Slide 1.

**Healthcare Associated Infections in 2015
Acute Care Hospitals**

Alfred DeMaria, M.D.

State Epidemiologist

Bureau of Infectious Disease and Laboratory Sciences

Katherine Fillo, Ph.D, RN-BC

Quality Improvement Manager

Bureau of Health Care Safety and Quality

Public Health Council

August 23, 2016

Slide 2.

**Introduction**

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)

This presentation is the seventh 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).

Slide 3.

**Methods and Measures**

This data summary includes the following statewide measures for the 2015 calendar year (January 1, 2015 – December 31, 2015):

Catheter associated urinary tract infections (CAUTI) (NEW);

Comparisons made to state comparator and national baseline

Central line associated bloodstream infections (CLABSI);

Comparisons made to state comparator and national baseline

Specific surgical site infections (SSI); and

Comparison made to the national baseline only (smaller sample size)

Specific facility wide laboratory identified events (LabID) (NEW).

Comparison made to the national baseline only (smaller sample size)

Slide 4.

**Measures (Continued)**

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

Slide 5.

**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.

Slide 6.

**CAUTI Criteria Definitions**

* NHSN groups Catheter Associated Urinary Tract Infections (CAUTIs) into three categories:
	+ Symptomatic urinary tract infection (SUTI) Criterion 1 and Criterion 2 infection
		- Positive urine culture with no more than two species of organisms
		- Signs or symptoms with no other recognized cause
		- SUTI 2 applies only to patients who are 1 year of age or younger
	+ Asymptomatic bacteremic urinary tract infection (ABUTI) infection
		- Positive urine culture with no more than two species of organisms
		- Patient has no signs or symptoms of SUTI
		- Positive blood culture with at least one matching bacteria to the urine culture or matching organisms in the urine

Slide 7.

**Massachusetts CAUTI Rates Compared to National Baseline Rate, by ICU Type
January 1, 2015-December 31, 2015**

**Key Findings**

Six ICU types had a significantly lower rate of infection compared to the national baseline:

Medical (T)

Medical (NT)

Medical/Surgical (T)

Pediatric Cardiothoracic

Pediatric Medical/Surgical

Surgical Cardiothoracic

One ICU type had a significantly higher rate of infection compared to the national baseline: Trauma There were 40 CAUTIs reported in this ICU type.

Slide 8.

**Massachusetts CAUTI Rates Compared to State Comparator\*, by ICU Type**

 **January 1, 2015-December 31, 2015**

**Key Findings**

All but two ICU types (Medical/surgical NT-Small and Neurosurgical) had a significantly lower rate of infection compared to the state comparator.

\*The state comparator is calculated from data reported by Massachusetts acute care hospitals to NHSN during calendar years 2013-2014.

Slide 9

**CAUTI Adult & Pediatric ICU Pathogens for 2014 and 2015**

**Calendar Year 2014 January 1, 2014 – December 31, 2014 n=726**

Escherichia coli 17%; Pseudomonas aeruginosa, 8%; Klebsiella pneumoniae, 5%; Coagulase- negative Staphylococcus, 4%; enterococcus sp.,3%; Gram-positive bacteria (other), 8%; Gram-negative other, 8%; multiple organisms, 10%; Candida Albicans, 16%; Yeast/Fungus (other) 21%.

**Calendar Year 2015 January 1, 2015 – December 31, 2015 n=379**

Escherichia coli 36%; Pseudomonas aeruginosa, 11%; Klebsiella pneumoniae, 6%; Coagulase- negative Staphylococcus, 5%; Enterococcus sp.,11%; Gram-positive bacteria (other), 9%; Gram-negative other, 14%; multiple organisms, 8%.

Slide 10

**State CAUTI SIR**

**Key Findings**

In 2015, adult and pediatric ICUs experienced a significantly lower number of infections than expected, as compared to the national baseline data and prior years.

\*In 2015, the NHSN definition for UTI was updated, and several criteria and elements were excluded. This may result in a similar, significant decrease in the 2015 CAUTI SIRs than in previous years

Slide 11

**State Urinary Catheter Utilization Ratios**

**Key Findings**

Adult ICUs continue to reduce urinary catheter use, reducing the risk of CAUTI.

Urinary catheter utilization in pediatric ICUs has remained relatively low and unchanged since the start of public reporting.

Slide 12

**CLABSI Criterion**

* NHSN groups central line associated bloodstream infections (CLABSIs) into three categories:
	+ Criterion 1 infection
		- Recognized “true” pathogen from one or more blood cultures
		- Organism is not related to an infection at another site
	+ Criterion 2, 3 infection
		- Pathogen identified is commonly found on the skin
		- Organism causing infection is found in two or more blood cultures drawn on separate occasions
		- Patient is symptomatic with blood stream infection
		- Criteria 3 applies only to patients who are 1 year of age or younger

Slide 13
**Massachusetts Criteria 1, 2, and 3 CLABSI Rates Compared to National Baseline Rate, by ICU Type
January 1, 2015-December 31, 2015**

 **Key Findings**

One ICU type had a significantly lower rate of infection compared to the national baseline:

Medical /Surgical (T)

One ICU type had a significantly higher rate of infection compared to the national baseline:

Pediatric Medical

There were 30 CLABSIs reported in this ICU type.

Slide 14

**Massachusetts Criteria 1, 2 and 3 CLABSI Rates Compared to State Comparator\*, by ICU Type
January 1, 2015-December 31, 2015**

**Key Findings**

One ICU type had a significantly higher rate of infection compared to the state comparator:

Pediatric

There were 30 CLABSIs reported in this ICU type.

\*The state comparator is calculated from data reported by Massachusetts acute care hospitals to NHSN during calendar years 2013 and 2014

Slide 15

**CLABSI Adult & Pediatric ICU Pathogens for 2014 and 2015**

Jan 1st- Dec 31st, 2014 n =172. gram-negative bacteria (other), 13% ; multiple organisms, 7%; candida albicans, 11%; yeast/fungus (other), 14%; staphylococcus aureus (not MRSA), 6%; Methicillin resistant staphylococcus aureus, 3%; Coagulase negative Staphylococcus, 19%; Enterococcus sp., 19%; Gram-positive bacteria (other), 8%

Jan 1st- Dec 31st, 2015 n =164. gram-negative bacteria (other), 24% ; multiple organisms, 5%; Candida albicans, 10%; yeast/fungus (other), 12%; staphylococcus aureus (not MRSA), 9%; Methicillin resistant staphylococcus aureus, 4%; coagulase negative staphylococcus, 16%; Enterococcus sp., 16%; gram-positive bacteria (other), 4%.

Slide 16

**Massachusetts Criteria 1, 2, and 3 Central Line Infection Rates in NICUs compared to National Baseline Rates, by Birth Weight Category *January 1, 2015-December 31, 2015***

**Key Findings**

Infants weighing less than or equal to 750 grams and those weighing 751 grams-1000 grams at birth had a significantly higher rate of infection compared to the national baseline

There were 37 CLABSIs reported in this ICU type

Slide 17

**Massachusetts Criteria 1, 2, and 3 Central Line Infection Rates in NICUs compared to State Comparator by Birth Weight Category**

**January 1, 2015-December 31, 2015**

**Key Findings**

Infants weighing less than or equal to 750 grams and those weighing 751 grams-1000 grams at birth had a significantly higher rate of infection compared to the state comparator

There were 37 CLABSIs reported in this ICU type.

\*The state comparator is calculated from data reported by Massachusetts acute care hospitals to NHSN during calendar years 2013-2014

Slide 18

**State CLABSI SIR**

**Key Findings**

In 2015, pediatric and neonatal ICU types had a significantly higher rate of infection compared to the national baseline.

There were 30 CLABSIs reported in 8 pediatric ICUs and 37 CLABSIs reported in the 10 neonatal ICUs.

DPH and The Neonatal Quality Improvement Collaborative are working to address causal factors.

Slide 19

**CLABSI NICU Pathogens for
2014 and 2015**

January 1, 2014– December 31, 2014 *n=18;* Gram-negative bacteria (other) 33%; multiple organisms 11%; candida and other yeast/fungus, 6%; Staphylococcus aureus not MRSA, 11%; Methicillin-resistant Staphylococcus aureus (MRSA) 17%; enterococcus sp., 11%; gram-positive bacteria (other), 5%; E.coli, 6%

January 1, 2015– December 31, 2015 n=23; Gram-negative bacteria (other) 9%; multiple organisms, 9%;

candida and other yeast/fungus, 13%; Staphylococcus aureus not MRSA, 31%; Methicillin-resistant Staphylococcus aureus (MRSA) 4%; Coagulase negative staphylococcus, 17%; gram-positive bacteria (other),4%.

Slide 20

**Central Line Utilization Ratios**

**Key Findings**

Discontinuing unnecessary central lines can reduce the risk for infection.

CL utilization in neonatal ICU types has remained low and relatively unchanged since the start of public reporting.

Slide 21

**SSI: Coronary Artery Bypass Graft (CABG) SIR
and Colon (COLO) SIR**

**Key Findings**

For the past five years, MA acute care hospitals performing coronary artery bypass graft procedures experienced a significantly lower number of infections than expected, as compared to the national baseline data. There were 31 CABG SSIs reported.

In 2015, Massachusetts hospitals performing colon procedures had an infection rate similar to the national baseline data. There were 223 colon procedure SSIs reported

Slide 22

**SSI: Knee Prosthesis (KPRO) SIR
and Hip Prosthesis (HPRO) SIR**

**Key Findings**

For the past three years, Massachusetts acute care hospitals performing knee and hip prosthesis procedures experienced a significantly lower number of infections than expected, as compared to the national baseline data. There were 57 KPRO and 64 HPRO SSIs reported

Slide 23

**SSI: Abdominal Hysterectomy (HYST) SIR and Vaginal Hysterectomy (VHYS) SIR**

**Key Findings**

In 2015, Massachusetts hospitals performing abdominal and vaginal hysterectomy procedures had an infection rate similar to the national baseline data. There were 43 HYST and 11 VHST SSIs reported.

DPH conducted an extensive validation of VHST procedures at MA hospitals over the past year.

Slide 24.

**SSI Pathogens for 2014-2015: CABG, KPRO, HPRO, HYST, VHYS, COLO**

January 1, 2014– December 31, 2014 n=484;

Staphylococcus aureus not MRSA, 10% ; Methicillin-resistant Staphylococcus aureus (MRSA) 5%; coagulase negative staphylococcus, 4%; gram-positive bacteria (other) 10%; Gram-negative bacteria (other) 18%; multiple organisms, 35%; other, 3%; no organism identified, 15%.

January 1, 2015– December 31, 2015 n=429;

Staphylococcus aureus not MRSA, 11% ; Methicillin-resistant Staphylococcus aureus (MRSA) 7%; coagulase negative staphylococcus, 4%; gram-positive bacteria (other) 12%; Gram-negative bacteria (other) 17%; multiple organisms, 29%; other, 3%; no organism identified, 17%.

Slide 25

**Statewide SSI Trends by Year2011-2015**

Slide 26

**Summary of SSI Results**

HYST, VHYS, COLO same as expected

CABG, KPRO, HPRO significantly lower than expected

Slide 27

**LabID: Clostridium difficile (CDI) SIR**

**Key Findings**

In 2015, Massachusetts hospitals reporting CDI events had an infection rate similar to the national baseline data. There were 2,771 CDI events reported.

Slide 28

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

**Key Findings**

For the past three years, Massachusetts acute care hospitals reporting MRSA events experienced a significantly lower number of events than expected, as compared to the national baseline data.

There were 180 MRSA events reported

Slide 29

**Statewide LabID Trends by Year 2013-2015**

Slide 30

**HAI Prevention Activities**

* External data validation of surgical site infections (SSIs) following vaginal hysterectomy (VHYS) procedures conducted at 20 hospitals
* Hemodialysis infection prevention simulation training initiative for hemodialysis nurses
* Clostridium difficile initiative in the long-term care setting
* Antimicrobial stewardship across the continuum of care

Slide 31

**Hemodialysis Infection Prevention**

This one day training for dialysis nurses utilizes simulation as a “hands on” teaching method to provide strategies and skills for the prevention of infections in hemodialysis settings using the Centers for Disease Control and Prevention (CDC) Dialysis Safety guidance and resources.

Describe the CDC Approach to BSI Prevention in Dialysis Facilities

Identify best practices to reduce the risk of healthcare-associated infections in dialysis settings

Review the Centers for Medicare and Medicaid Services (CMS) standards and requirements for End Stage Renal Disease (ESRD) facilities

Provide an opportunity for each participant to practice simulation lab exercises as a teaching method to enhance nursing practice.

Slide 32

The Department will continue to work with hospitals and additional state and national organizations in a comprehensive effort to address these largely preventable infections

This update will be available on the MDPH website:

[www.mass.gov/dph/dhcq](http://www.mass.gov/dph/dhcq)

 Please direct any questions to:

 Katherine T. Fillo, Ph.D, RN-BC

 Quality Improvement Manager

 Bureau of Health Care Safety and Quality

 katherine.fillo@state.ma.us

 617-753-7328