- Staffing. This program is routinely staffed by one full-time HAI Coordinator.
- HAI Advisory Council. Recently Maine undertook an effort to combine the two organizations in the state that have had an advisory function for healthcare associated infection reduction (the Maine Infection Prevention Collaborative Coordinating Committee and the Maine Quality Forum HAI Subcommittee). This new group is the HAI Collaborative Partners Committee. It includes members with expertise in 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; healthcare facility accreditation and licensing; as well as representatives from state healthcare associations and consumer coalitions (see APPENDIX D for list of members). Its mission is 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.

Surveillance:

- Data Quality. Many elements of HAI data are analyzed throughout the year in order to target our HAI prevention efforts. The data quality program is composed of two functions - a check for completeness of the data and an evaluation of the accuracy of the data. The HAI Coordinator conducts a completeness check 4-6 weeks prior to the HAI data reporting deadlines. The Coordinator then works with each healthcare facility's Infection Prevention and Control Department with the goal to complete the data submission by the deadline. Data accuracy is determined by a process known as external validation. Each year, several acute care hospitals are selected to have a portion of their HAI data submissions reviewed for accuracy. Lessons learned from these reviews are shared with all the acute care hospitals that report data.
- Emerging Pathogens. The Maine CDC continues its efforts to add the multi-drug resistant organism known as carbapenim-resistant Enterobacteriaceae (CRE) to the state Notifiable Conditions list. We know CRE has already arrived in Maine; this effort will help us to determine its size and spread within the state.
- Additions to HAI reportable infections. Maine's acute care facilities (the large and mid-size hospitals designated by the Centers for Medicare & Medicaid Services (CMS) as Prospective Payment System hospitals) are already required to report CLABSI (Central Line Associated Blood Stream Infections) and CAUTI (Catheter Associated Urinary Tract Infections) in their Intensive Care Units and Neonatal Intensive

Care Units to the federal CDC. Since January 1, 2015, these CLABSI and CAUTI reporting requirements have been expanded to acute care facility Medical, Surgical, and combined Medical/Surgical units.

Prevention:

- The focus for prevention this year was to identify acute care hospitals with the highest rates of healthcare associated infections. The HAI Coordinator worked with these facilities to assess their HAI prevention efforts and evaluate the impact of these efforts on HAI reduction over time. Facilities that did not demonstrate a trend towards reduction were encouraged to participate in state prevention collaborative efforts being organized by Healthcentric Advisors, the new, CMS-appointed quality improvement organization for Maine.
- Prevention Collaborations. The Maine CDC is developing a partnership with Healthcentric Advisors to create several new HAI prevention collaborations across acute, extended and outpatient care settings. Although Healthcentric Advisors is Rhode Island-based, they have recently opened a local office to expand their availability in Maine.
- Maine CDC and APIC are collaborating with the Muskie School of Public Service to create education for new Long Term Care / Extended Care Infection Preventionists (IP). This program was chosen to answer the needs of extended care IPs many of whom enter their position with minimum prevention training. Given that they are often tasked with juggling multiple roles within the facility, it's often difficult to attend off-site training programs. The new training program is designed to be available online, self-paced and tailored to the specific needs of extended care facilities.

Communication:

- Education. The HAI Coordinator continues to make presentations on general infection prevention and methodologies for reducing HAIs to a variety of organizations.
- Facility specific HAI summary reports are compiled each year and forwarded to the Chief Executive Officers (CEO) at all Maine acute care hospitals.

Maine now has a solid foundation on which to build future efforts to reduce healthcare associated infection. Below is a list of activities that will help us to achieve our goals in the coming years.

- Build a comprehensive HAI-prevention database of all healthcare facilities in the state, including acute care, extended care and outpatient care. The database will consolidate several data sources (infection events, prevention compliance, outbreak incidence, etc.) into a single location to improve our capacity to analyze the data.
- Enhance our HAI surveillance to identify regional patterns, trends and potential emerging threats. This will allow us to target and customize our prevention activities.
- Update our State HAI Plan.

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 is a national organization dedicated to improving patient safety by decreasing infection associated with the provision of healthcare. National 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.

The Maine Infection Prevention Collaborative combined with the Association for Professionals in Infection Control and Epidemiology, Pine Tree Chapter in early 2014 to advance the goals of the national organization in Maine. Capitalizing on the structure and support provided by the national organization, job descriptions were developed for the officers of the chapter. Subcommittees were formed to support each Director and goals were established. The following report will outline the goals established and the domain of the responsibility as it relates to infection prevention through the continuum of care.

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. Over the course of 2013 the MIPC-CC committee had ceased to meet. To that end, the initial meeting of the Collaborating Partners Committee met early 2015.

In conjunction with the Maine CDC and Maine Quality Forum, the Collaborative Partners Committee became the HAI Collaborative Partners Committee to establish the Maine State HAI plan for 2015 and beyond. The multidisciplinary group is meeting monthly during the first half of 2015.

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, with photos, is underway to connect the IPs throughout the state with each other for mentorship and best practice guidance.

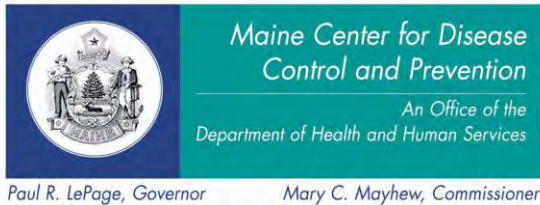
The Multidisciplinary Director of APIC-PTC is the advocate for diverse programming at the monthly meetings to meet the educational needs across the continuum of care. She is tasked with reaching out to long term care, offices, clinics, home care and any other clinical location that provides care to patients to invite them

to participate in the educational opportunities and mentorship provided by APIC-PTC. The Multidisciplinary Committee is tasked with continuing the work of the *Clostridium difficile* taskforce.

The Acute Care Initiatives Director is responsible for maintaining an awareness of state and national HAI initiatives and bringing that knowledge to the membership. She is also responsible for being the content expert on NHSN guidelines and CMS reporting requirements and serving as a resource for members. The ACI Director influences the agenda of the monthly meeting to meet the needs of the acute care membership.

Through the year 2014 the Infection preventionists in the State of Maine have received education regarding *Clostridium difficile* disease, Ebola preparedness, Catheter Associated Urinary Tract Infection (CAUTI) prevention best practices, emerging infections (e.g., Enterovirus 68) and NHSN data analysis). The membership collaborated with the Muskie School on an infection prevention course for long term care, the QIN-QIO on a webinar on CAUTI and the Emergency Preparedness community on Ebola preparation for pre-hospital and hospital care.

Appendix G: Maine CDC MRSA LabID Event Validation Report



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Methicillin Resistant *Staphylococcus aureus* (MRSA) LabID Event Data Validation 2015

Data Range: January-June 2014

The Maine Legislature has charged all acute care hospitals to report Methicillin Resistant *Staphylococcus aureus* (MRSA) LabID Events to the National Healthcare Safety Network (NHSN) database. Every positive test result for MRSA obtained from an inpatient in an acute care hospital is eligible for reporting to this database. 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.
- HO (Healthcare facility Onset) – positive test after third day of hospital stay.

It is important to note that the LabID Event surveillance methodology does not evaluate a positive test result against an established definition of infection related criteria. LabID Event surveillance is a proxy measure, designed to ease the burden of data collection and evaluation, while producing data to aid in targeting 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: January 1, 2014 – June 30, 2014

NHSN surveillance criteria: LabID Event

MRSA categorizes validated: All positive test results from the inpatient population

Number of Acute Care Hospitals validated: 17 of 35

Hospital selection criteria: Most hospitals that did not undergo *Clostridium difficile* infection (CDI) validation in 2014 (to establish an alternating schedule between MRSA and CDI validation schedules)

Number of validators: 1

Validation conducted: January - February 2015

Method:

1. Each selected hospital submitted a list of positive test results in the sampling period for their inpatient population, including Emergency Department and affiliated clinic patients admitted on the same calendar day. This list included 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 to obtain this data directly from the laboratory software system, in order to validate that Infection Prevention software systems captures all positive test results needed to conduct surveillance successfully.

2. Maine CDC produced a list of positive test results reported to NHSN for each of the selected hospitals. This list included 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 Healthcare Associated Infections (HAI) Coordinator 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 Coordinator 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.
4. In addition, as the onset category assignment utilizes the admission date and specimen collection dates, this validation included an accuracy check of these dates.
5. Data for MRSA LabID Events is available by the location on the body that the specimen collection occurred. This information can be helpful in targeting prevention measures. Therefore, this validation included an accuracy check of the body site locations.
6. Hospitals amend any missed or over-reported positive test results or inaccurate admission dates, specimen collection dates or specimen sources in NHSN. The Maine CDC Healthcare Associated Infections Coordinator verified that these corrections were completed.

Validation Results:

Hospital	# Cases Reviewed	Missed Events	Over-reported Events	Sensitivity	PPV	Admission Date Accuracy	Specimen Date Accuracy	Specimen Source Accuracy
Calais	5	0	0	100%	100%	100%	100%	100%
Cary	5	0	0	100%	100%	100%	100%	100%
CMMC	85	2	3	96%	94%	100%	96%	96%
Houlton	10	0	0	100%	100%	90%	100%	100%
Inland	1	0	0	100%	100%	100%	100%	100%
Maine Coast	13	0	0	100%	100%	100%	91%	91%
MMC	229	39	86	61%	41%	92%	92%	96%
Mayo	7	0	0	100%	100%	100%	100%	100%
Mercy	68	3	1	93%	98%	98%	98%	100%
Millinocket	0	0	0	---	---	---	---	---
NMMC	3	0	0	100%	100%	100%	100%	100%
Pen Bay	41	1	0	96%	100%	100%	100%	100%
Pen Valley	5	0	0	100%	100%	100%	100%	100%
Rumford	2	0	0	100%	100%	100%	100%	100%
St. Joseph	35	1	1	96%	96%	92%	100%	96%
Stephens	15	0	0	100%	100%	100%	100%	100%
TAMC	9	5	0	38%	100%	100%	100%	100%
State of Maine*	533	51	91	83%	74%	97%	97%	98%

* Each year, about one half of the acute care hospitals undergo MRSA validation. This year, the facilities selected for MRSA validation were those not selected for *Clostridium difficile* infection (CDI) validation in 2014. This schedule will allow each facility to undergo one validation event a year, alternating between MRSA and CDI data sets.

Sensitivity: the ability to identify a reportable test and reports 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 test 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.

This validation cycle identified 142 discrepancies. Reasons for these discrepancies are:

- Fifty one events for MRSA that should have been reported but were not (Missed)
 - Issues related to electronic transfer of data = 39 events
 - Use of federal definition vs. state definition = five events
 - Misclassified event as a duplicate = four events
 - Misclassification of observation patient = two events
 - Missed, no reason identified = one event
- Ninety-one events for MRSA that should not have been reported were reported (Over-reported)
 - Issues related to electronic transfer of data = 88 events
 - Duplicate event reported = three events

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.

Facilities utilizing electronic transfer of data need to verify that data submissions comply with NHSN surveillance definitions. This may not have happened at all facilities after the change from HAI surveillance (infection-based criteria) definition to LabID Event surveillance (proxy measure) definition on January 1, 2014.

The HAI Coordinator provided education regarding the 'duplicate' definition to all acute care hospitals.

Summary:

In Maine, the ability to identify and correctly report true MRSA LabID events could be better. An acceptable score for sensitivity and positive predictive value under LabID Event surveillance methodologies is 98 percent or higher. Our sensitivity score was 83 percent, our positive predictive value was 74 percent. The data shows that Maine is more likely to over-report a case than to miss a case.

The accuracy for admission dates and specimen collection dates was 97 percent while the accuracy for specimen source was 98 percent. An acceptable score for these accuracy checks would be a score of greater than or equal to 98 percent or higher.

Starting January 1, 2014 Maine made a change in the surveillance criteria from HAI to LabID Event. Therefore, no comparison to prior validations is available.

Submitted by: Maine CDC, Division of Infectious Disease, Medical Epidemiology, HAI Program
Date: March 16, 2015

Appendix H: Maine CDC *C. difficile* LabID Event Validation Report



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***Clostridium difficile* Infection (CDI) LabID Event Data Validation 2015**

Data Range: July 2013 – March 2014

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. 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 LabID Event surveillance methodology does not evaluate a positive test result against an established definition of infection related criteria. LabID 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, 2013 – March 31, 2014

NHSN surveillance criteria: LabID Event

CDI categorizes validated: All positive test results from the inpatient population

Number of Acute Care Hospitals validated: 22 of 35

Hospital selection criteria: All hospitals that did not undergo CDI validation in 2012-2013.

Number of validators: 1

Validation conducted: August – November 2014

Method:

1. 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. This list included 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 captures all positive test results needed to conduct surveillance successfully.

2. 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.
3. The Healthcare Associated Infections (HAI) Coordinator 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 Coordinator 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.
4. In addition, as the onset category assignment utilizes the admission date and specimen collection dates, this validation included an accuracy check of these dates.
5. Hospitals amended any missed or over-reported positive test results; or inaccurate admission or specimen collection dates in NHSN. The Maine CDC Healthcare Associated Infections Coordinator verified that these corrections were completed.

Validation Results:

Hospital	# Cases Reviewed	Missed Events	Over-reported Events	Sensitivity	PPV	Admission Date Accuracy	Specimen Date Accuracy
Biddeford	63	0	0	100%	100%	100%	100%
Blue Hill	7	3	0	---	---	---	---
Bridgton	3	0	0	100%	100%	100%	100%
CA Dean	0	0	0	---	---	---	---
Calais	1	0	0	100%	100%	100%	100%
Cary	6	0	0	100%	100%	100%	100%
Down East	4	0	0	100%	100%	100%	100%
EMMC	56	0	0	100%	100%	98%	100%
Franklin	8	0	0	100%	100%	100%	100%
MGMC	96	0	2	100%	98%	97%	94%
Mid Coast	21	1	0	95%	100%	100%	95%
MDI	3	0	1	100%	67%*	50%*	100%
Parkview	7	2	0	71%*	100%	100%	100%
Pen Bay	19	0	1	100%	94%*	100%	100%
Pen Valley	5	0	0	100%	100%	100%	100%
RFGH	14	0	0	100%	100%	100%	100%
Rumford	6	0	0	100%	100%	100%	100%
Sanford	15	0	0	100%	100%	100%	100%
Sebasticook	2	0	0	100%	100%	100%	100%
St. Mary's	17	0	0	100%	100%	100%	100%
Waldo	1	0	0	100%	100%	100%	100%
York	5	0	0	100%	100%	100%	100%
State of Maine *	359	6	4	98%	99%	99%	98%

* Each year, about one half of the acute care hospitals undergo CDI validation. This year, the facilities selected for CDI validation were those not selected for validation in 2012-2013. Results of the 2012-2013 validation event are available in the 2014 Annual Report Healthcare Associated Infections in Maine.

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.

This validation cycle identified 10 discrepancies. Reasons for these discrepancies are:

- Six events of CDI that should have been reported but were not (Missed)
 - Late data entry (three events)
 - Positive test result was not identified (three events)
- Four events of CDI that should not have been reported were reported (Over-reported)
 - Final/Confirmatory Laboratory test result was negative (three events)
 - Inaccurate admission date used (one event).

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.

Late data entry was the only system failure pattern noted. The Maine CDC HAI Program is now conducting data completeness checks quarterly, prior to the data entry deadlines. The Maine CDC HAI Program then works with facilities to resolve technical issues and keeps facilities updated on their data completeness status as the data entry deadline approaches. This should help hospitals avoid late data entries in the future.

An attempt to verify the accuracy of the hospital unit location reported proved unsuccessful. Discrepancies in hospital nursing unit labeling between the laboratory and NHSN data systems, as well as the inability of the laboratory data systems to generate a report detailing the transfer of the patient once the patient was admitted from the Emergency Department were the identified issues.

Summary:

In Maine, the ability to identify and correctly report true CDI events is very good. An acceptable score for sensitivity and positive predictive value, for LabID Event surveillance methodologies, would be a score of 98 percent or higher. Maine's sensitivity score was 98 percent, its positive predictive value was 99 percent.

The accuracy for admission dates was 99 percent, while and the accuracy for specimen collection dates was 98 percent. An acceptable score for admission dates and specimen collection dates would be 98 percent or higher. Only two of the 10 inaccuracies in dates led to a change in the category of the CDI case.

All 35 hospitals have now completed one validation cycle for CDI events in the last two years. This year, the validation cycle included 22 acute care hospitals in Maine. The remaining 13 hospitals completed a validation cycle for CDI in 2013. In 2013, the error rate was the metric used for evaluation (the number of discrepancies found per the number of cases reviewed). This error rate was 7 percent (26 of 391). In 2014, the error rate is 3 percent (10 of 359). 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. This may be the reason for the lower error rate obtained in 2014.

Submitted by: Maine CDC, Division of Infectious Disease, Medical Epidemiology, HAI Program
March 16, 2015

Appendix I: 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. We anticipate piloting the new online curriculum in the fall of 2015.

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 newborns), 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 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.

Joint Commission, The – the independent, non-profit organization that provides accreditation for U.S. hospitals and other healthcare organizations, and that develops and sets standards of quality including some of the HAI-related quality measures in this report

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.

Surgical Care Improvement Project (SCIP) measures – a set of quality indicators developed by the Joint Commission that measure how well hospitals comply with best practices to prevent harm to patients before, during and after surgery. The “SCIP-inf” measures covered by this report focus on preventing HAIs associated with surgery.

Surgical site infection (SSI) – an infection that occurs after surgery at or near the part of the body where the surgery took place. Some SSIs may infect the skin only.

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 neck³⁴, 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.ihl.org/resources/Pages/Measures/VentilatorAssociatedPneumoniaRateper1000VentilatorDays.aspx>