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**Healthcare Associated Infections in 2016  
Acute Care Hospitals**

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**Introduction**

Healthcare-associated infections (HAIs) are infections that patients acquire during the course of receiving treatment for other conditions within a healthcare setting.

HAIs are among the leading causes of preventable death in the United States, affecting 1 in 25 hospitalized patients, accounting for an estimated 722,000 infections and an associated 75,000 deaths during hospitalization.\*

The Massachusetts Department of Public Health (DPH) developed this data update as a component of the Statewide Infection Prevention and Control Program created pursuant to Chapter 58 of the Acts of 2006.

Massachusetts law provides DPH with the legal authority to conduct surveillance, and to investigate and control the spread of communicable and infectious diseases. (MGL c. 111,sections 6 & 7)

DPH implements this responsibility in hospitals through the hospital licensing regulation. (105 CMR 130.000)

Section 51H of chapter 111 of the Massachusetts General Laws authorizes the Department to collect HAI data and disseminate the information publicly to encourage quality improvement. (https://malegislature.gov/Laws/GeneralLaws/PartI/TitleXVI/Chapter111/Section51H)

Magill SS, Edwards JR, Bamberg W, et al. Multistate point-prevalence survey of health care-associated infections.

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**Introduction**

This HAI presentation is the eighth annual Public Health Council update:

It is an important component of larger efforts to reduce preventable infections in health care settings;

It presents an analysis of progress on infection prevention within Massachusetts acute care hospitals; and

It is based upon work supported by state funds and the Centers for Disease Control and Prevention (CDC).

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**Methods**

This data summary includes the following statewide measures for the 2016 calendar year (January 1, 2016 – December 31, 2016) as reported to the CDC’s National Healthcare Safety Network (NHSN).

The DPH required measures are consistent with the Centers for Medicare and Medicaid Services quality reporting measures.

Central line associated bloodstream infections (CLABSI) in intensive care units

Catheter associated urinary tract infections (CAUTI) in intensive care units

Specific surgical site infections (SSI); and

Specific facility wide laboratory identified events (LabID)

\*National baseline data for each measure are based on a statistical risk model derived from 2015 national data.

\*All data were extracted from NHSN on August 11, 2017.

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**NEW: NHSN Rebaseline**

In previous years, DPH has used the CDC’s NHSN 2006-2011 national baseline data as the basis for analysis.

January 2017, CDC completed the process of updating NHSN’s original HAI baselines.

The “rebaseline” was necessary due to multiple factors that have made the original baseline comparator data obsolete:

Some of the baselines were very old

NHSN protocols and surveillance definitions have changed over time

Transition to the new 2015 national baseline allows for comparison to more current data, significantly moves the previous values that provided the basis for comparison and creates a higher performance standard.

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**Measures**

The Standardized Infection Ratio (SIR) is calculated by dividing the actual number of infections by the predicted number of infections.

Central Line Utilization Ratio is calculated by dividing the number of central line days buy the number of patient days.

Urinary Catheter Utilization ratio is calculated by dividing the number of urinary catheter days by the number of patient days

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**How to Interpret SIRs and 95% Confidence Intervals (CIs)**

What is an SIR?

The standardized infection ratio (SIR) is a summary measure used to track HAIs over time. It compares actual HAI rates in a facility or state with baseline rates derived from aggregate data from NHSN. The CDC adjusts the SIR for risk factors that are most associated with differences in infection rates. In other words, the SIR takes into account that different healthcare facilities treat patients with differences in disease type and severity.

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Massachusetts Central Line-Associated Bloodstream Infection (CLABSI) SIR, by ICU Type   
*January 1, 2016-December 31, 2016*** Key Findings:

Two ICU types experienced a significantly lower number of infections than predicted, based on 2015 national aggregate data: Medical /Surgical (T) Surgical

One ICU type experienced a significantly higher number of infections than predicted, based on 2015 national aggregate data: Burn) SIR, by ICU Type

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**CLABSI Adult & Pediatric ICU Pathogens for 2015 and 2016**

**January 1, 2016-December 31, 2016**

Jan 1st- Dec 31st, 2015 n =158. gram-negative bacteria (other), 25% ; multiple organisms, %; candida albicans, 10%; yeast/fungus (other), 11%; staphylococcus aureus (not MRSA), 0%; Methicillin resistant staphylococcus aureus, 4%; Coagulase negative Staphylococcus, 16%; Enterococcus sp., 15%; Gram-positive bacteria (other), 5%

Jan 1st- Dec 31st, 2016 n =176. gram-negative bacteria (other), 17% ; multiple organisms, 11%; Candida albicans, 10%; yeast/fungus (other), 11%; staphylococcus aureus (not MRSA), 7%; Methicillin resistant staphylococcus aureus, 5%; coagulase negative staphylococcus, 17%; Enterococcus sp., 16%; gram-positive bacteria (other), 6%.

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**Massachusetts Central Line-Associated Bloodstream Infection (CLABSI) SIR, by Massachusetts CLABSI SIR in NICUs, by Birth Weight Category** *January 1, 2016-December 31, 2016*

Key Findings:

All five birth-weight categories experienced the same number of infections as predicted, based on 2015 national aggregate data.

There were 26 CLABSIs reported in this ICU type.

MA previously reported a higher than expected SIR across NICUs during 2015

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**CLABSI NICU Pathogens for 2015 and 2016**

January 1, 2015– December 31, 2015 n=37; Gram-negative bacteria (other) 3%; multiple organisms, 11%; candida and other yeast/fungus, 5%; Staphylococcus aureus not MRSA, 30%; Methicillin-resistant Staphylococcus aureus (MRSA) 5%; Coagulase negative staphylococcus, 19%; gram-positive bacteria (other),3%.;l enterococcus sp.,8%; E.Coli 16%

January 1, 2016– December 31, 2016 *n=26;* Gram-negative bacteria (other) 19%; multiple organisms 8%; Staphylococcus aureus not MRSA, 35%; Methicillin-resistant Staphylococcus aureus (MRSA) 4%; enterococcus sp., 19;Coagulase negative staphylococcus, 15%;

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**State CLABSI SIR**

**Key Findings**

For the past two years, adult ICUs experienced a significantly lower number of infections than predicted, based on 2015 national aggregate data.

In 2016, neonatal ICUs experienced the same number of infections than predicted, based on 2015 national aggregate data.

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**State Central Line (CL) Utilization Ratio**

**Key Findings**

Discontinuing unnecessary central lines can reduce the risk for infection.

Central line (CL) utilization has remained relatively unchanged between 2015 and 2016.

\*The CL utilization ratio is calculated by dividing the number of CL days by the number of patient days

**Slide 14 Massachusetts Catheter-Associated Urinary Tract infection (CAUTI) SIR, by ICU Type**

**January 1, 2016-December 31, 2016**  
Key Findings

All ICU types experienced the same number of infections as predicted, based on 2015 national aggregate data. There were 290 CAUTIs reported in 2016.

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**CAUTI Adult & Pediatric ICU Pathogens for 2015 and 2016**

Calendar Year 2015 January 1, 2015 – December 31, 2015 n=391

Escherichia coli 36%; Pseudomonas aeruginosa, 11%; Klebsiella pneumoniae, 6%; Coagulase- negative Staphylococcus, 6%; Enterococcus sp.,11%; Gram-positive bacteria (other), 9%; Gram-negative other, 14%; multiple organisms, 7%.

Calendar Year 2016 January 1, 2016 – December 31, 2016 n=280

Escherichia coli 35%; Pseudomonas aeruginosa, 13%; Klebsiella pneumoniae, 12%; Coagulase- negative Staphylococcus, 2%; Enterococcus sp.,8%; Gram-positive bacteria (other), 10%; Gram-negative other, 14%; multiple organisms, 6%.

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**State CAUTI SIR**

**Key Findings**

In 2016, all ICU types experienced the same number of infections predicted based on 2015 national aggregate data.

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**State Urinary Catheter Utilization Ratios**

**Key Findings**

Discontinuing unnecessary urinary catheters can reduce the risk for infection.

Urinary catheter utilization in adult and pediatric ICUs has remained relatively unchanged between 2015 and 2016.

\*The urinary catheter utilization ratio is calculated by dividing the number of catheter days by the number of patient days**.**

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**Surgical Site Infections (SSI)*Coronary Artery Bypass Graft (CABG) SIR and Colon Procedure (COLO) SIR***

**Key Findings**

For the past two years, MA acute care hospitals performing coronary artery bypass graft procedures (CABG) and colon procedures (COLO) experienced the same number of infections as predicted based on 2015 national aggregate data.

There were 23 CABG SSIs reported in 2016. There were 158 COLO SSIs reported in 2016**.**

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**Surgical Site Infections (SSI) Knee Prosthesis (KPRO) SIR and Hip Prosthesis (HPRO) SIR**

**Key Findings**

In 2016, Massachusetts acute care hospitals performing knee prosthesis procedures (KPRO) experienced a significantly higher number of infections than predicted, based on 2015 national aggregate data.

There were 76 KPRO SSIs and 83 HPRO SSIs reported in 2016.

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**Surgical Site Infections (SSI) Abdominal Hysterectomy (HYST) SIR and Vaginal Hysterectomy (VHYS) SIR**

Key Findings

In 2016, Massachusetts acute care hospitals performing abdominal and vaginal hysterectomy procedures experienced a significantly higher number of infections than predicted based on 2015 national aggregate data.

There were 46 HYST SSIs and 21 VHYS SSIs reported in 2016.

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S**SI Pathogens for 2015-2016 CABG, KPRO, HPRO, HYST, VHYS, COLO**

January 1, 2015– December 31, 2015 n=369;

Staphylococcus aureus not MRSA, 11% ; Methicillin-resistant Staphylococcus aureus (MRSA) 7%; coagulase negative staphylococcus, 12%; gram-positive bacteria (other) 12%; Gram-negative bacteria (other) 16%; multiple organisms, 30%; other, 4%; no organism identified, 10%.

January 1, 2016– December 31, 2016 n=407;

Staphylococcus aureus not MRSA, 14% ; Methicillin-resistant Staphylococcus aureus (MRSA) 8%; coagulase negative staphylococcus, 4%; gram-positive bacteria (other) 11%; Gram-negative bacteria (other) 15%; multiple organisms, 28%; other, 3%; no organism identified, 17%.

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**Statewide SSI Trends by Year 2015-2016**

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**Summary of SSI Results**

KPRO, HYST, VHYS: Higher than predicted

CABG HPRO COLO: Same as predicted

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**DPH Response**

DPH has conducted outreach to individual hospitals to determine action taken to address higher than expected SIRs.

Selected examples of hospital actions: conducting root-cause analyses for each infection to identify the cause; re-education to ensure adherence to evidence based practices; observation of OR practices; limiting OR traffic; preoperative chlorhexidine baths and implementation of mandatory “joint class boot camp” for patients having elective surgery.

DPH has consulted with hospitals in the investigation of higher than expected rates of KPRO SSIs.

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**Laboratory Identified Events (LabID): Clostridium difficile (CDI) SIR**

**Key Findings**

In 2016, Massachusetts hospitals reporting CDI events experienced significantly lower number of infections than predicted based on 2015 national aggregate data.

There were 2,371 CDI events reported in 2016.

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**Laboratory Identified Events (LabID): Methicillin-resistant Staphylococcus aureus (MRSA) SIR**

**Key Findings**

For the past two years, Massachusetts acute care hospitals reporting MRSA events experienced significantly lower number of infections than predicted, based on 2015 national aggregate data.

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**Statewide LabID Trends by Year 2015-2016**

There were 123 MRSA events reported in 2016.

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**Summary of LabID Results**

CDI and MRSA Lab ID Events: Significantly lower than predicted.

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**HAI Prevention Activities**

External data validation of catheter-associated urinary tract infections conducted at 20 hospitals

Hemodialysis infection prevention simulation training initiative for hemodialysis nurses was expanded to include dialysis technicians

Clostridium difficile initiative in the long-term care setting

Antimicrobial stewardship across the continuum of care

On-site Infection Control Assessment and Response (ICAR) visits in nursing homes

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**Next Steps**

Hospitals with higher than expected SIRs have been contacted to ensure the need for improvement has been addressed.

DPH will continue to monitor progress by providing quarterly Data Cleaning Reports and Targeted Assessment for Prevention (TAP) Reports for all hospitals to identify areas where focused infection prevention efforts are needed.

DPH will continue to conduct on-site data validation of specific NHSN measures to ensure completeness and accuracy of reported data.

DPH plans to provide educational webinars for hospitals in order that they may effectively use the data obtained from the surveillance system to improve patient and healthcare personnel safety.

DPH will continue to collaborate with state and national organizations to provide educational programs that address multi-drug resistant organisms and antibiotic resistance.

This update will be available **on the MDPH website: www.mass.gov/dph/dhcq**