

Health Care Associated Infections in 2016

Acute Care Hospitals

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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>)

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).

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.

- 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.

- 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

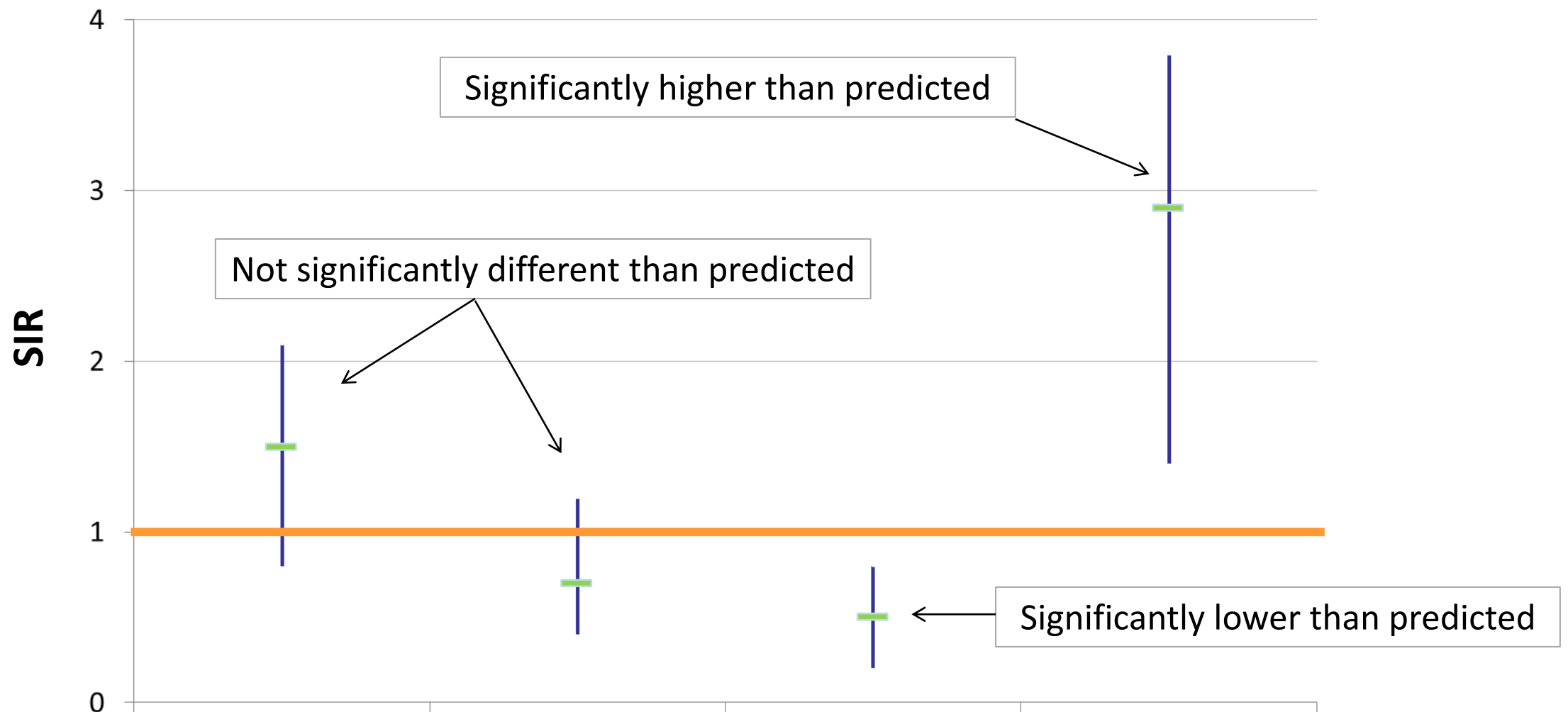
- Central Line Utilization Ratio

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

- Urinary Catheter Utilization Ratio

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

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.

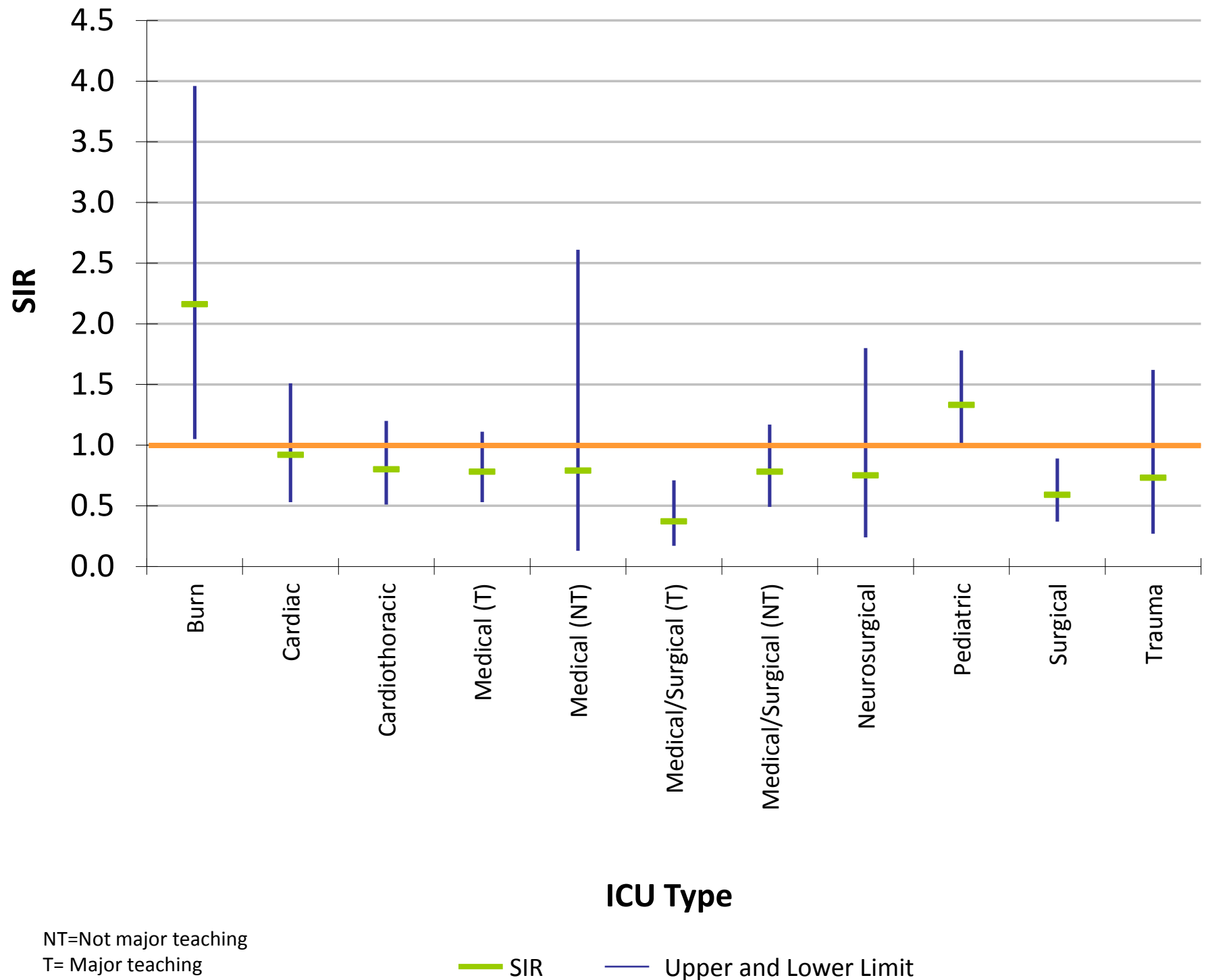
Key Findings

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

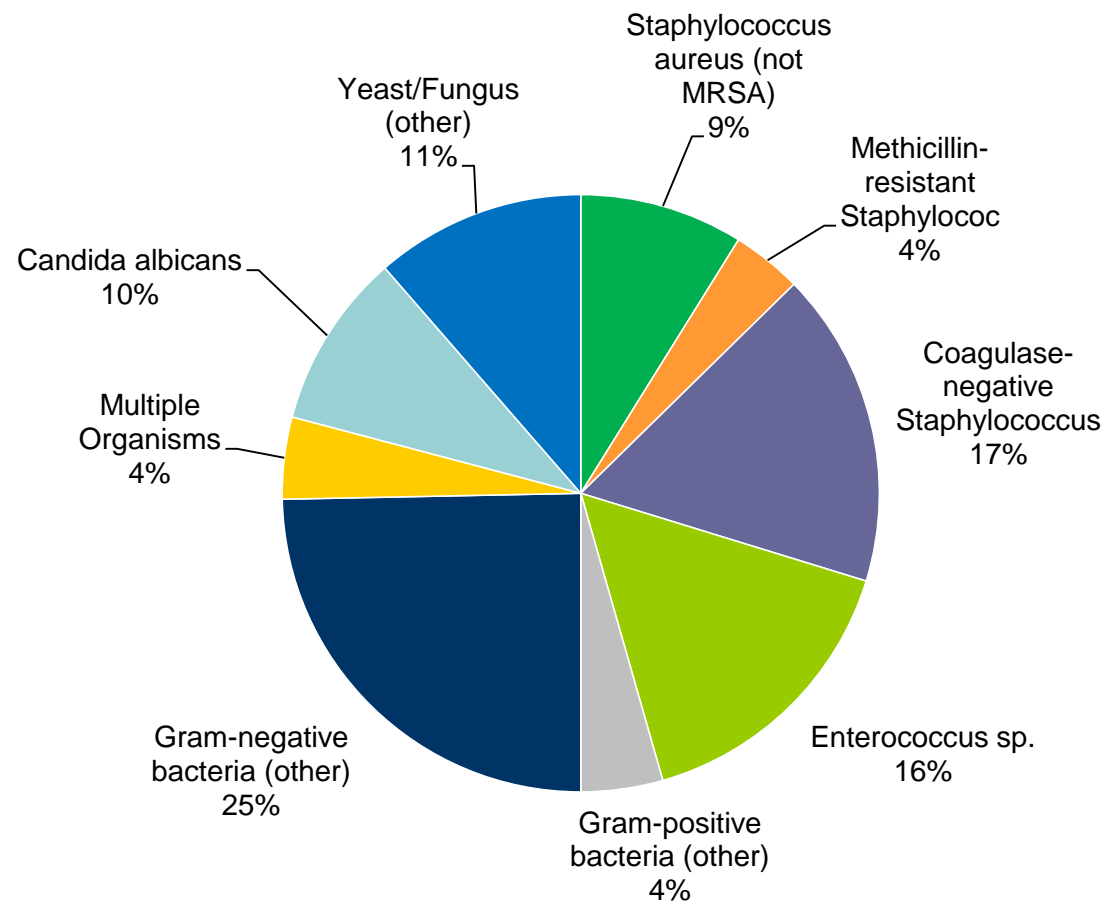


CLABSI Adult & Pediatric ICU Pathogens for 2015 and 2016

Calendar Year 2015

January 1, 2015 – December 31, 2015

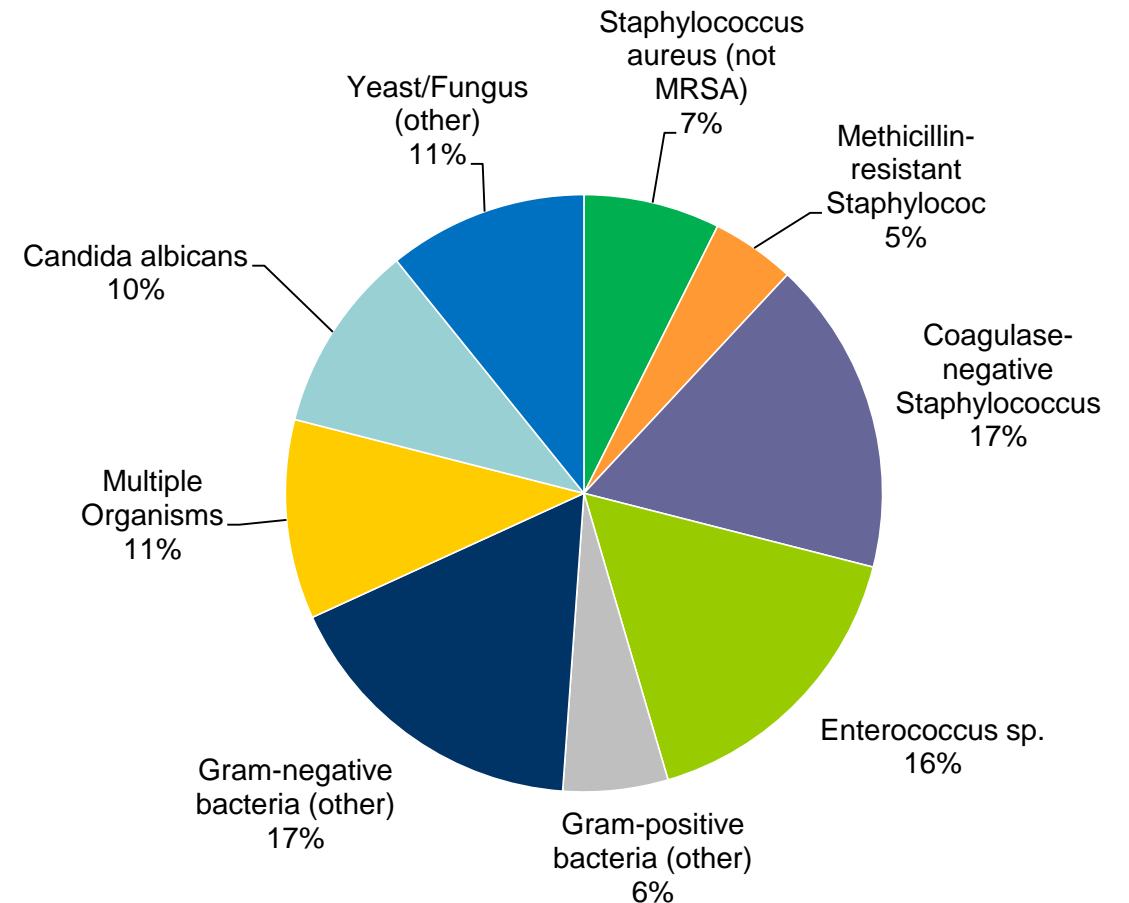
n=158



Calendar Year 2016

January 1, 2016 – December 31, 2016

n=176



Massachusetts CLABSI SIR in NICUs, by Birth Weight Category

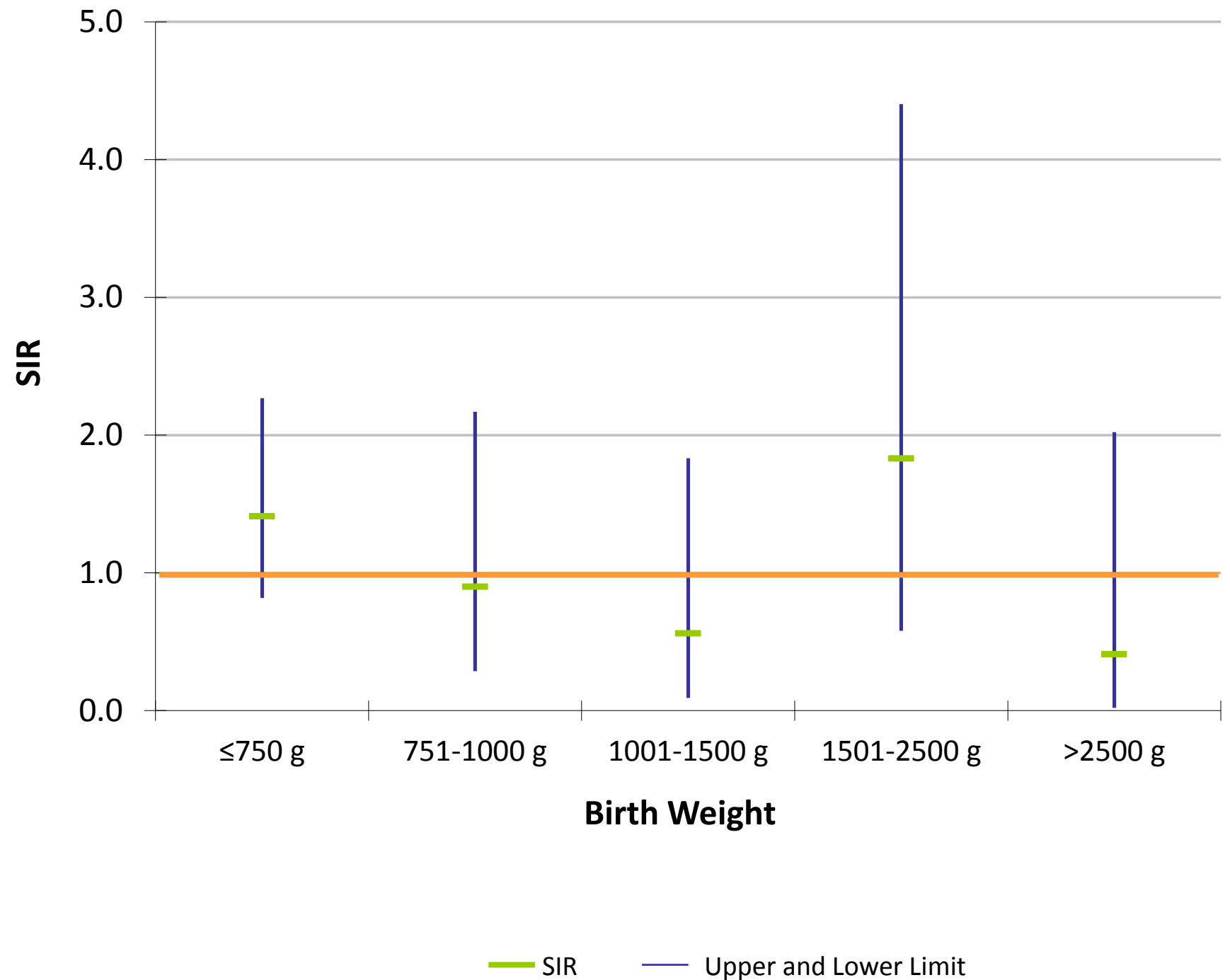
January 1, 2016-December 31, 2016

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

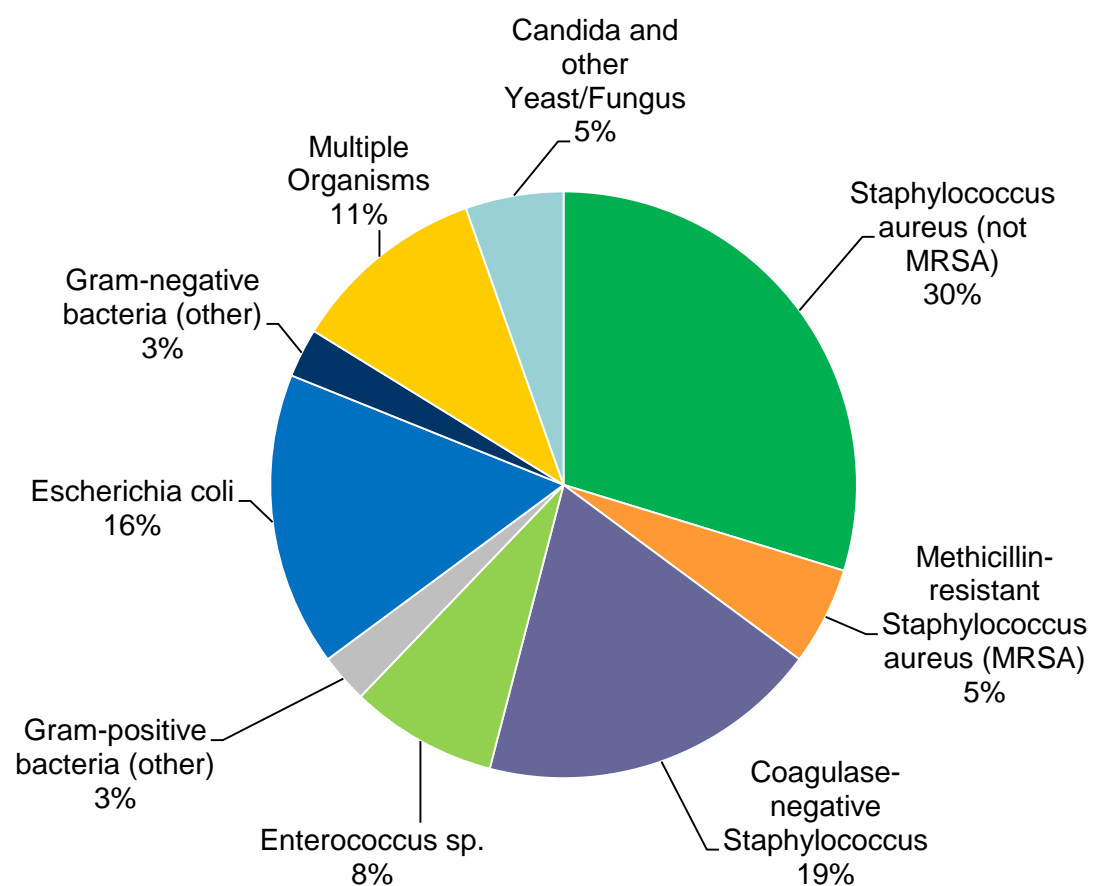


CLABSI NICU Pathogens for 2015 and 2016

Calendar Year 2015

January 1, 2015– December 31, 2015

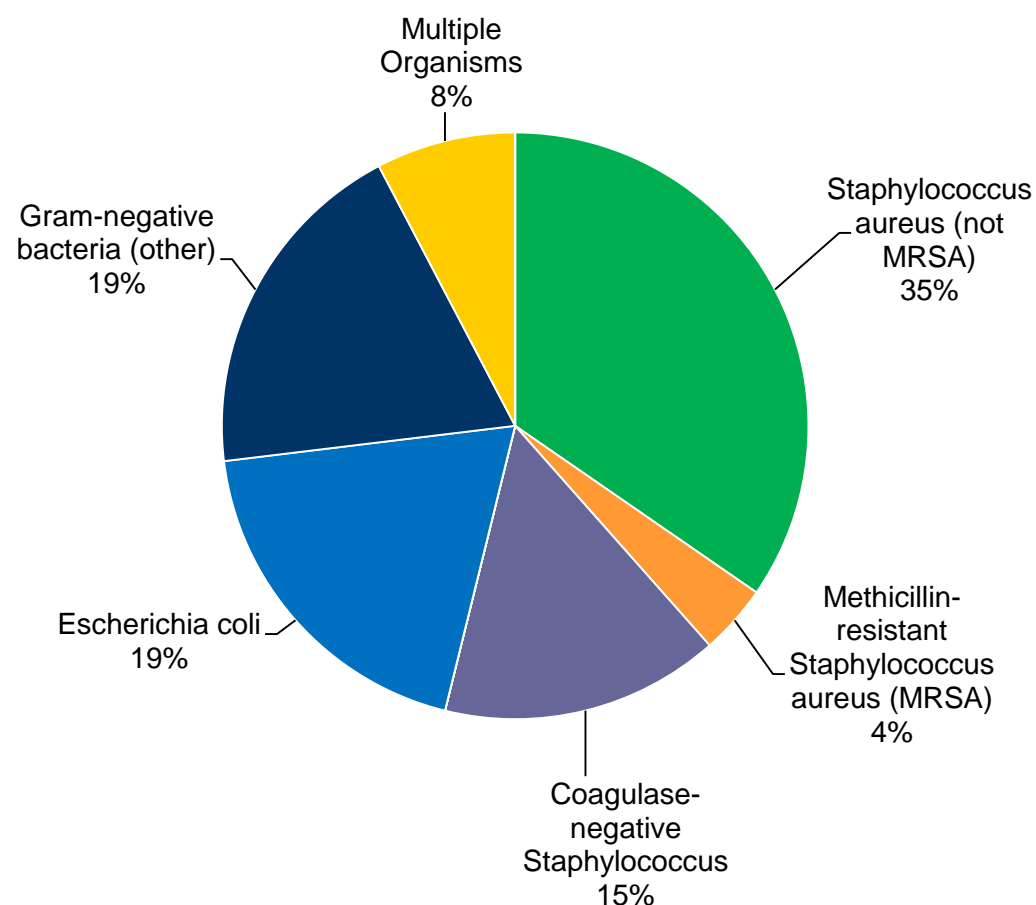
n=37



Calendar Year 2016

January 1, 2016– December 31, 2016

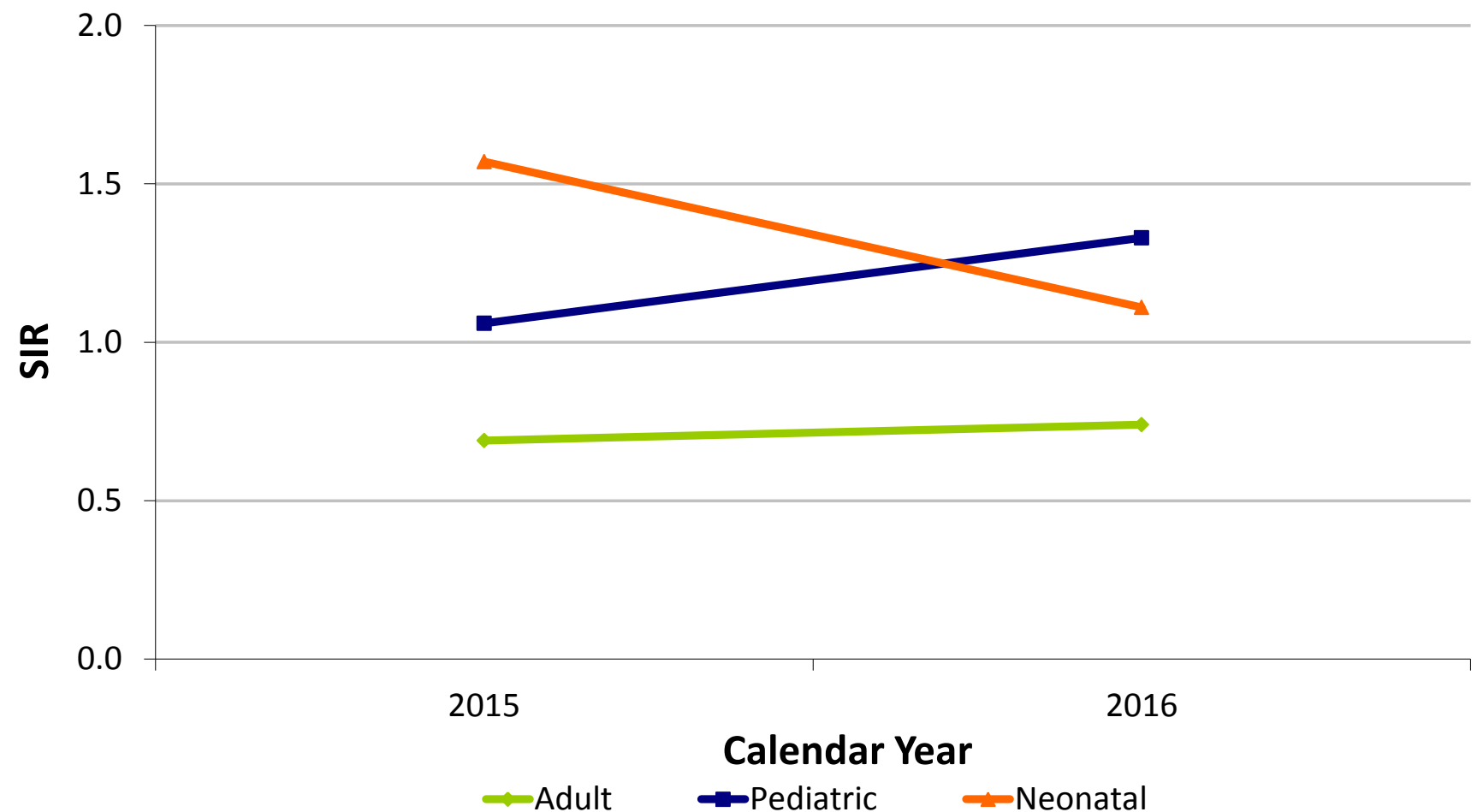
n=26



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.



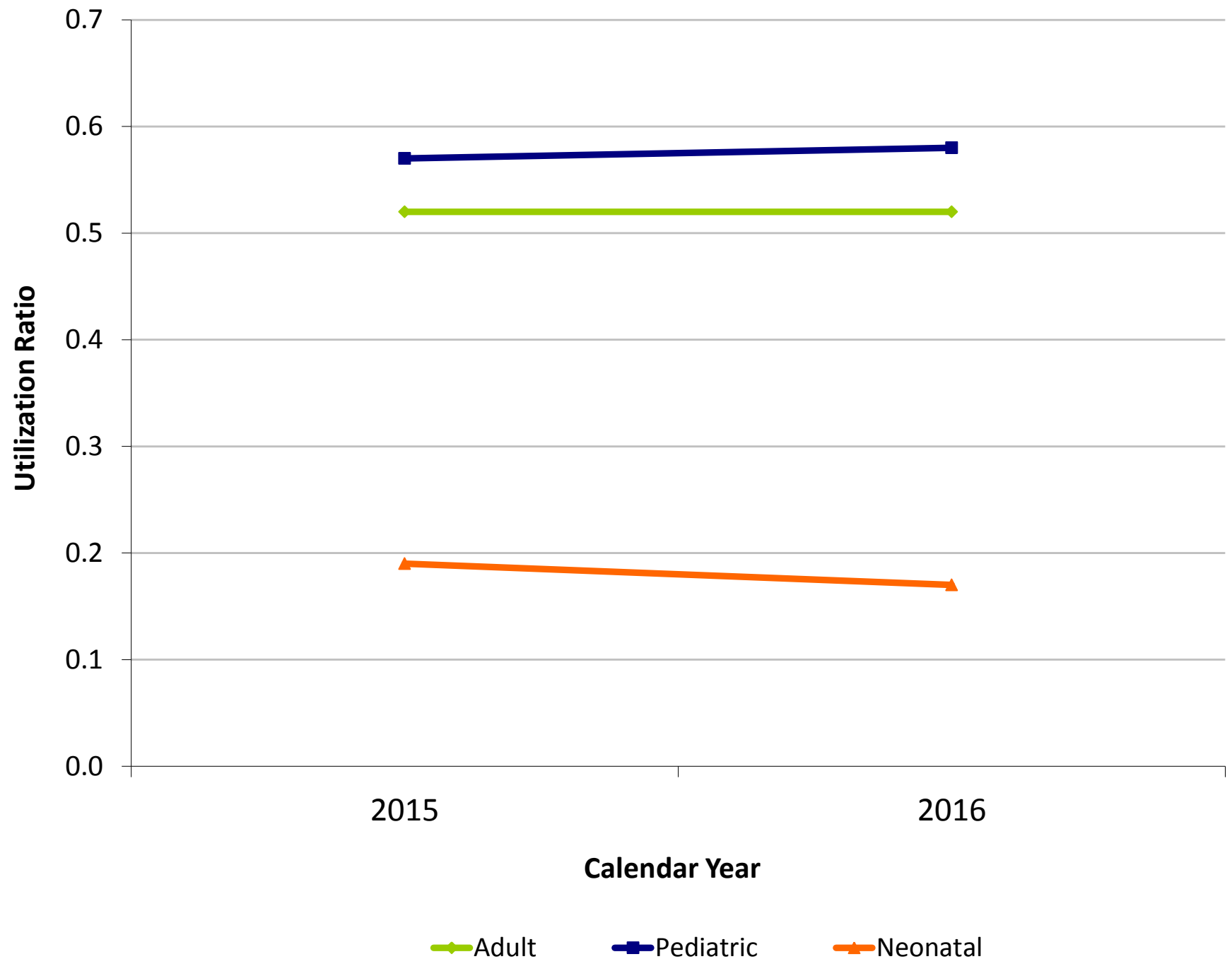
State Central Line (CL) Utilization Ratios

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.

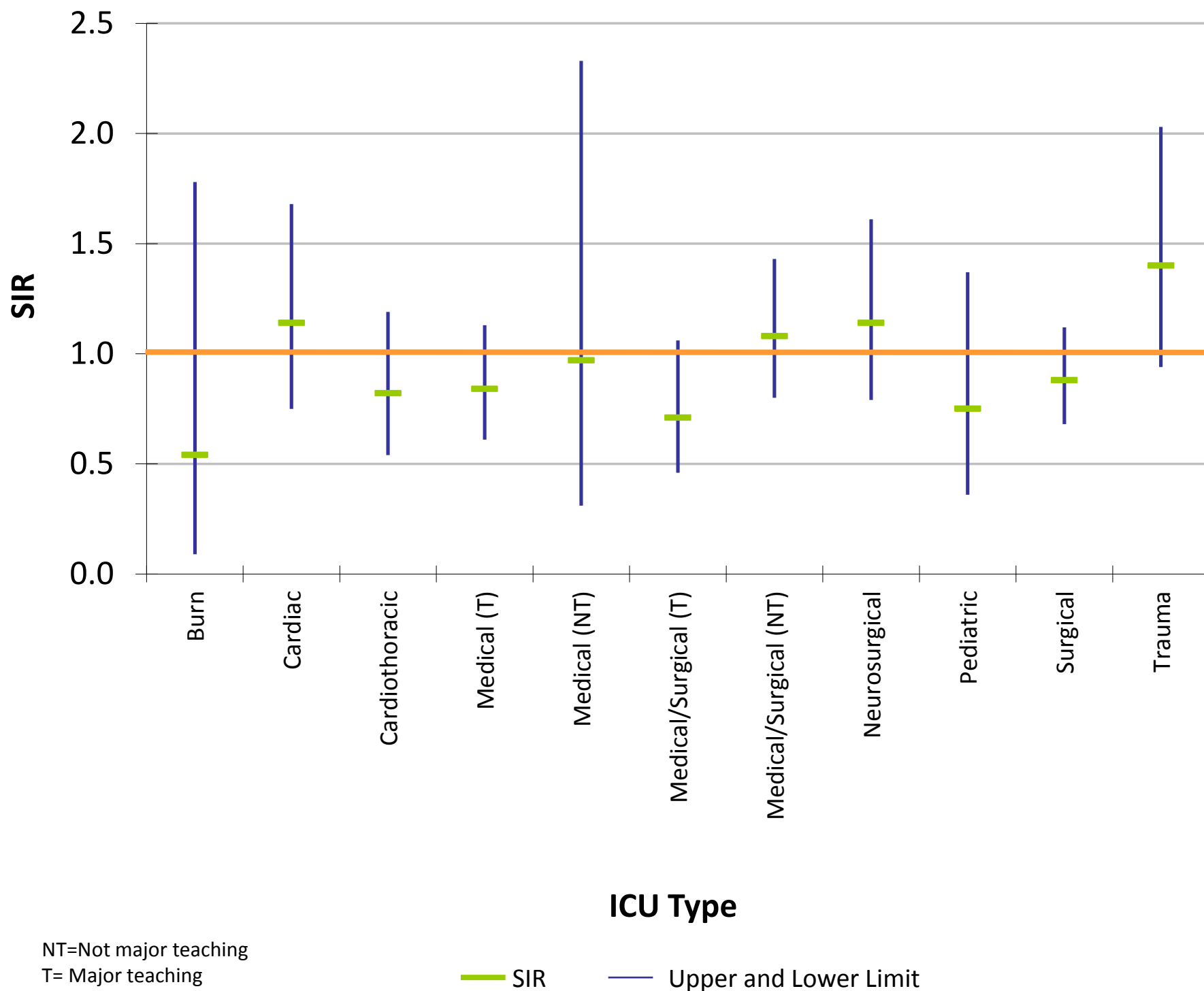


Key Findings

All ICU types experienced the same number of infections as predicted, based on 2015 national aggregate data.

No ICU type was an outlier for this measure

There were 290 CAUTIs reported in 2016.

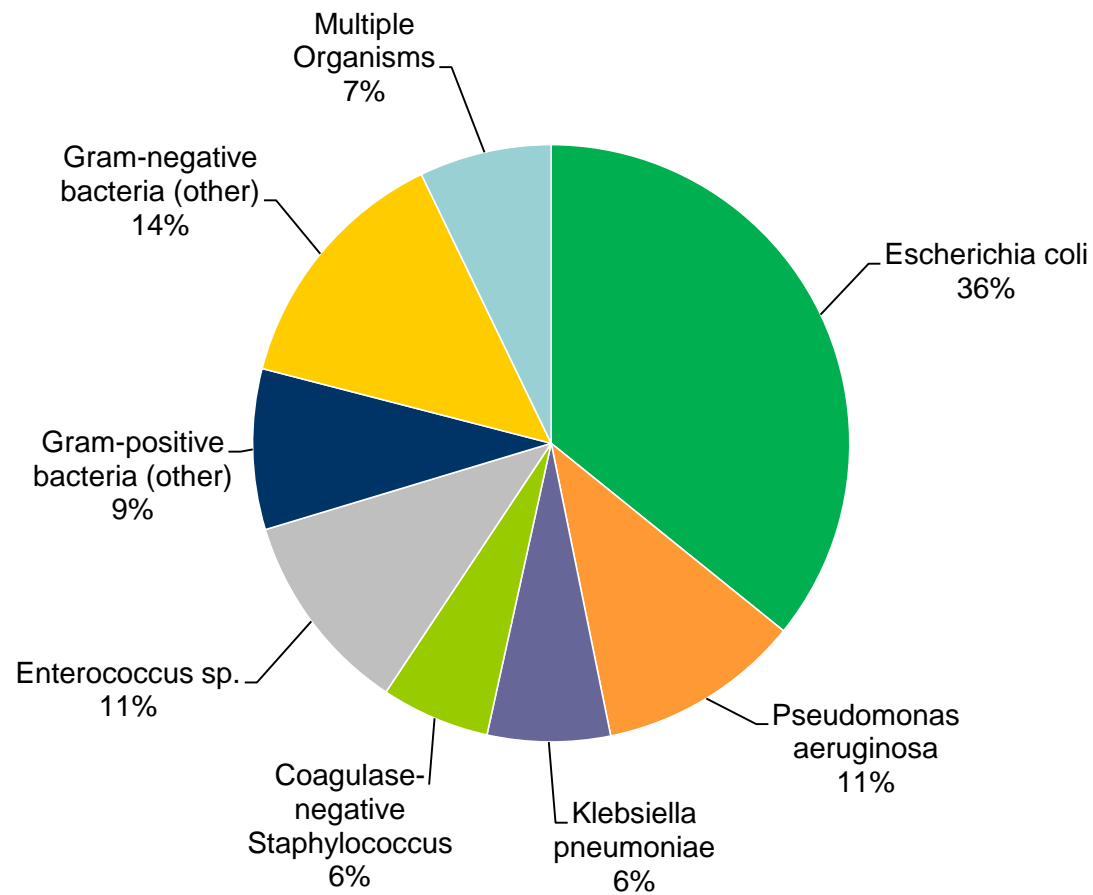


CAUTI Adult & Pediatric ICU Pathogens for 2015 and 2016

Calendar Year 2015

January 1, 2015 – December 31, 2015

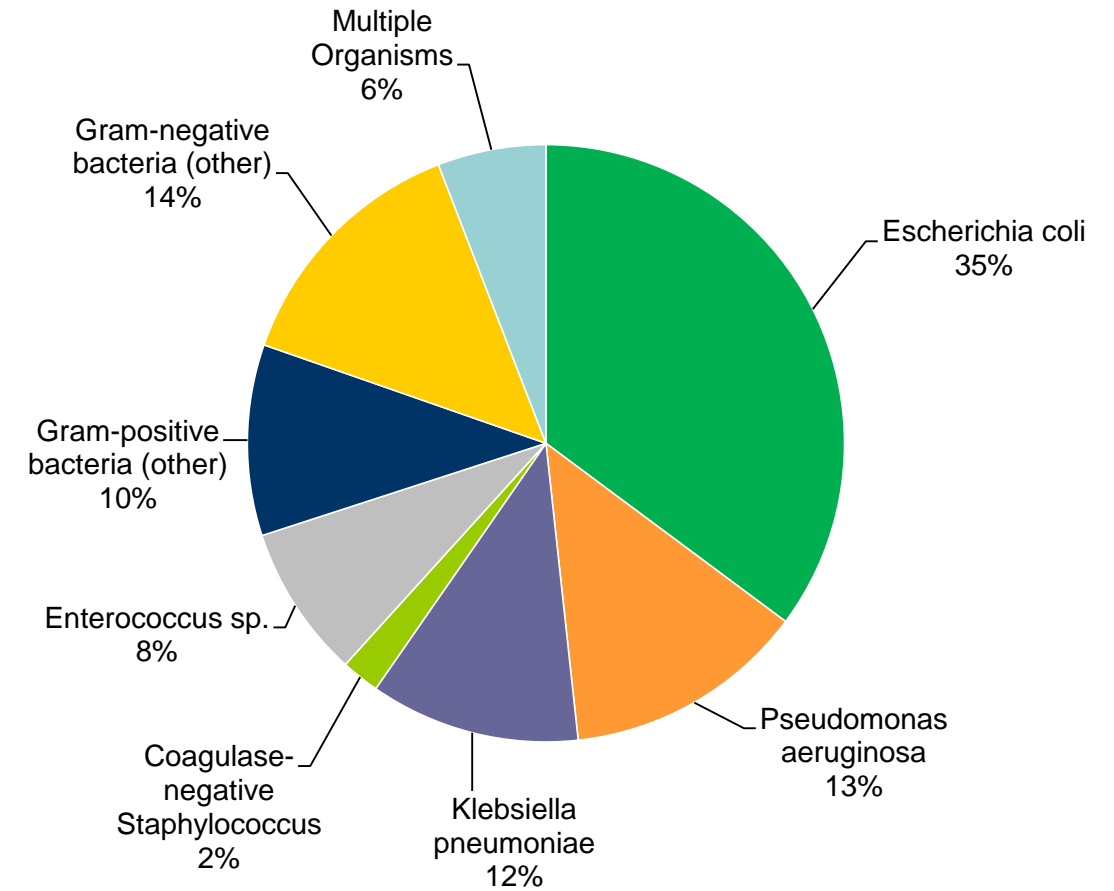
n=391



Calendar Year 2016

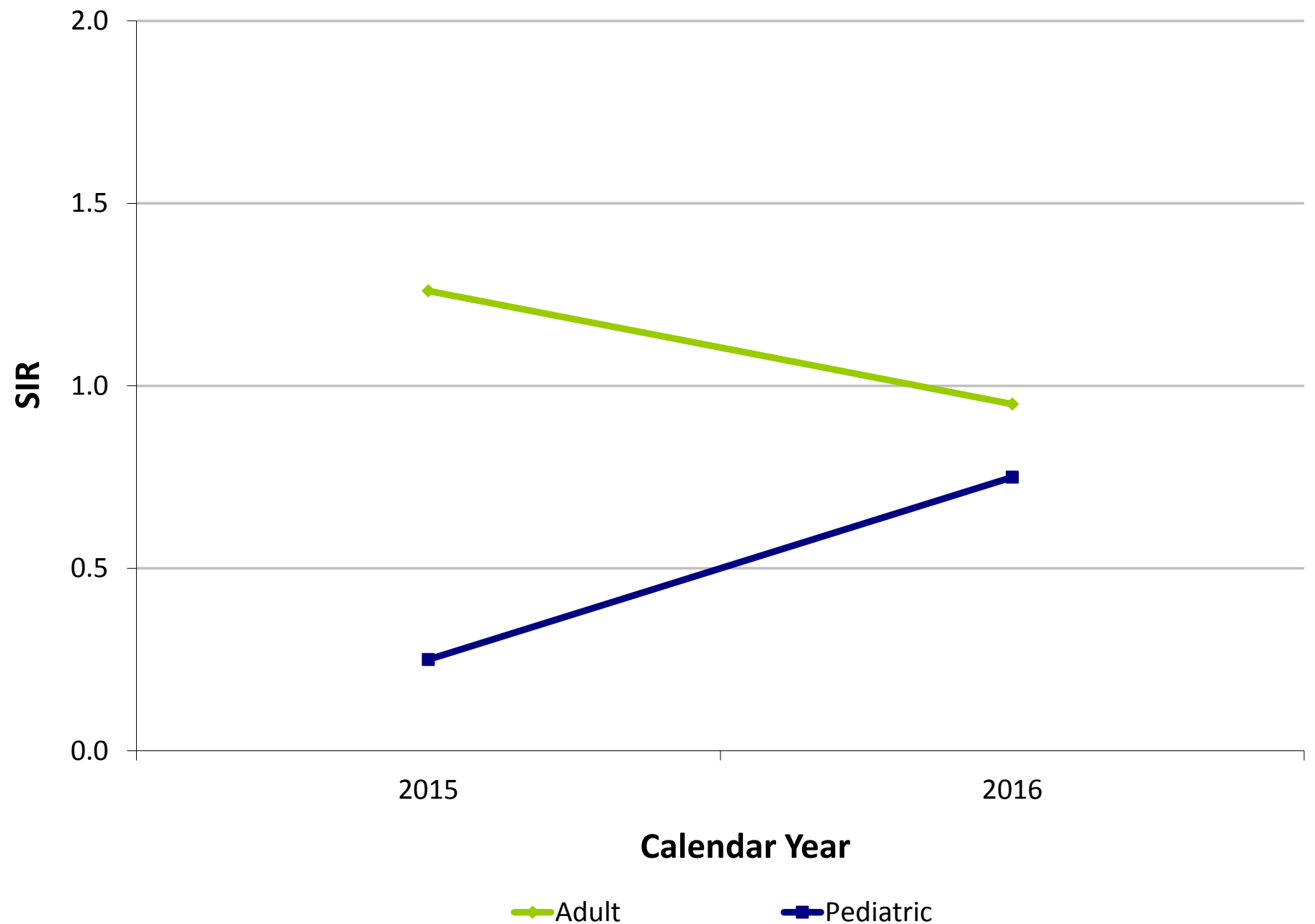
January 1, 2016 – December 31, 2016

n=290



Key Findings

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



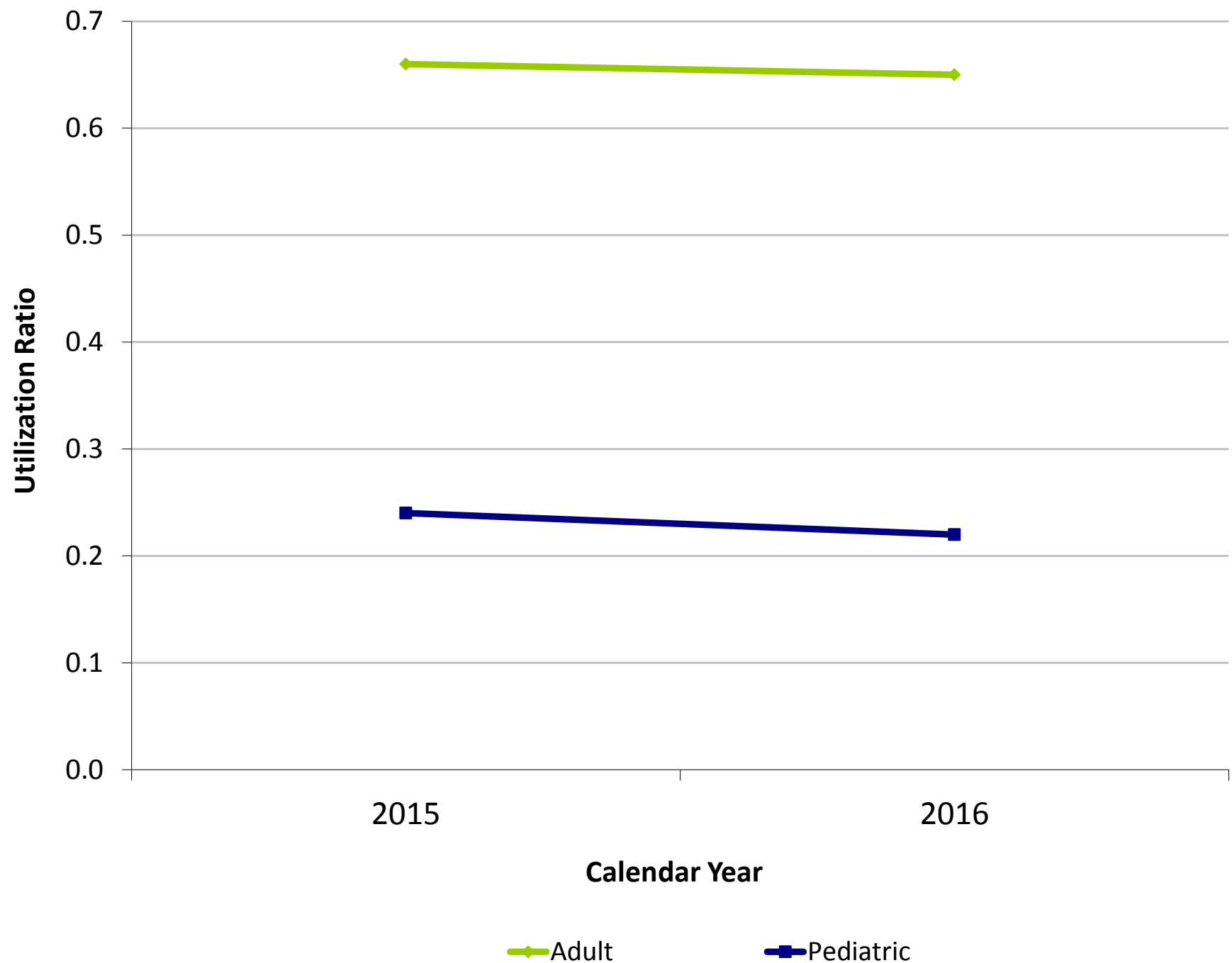
State Urinary Catheter Utilization Ratios

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.

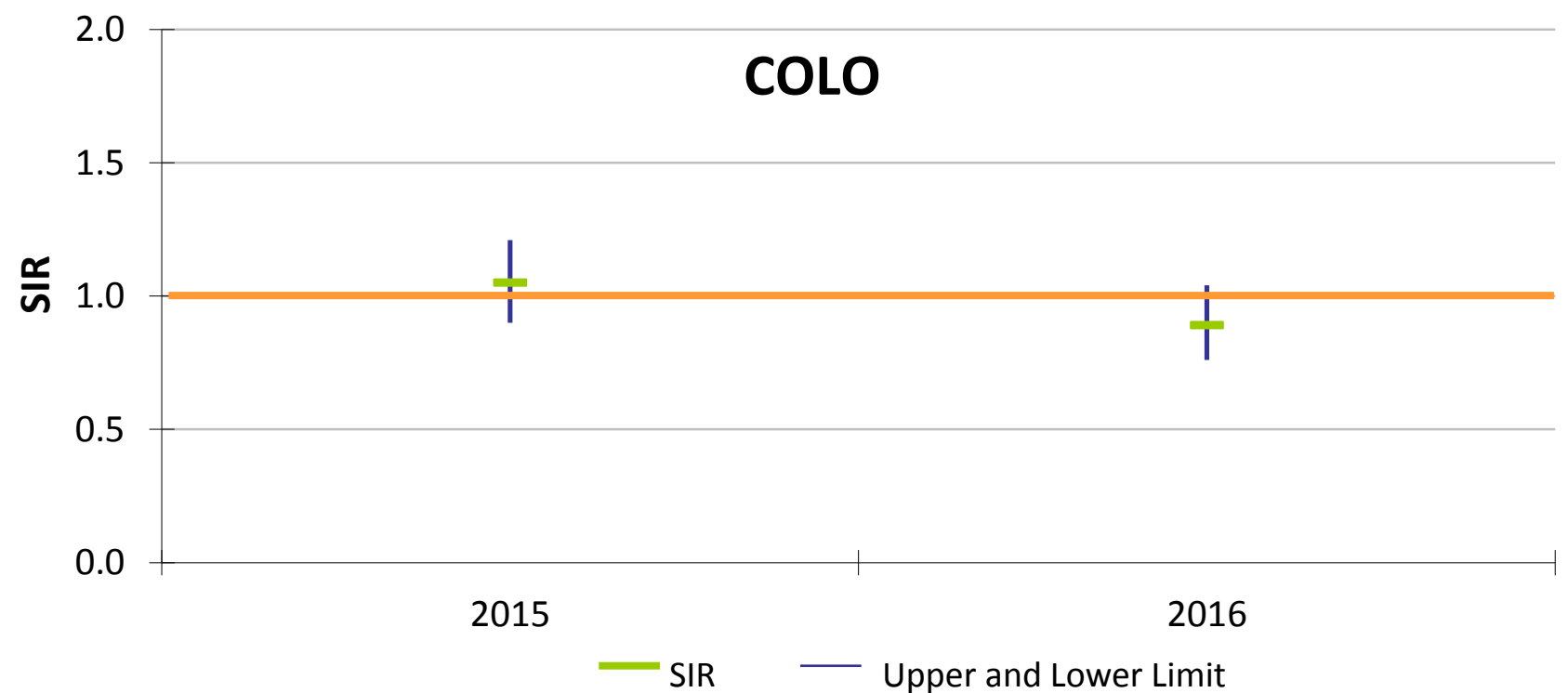
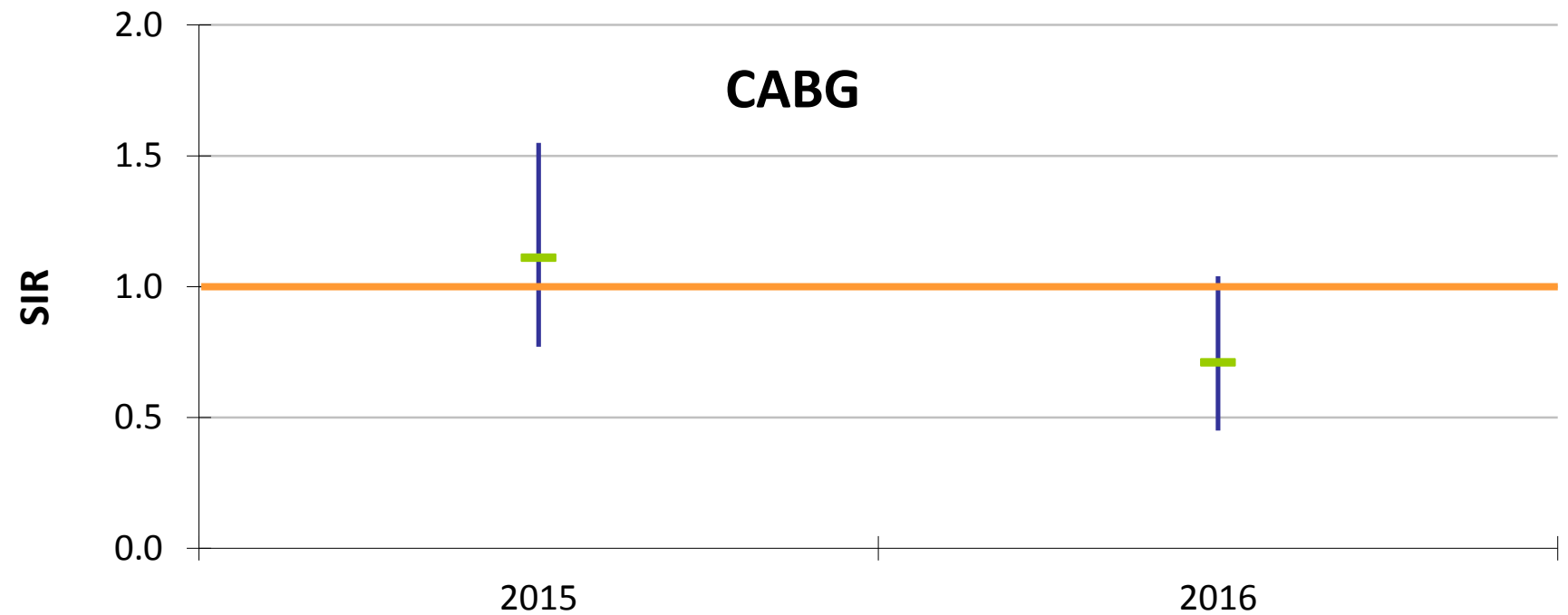


Key Findings

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.

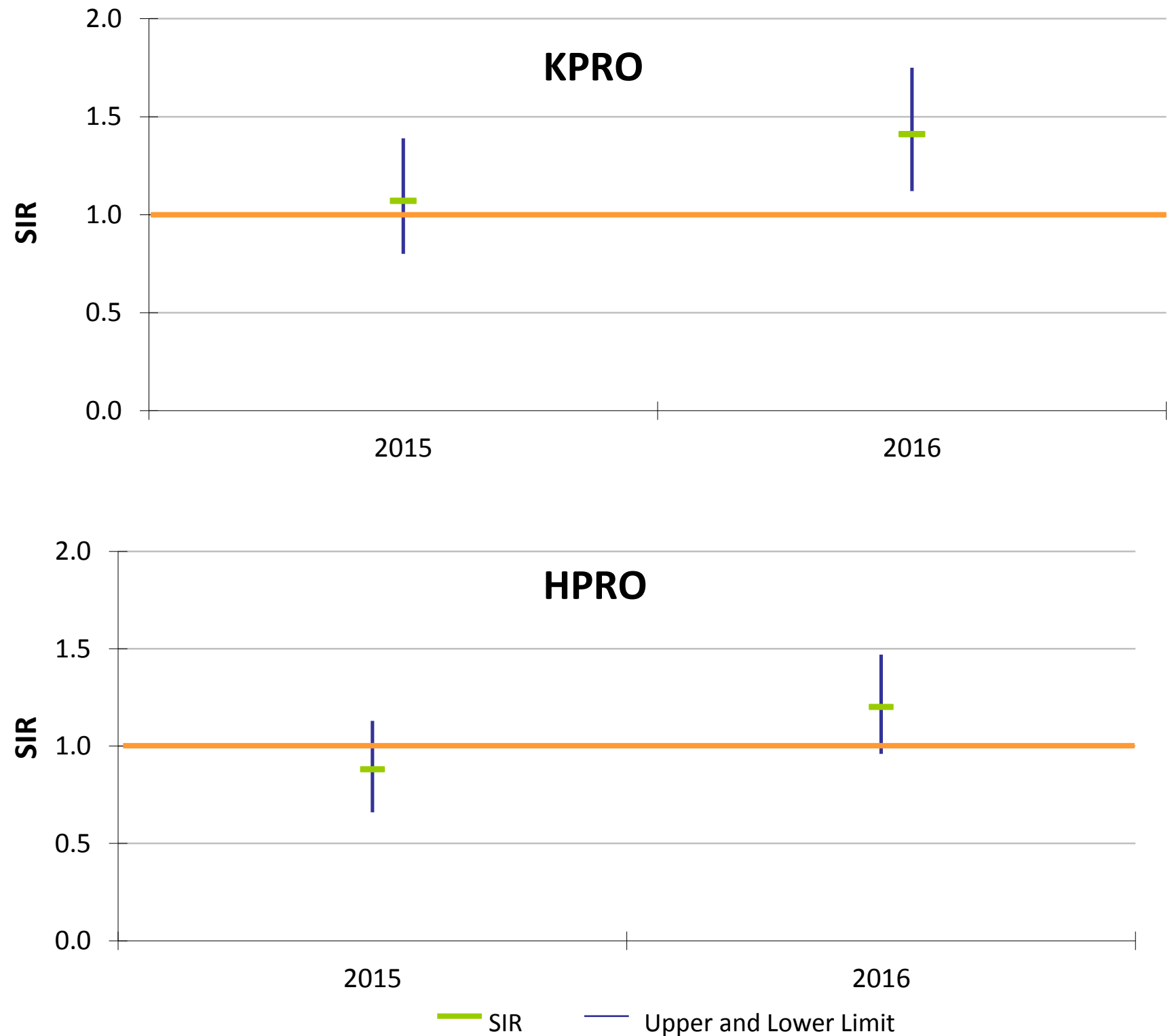
There were 158 COLO SSIs reported in 2016.



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.

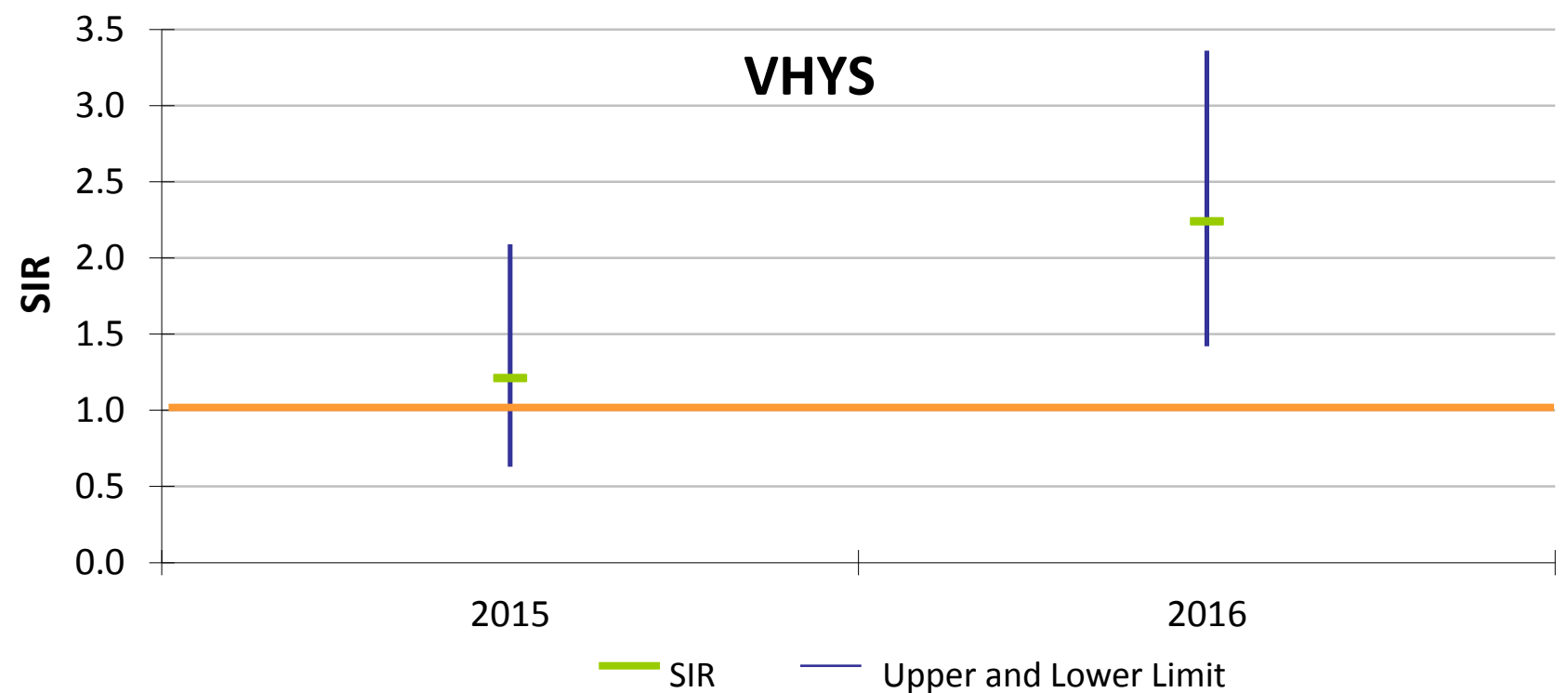
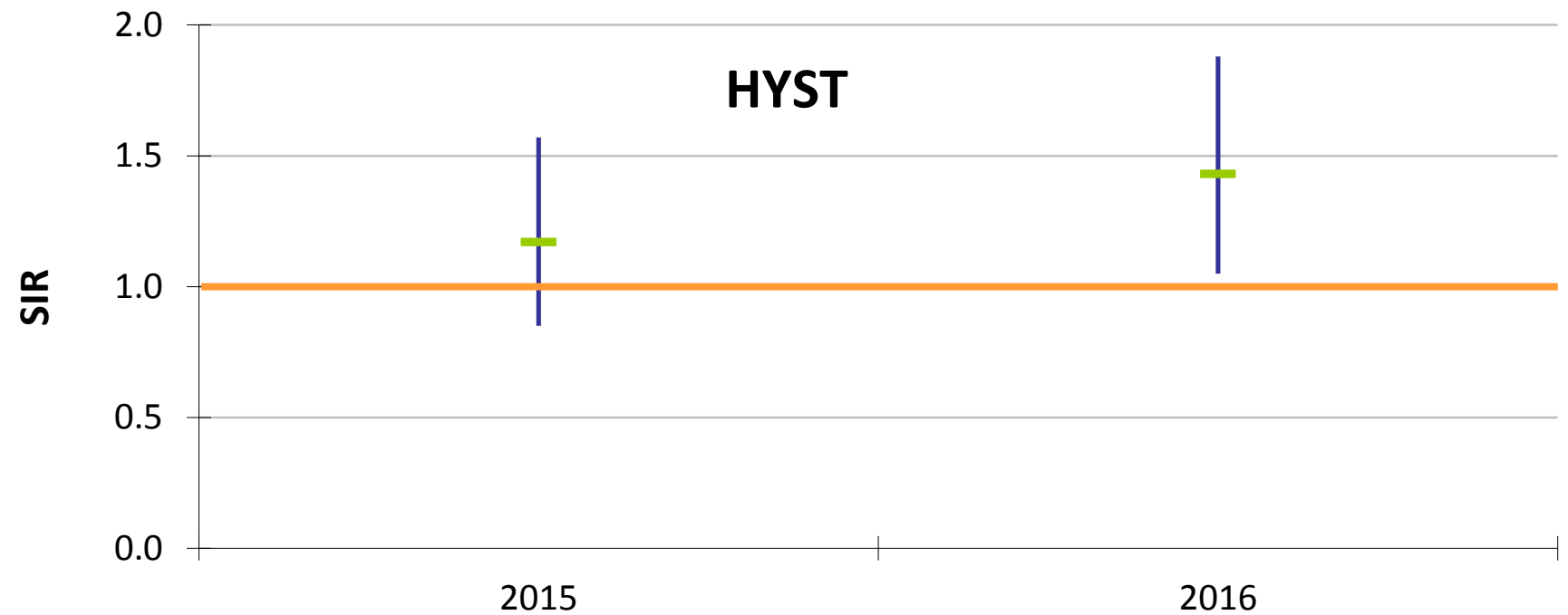
There were 76 KPRO SSIs and 83 HPRO SSIs reported in 2016.



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.



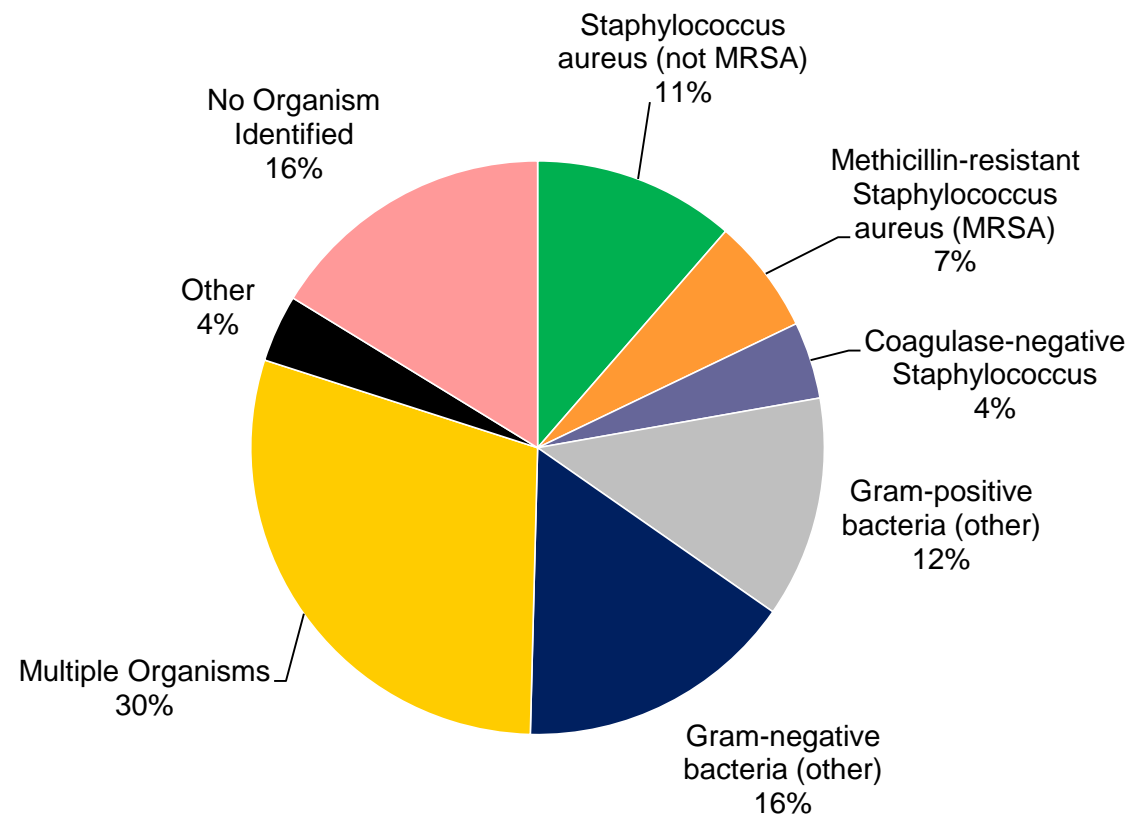
SSI Pathogens for 2015-2016

CABG, KPRO, HPRO, HYST, VHYS, COLO

Calendar Year 2015

January 1, 2015– December 31, 2015

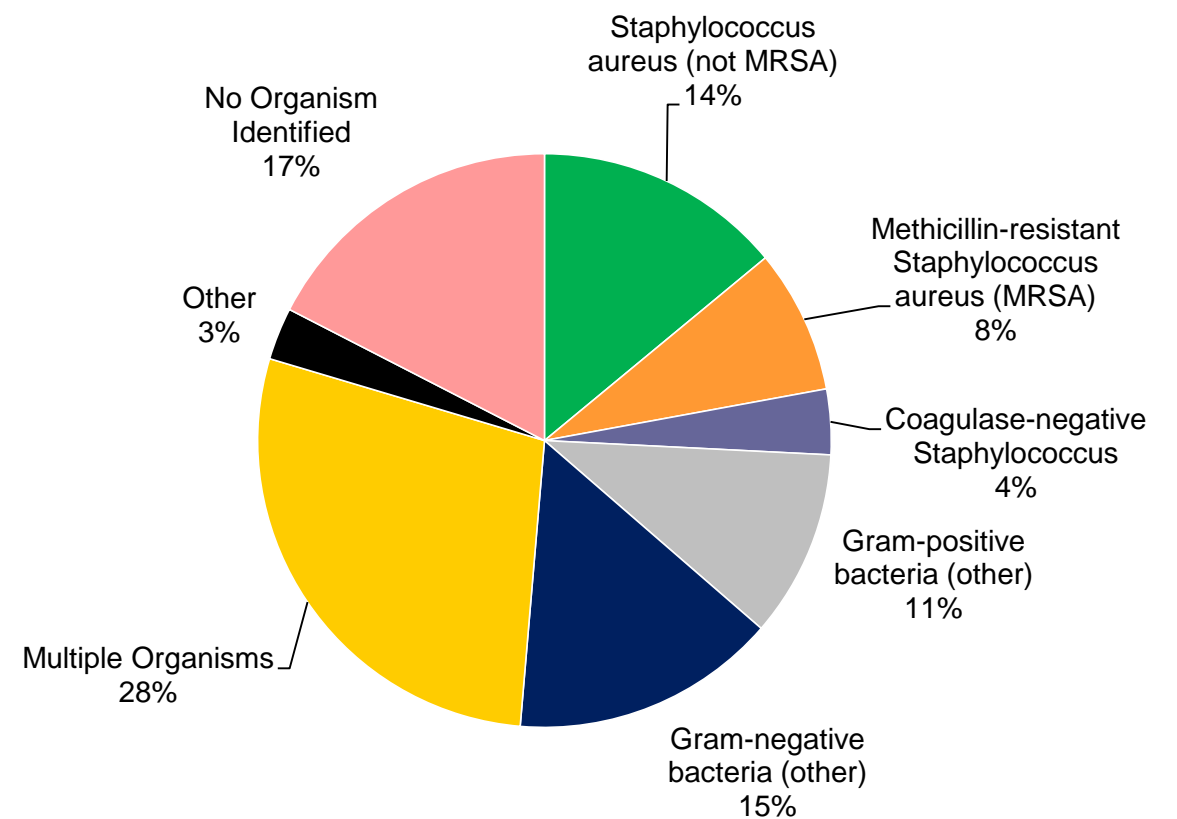
n=369



Calendar Year 2016

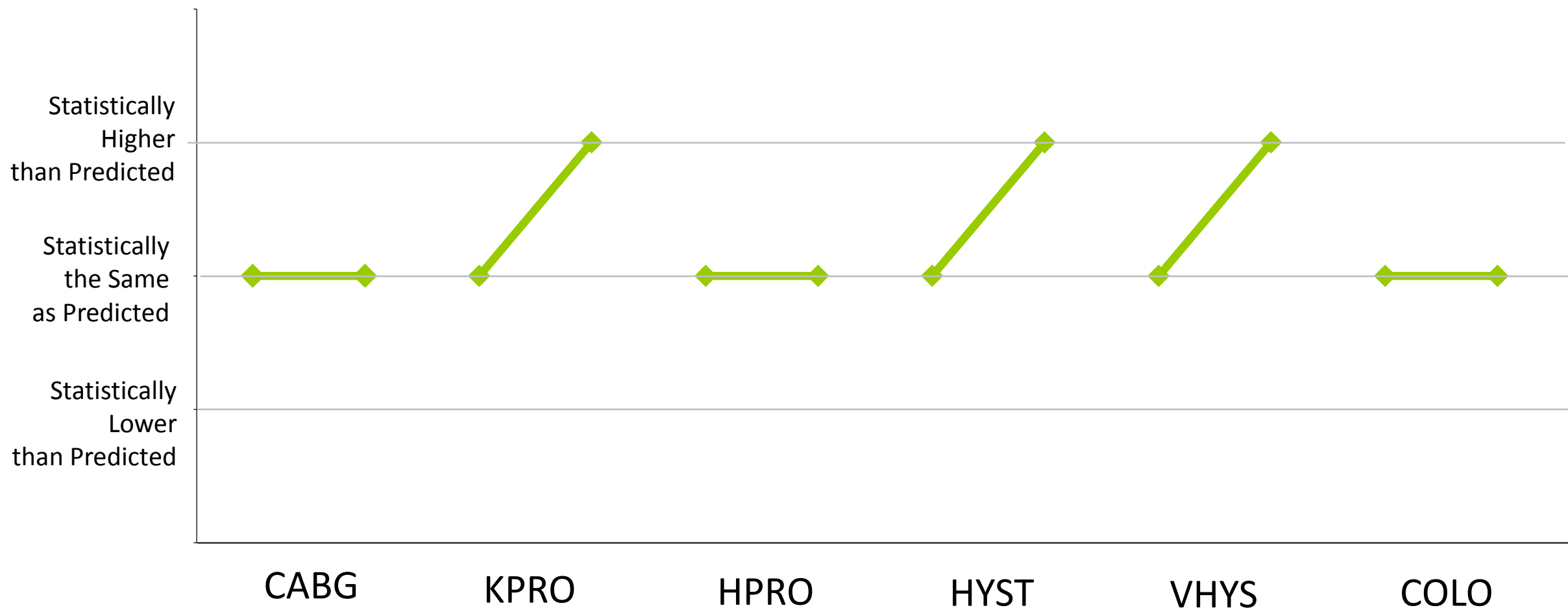
January 1, 2016 – December 31, 2016

n=407



Statewide SSI Trends by Year

2015-2016



KPRO
HYST
VHYS

Significantly Higher than Predicted

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

CABG
HPRO
COLO

Same as Predicted

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

Significantly Lower than Predicted

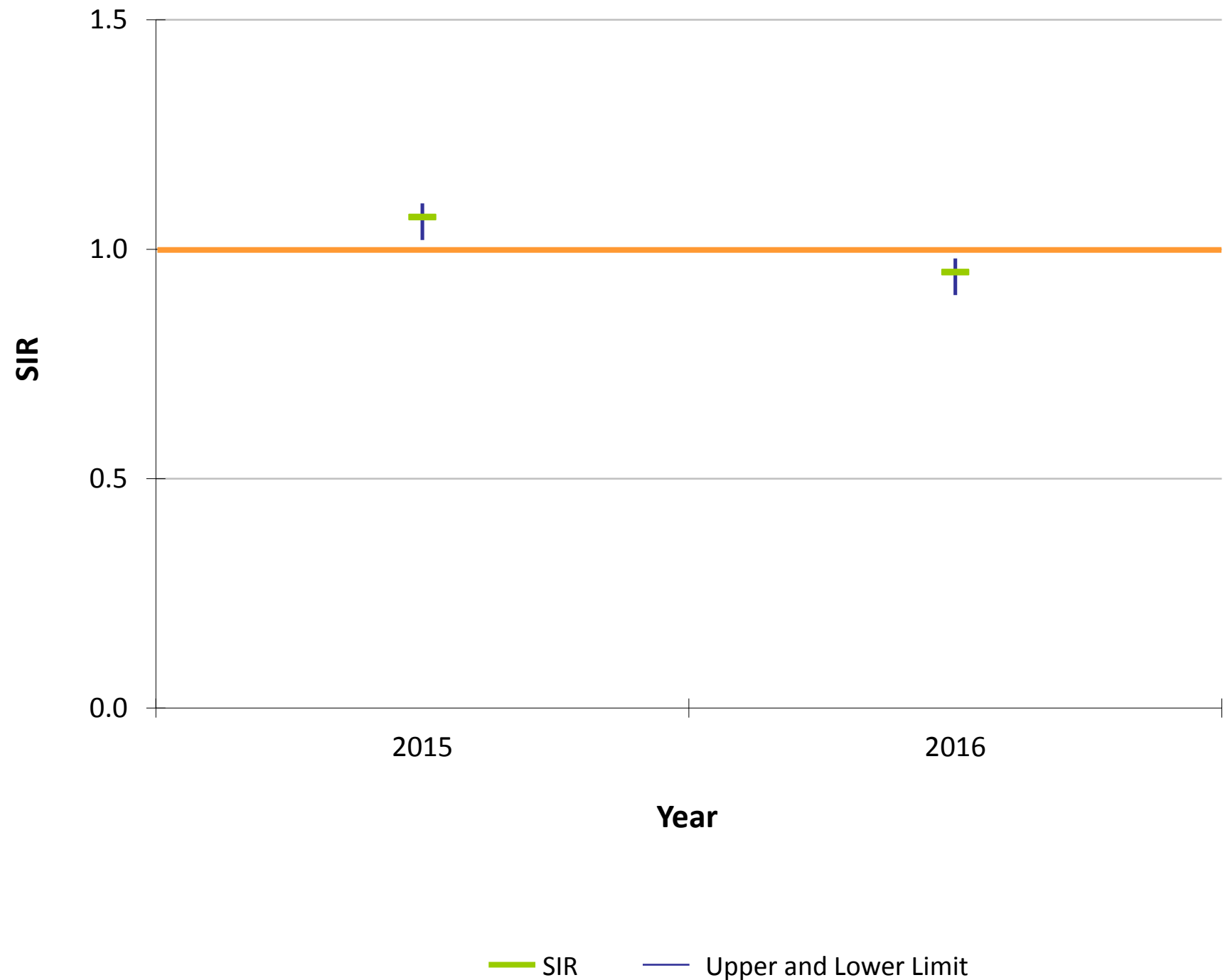
The number of infections reported is lower than the number of predicted infections.

- 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.

Key Findings

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

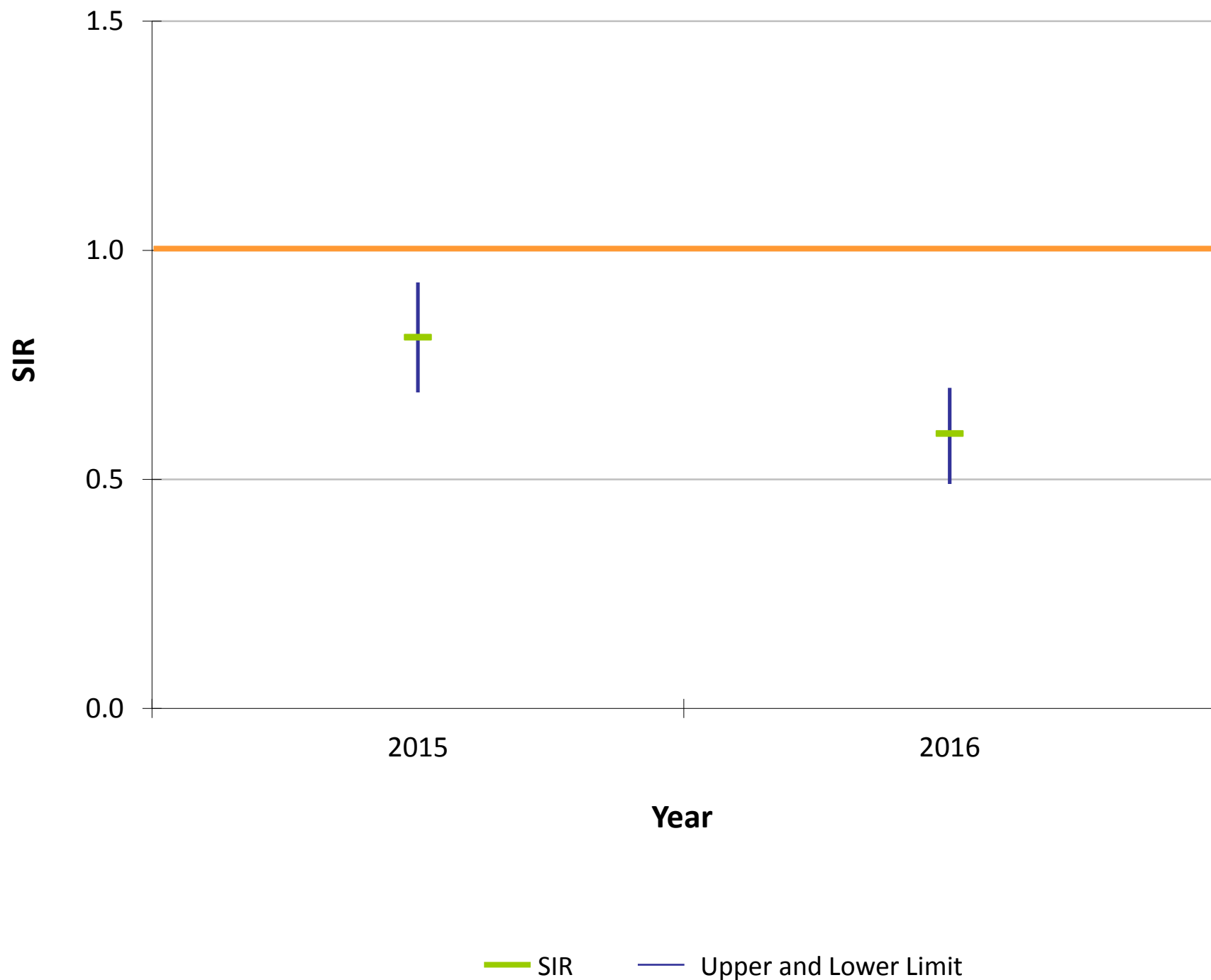
There were 2,371 CDI events reported in 2016.



Key Findings

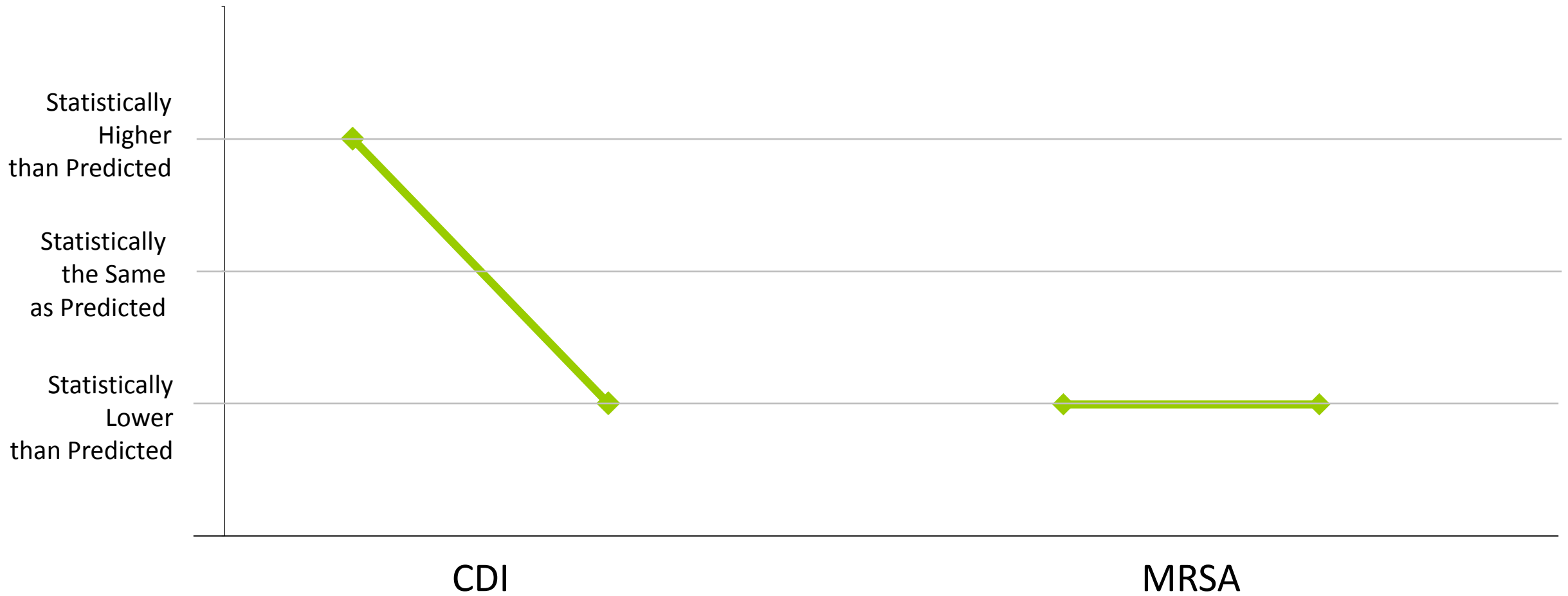
For the past two years, Massachusetts acute care hospitals reporting MRSA events experienced significantly lower number of infections than predicted, based on 2015 national aggregate data.

There were 123 MRSA events reported in 2016.



Statewide LabID Trends by Year

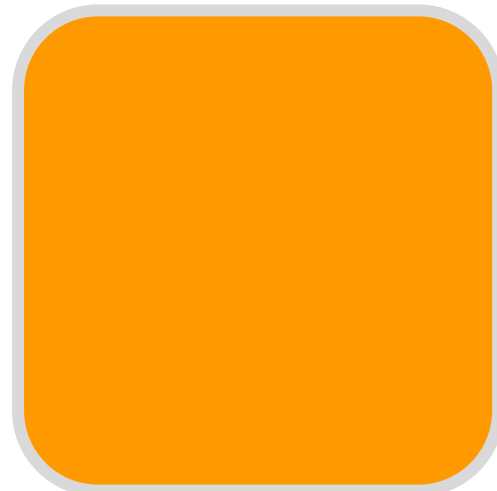
2015-2016





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.

- 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

- 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