Healthcare Associated Infections in 2014 Acute Care Hospitals

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- Purpose
- Introduction
- Background
- Methods
- Measures
- Outcomes
- Quality Improvement Activities

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This presentation is given for the following purposes:

- It is the sixth Public Health Council update that represents a component of larger efforts to reduce preventable infections in health care settings; and

- It presents an analysis of progress on infection prevention within Massachusetts acute care hospitals, and is based upon work supported by state funds and the Centers for Disease Control and Prevention (CDC).

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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)

Massachusetts licensure regulations (105 CMR 130.000) require acute care hospitals to report specific Healthcare Associated Infection (HAI) related data to the Centers for Disease Control and Prevention's **National Healthcare Safety Network (NHSN)**.

NHSN is a secure, internet-based surveillance system for healthcare facilities to submit information about HAI and to monitor patient safety.

NHSN offers:
- Use of standardized definitions
- Built-in analytical tools
- User training and support
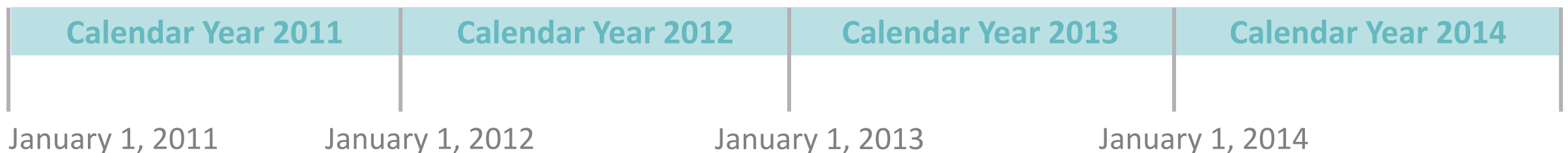- Integrated data quality checks

NHSN is free to all participants. It is the primary data collection tool used for HAI reporting by more than 13,000 acute care facilities across the country.

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This data summary includes statewide measures for central line associated bloodstream infections (CLABSI) and specific surgical site infections (SSI) for the 2014 calendar year.

- All data were extracted from NHSN on June 2, 2015

- Central line associated bloodstream infection
  - National baseline data applied to 2014 state data are from 2013
  - State comparator data has been shifted to January 1, 2012 through December 31, 2013

- Surgical site infection
  - National baseline data are based on a statistical risk model derived from 2006-2008 national data

Previous State Comparator

New State Comparator

Calendar Year 2011	Calendar Year 2012	Calendar Year 2013	Calendar Year 2014

January 1, 2011   January 1, 2012   January 1, 2013   January 1, 2014

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- Central Line Associated Bloodstream Infections (CLABSI)
  - Comparisons made to state comparator and national baseline

- Surgical Site Infection (SSI)
 - Comparison made to the national baseline only (smaller sample size)

- Standardized Infection Ratio (SIR)*

$$\text{Standardized Infection Ratio (SIR)} = \frac{\text{Actual Number of Infections}}{\text{Predicted Number of Infections}}$$

  * When the actual number is equal to the predicted number the SIR = 1.0

- Central Line Utilization Ratio

$$\text{Central Line Utilization Ratio} = \frac{\text{Number of Central Line Days}}{\text{Number of Patient Days}}$$
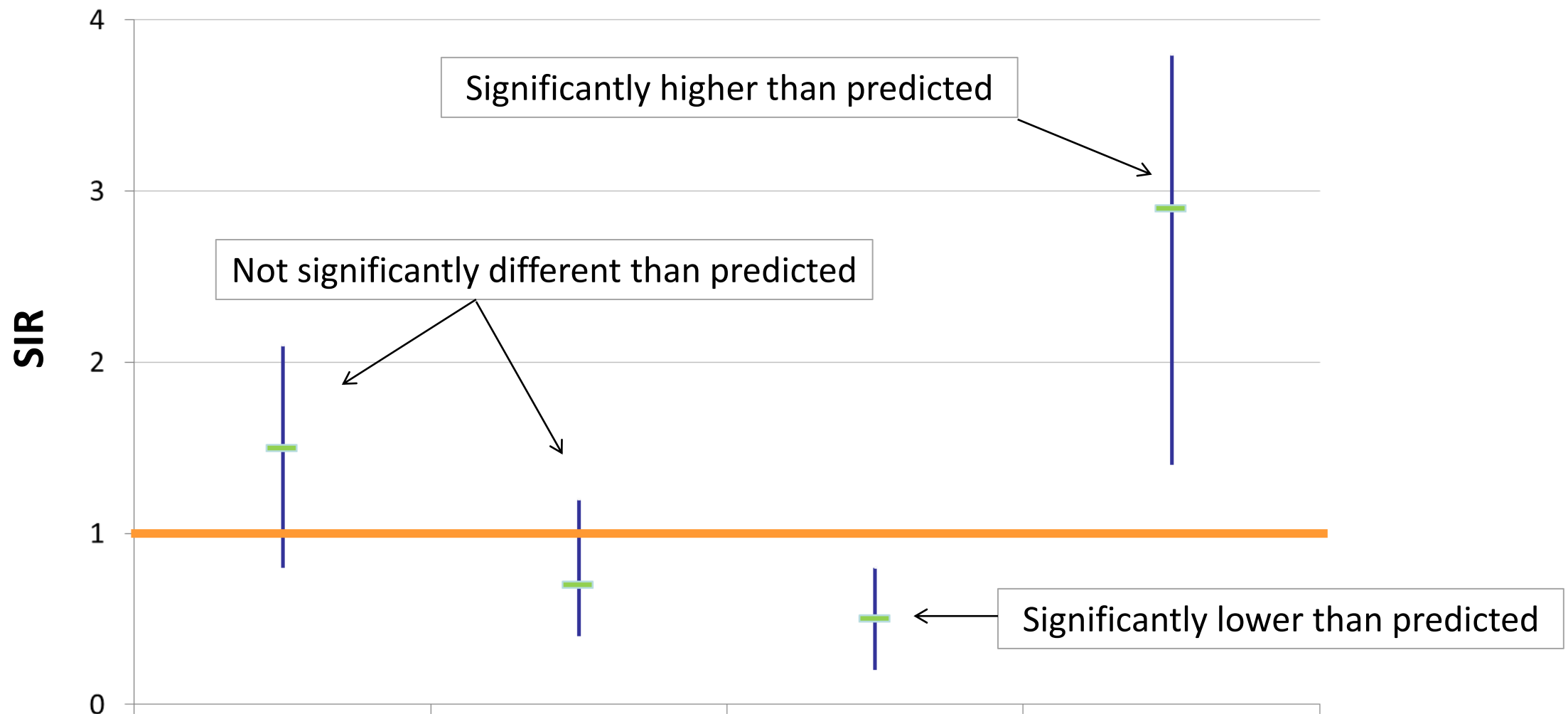
What is an SIR?

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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- NHSN groups 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 of blood infection
    - Criteria 3 applies only to patients ≤ 1 year of age

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Massachusetts Criteria 1, 2, and 3 CLABSI Rates Compared to National Baseline Rate, by ICU Type
January 1, 2014-December 31, 2014

Key Findings

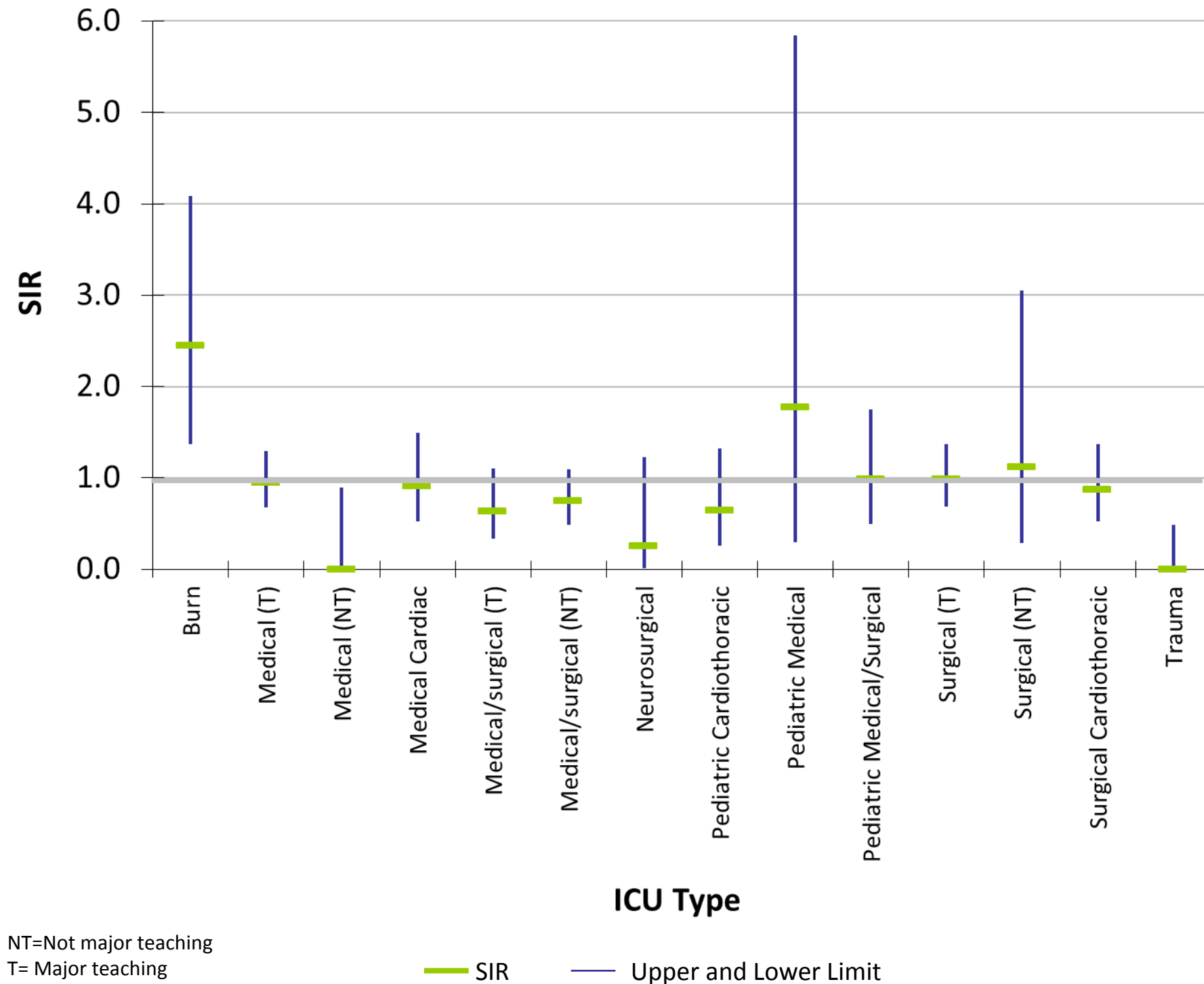Two ICU types had a **significantly lower** rate of infection compared to the national baseline:

Medical (NT)
Trauma

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

Burn

If limited to just Criterion 1, Four ICU types had a **significantly lower** rate of infection compared to the national baseline:

Medical/surgical (T)
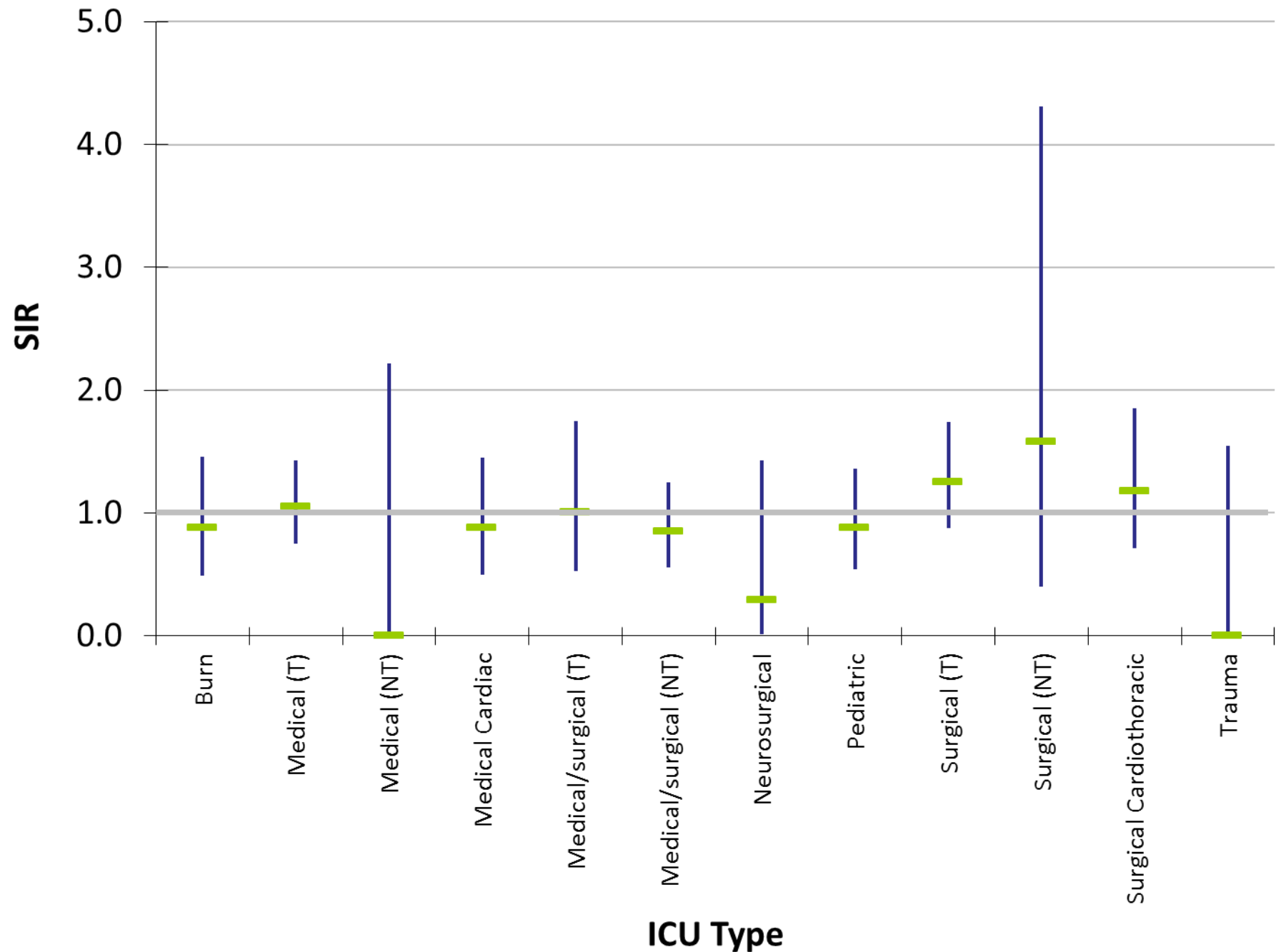Medical/surgical (NT)
Neurosurgical
Trauma

NT=Not major teaching
T= Major teaching

SIR   Upper and Lower Limit

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Key Findings

CLABSI all criteria rates by ICU type are **comparable** to the state comparator.

CLABSI criterion 1 rates by ICU type are **comparable** to the state comparator.

*The state comparator is calculated from data reported by Massachusetts acute care hospitals to NHSN during calendar years 2012-2013.
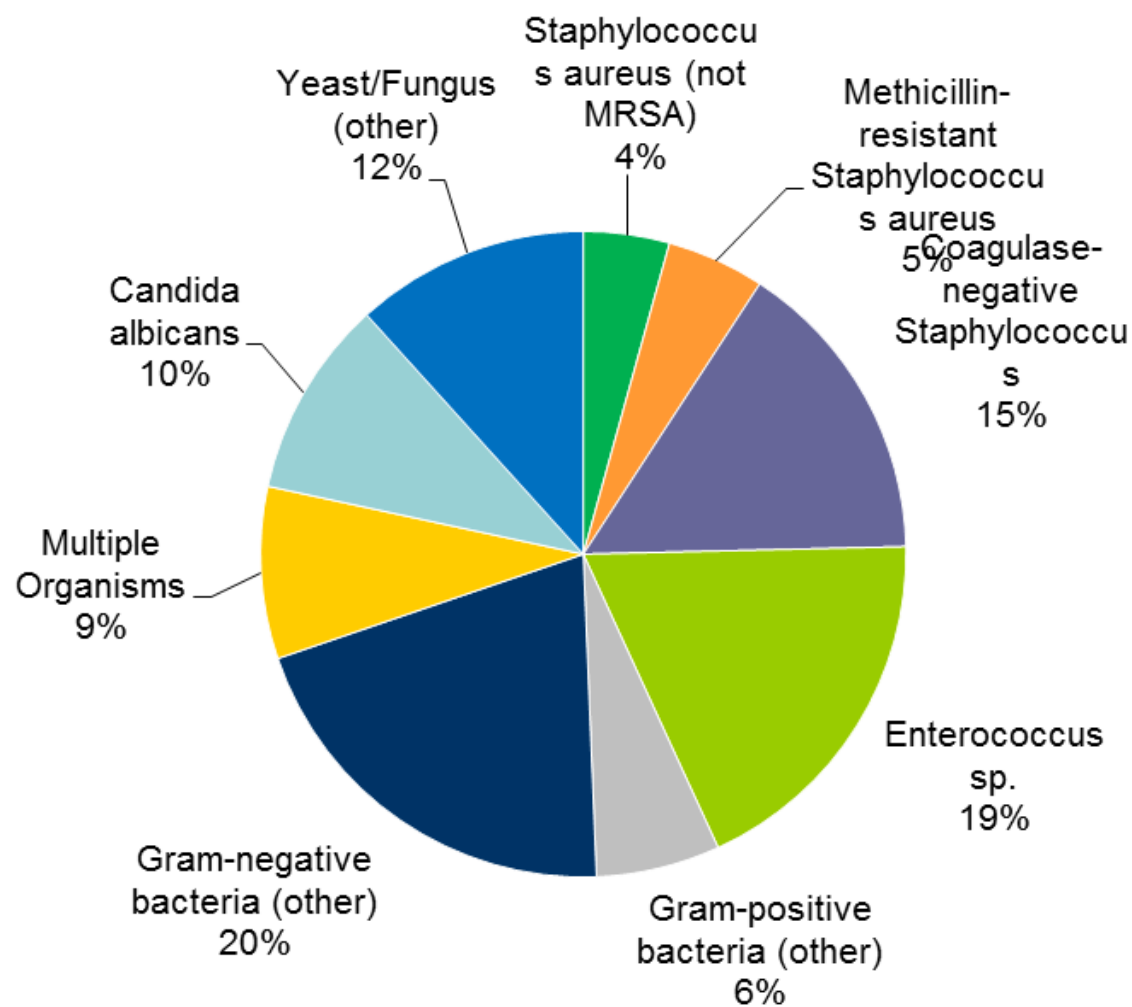

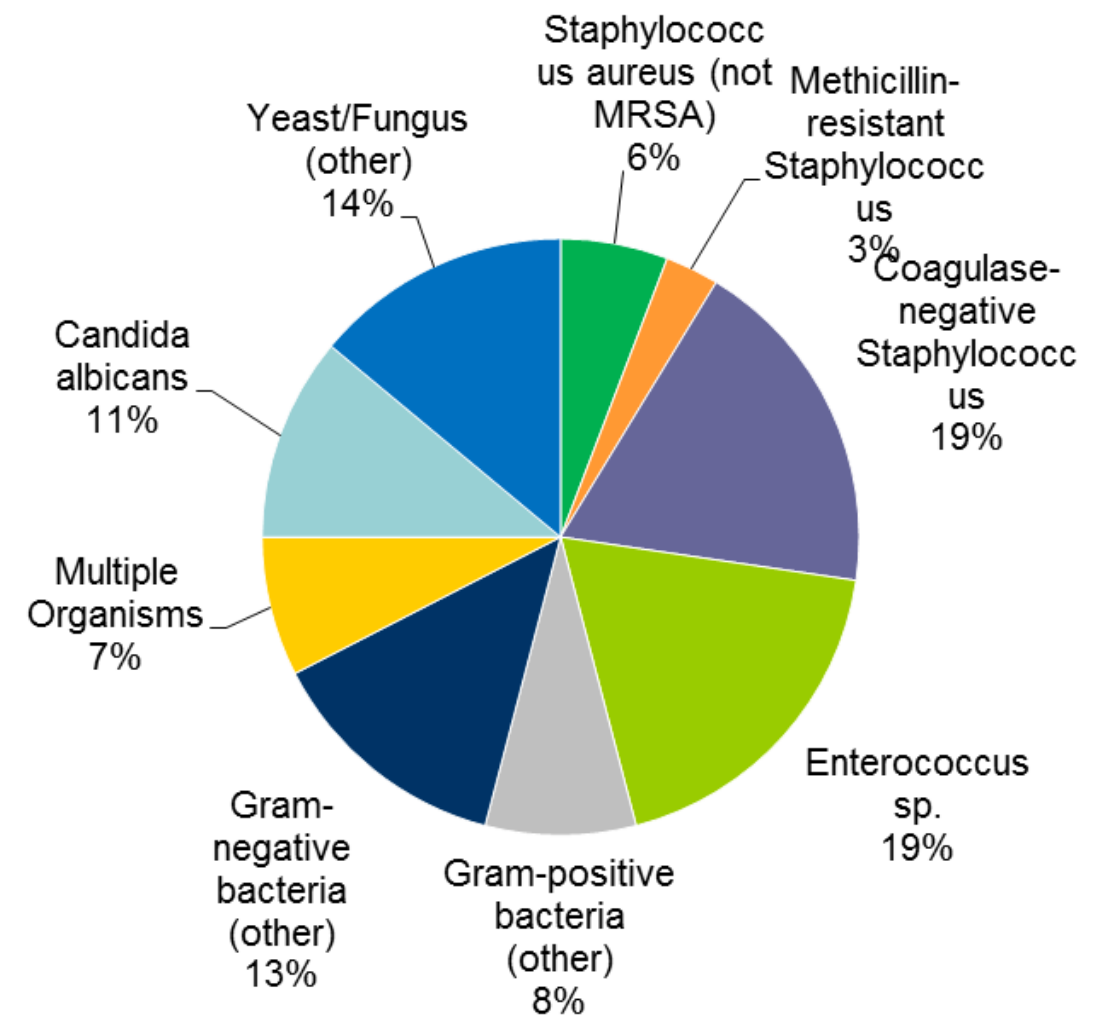NT=Not major teaching
T= Major teaching

SIR   Upper and Lower Limit

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Calendar Year 2013
January 1, 2013 – December 31, 2013
n=162

- Staphylococcus aureus (not MRSA) 4%
- Methicillin-resistant Staphylococcus aureus 5%
- Coagulase-negative Staphylococcus 15%
- Enterococcus sp. 19%
- Gram-positive bacteria (other) 6%
- Gram-negative bacteria (other) 20%
- Multiple Organisms 9%
- Candida albicans 10%
- Yeast/Fungus (other) 12%

Calendar Year 2014
January 1, 2014 – December 31, 2014
n=161

- Staphylococcus aureus (not MRSA) 6%
- Methicillin-resistant Staphylococcus 3%
- Coagulase-negative Staphylococcus 19%
- Enterococcus sp. 19%
- Gram-positive bacteria (other) 8%
- Gram-negative bacteria (other) 13%
- Multiple Organisms 7%
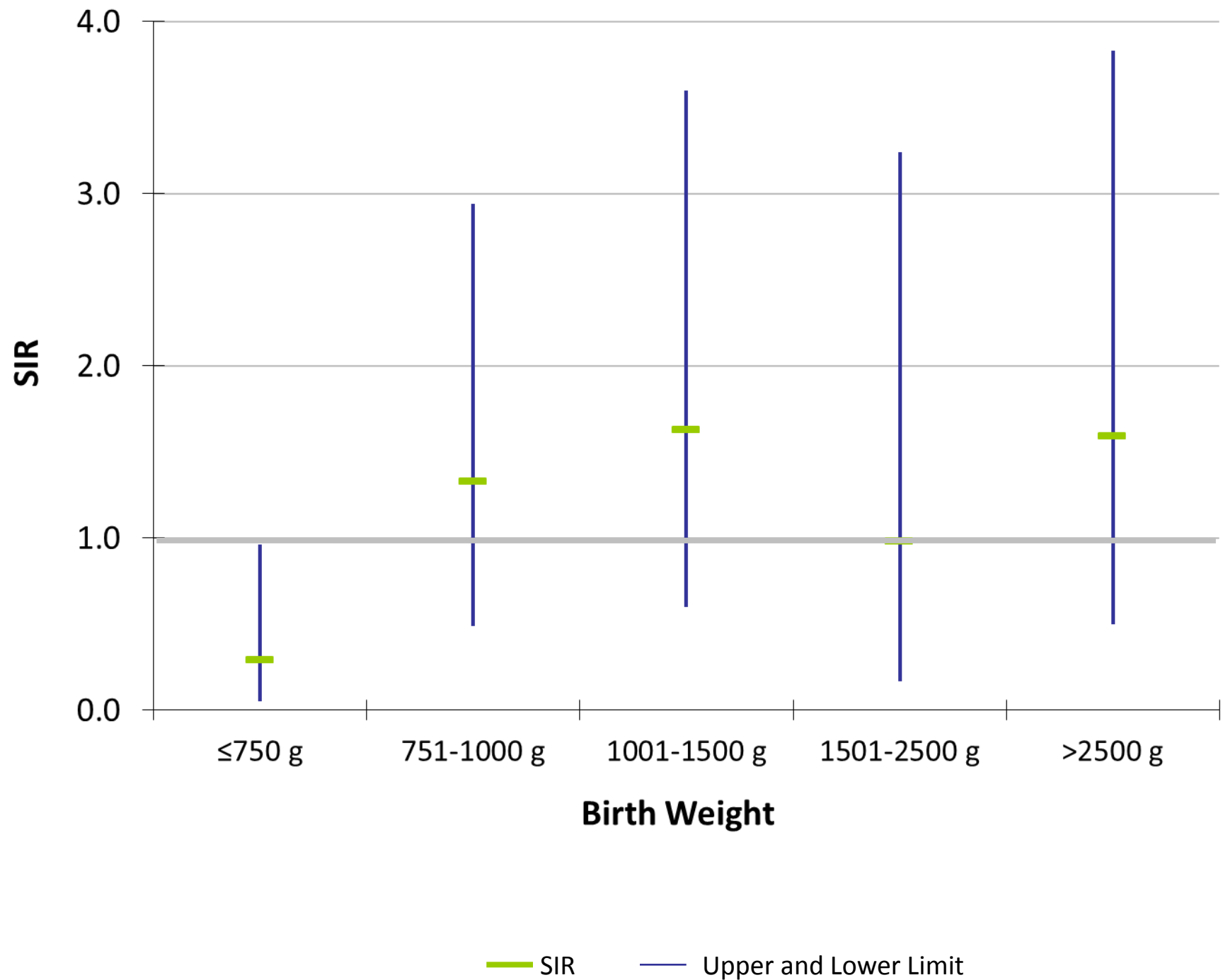- Candida albicans 11%
- Yeast/Fungus (other) 14%

Massachusetts Criteria 1, 2, and 3 Central Line Infection Rates in NICUs compared to National Baseline Rates, by Birth Weight Category

January 1, 2014-December 31, 2014

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Key Findings

Infants weighing less than or equal to 750 grams at birth had a **significantly lower** rate of infection compared to the national baseline.
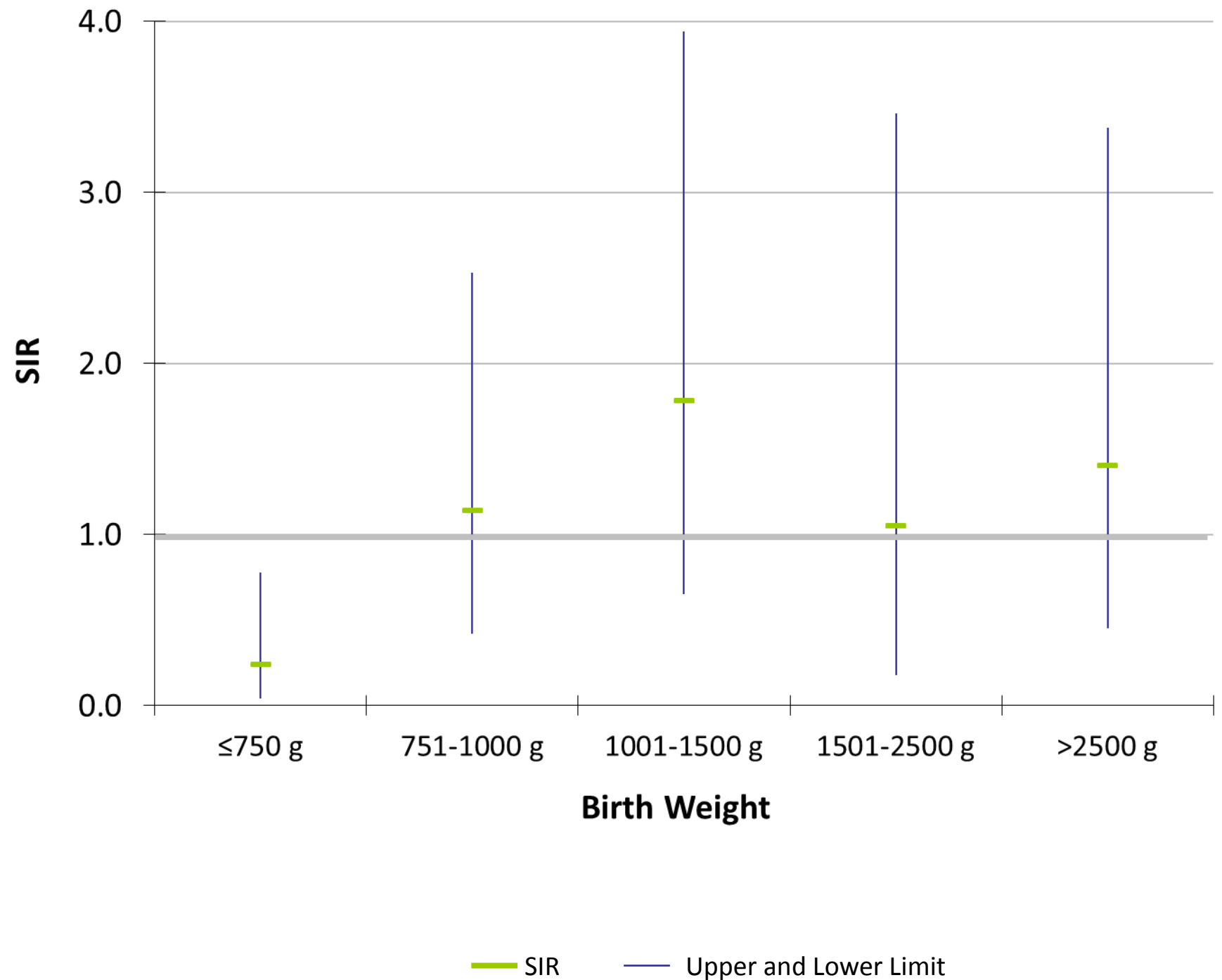

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Massachusetts Criteria 1, 2 and 3 Central Line Infection Rates in NICUs compared to State Comparator*, by Birth Weight Category

January 1, 2013-December 31, 2013

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Key Findings

Infants weighing less than or equal to 750 grams at birth 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 2012-2013.
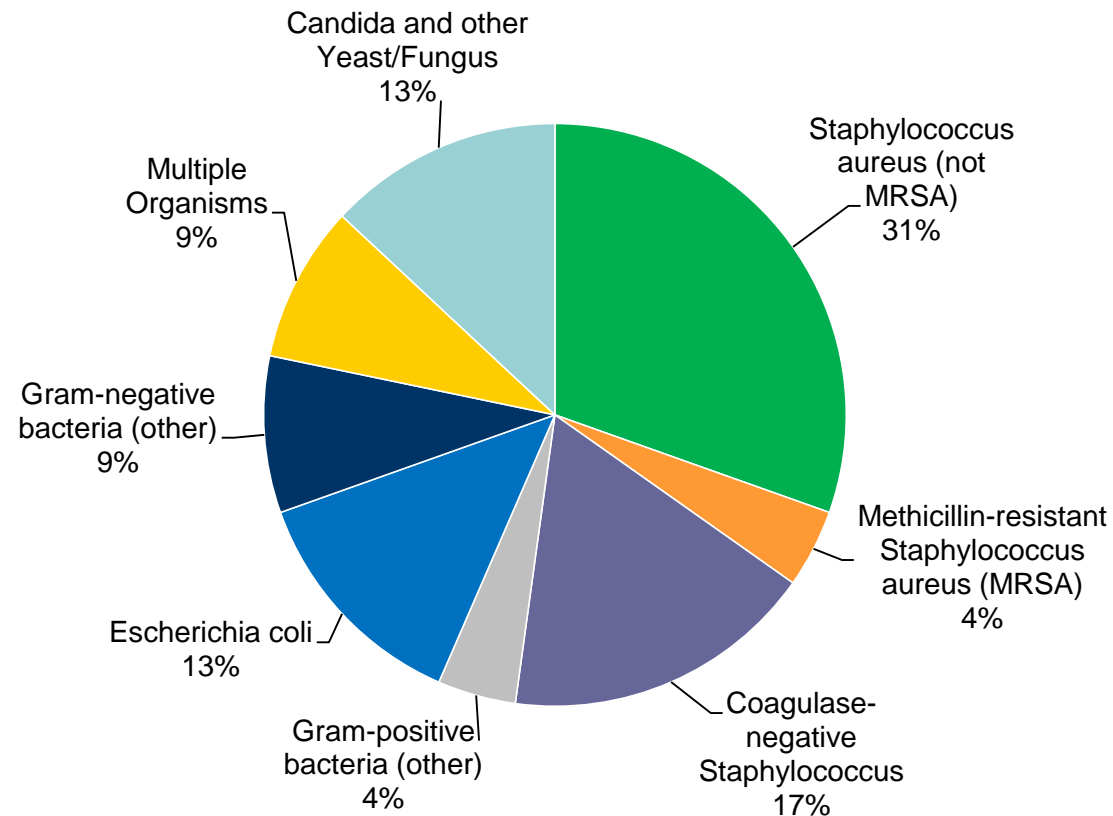

Birth Weight

SIR   Upper and Lower Limit

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Calendar Year 2013
January 1, 2013 – December 31, 2013
n=23

Candida and other Yeast/Fungus 13%
Multiple Organisms 9%
Gram-negative bacteria (other) 9%
Escherichia coli 13%
Gram-positive bacteria (other) 4%
Coagulase-negative Staphylococcus 17%
Methicillin-resistant Staphylococcus aureus (MRSA) 4%
Staphylococcus aureus (not MRSA) 31%

Calendar Year 2014
January 1, 2014 – December 31, 2014
n=18

Candida and other Yeast/Fungus 6%
Multiple Organisms 11%
Gram-negative bacteria (other) 33%
Escherichia coli 6%
Gram-positive bacteria (other) 5%
Enterococcus sp. 11%
Methicillin-resistant Staphylococcus aureus (MRSA) 17%
Staphylococcus aureus (not MRSA) 11%

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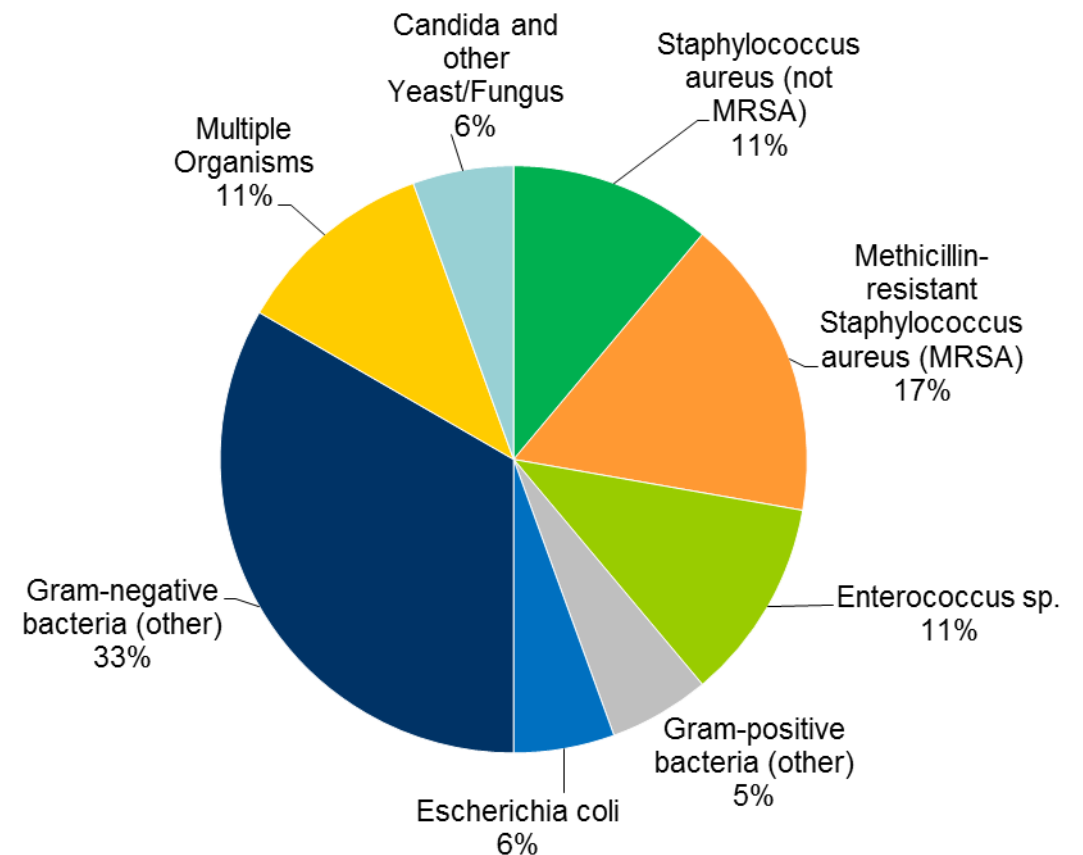
Key Findings

Efforts are being made to discontinue unnecessary CLs to reduce the risk for infection.

CL utilization in adult, pediatric and neonatal ICU types has remained relatively unchanged since the start of public reporting and is no different than the national utilization ratio.
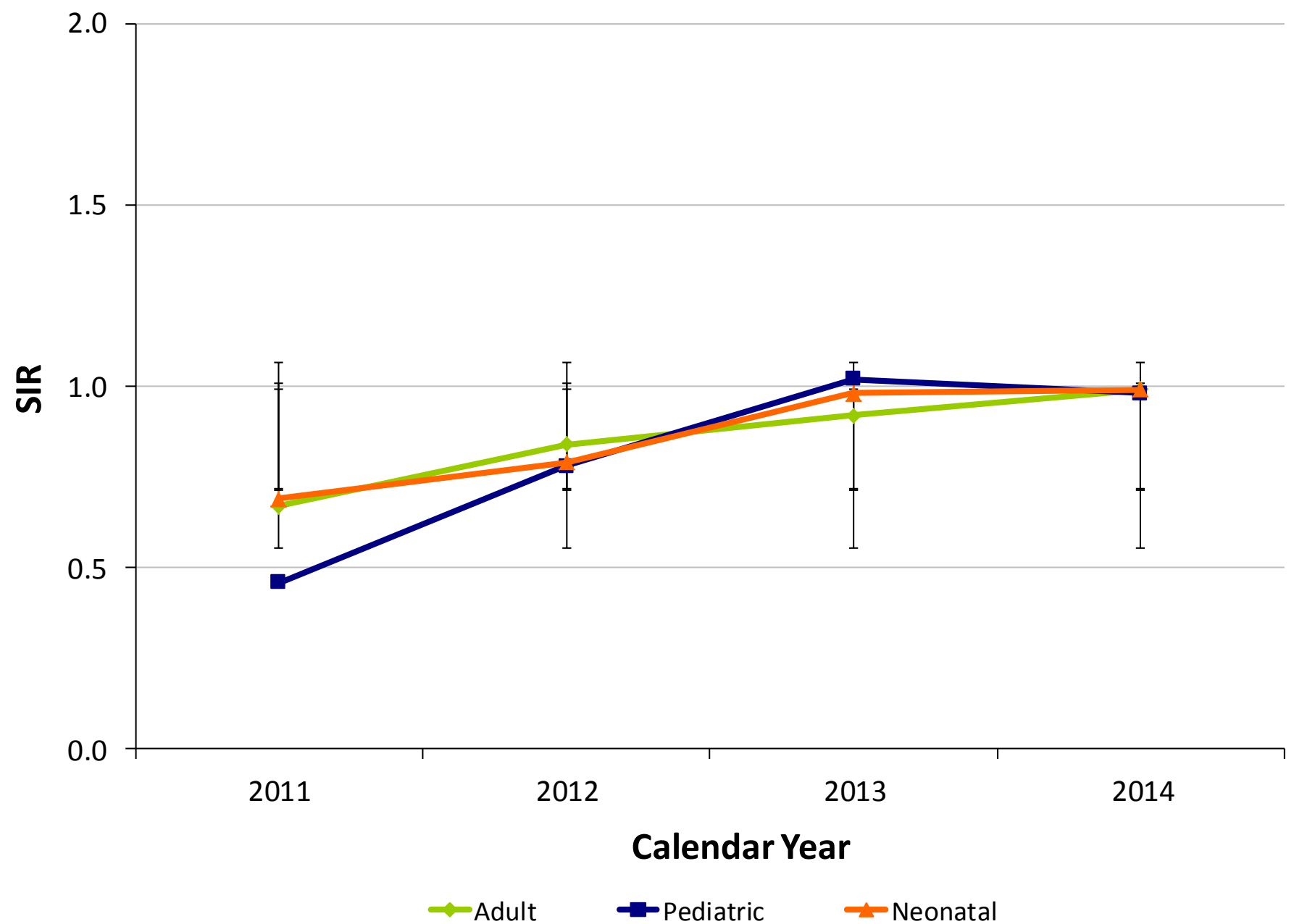
*The CL utilization ratio is calculated by dividing the number of CL days by the number of patient days.

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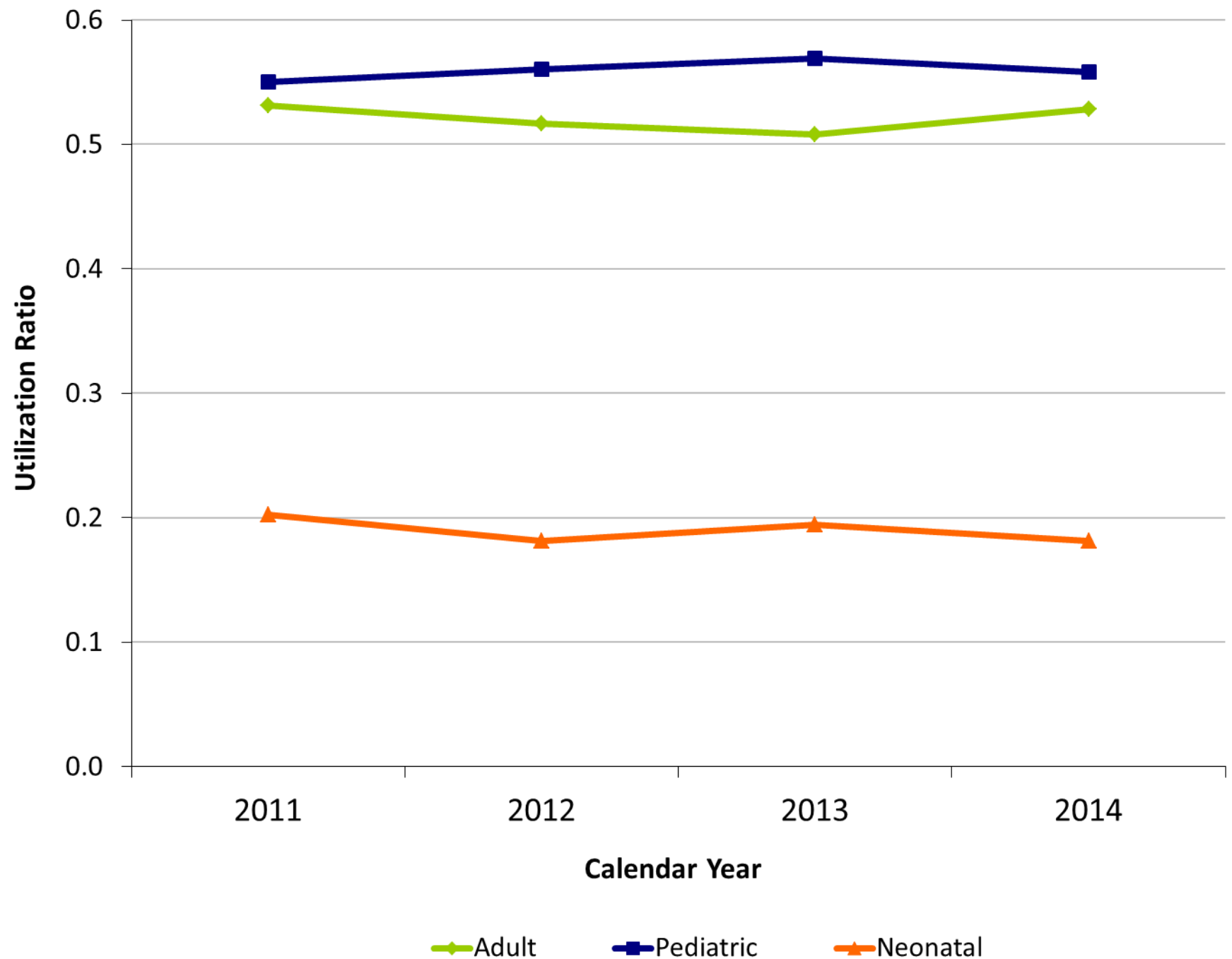
Key Findings

Massachusetts has maintained a statewide SIR at or below 1.0

There has not been a statistically significant change in the statewide CLABSI SIR over time.

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- For the past two years, Massachusetts' three trauma ICUs have experienced a significantly lower rate of infection as compared to the national baseline.

- Burn ICUs continue to experience a significantly higher rate of infection as compared to the national baseline.

- Statewide SIRs for adult, pediatric, and neonatal ICUs remain at the national baseline.

- Neonatal ICUs continue to reduce central line use, reducing the risk of CLABSI.
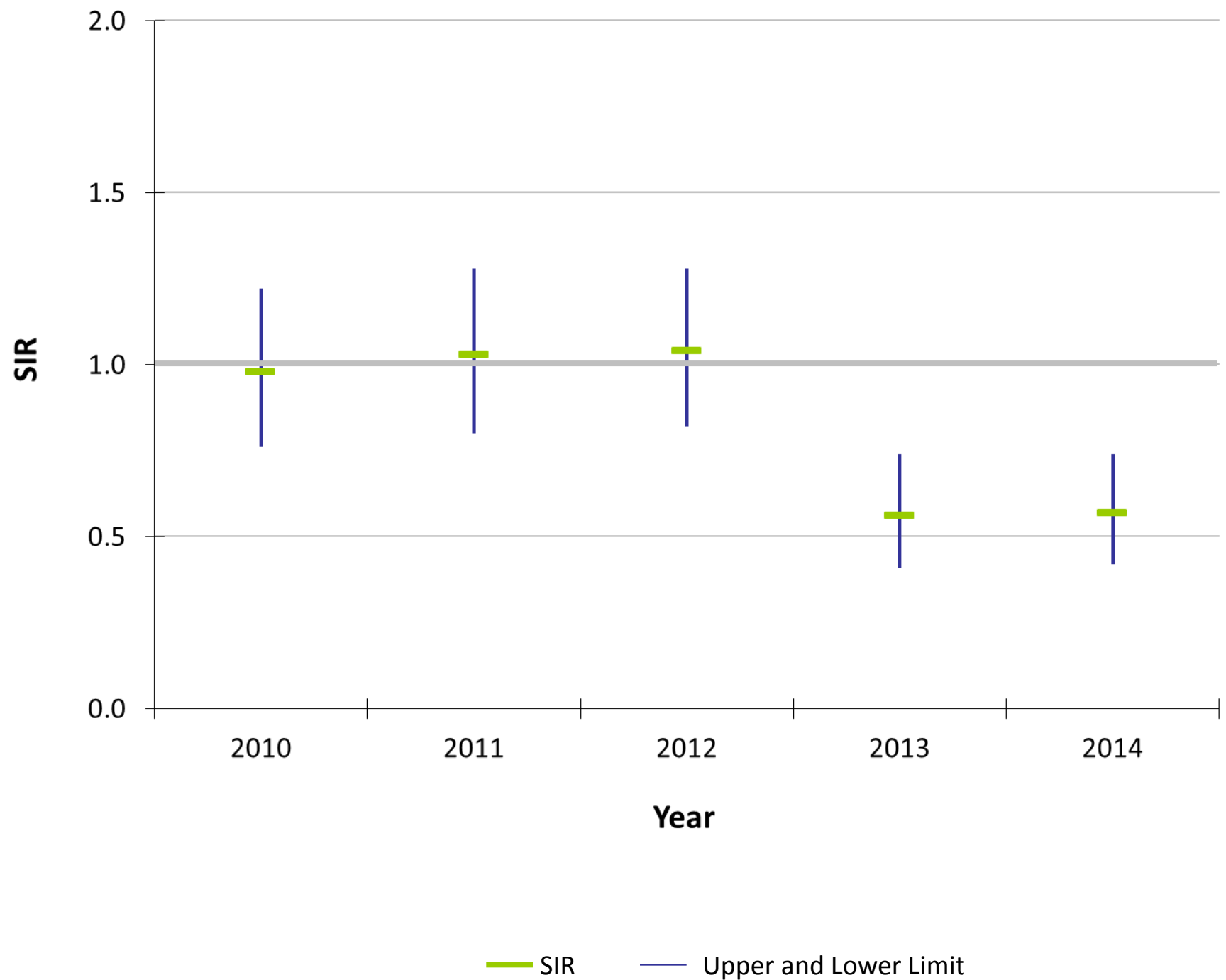
Key Findings

For the past four years, Massachusetts acute care hospitals performing CABG procedures experienced a **significantly lower** number of infections than expected, as compared to national baseline data.
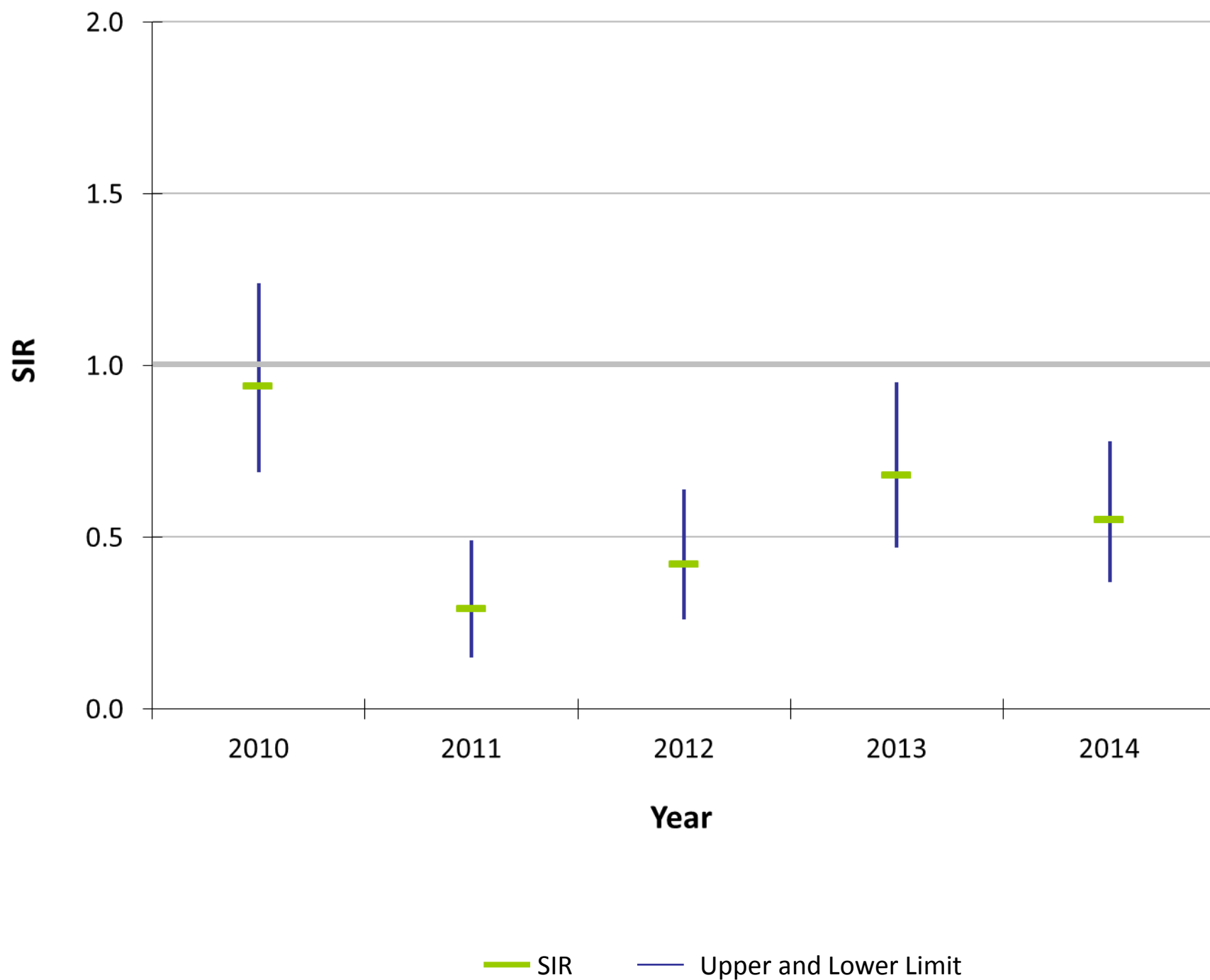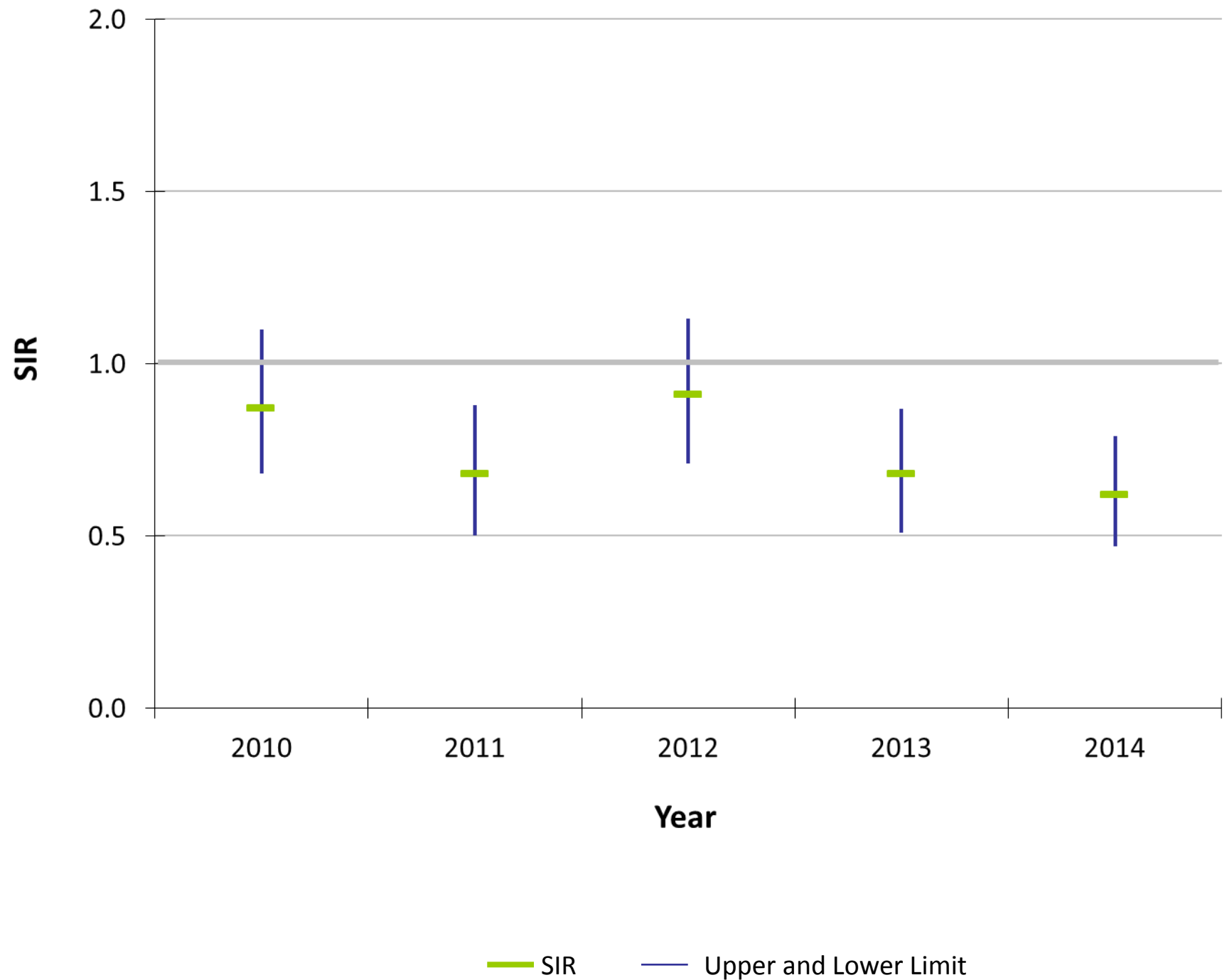
Key Findings

For the past two years, Massachusetts acute care hospitals performing KPRO procedures experienced a **significantly lower** number of infections than expected, as compared to national baseline data.
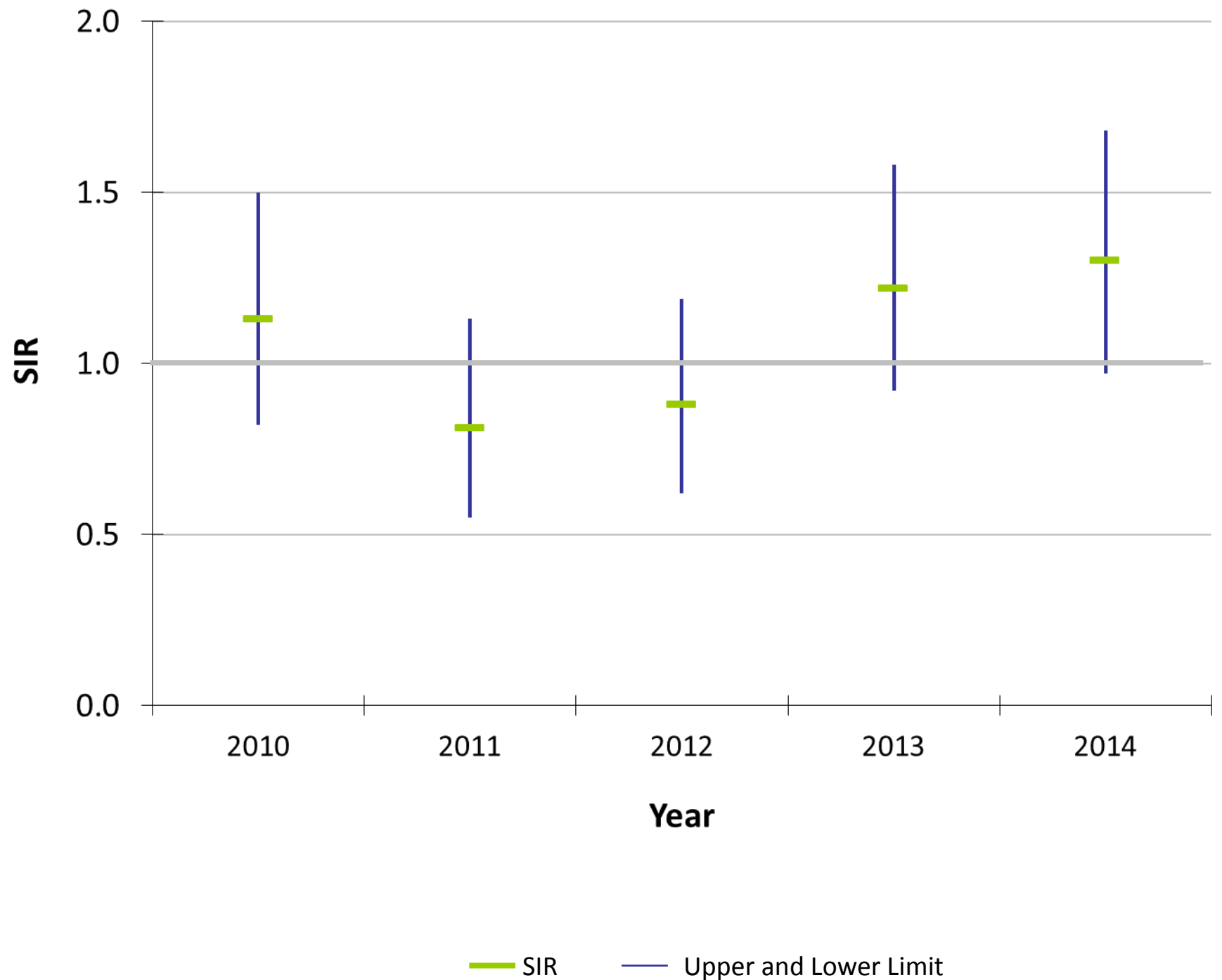
Key Findings

For the past two years, Massachusetts acute care hospitals performing HPRO procedures experienced a **significantly lower** number of infections than expected, as compared to national baseline data.

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Key Findings

In 2014, Massachusetts hospitals performing abdominal hysterectomy procedures had an infection rate **similar** to national baseline data.

Key Findings

In 2014, Massachusetts hospitals performing vaginal hysterectomy procedures experienced a **significantly higher** number of infections than expected, as compared to national baseline data.

There were 26 infections reported in 2014 out of 1,794 procedures performed.
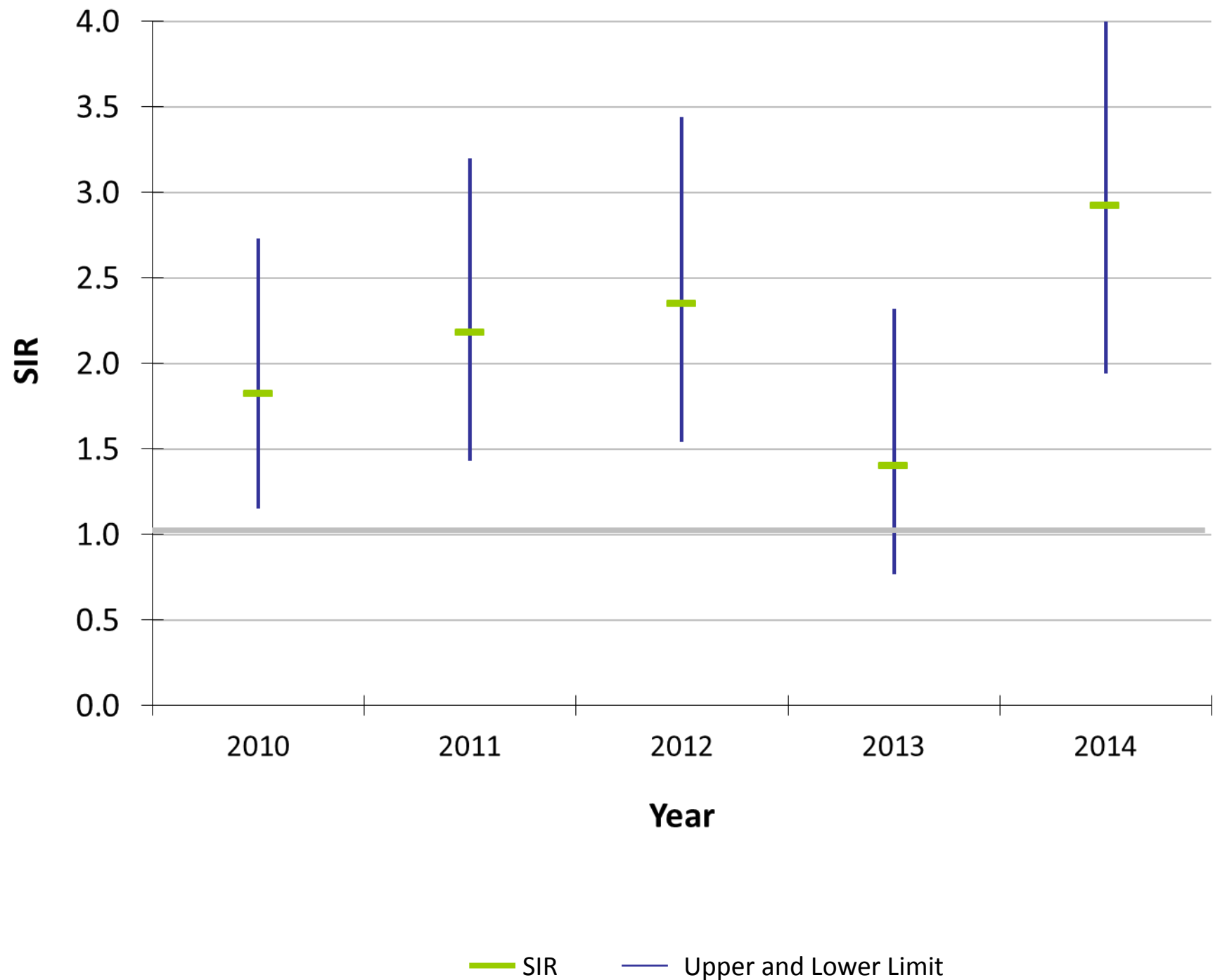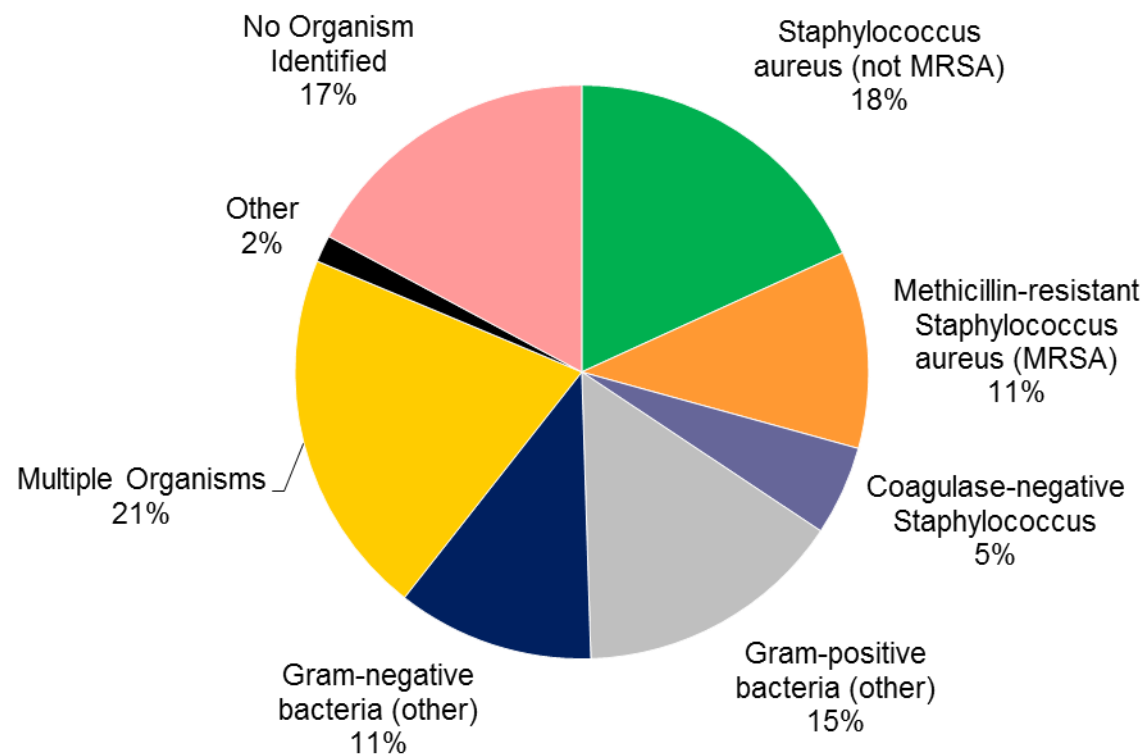
SSI Pathogens for 2013-2014
CABG, KPRO, HPRO, HYST, VHYS

Calendar Year 2013
January 1, 2013 – December 31, 2013
n=198

- No Organism Identified 17%
- Staphylococcus aureus (not MRSA) 18%
- Other 2%
- Methicillin-resistant Staphylococcus aureus (MRSA) 11%
- Multiple Organisms 21%
- Coagulase-negative Staphylococcus 5%
- Gram-negative bacteria (other) 11%
- Gram-positive bacteria (other) 15%

Calendar Year 2014
January 1, 2014 – December 31, 2014
n=210

- No Organism Identified 15%
- Staphylococcus aureus (not MRSA) 22%
- Methicillin-resistant Staphylococcus aureus (MRSA) 7%
- Multiple Organisms 25%
- Coagulase-negative Staphylococcus 9%
- Gram-negative bacteria (other) 12%
- Gram-positive bacteria (other) 10%

VHYS

Significantly Higher than Predicted

The number of infections reported is higher than the number of predicted infections.

HYST

Same as Predicted

The number of infections reported is the same as the number of predicted infections.

**CABG
KPRO
HPRO**

Significantly Lower than Predicted

The number of infections reported is lower than the number of predicted infections.

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- The HAI program is a "cross bureau" collaboration comprised of key DPH components including the Bureau of Healthcare Safety and Quality and Bureau of Infectious Disease.

- Program Objectives:
  - Provide meaningful data for public reports and to guide quality improvement
  - Support provider collaborative learning
  - Promote adherence to evidence based preventive best practices.

- Data for Action: DPH uses the following data sources to guide quality improvement efforts:
  - HAI reporting
  - Findings from the survey and certification process
  - Communicable disease reporting
  - Serious Reportable Event (SRE) incident reports for facilities located within hospital settings.

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- External validation is essential to ensure high quality surveillance data .

- MDPH received competitive funding to support validation efforts for 2014-2015.

- The NHSN 2013 External Validation Guidance and Toolkit were used to identify 18 targeted and two random (5%) hospitals for validation of surgical site infections (SSIs) following abdominal hysterectomy (HYST) procedures.

  – Selected hospitals were identified using a targeted selection algorithm developed by the CDC that targets facilities with high volume of exposure to HAI risk.

- A team of MDPH epidemiologists conducted on-site validation visits to review medical records.

- Findings from hospital specific validation visits are summarized in a report and shared with hospital Infection Preventionists following the site visit.

- Information learned through the process has been shared with CDC.

Hemodialysis Infection Prevention

– Expands initiatives beyond the acute care hospital setting.

– DPH partnered with the Centers for Disease Control and Prevention (CDC), the End Stage Renal Disease Network and dialysis providers.

First year goals:

– Gain an understanding of current infection prevention practices at MA dialysis centers

– Develop curriculum for a one-day, in-person infection prevention training for nurses working in outpatient dialysis centers

Long-term goals:

– Provide ongoing guidance to dialysis providers on infection prevention practices

– Improve the care of individuals receiving dialysis treatment in Massachusetts

Infection Prevention Best Practices In Hemodialysis

Tuesday, May 19, 2015 — **St. Elizabeth's Medical Center - Boston**
Thursday, June 4, 2015 — **Saint Vincent Hospital - Worcester**

This one day training for dialysis nurses will 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
- Describe the risk factors, disease burden, and progression of hepatitis C
- Create an Infection Prevention "Toolkit" using CDC guidance and resources
- Use a simulation lab as a patient care educational teaching method

Presented by the Massachusetts Department of Public Health
Nursing CEUs will be provided

- Continue to engage stakeholders in our two infection initiatives.
- 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

- Please direct any questions to:
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