

# Health Care Associated Infections in 2015

## Acute Care Hospitals

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**Public Health Council**  
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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](#))

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).

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)

- 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

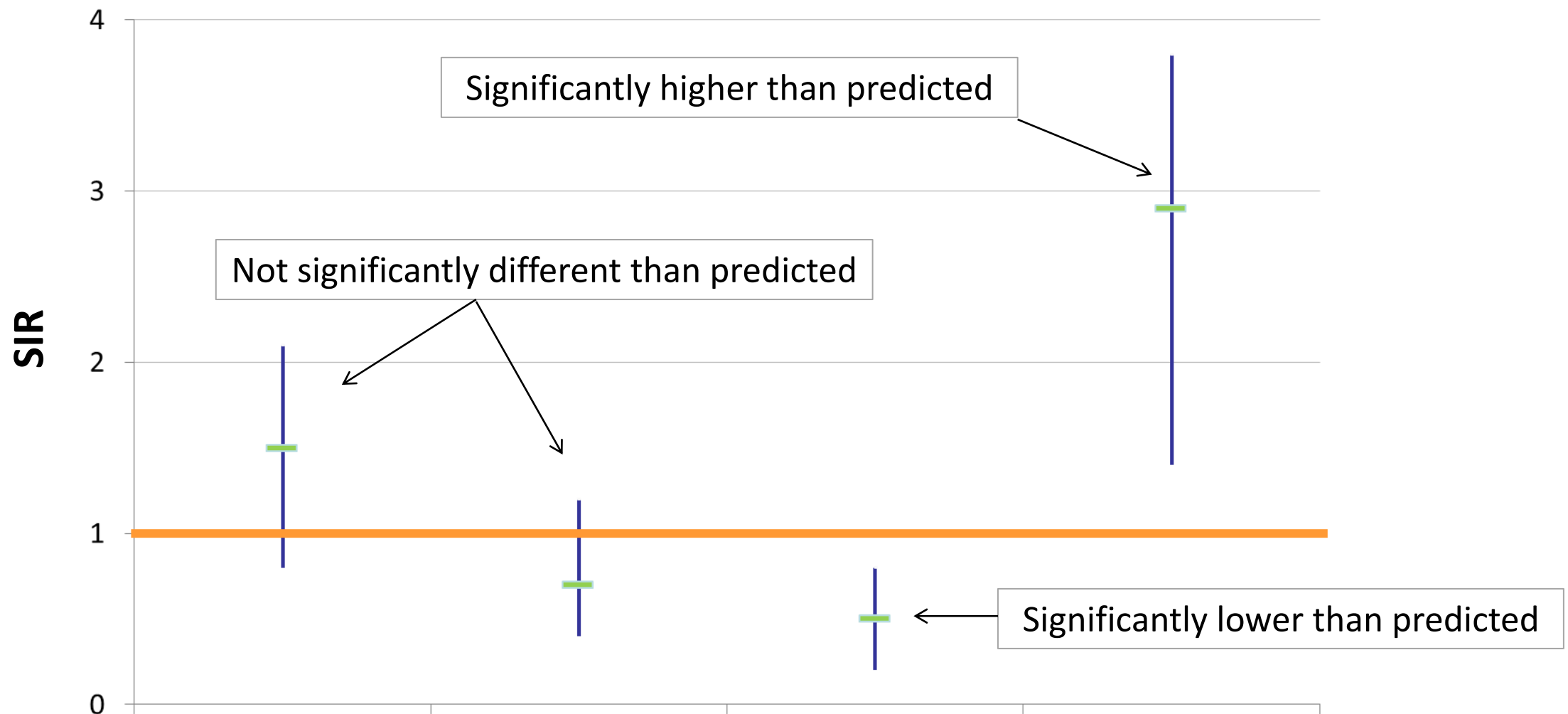
- Central Line Utilization Ratio

$$\text{Central Line Utilization Ratio} = \frac{\text{Number of Central Line Days}}{\text{Number of Patient Days}}$$

- Urinary Catheter Utilization

$$\text{Urinary Catheter Utilization Ratio} = \frac{\text{Number of Urinary Catheter Days}}{\text{Number of Patient Days}}$$

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



The **green** horizontal bar represents the SIR, and the **blue** vertical bar represents the 95% confidence interval (CI). The 95% CI measures the probability that the true SIR falls between the two parameters.

- If the blue vertical bar crosses 1.0 (highlighted in **orange**), then the actual rate is not statistically significantly different from the predicted rate.
- If the blue vertical bar is completely above or below 1.0, then the actual is statistically significantly different from the predicted rate.

- National Healthcare Safety Network (NHSN) groups Catheter Associated Urinary Tract Infections (CAUTIs) into two categories:
  - Symptomatic urinary tract infection (SUTI)
    - Positive urine culture with no more than two species of organisms
    - Signs or symptoms with no other recognized cause
  - 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

## Key Findings

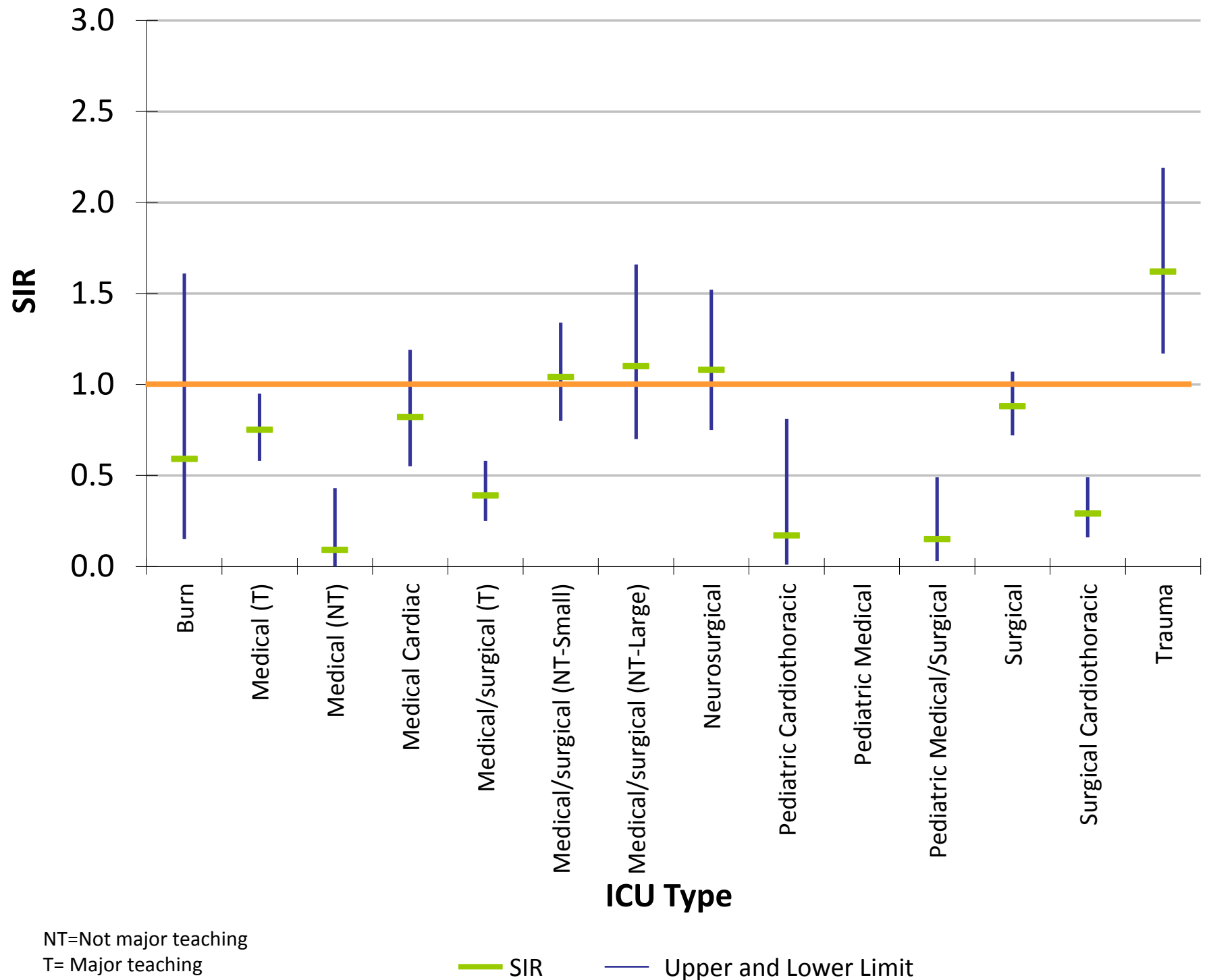
Six ICU types had a significantly lower rate of infection compared to the national baseline:

- 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.



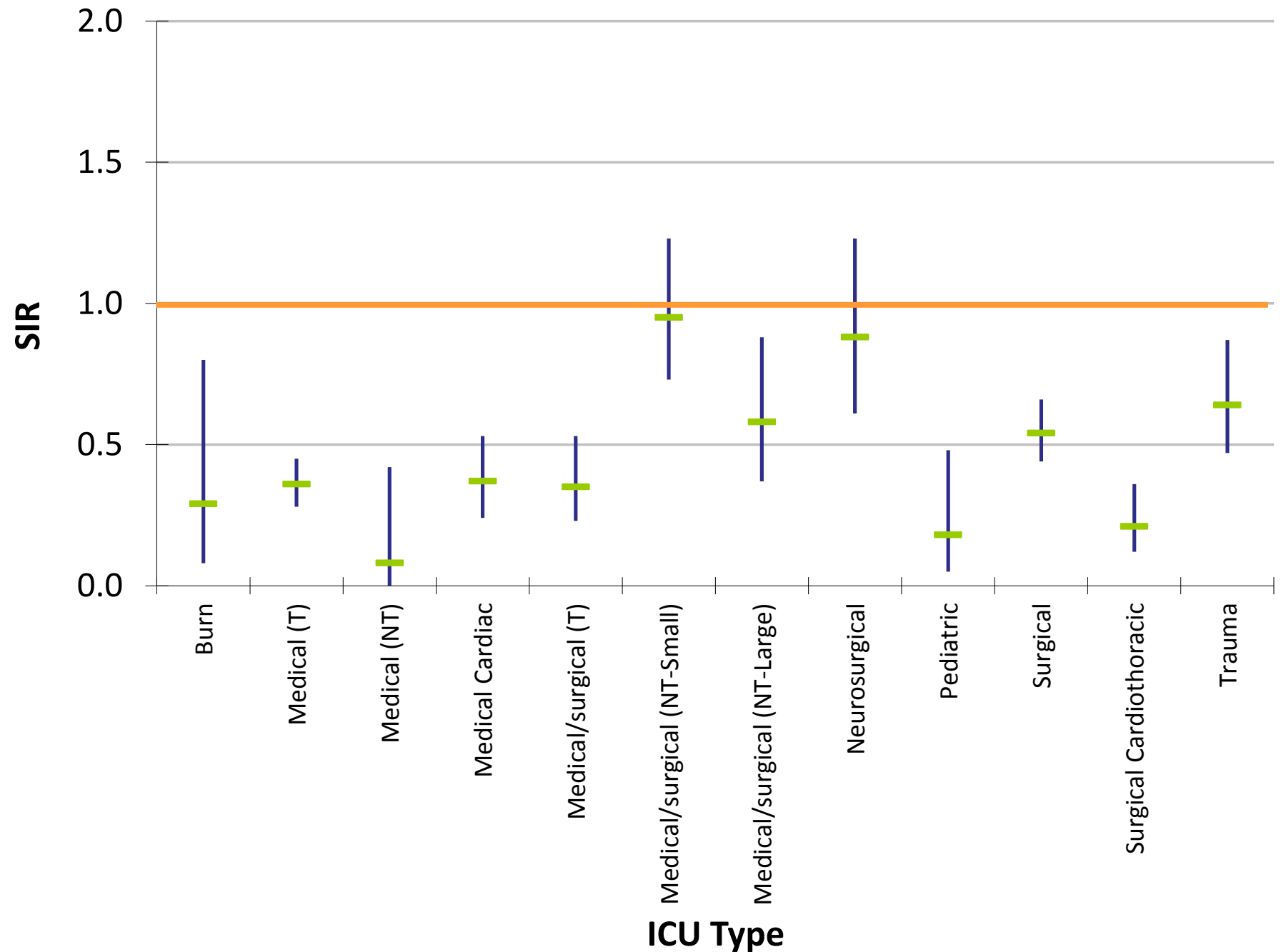
# Massachusetts CAUTI Rates Compared to State Comparator\*, by ICU Type

January 1, 2015-December 31, 2015

## Key Findings

All but two ICU types (Medical/surgical NT-Small and Neosurgical) 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.



NT=Not major teaching  
T= Major teaching

— SIR

— Upper and Lower Limit

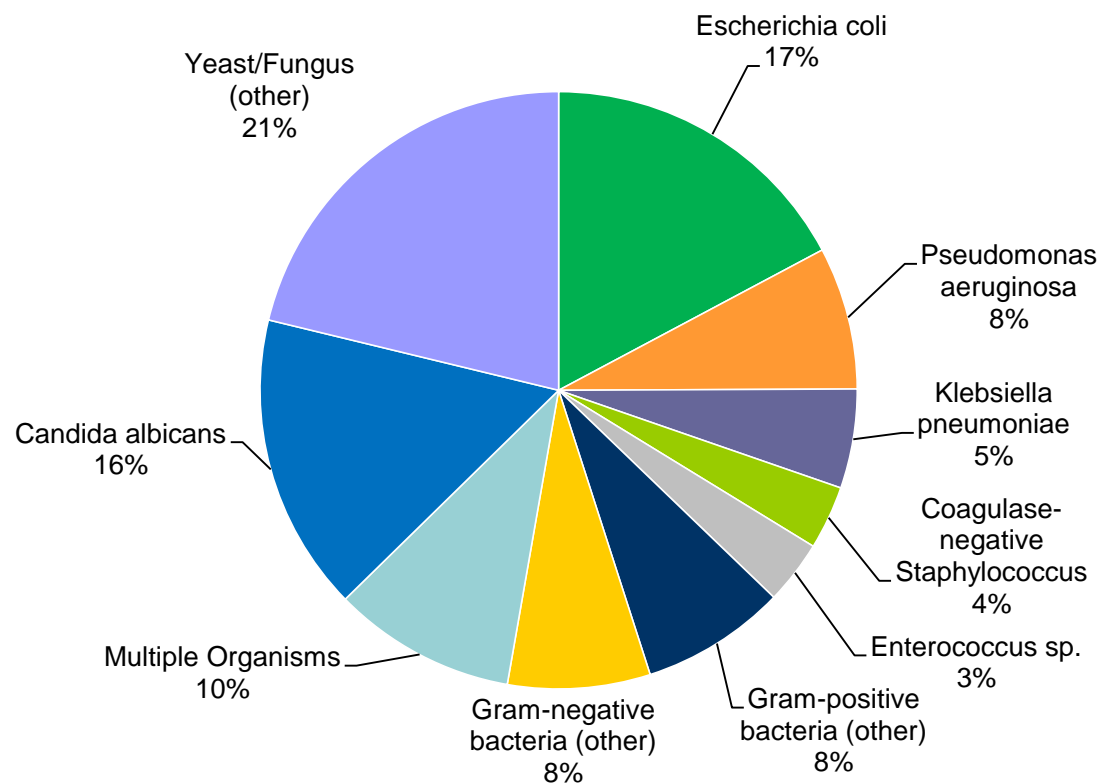


# CAUTI Adult & Pediatric ICU Pathogens for 2014 and 2015

## Calendar Year 2014

January 1, 2014 – December 31, 2014

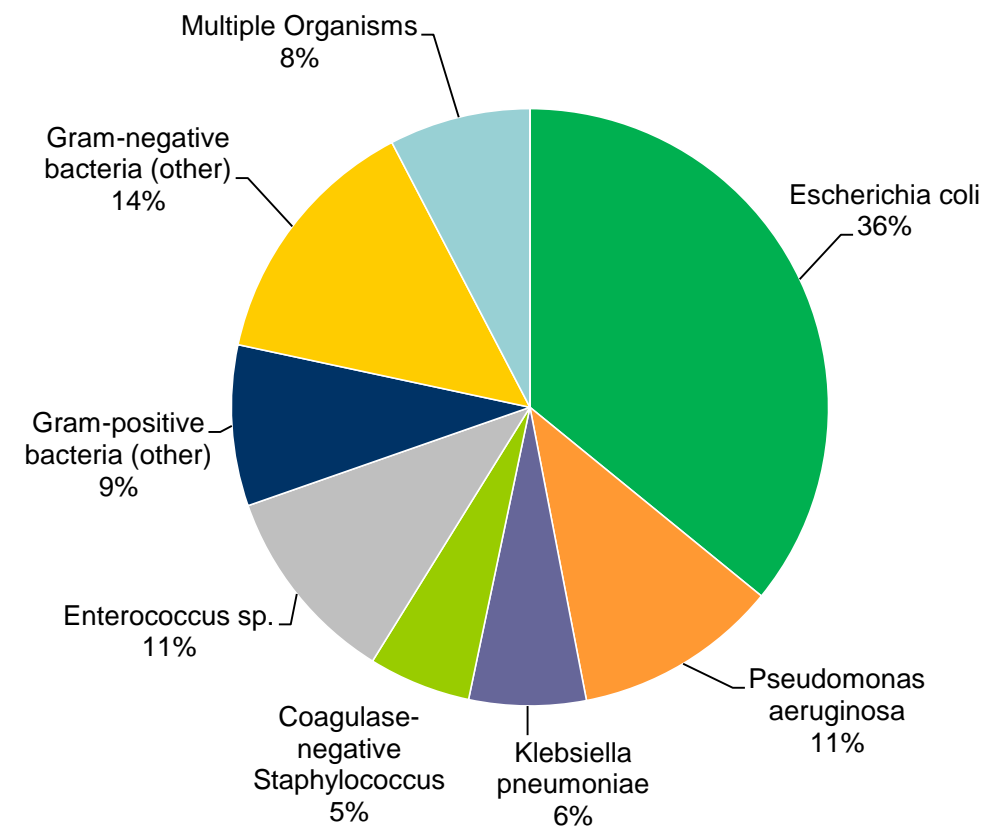
*n*=726



## Calendar Year 2015

January 1, 2015 – December 31, 2015

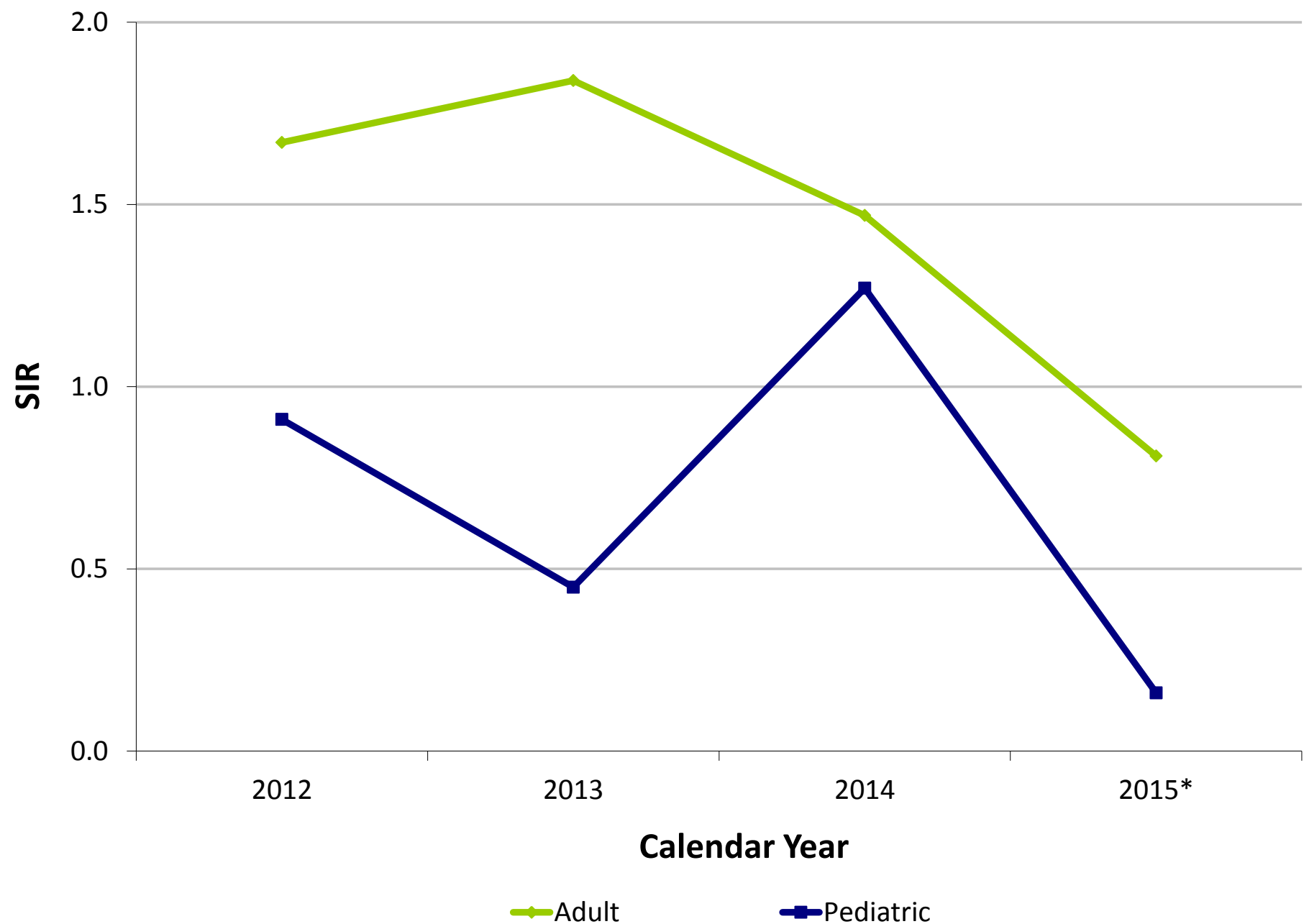
*n*=379



## 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

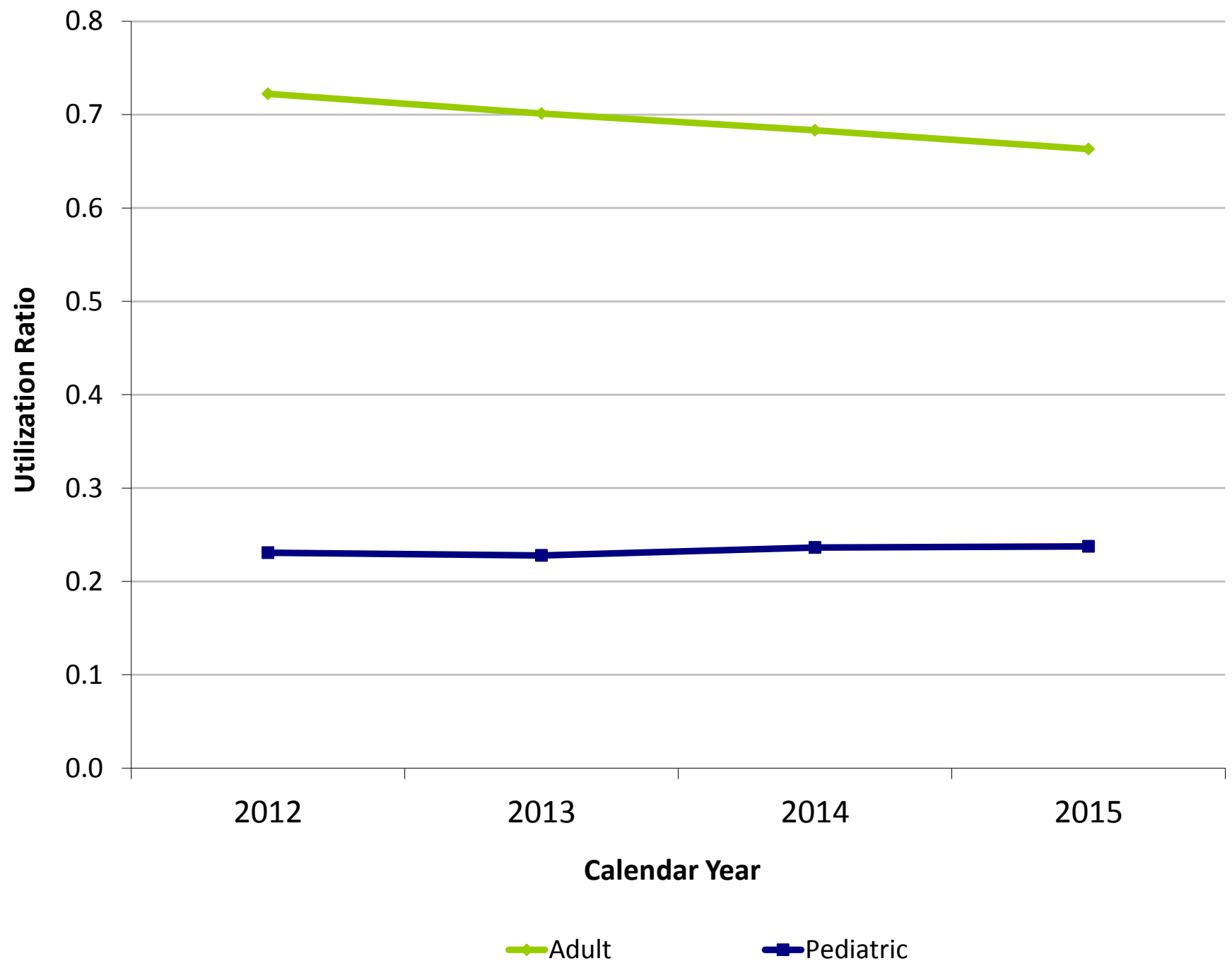


# State Urinary Catheter Utilization Ratios

## 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.



- 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

## Key Findings

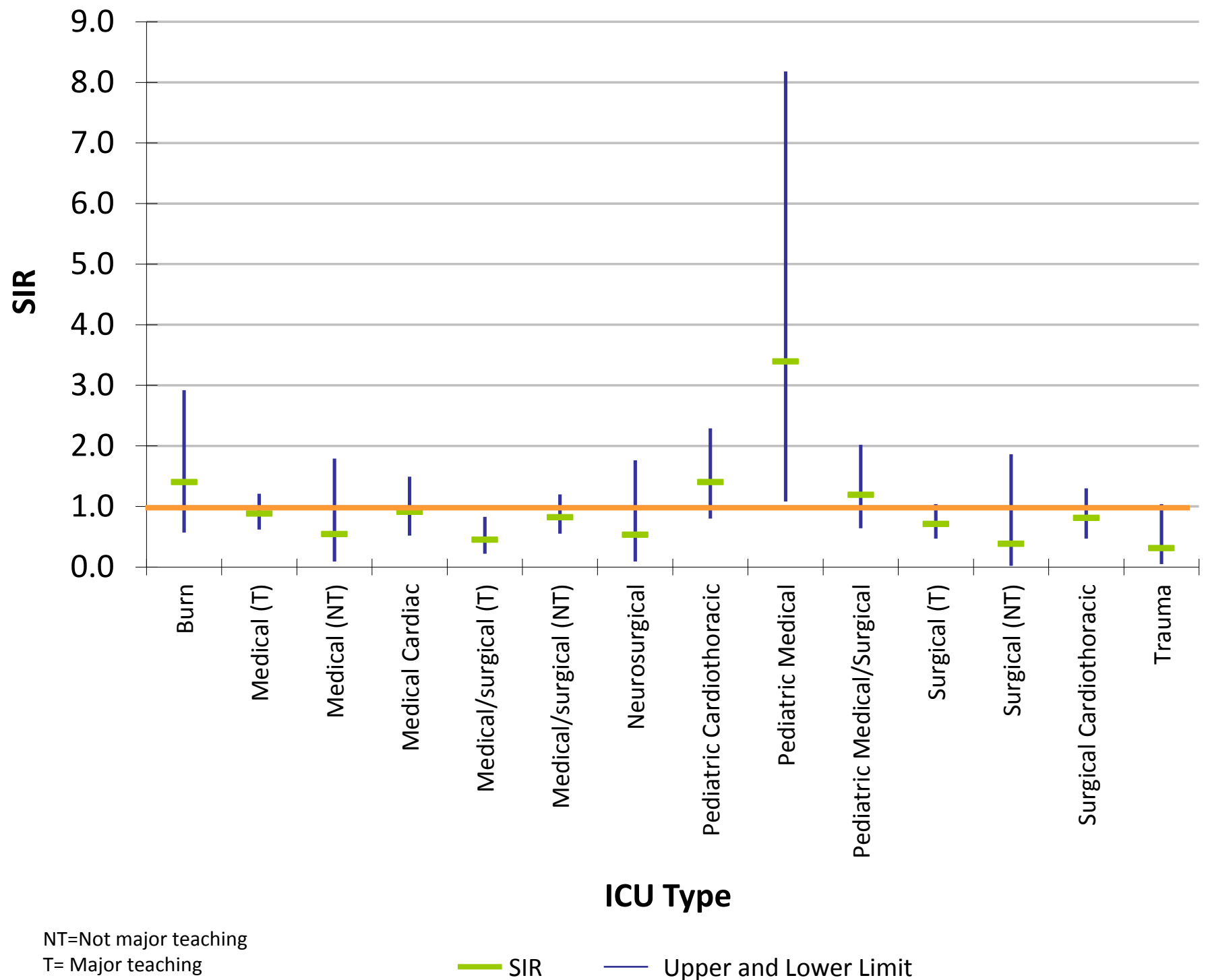
One ICU type had a significantly lower rate of infection compared to the national baseline:

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.



# Massachusetts Criteria 1, 2 and 3 CLABSI Rates Compared to State Comparator\*, by ICU Type

January 1, 2015-December 31, 2015

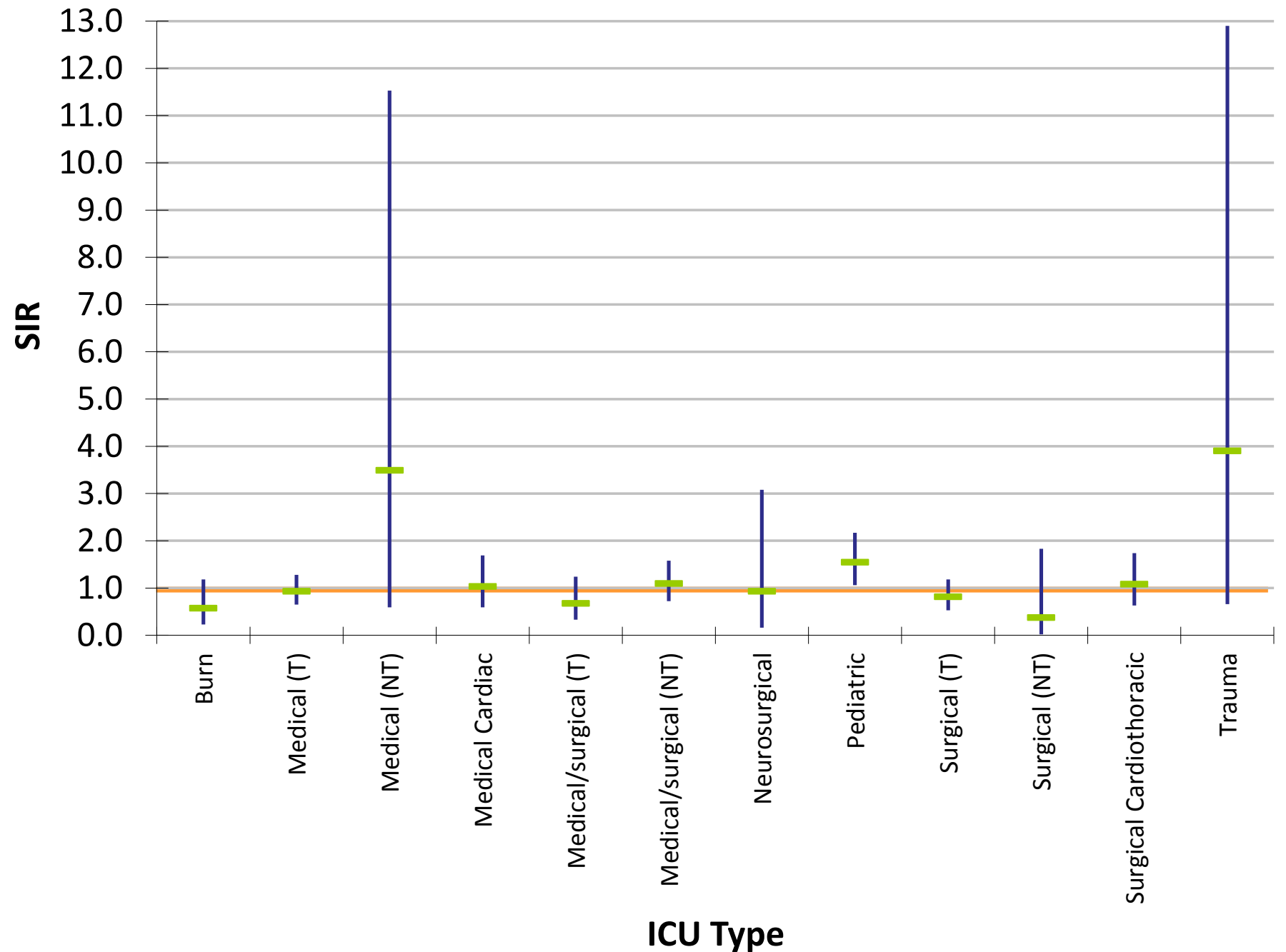
## Key Findings

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 2013-2014.



NT=Not major teaching  
T= Major teaching

— SIR

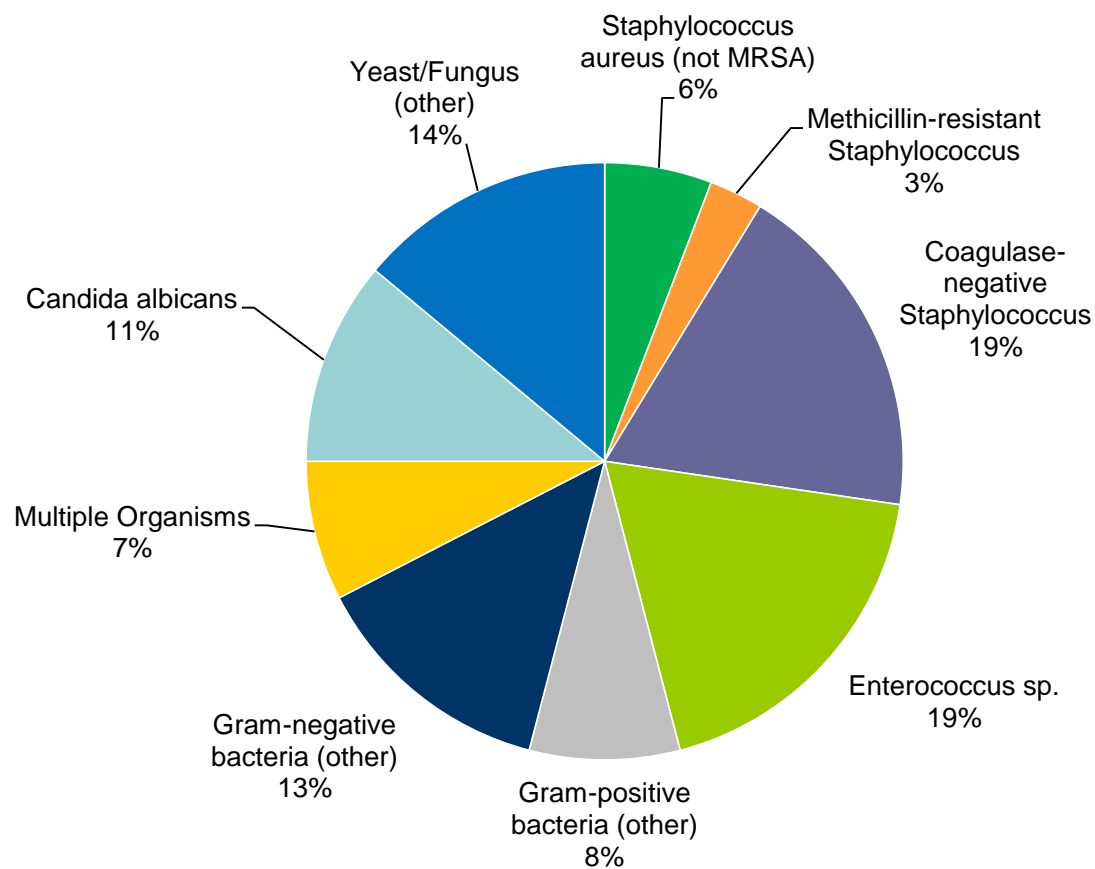
— Upper and Lower Limit

# CLABSI Adult & Pediatric ICU Pathogens for 2014 and 2015

## Calendar Year 2014

January 1, 2014 – December 31, 2014

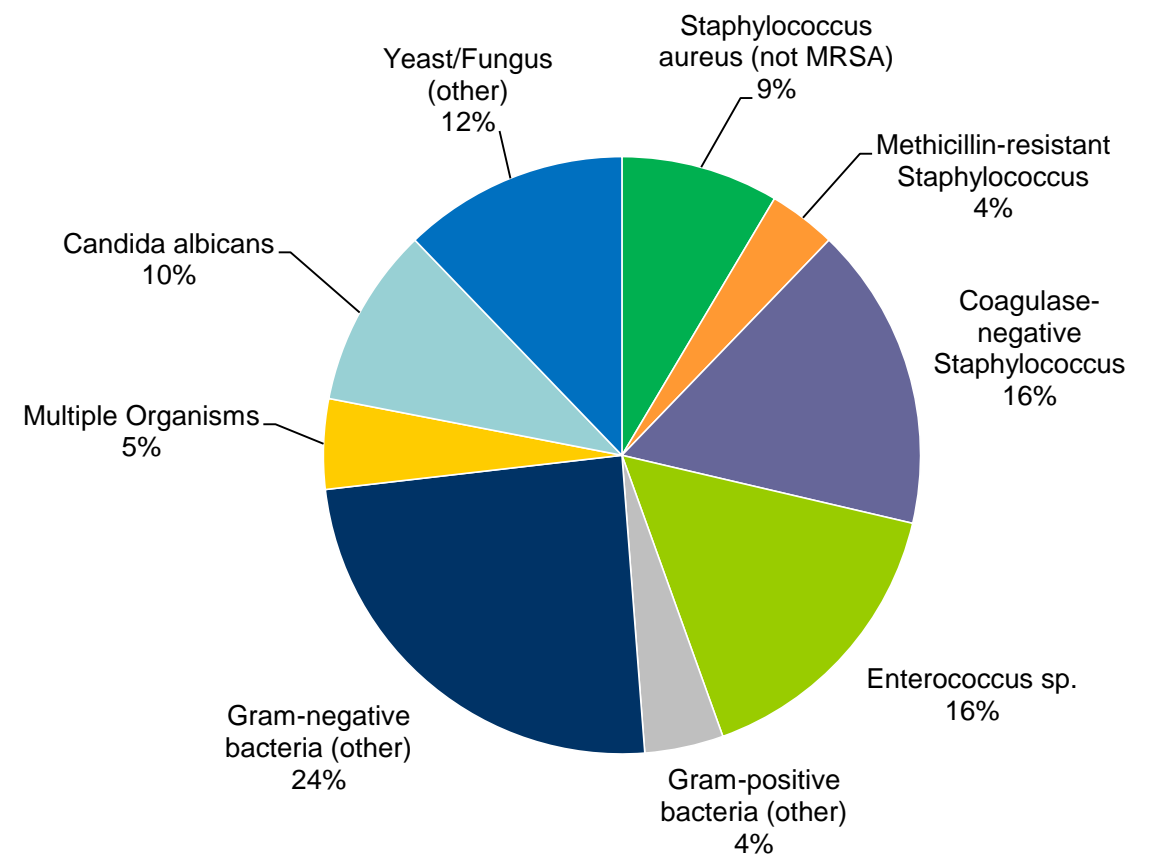
*n*=172



## Calendar Year 2015

January 1, 2015 – December 31, 2015

*n*=164



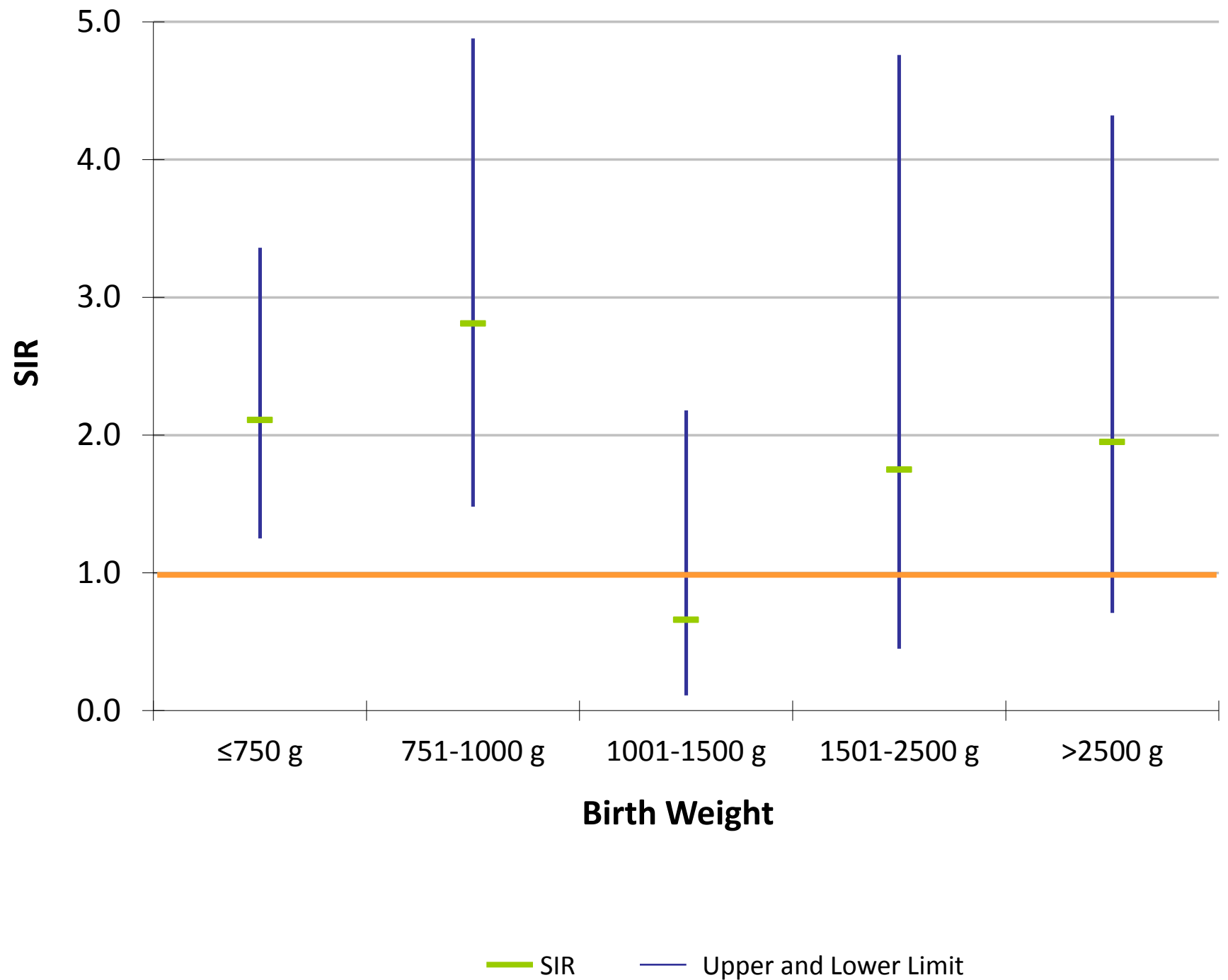
# Massachusetts Criteria 1, 2, and 3 CLABSI Rates in NICUs compared to National Baseline Rates, by Birth Weight Category

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.





# Massachusetts Criteria 1, 2 and 3 CLABSI Rates in NICUs compared to State Comparator\*, by Birth Weight Category

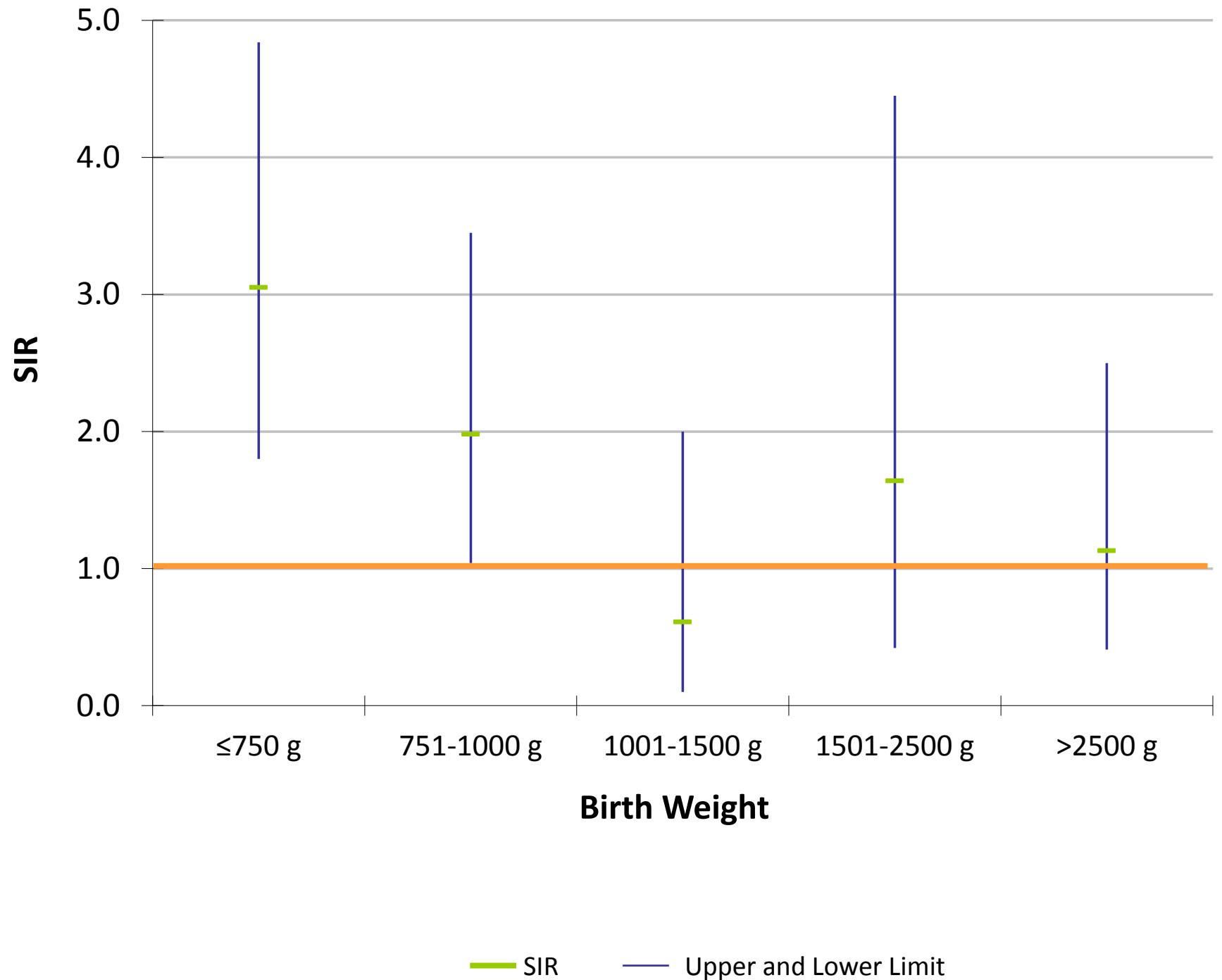
January 1, 2015-December 31, 2015

## 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

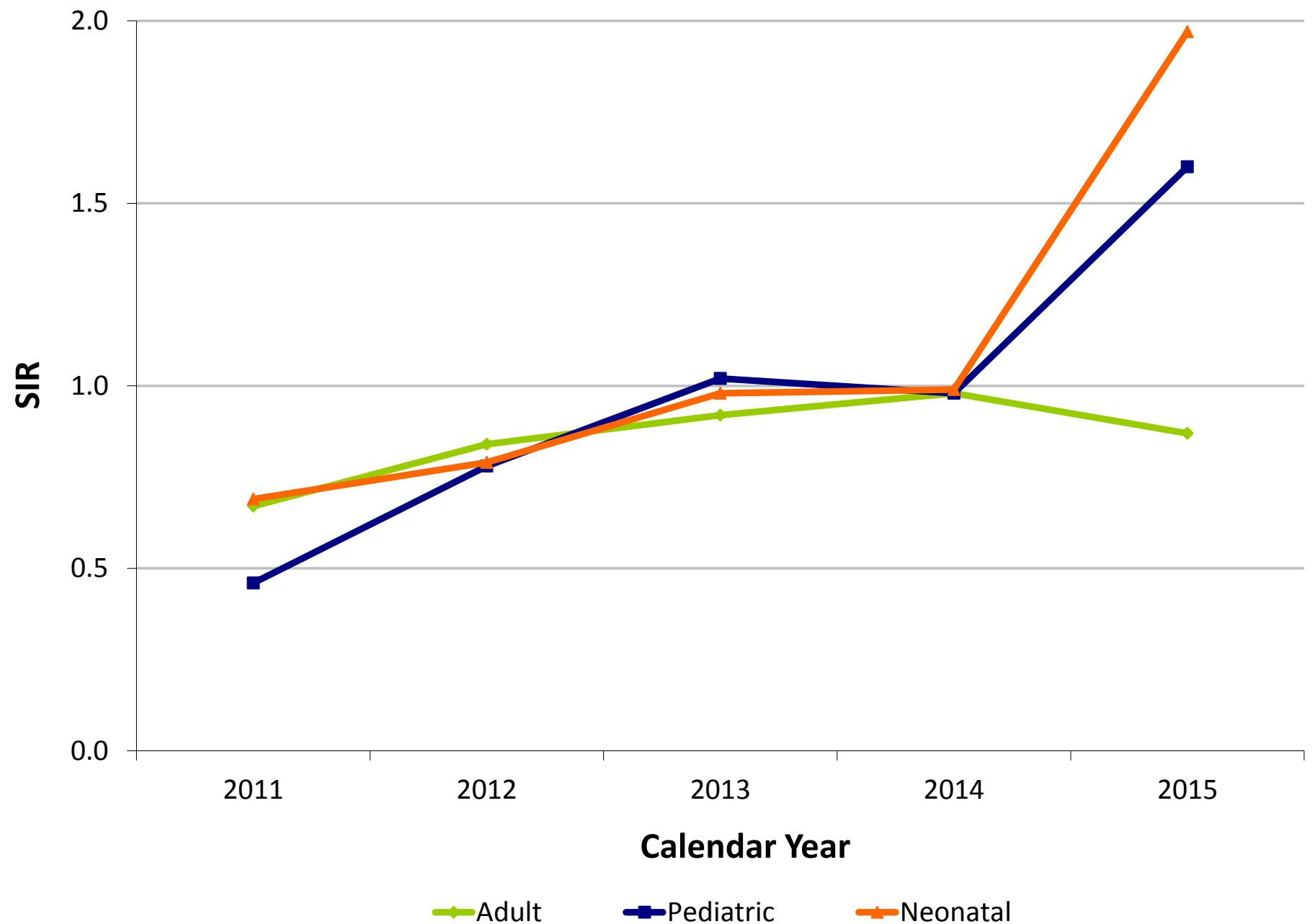


## Key Findings

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.

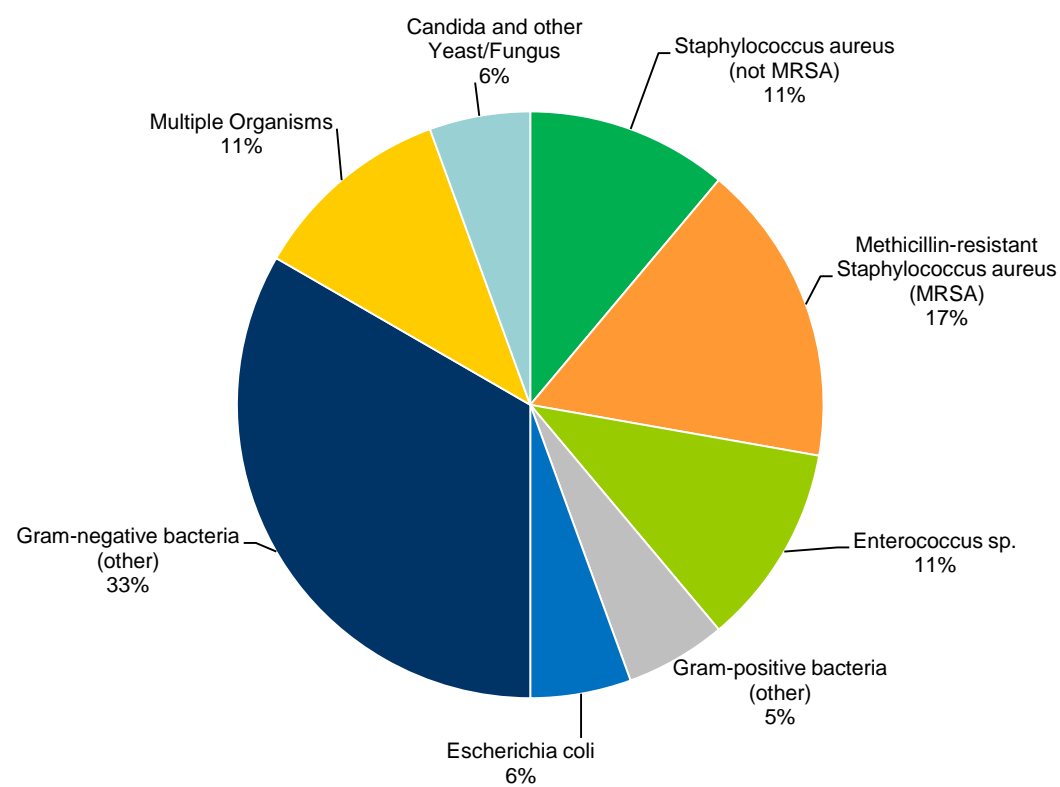


# CLABSI NICU Pathogens for 2014 and 2015

## Calendar Year 2014

January 1, 2014– December 31, 2014

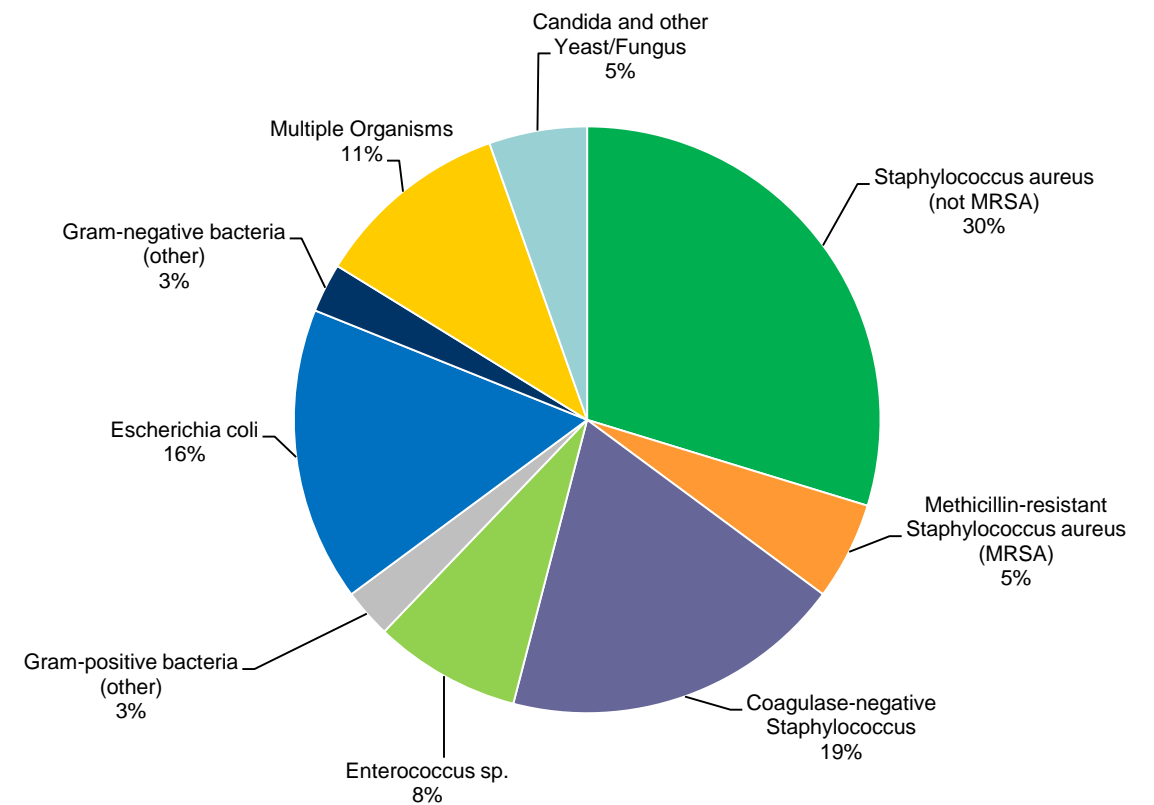
*n*=18



## Calendar Year 2015

January 1, 2015– December 31, 2015

*n*=37

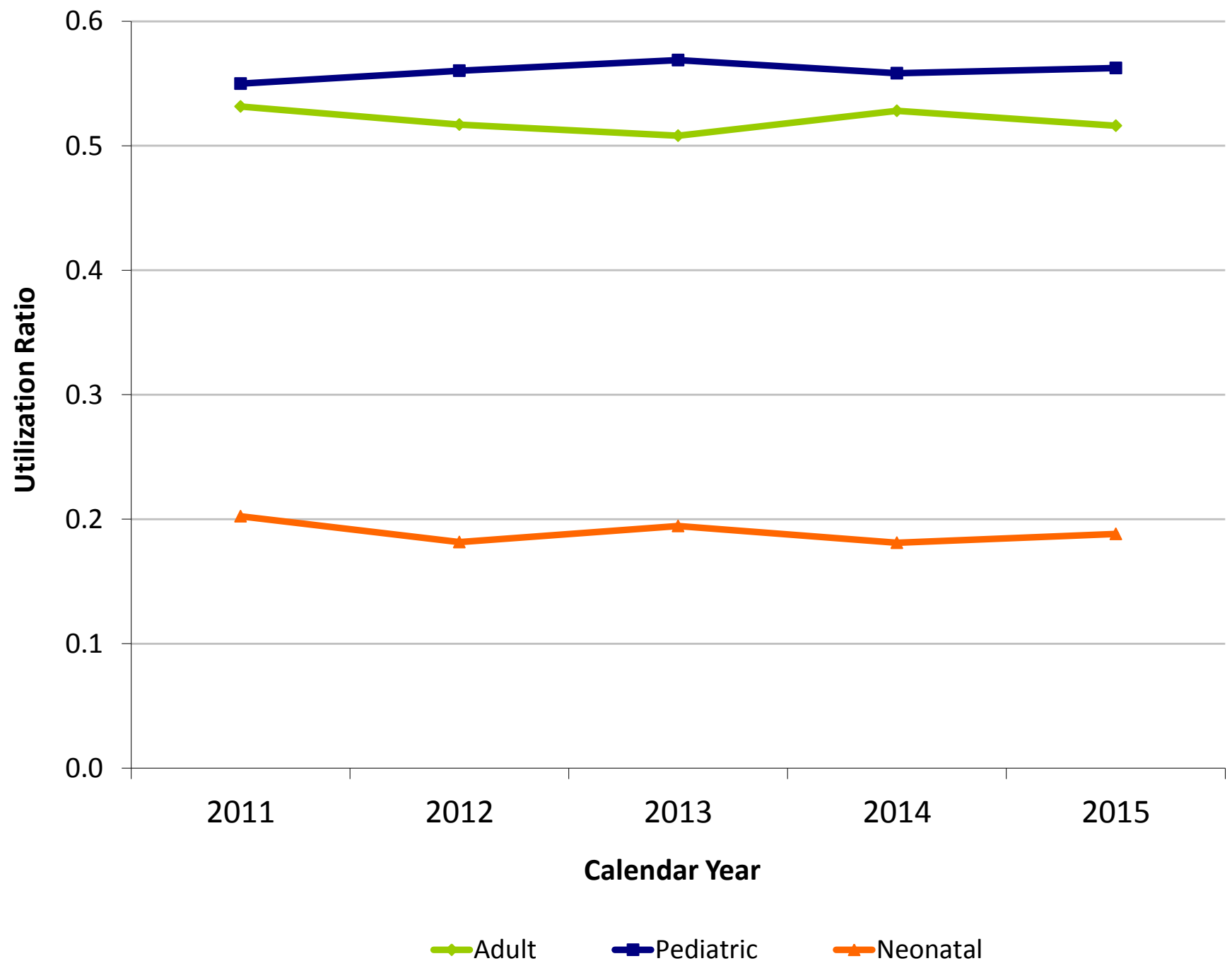


# State Central Line (CL) Utilization Ratios

## Key Findings

Discontinuing unnecessary central lines can reduce the risk for infection.

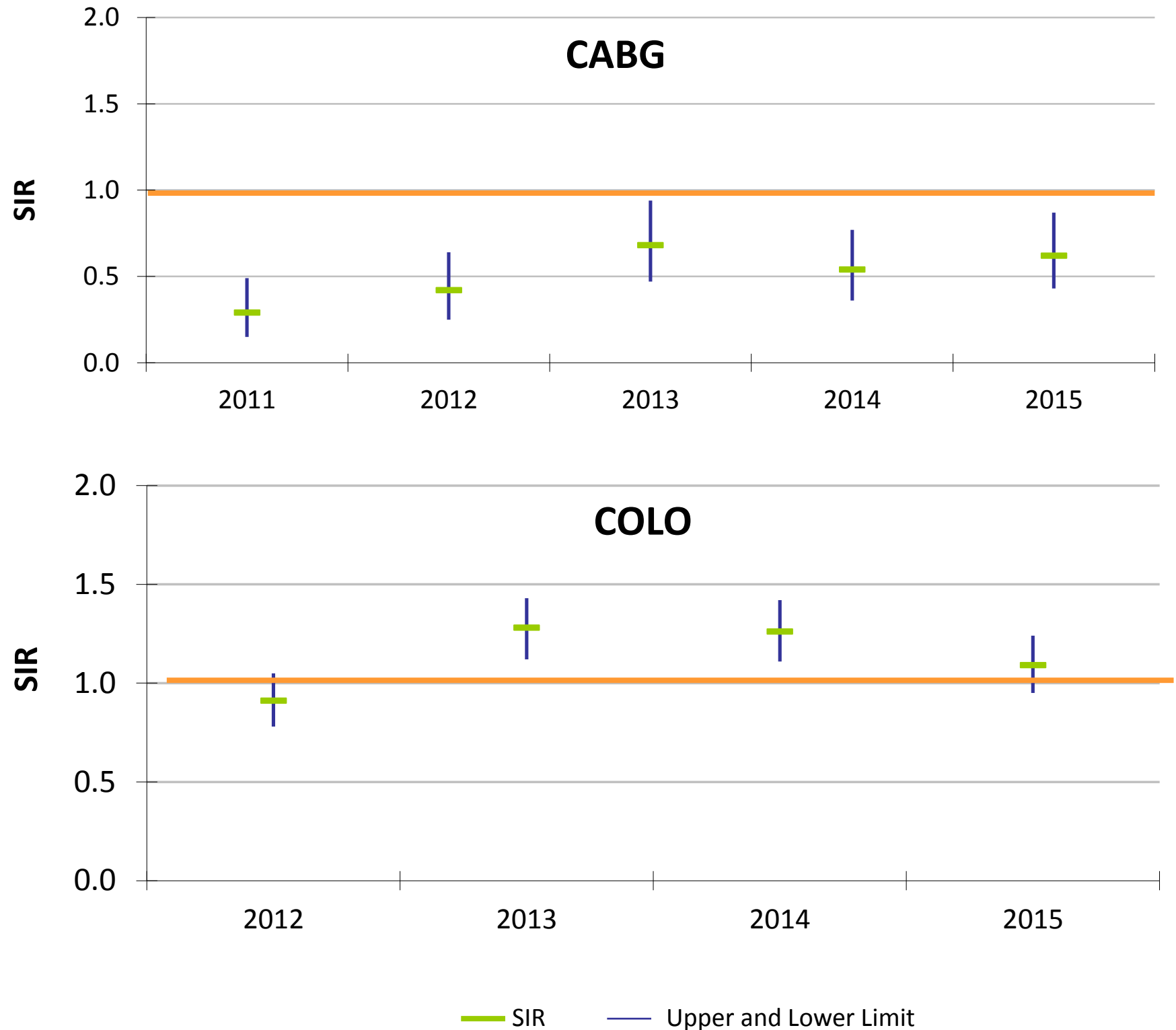
CL utilization in neonatal ICU types has remained low and relatively unchanged since the start of public reporting.



## Key Findings

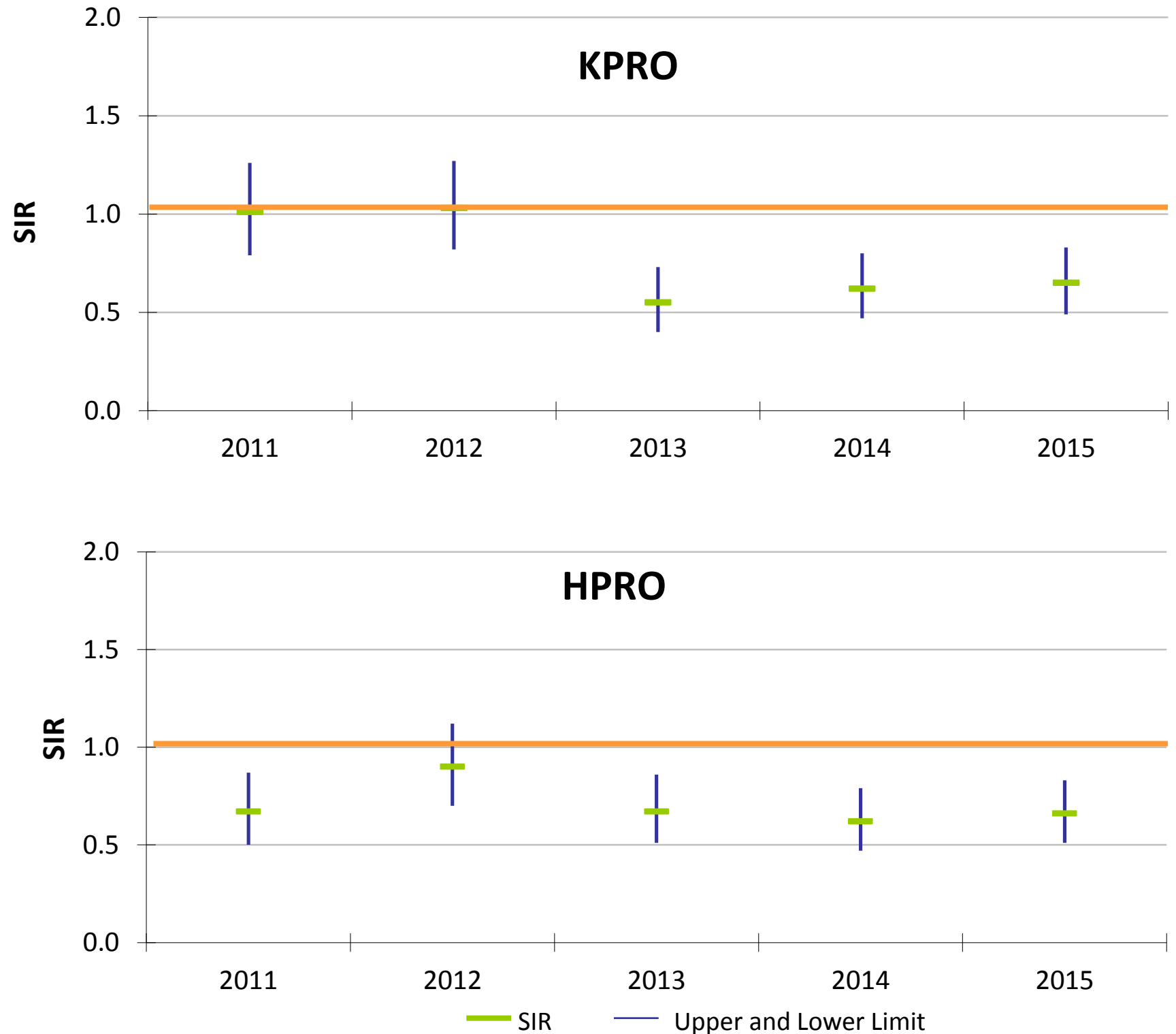
For the past five years, MA acute care hospitals performing coronary artery bypass graft procedures experienced a significantly lower number of infections than expected, as compared to the national baseline data. There were 31 CABG SSIs reported.

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



## 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.

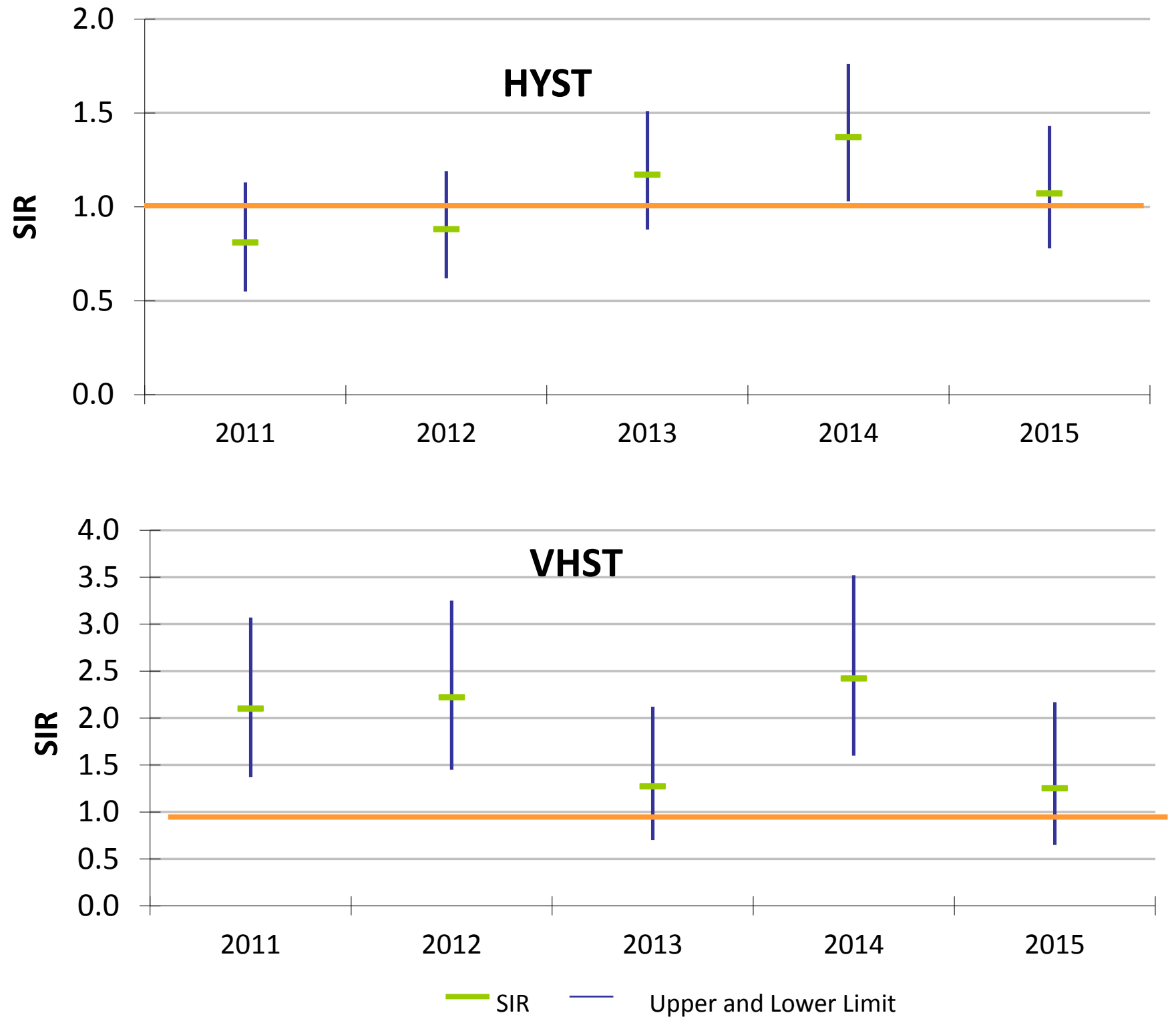


## SSI: Abdominal Hysterectomy (HYST) SIR and Vaginal Hysterectomy (VHYS) SIR

### 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.



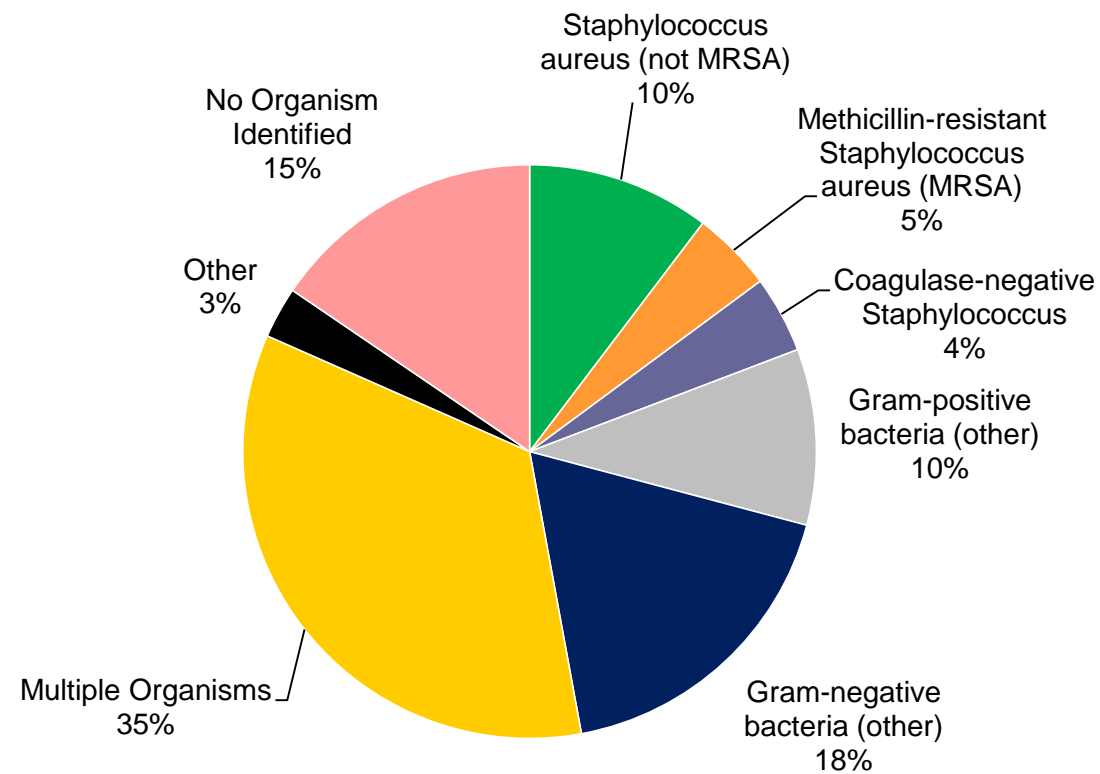
# SSI Pathogens for 2014-2015

CABG, KPRO, HPRO, HYST, VHYS, COLO

## Calendar Year 2014

January 1, 2014– December 31, 2014

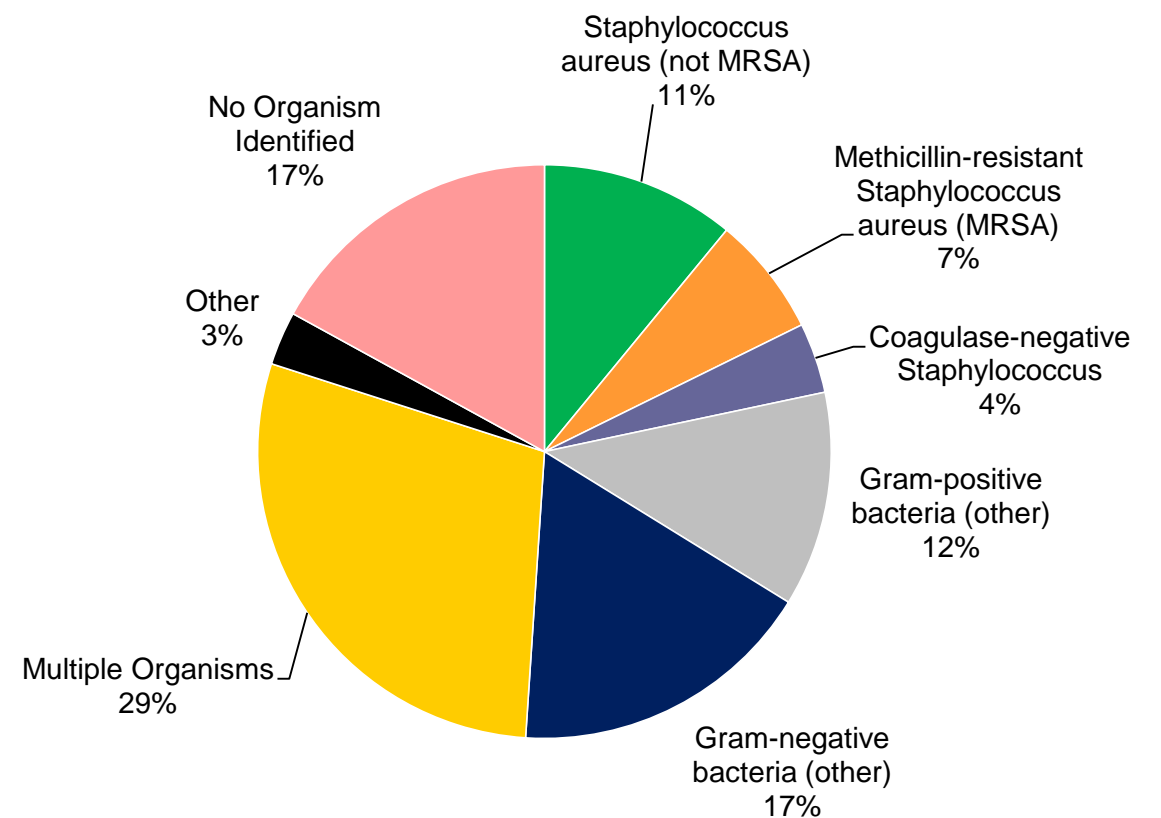
*n*=484



## Calendar Year 2015

January 1, 2015 – December 31, 2015

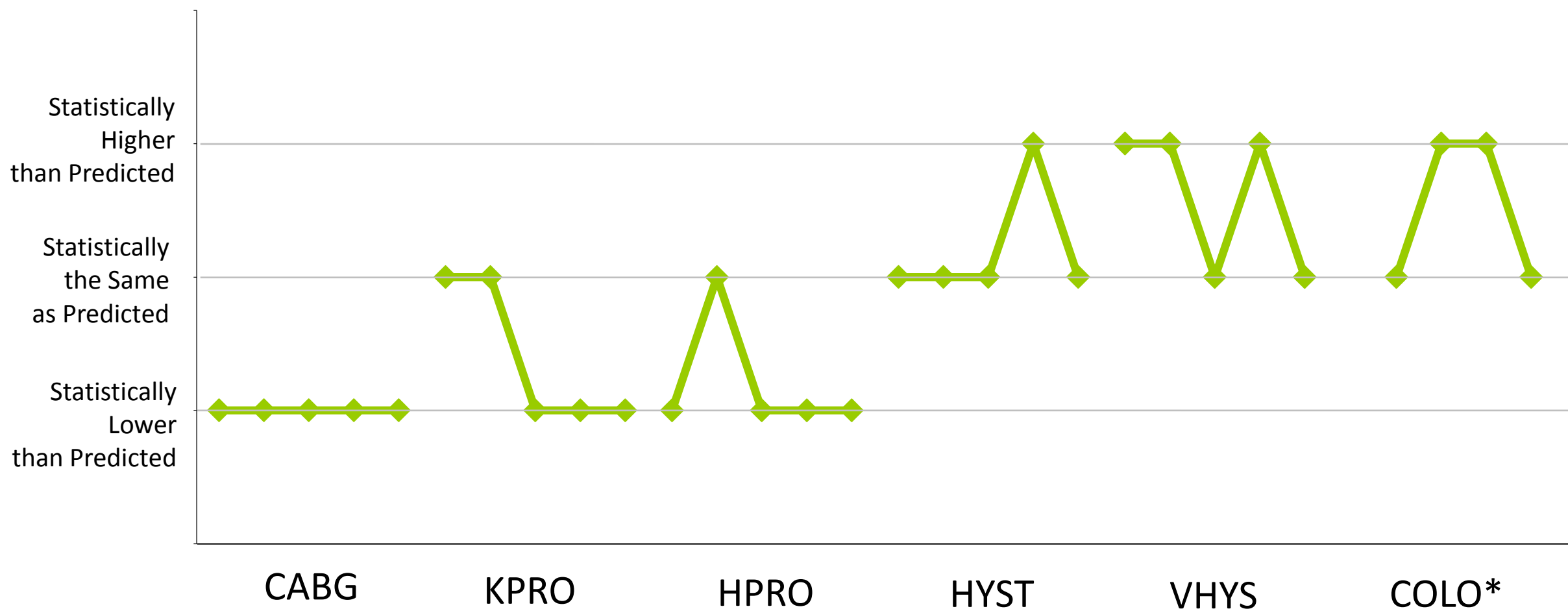
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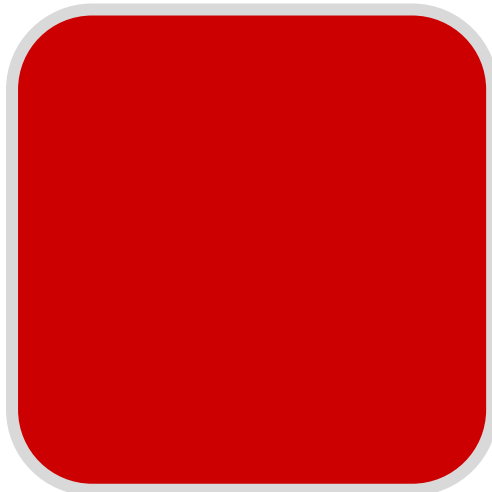


# Statewide SSI Trends by Year

2011-2015



\*COLO includes data from 2012-2015 only.



## Significantly Higher than Predicted

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



## Same as Predicted

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



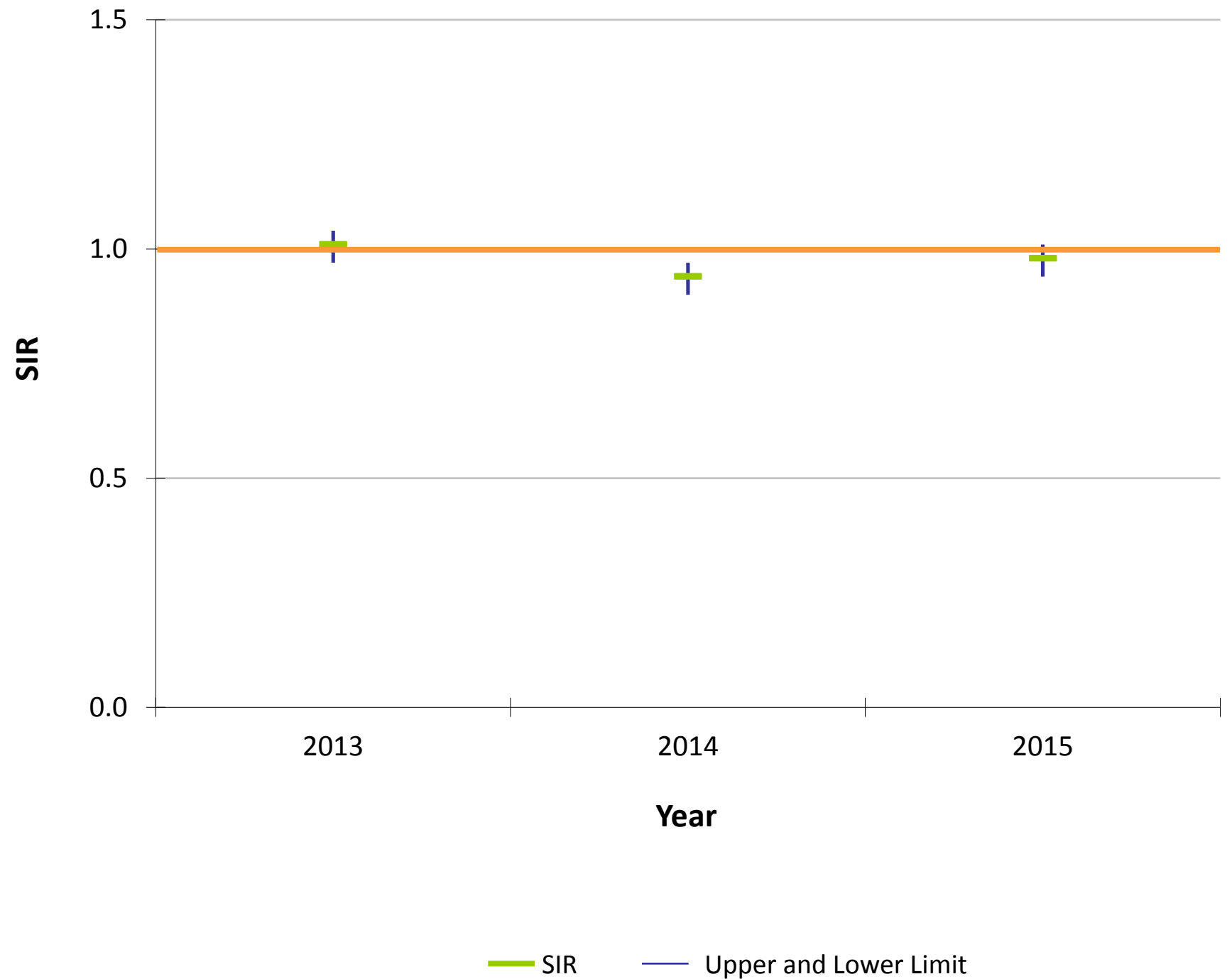
## Significantly Lower than Predicted

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

### Key Findings

In 2015, Massachusetts hospitals reporting CDI events had an infection rate similar to the national baseline data.

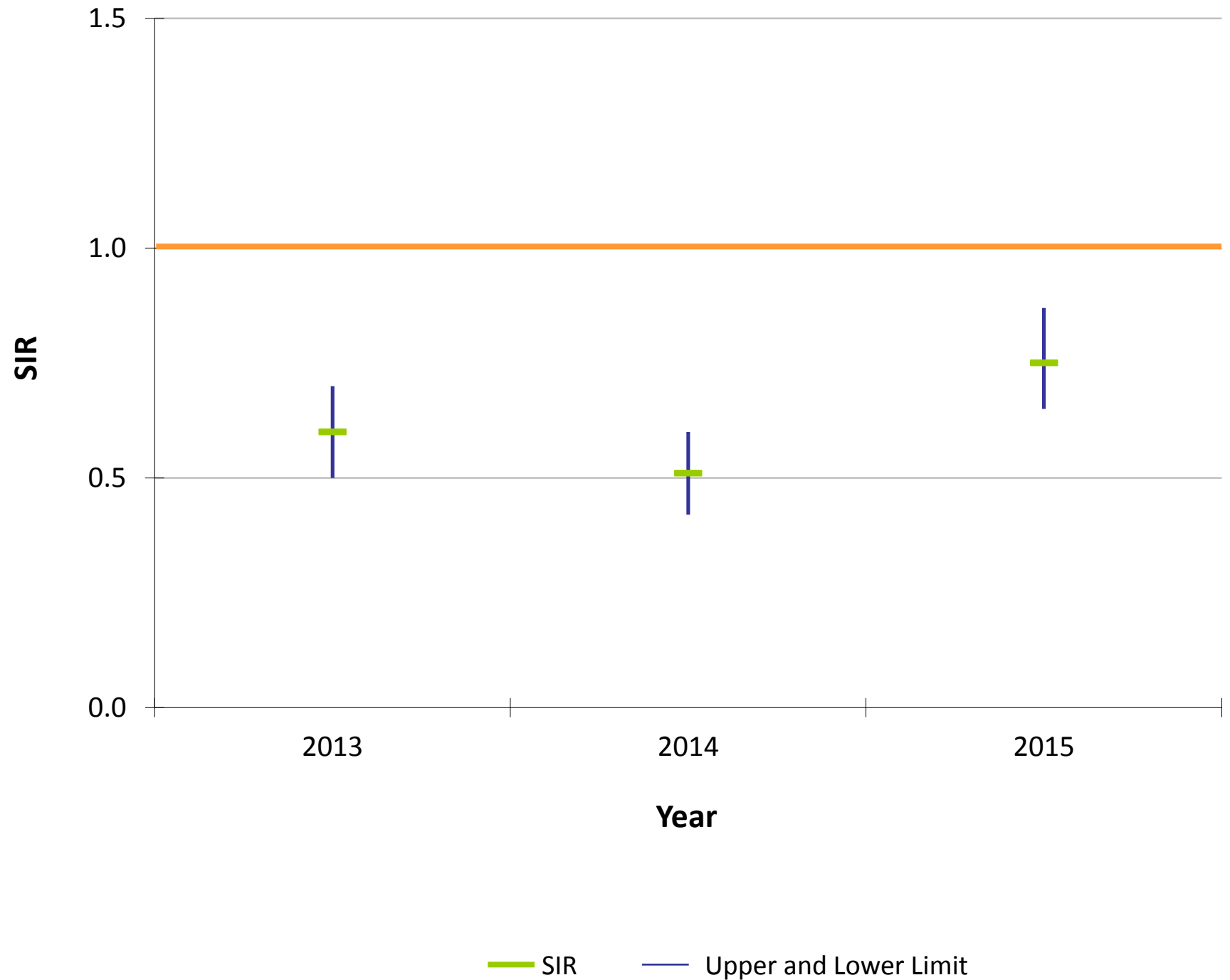
There were 2,771 CDI events reported.



### Key Findings

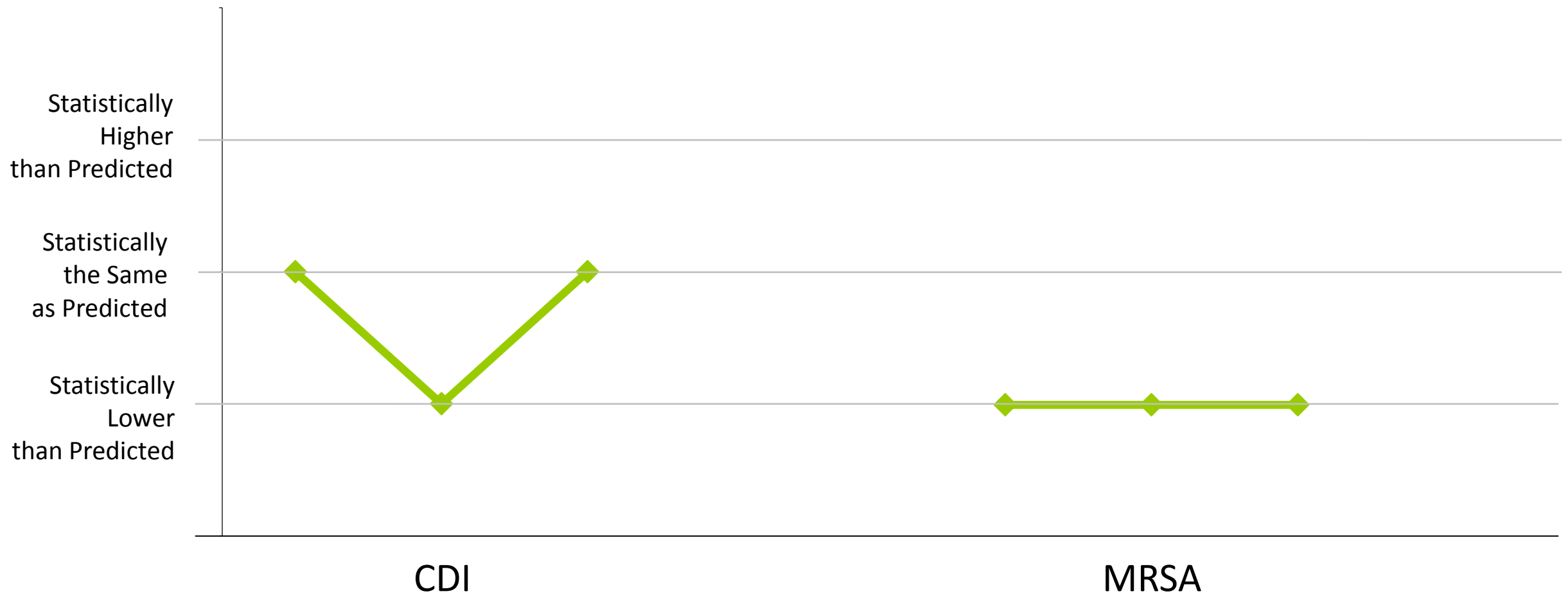
For the past three years, Massachusetts acute care hospitals reporting MRSA events experienced a significantly lower number of events than expected, as compared to the national baseline data.

There were 180 MRSA events reported.



# Statewide LabID Trends by Year

2013-2015



- 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

## Infection Prevention Best Practices In Hemodialysis Use of Simulation to Improve Nursing Practice



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

- 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:  
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