

Easy Does It– Preventing Healthcare-Associated Infections (HAI) through teamwork and collaboration

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**Mount
Sinai**

Disclosures

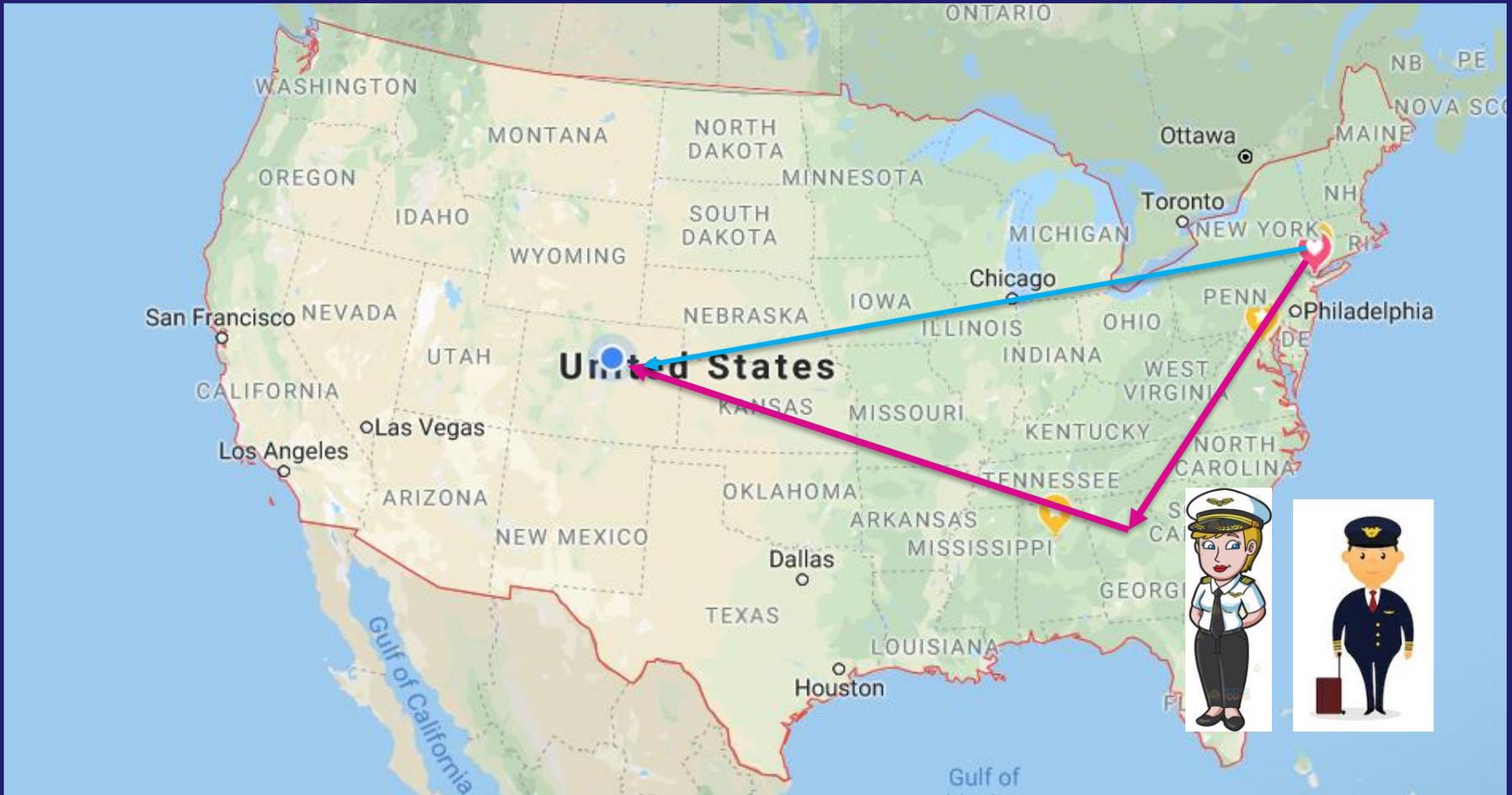
- ▶ I have no conflict of interest to disclose

Learning Objectives

- ▶ Describe potential multidisciplinary interventions to decrease the incidence of healthcare-associated infections (HAI)
- ▶ Describe some potential drawbacks to public reporting



My trip last night



Multidisciplinary Approach



UAB Medicine



49,149 DISCHARGES FROM UAB HOSPITAL

MORE THAN _____
1,200,000 OUTPATIENT VISITS

6,000,000
SQUARE FEET

1,150
BEDS

1,147
PHYSICIANS



— 16,361 —
UAB Medicine
Employees

Signature Service Lines

- Comprehensive Cancer Center
- Comprehensive Transplant Center
- Cardiovascular

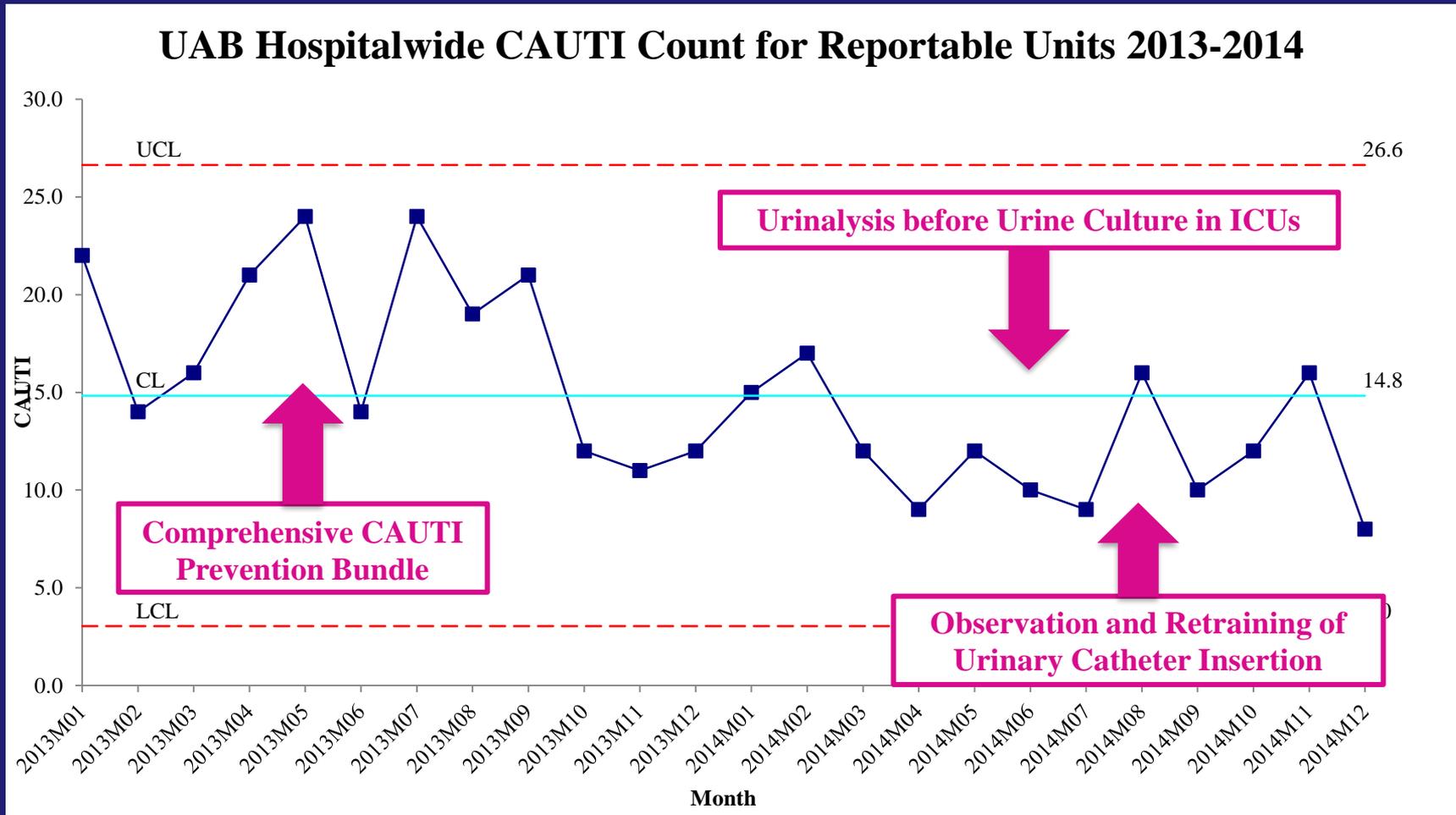


UAB Hospital CMS Healthcare-Acquired Condition (HAC) Scores; FY 2015- FY 2020

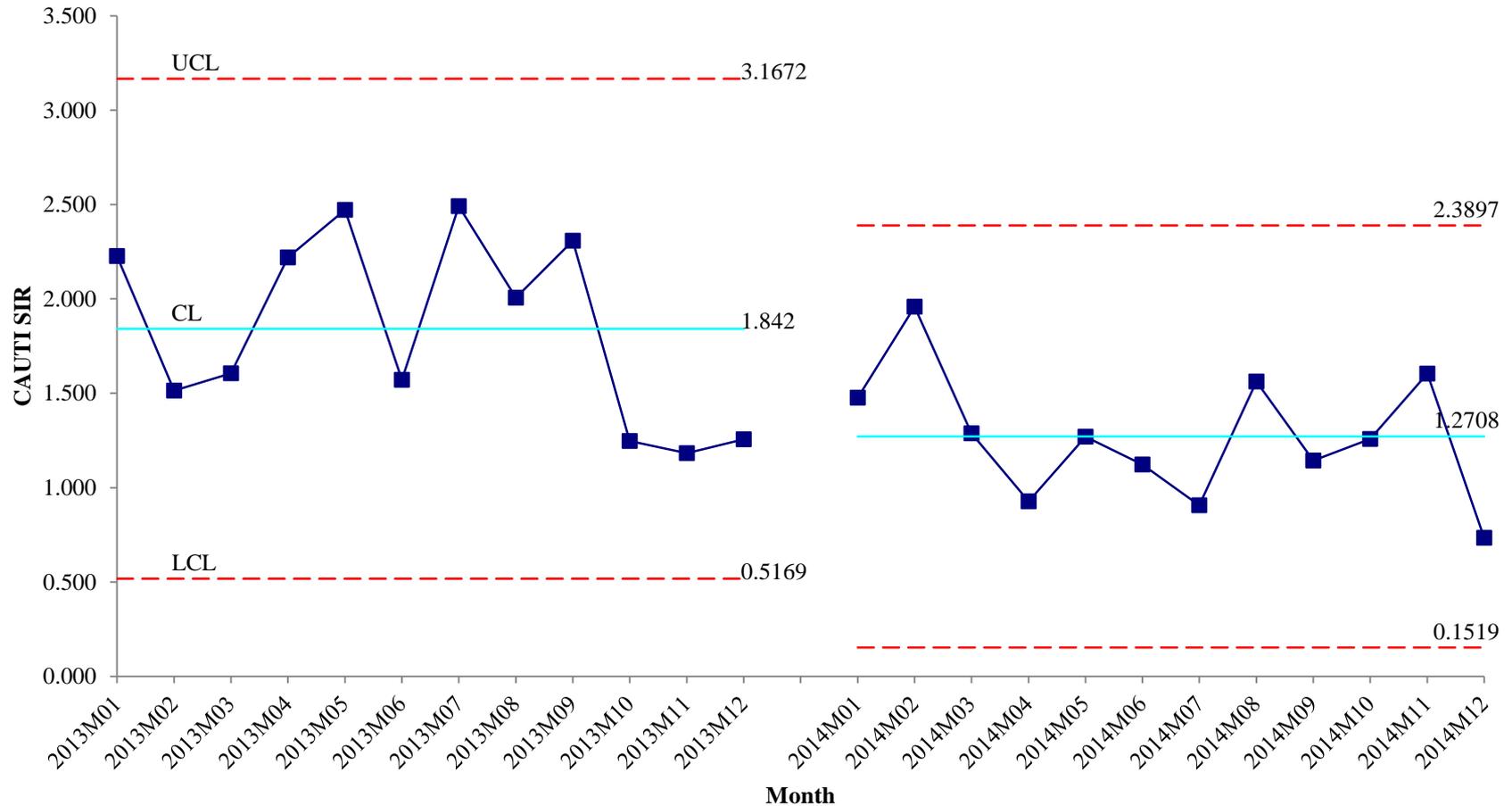
| Time Period | 75th percentile cutoff | Composite Score | Domain 2 | CLABSI | CAUTI | CDI | MRSA | SSI |
|--------------------|------------------------|-----------------|----------|--------|---------|---------|--------|---------|
| 7/1/2011-6/30/2013 | 7.5 | 8 | 8 | 9 | 7 | N/A | N/A | N/A |
| 7/1/2012-6/30/2014 | 6.75 | 6.75 | 7 | 8 | 9 | N/A | N/A | N/A |
| 7/1/2013-6/30/2015 | 6.57 | 6.04 | 6.4 | 8 | 6 | 5 | 8 | 5 |
| 7/1/2014-6/30/2016 | 0.3607 | 0.0364 | 0.0062 | 0.4424 | -0.9206 | -0.5147 | 0.836 | 0.1881 |
| 7/1/2015-6/30/2017 | 0.3316 | -0.0146 | -0.3162 | -0.365 | -0.9672 | -0.5515 | 0.4471 | -0.1443 |
| 7/1/2016-6/30/2018 | 0.3229 | -0.0727 | N/A | -0.568 | -1.041 | -0.5867 | 0.2516 | -0.2139 |

Catheter-associated Urinary Tract Infection (CAUTI) Reduction Interventions

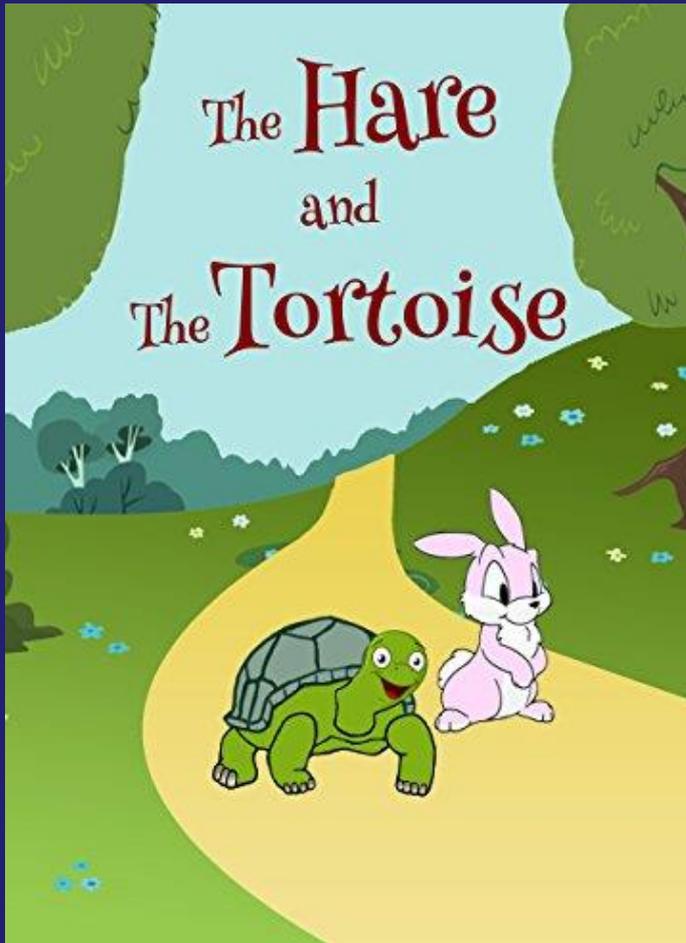
UAB Hospital-wide CAUTI Count for Reportable Units 2013-2014



UAB Hospital-wide CAUTI SIR for Reportable Units 2013-2014

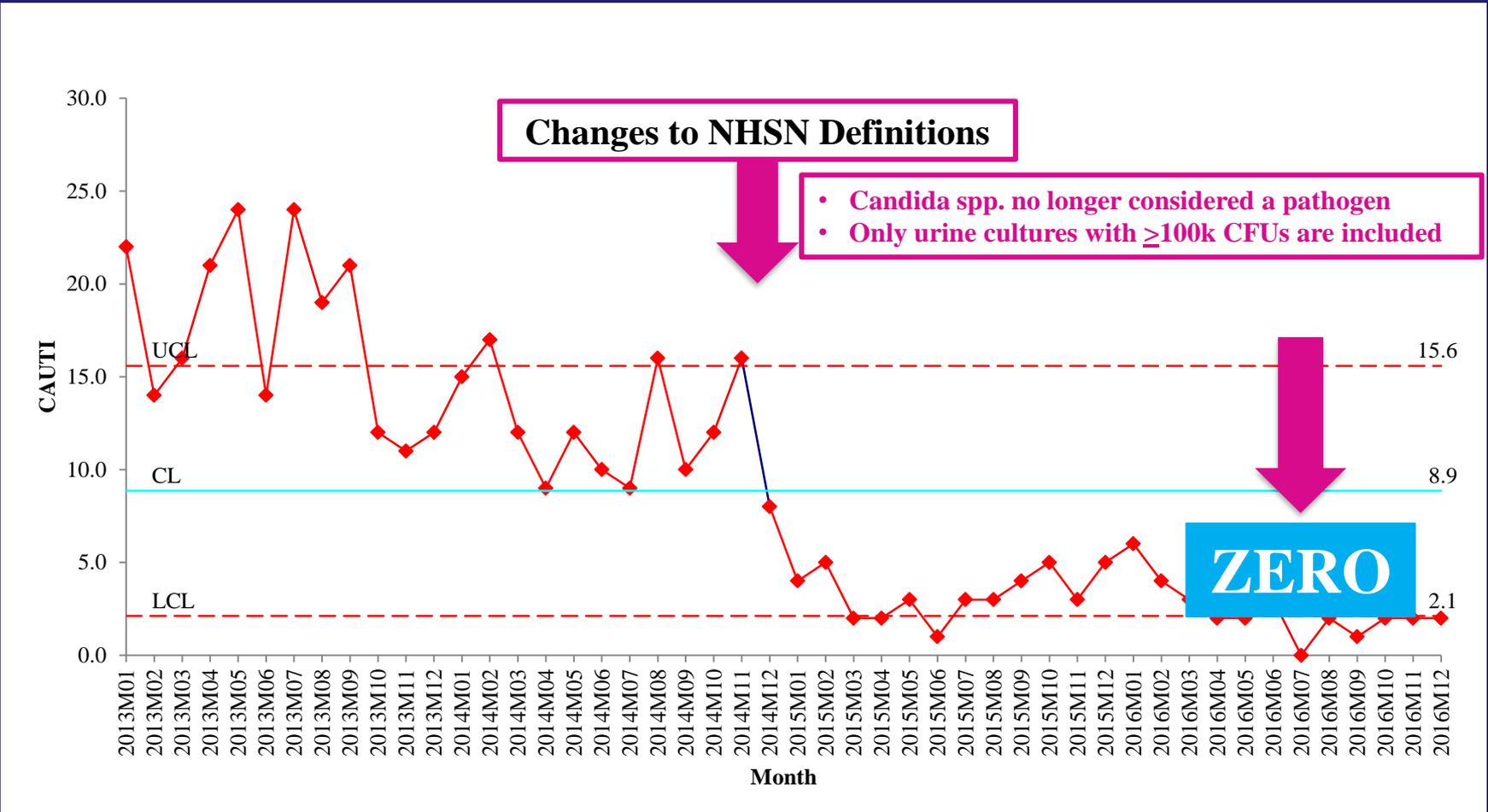


From Last Place to Top Ten in the State

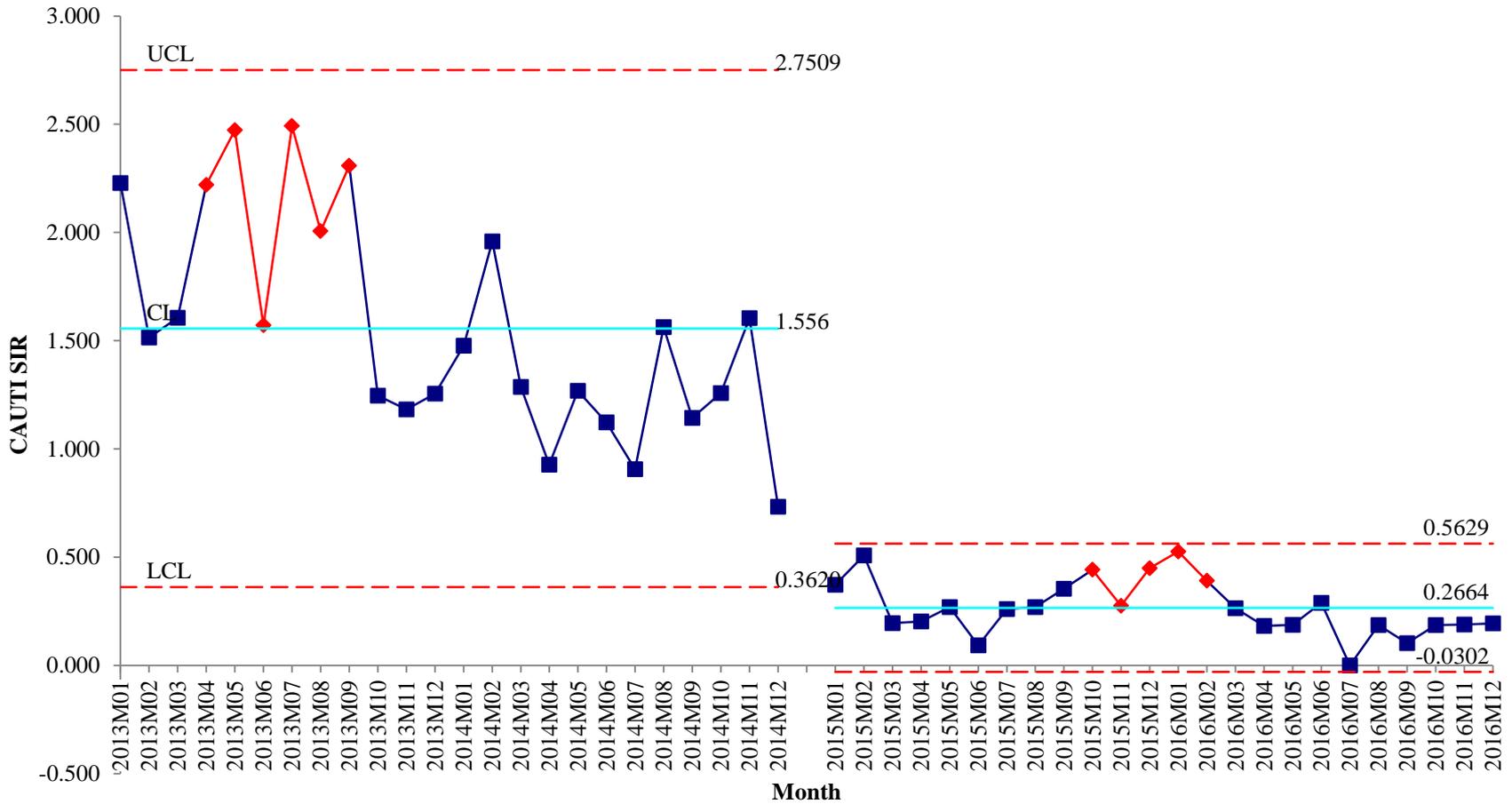


- ✓ Nurse-driven Catheter removal protocol
- ✓ Check urinalysis before sending the urine for cultures
- ✓ Review techniques for insertion and catheter care
- ✓ Change reporting by Microbiology Lab -- Report only urine cultures that are positive $\geq 100k$ colony forming units
- ✓ Justification of continued Foley catheter use on day 5 or later

UAB Hospitalwide CAUTI Count for Reportable Units 2013-2016



UAB Hospital-wide CAUTI SIR for Reportable Units 2013-2016



Impact of Changes to the National Healthcare Safety Network (NHSN) Definition on Catheter-Associated Urinary Tract Infection (CAUTI) Rates in Intensive Care Units at an Academic Medical Center

Catheter-associated urinary tract infections (CAUTIs) account for >30% of hospital-acquired infections (HAIs) reported by acute-care hospitals.^{1,2} Acute-care hospitals are incentivized to reduce CAUTIs because it is one of the measures included in the Centers for Medicare and Medicaid (CMS) hospital-acquired condition reduction program.³ The National Healthcare

RESULTS

When the corresponding NHSN definition for the respective year was applied, we observed a trend for decreasing yearly CAUTI rates. Even before the NHSN definition was updated, but during the implementation of the CAUTI prevention bundle, we observed a significant decrease in the CAUTI incidence rate (IR) from 5.7 UTIs per 1,000 catheter days in 2013 to 3.9 UTIs per 1,000 catheter days in 2014 ($P < .001$). During the 2-year period between January 2013 and December 2014, 345 CAUTIs occurred, but more than half of these did not meet the current (2015) NHSN definition. Notably, 44.1% of CAUTIs in 2013 and 50.3% in 2014 were due to yeast (Table 1).

With the current 2015 NHSN definition, we observed a significant decline in the CAUTI IR in 2015: 0.98 UTIs per 1,000 catheter days in 2015 versus 3.89 in 2014 ($P < .001$). When the current 2015 NHSN definition was applied to the 2013 CAUTI data, the CAUTI IR decreased by 57.5% from 5.7

INFECTION CONTROL & HOSPITAL EPIDEMIOLOGY JULY 2018, VOL. 39, NO. 7

CONCISE COMMUNICATION

The Impact of 2015 NHSN Catheter-associated Urinary Tract Infection (CAUTI) Definition Change on Central Line-associated Bloodstream Infection (CLABSI) Rates and CLABSI Prevention Efforts at an Academic Medical Center

Sonali D. Advani, MD, MPH;¹ Rachael A. Lee, MD;² Martha Long, MSN, RN, CIC;³ Mariann Schmitz, MPH, CIC;³ Bernard C. Camins, MD, MSc²

The 2015 changes in the catheter-associated urinary tract infection definition led to an increase in central line-associated bloodstream infections (CLABSIs) and catheter-related candidemia in some health systems due to the change in CLABSI attribution. However, our rates remained unchanged in 2015 and further declined in 2016 with the implementation of new vascular-access guidelines.

Infect Control Hosp Epidemiol 2018;39:878–880

updated early 2016 to improve insertion and maintenance practices. In addition, new guidelines for drawing blood cultures in the setting of central lines were introduced. These included recommendations to stop surveillance blood cultures in asymptomatic patients and to refrain from drawing blood cultures through central venous catheters.

Data Collection

This retrospective study included CAUTI and CLABSI surveillance data from January 1, 2013 to December 30, 2016. This surveillance program was performed by trained infection preventionists using the applicable NHSN definitions. The UAB Institutional Review Board deemed this study exempt from review.

Statistical Analysis

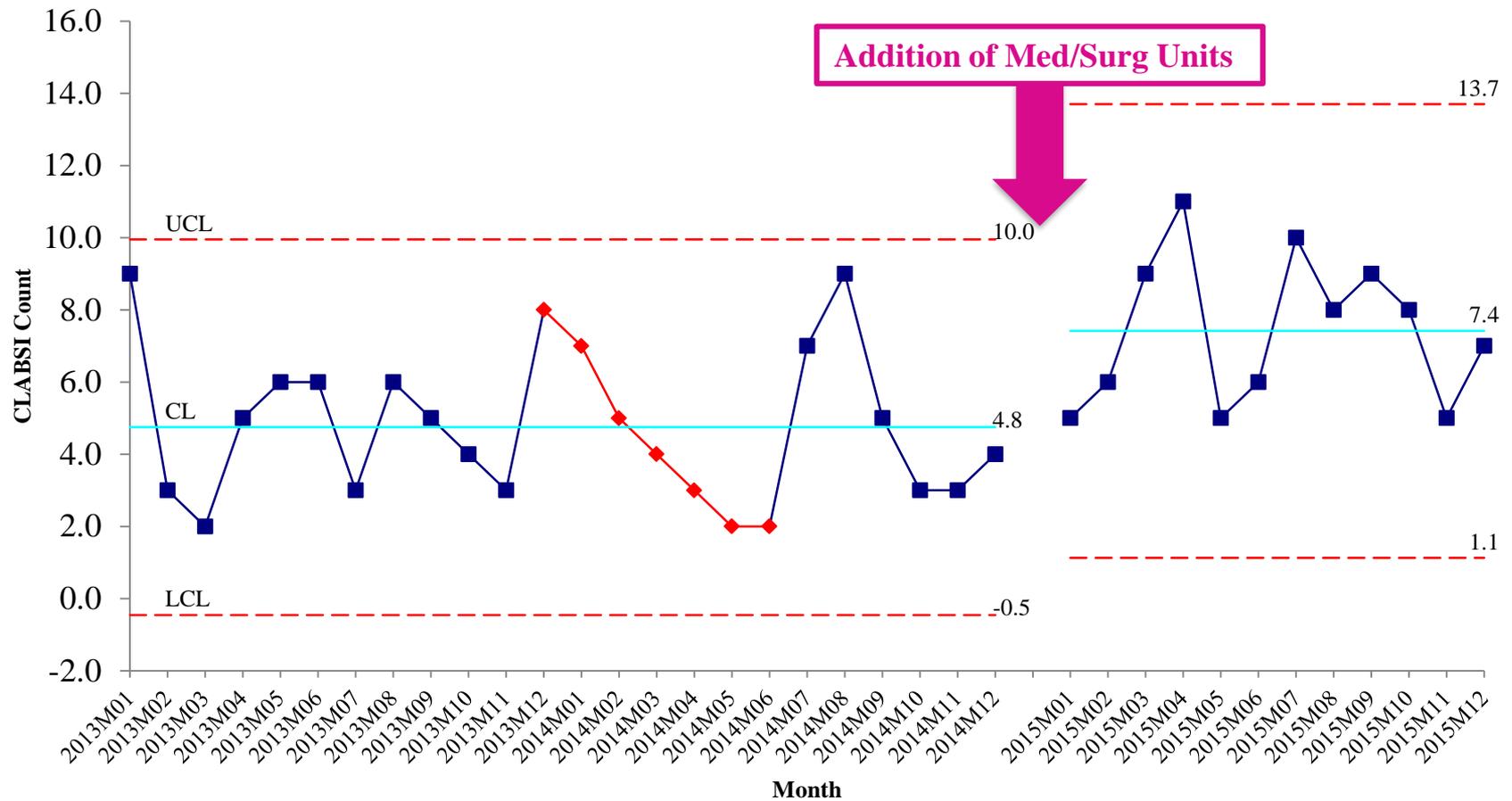
We analyzed both the reportable hospital-wide and the intensive care unit (ICU) CLABSI and CAUTI rates. We performed a review of organisms causing CLABSIs and CAUTIs from 2013 to 2016 and compared them for changes after the 2015 NHSN definition change. Descriptive statistics

Other Potential Interventions to Reduce CAUTI Incidence

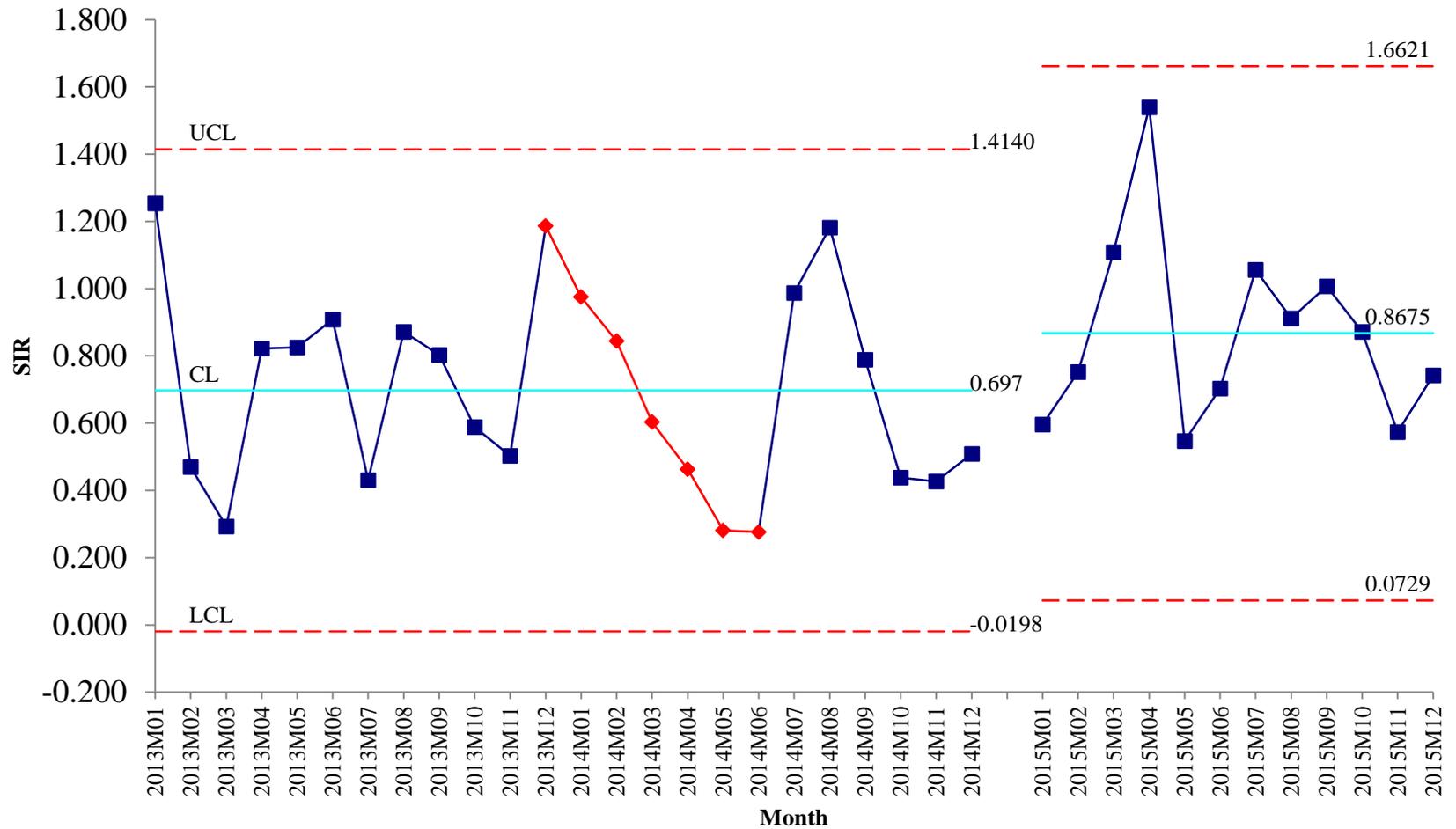
- ▶ Requiring justification of Foley catheter use after a set number of days (i.e., 3-5 days)
- ▶ Female external catheters

Central Line-Associated Bloodstream Infection (CLABSI) Reduction Interventions

UAB Hospital CLABSI Count for CMS Reportable Units 2013-2015



UAB Hospital-wide CLABSI SIR for Reportable Units 2013-2015



UAB Hospital CVL Summit 2016

- ▶ The CVL summit was led by our CMO and CNO
- ▶ Training for physicians, residents, and medical students for insertion practices developed by a team that comprised of the associate CMOs of each department
- ▶ Nursing directors, nursing managers, nurse educators, and bedside nurses were included in the discussion and involved with the revision of vascular access standard

Timeline For Revisions of Vascular Access Policy

- ▶ March 2, 2016: 1st Meeting of CVL Summit
 - Established Vascular Access Task Force
- ▶ March 11, 2016: Delivered Revised Policy
- ▶ March 21, 2016 : 2nd Meeting of the CVL Summit
 - Established CVL Team Cart
- ▶ April 19, 2016: Policy & Training Approach Approved by MEC
 - Soft start in CMS reportable units with implementation of new recommendations
- ▶ April 25, 2016: 3rd CVL Summit
 - CVL carts standardized, implementation date set
- ▶ July 1, 2016: Full Implementation of the new Vascular Access Policy

UAB Hospital CVL Access Model

DECISION

- IV Access decision algorithm
- Need for CVL checklist

INSERTION

- Processes
 - Pre- procedure
 - Procedure
 - Post-procedure
 - Documentation
- Support
 - Documents
 - Training
 - Line carts stocking/restocking

MAINTENANCE

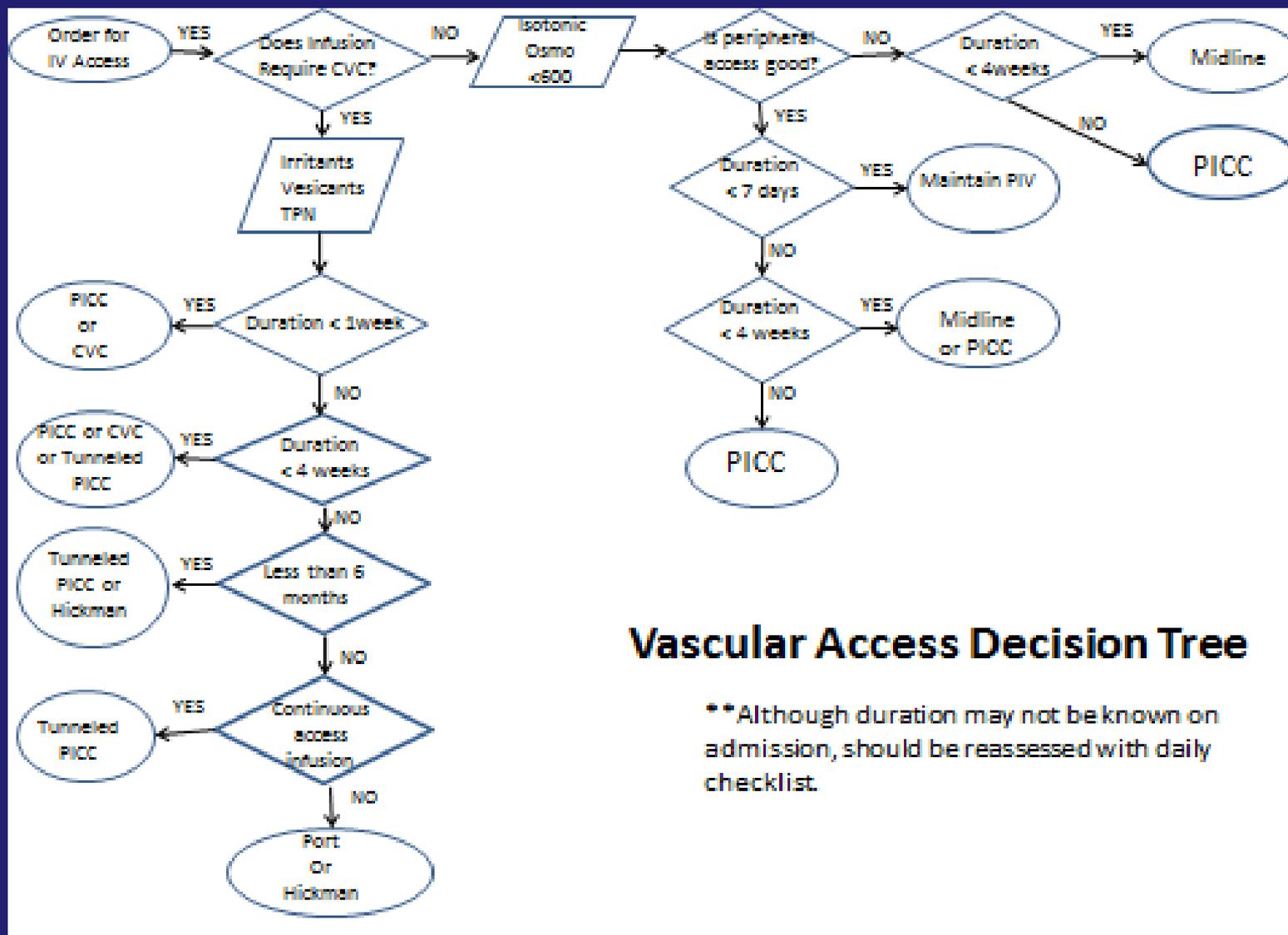
- Processes
 - Dressing changes
 - Line/tubing change
 - Access
 - Infusions
 - Lab draws including blood cultures
- Support
 - Documents
 - Training
 - Supplies

REMOVAL

- Active monitoring
- Decision to remove line
- Procedure
 - Documents
- Training

Decision

- Is the central line indicated?
- Use vascular access decision tree and escalate difficult IV access.
- Assess daily if central access is indicated.
- Consult central venous access team (CVAT) team



Insertion



- Standardized insertion method:
 - Line insertion checklist
 - Antiseptic coated catheter
 - Full maximum barrier protection for all CVL placement
 - CVL insertion carts
- All providers who insert CVL to receive training at orientation and annually
- Required simulation training for residents
- Medical students and health related profession student get simulation training only
- Required inter-professional “Time out”
- Place “Stop Sign” on patient’s door prior to insertion

Maintenance

- Daily assessment for necessity of line and documentation in EMR
- Hand hygiene prior to each access
- Daily Chlorhexidine baths
- Daily change of patient bed linens
- Dressing changes every Tuesday/Friday
- Tubing and cap changes
- Providers, patients and families wear masks during dressing changes

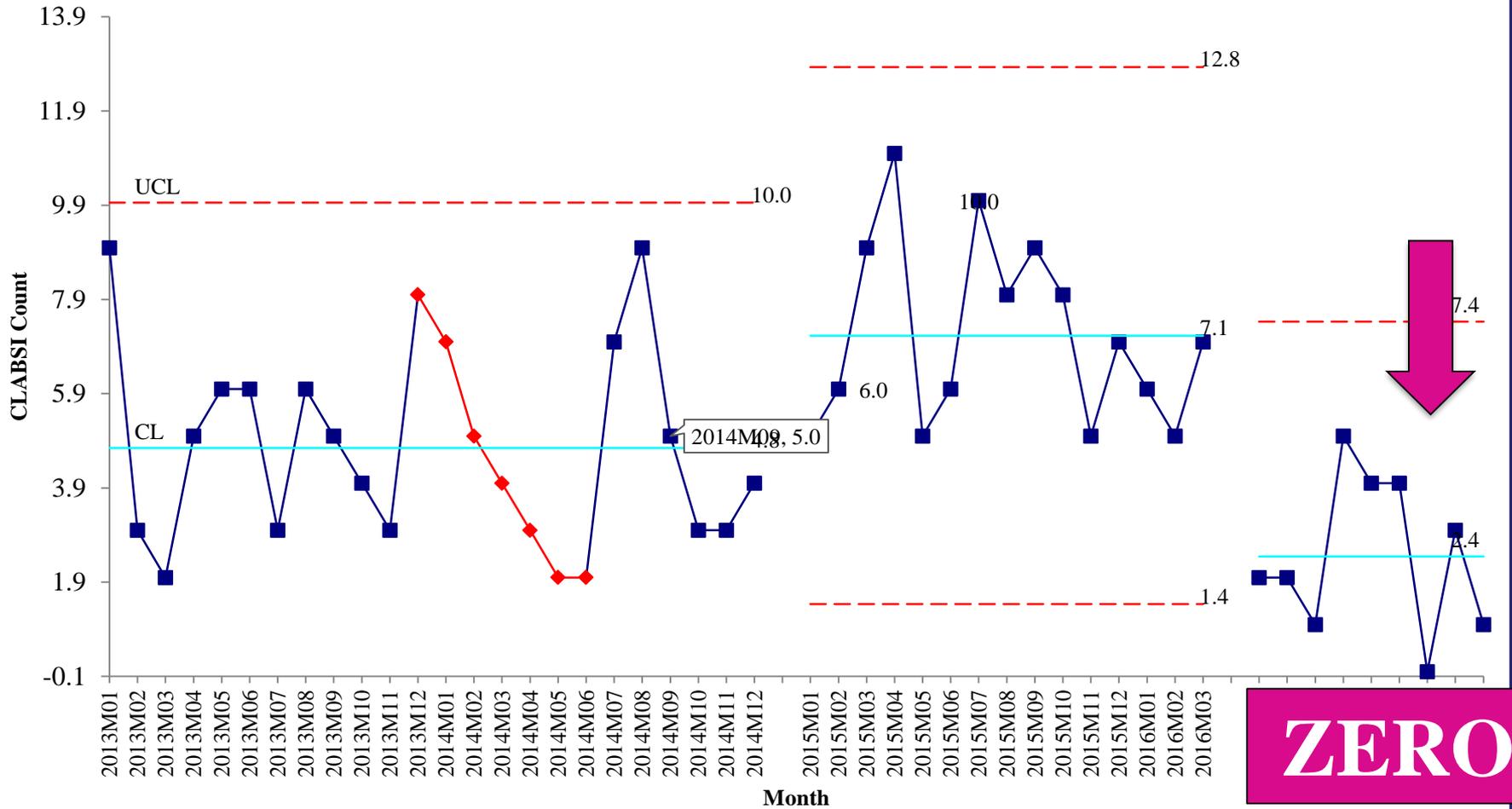
Clinical Practice Changes

- Guidelines for blood cultures in setting of CVL
 - Required bedside clinical assessment prior to ordering
 - Leukocytosis or fever alone is not an indication for blood culture
 - Assess for secondary site of infection and document in EMR
 - Peripheral blood cultures only and no catheter tip cultures
 - Pre-approval to draw blood cultures through CVL
 - Cultures may be drawn to confirm clearance for *S. aureus*, *Candida* and *Enterococcus* spp.
 - No surveillance cultures
- Deviation from guidelines
 - Escalation pathway: RN → ANM → NM + Attending Physician

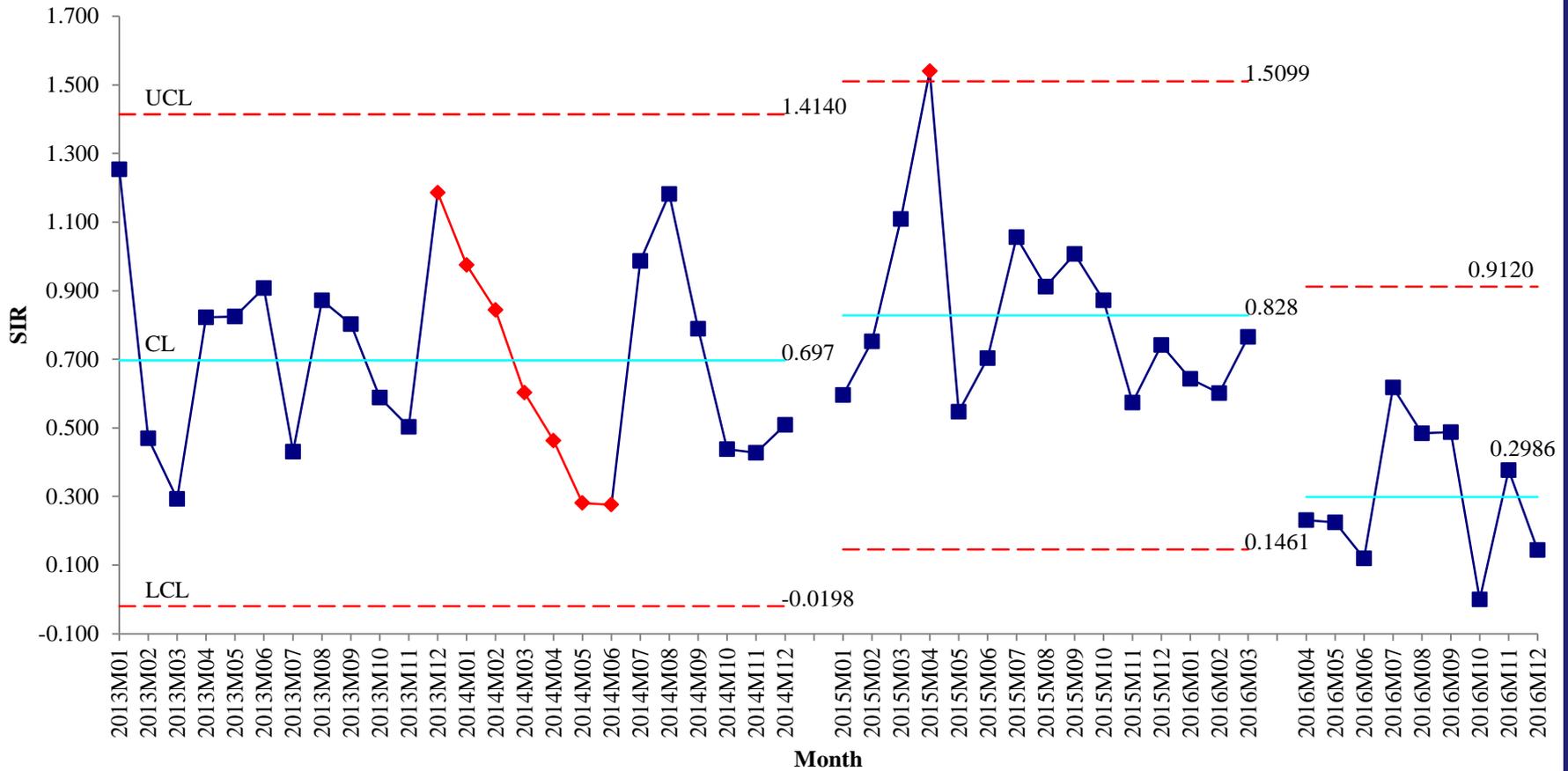
Removal

- ▶ Assess need daily
- ▶ Discontinue line as soon as possible
- ▶ Use removal checklist
- ▶ Document discontinuation
- ▶ Removal or replacement of line not aseptically placed within 48 hours

UAB Hospital-wide Reportable Units CLABSI Count 2013-2016



UAB Hospitalwide SIR for Reportable Units 2013-2016



CLABSIs Prevented in 2016

- ▶ 100.6 CLABSIs expected
- ▶ 40 CLABSIs occurred

**60 CLABSIs
Prevented !**

**Without chlorhexidine-
impregnated patches or
chlorhexidine dressings**

**624 Excess
Patient Days
Avoided**

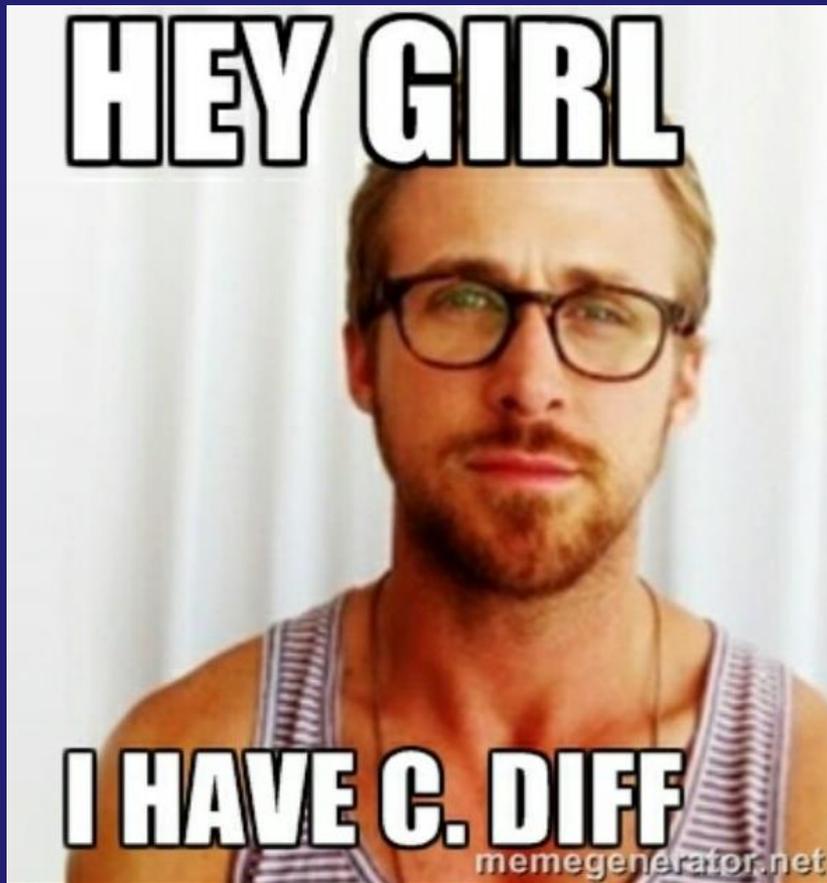
\$2.7 Million Saved

Hospital-onset *C. difficile* infection (CDI) Lab-ID Event Reduction



Predictors Included in the Logistic Regression Model for Expected CDI Events

1. Inpatient community-onset prevalence rate
2. CDI test type (EIA vs. NAAT)
3. Medical school affiliation
4. Number of ICU beds
5. Total number of inpatient beds
6. Facility type



Diagnosis

Clinical Diagnosis

- ▶ Johnson et al first defined CDI as ≥ 3 loose or watery bowel movements in 24 hours
 - Confounded by other conditions (e.g., laxative use)
- ▶ Two separate retrospective studies showed that 39% and 36% of patients tested did not meet the above criteria
- ▶ To improve the specificity of lab tests:
 - Do not test stool from a patient who has received a laxative within the previous 48 hours
 - Reject specimens that are not liquid or soft

Johnson et al. *Clin Infect Dis* 2014; 59:345–54
Dubberke et al. *J Clin Microbiol* 2011; 49:2887–93
Peterson et al. *Clin Infect Dis* 2007; 45:1152–60

Laboratory Tests

▶ EIA

- Monoclonal or polyclonal antibodies to detect toxin A and B or Glutamate dehydrogenase (GDH)
- Low sensitivity but new toxin EIAs are more sensitive
- GDH immunoassays detect the highly conserved metabolic enzyme; present in both toxigenic and nontoxigenic strains so lack specificity

▶ NAAT

- More sensitive than toxin EIAs and likely GDH EIAs but less sensitive than toxigenic culture
- Positive predictive value is low if low risk patient is tested

Discrepancy Between Toxin EIA and NAAT for CDI testing

| State | Switch Laboratories | | Non-switch Laboratories | | Median Test <i>P</i> Value | Attributable Increase to NAAT |
|------------|---------------------|-----------------------|-------------------------|-----------------------|----------------------------|-------------------------------|
| | No. of Month-Pairs | Median Ratio (95% CI) | No. of Month-Pairs | Median Ratio (95% CI) | | |
| California | 14 | 1.52 (.69–2.50) | 56 | 1.0 (1.00–1.50) | .09 | 52% |
| Colorado | 24 | 1.43 (1.21–2.33) | 161 | 1.0 (.85–1.06) | .0002 | 43% |
| Georgia | 50 | 1.67 (1.50–2.06) | 149 | 1.0 (.89–1.04) | <.0001 | 67% |

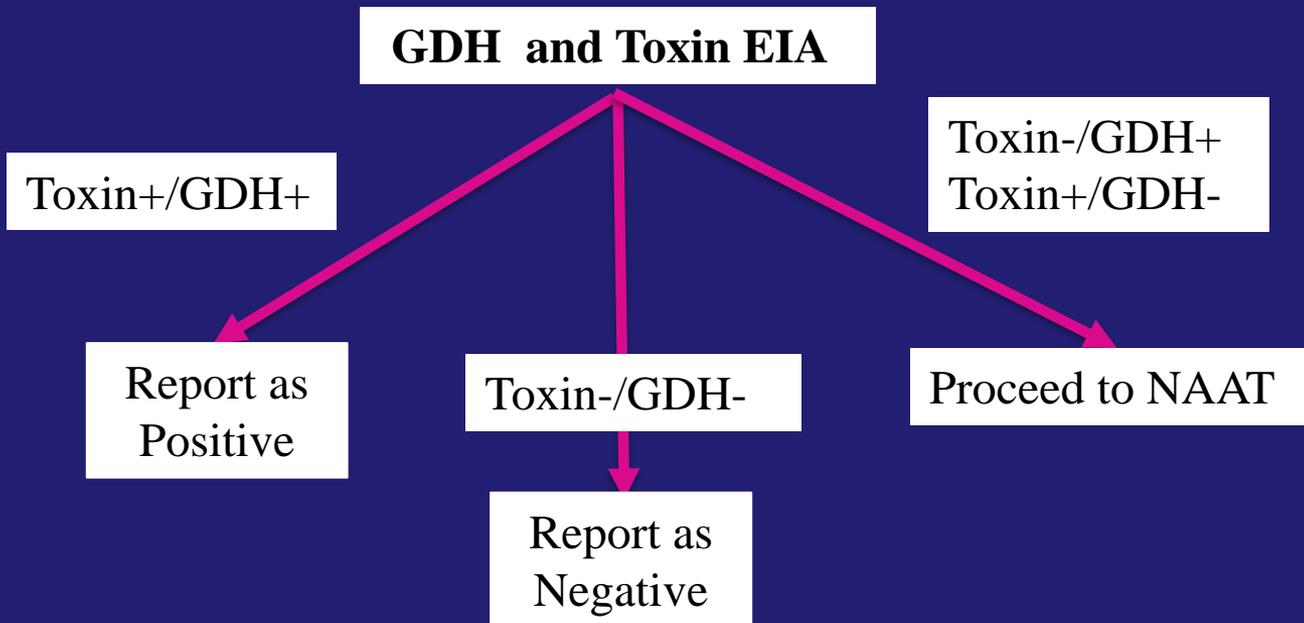
Gould et al. *Clin Infect Dis* 2013; 57:1304–1307

EIA vs NAAT Testing in the NHSN CDI Event Model

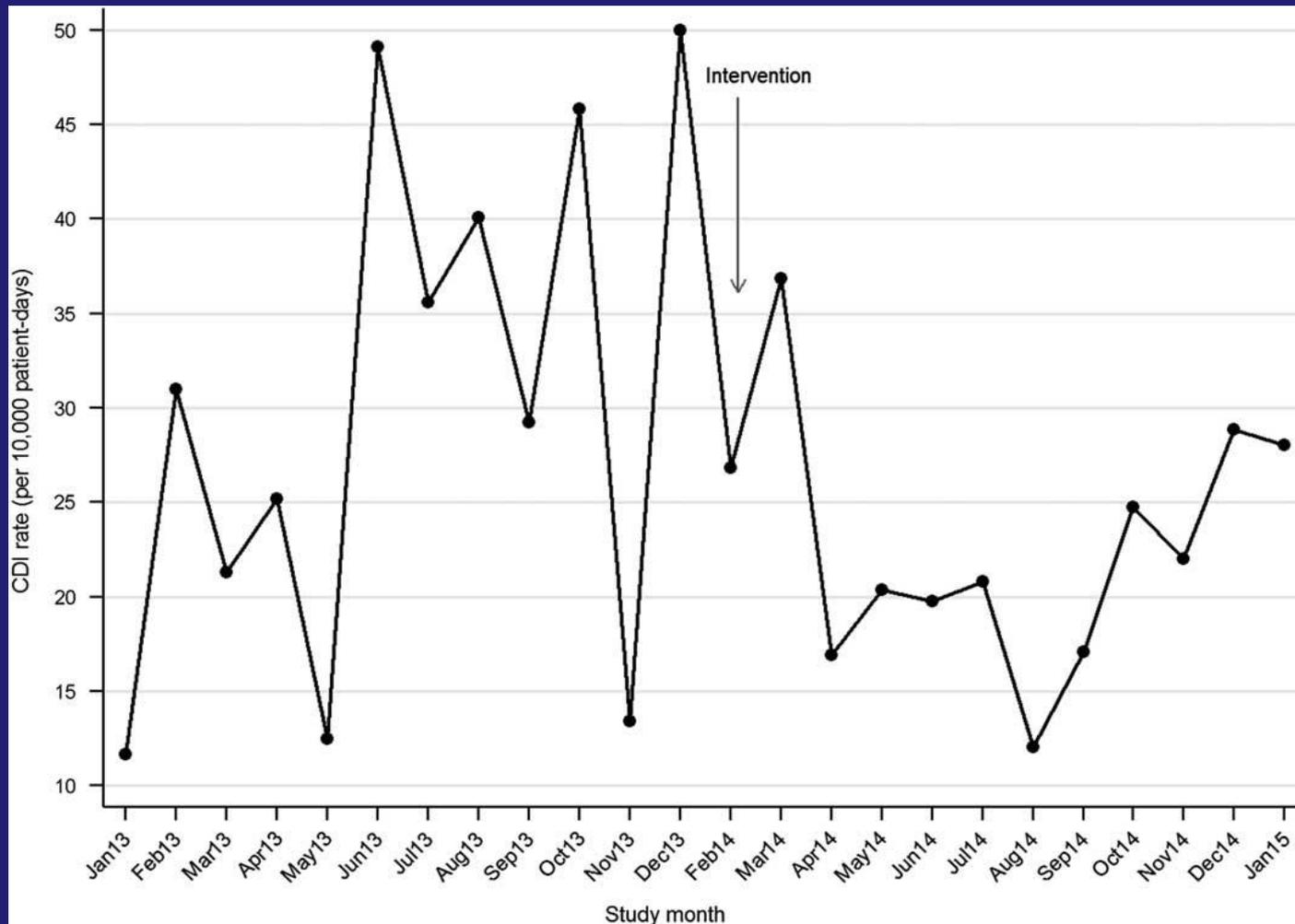
| Previous CDI Model | | | |
|---------------------------|---------------|------------------------|------------------------|
| Lab Method | HO-CDI Events | HO-CDI Events Expected | HO LabID-CDI Event SIR |
| EIA | 88 | 176.3 | 0.50 |
| NAAT | 247 | 259.8 | 0.95 |
| Later CDI Model | | | |
| EIA | 88 | 144.9 | 0.61 |
| NAAT | 247 | 277.1 | 0.89 |

Laboratory Testing

- ▶ Use a stool toxin test as part of a multistep algorithm



Monthly CDI Incidence in 3 Hematology/Oncology Wards at the Hospital for the University of Pennsylvania





C. Diff Test Not Indicated

This patient has received magnesium sulfate within the past 48 hours. C. difficile toxin testing is not indicated since a positive test will likely be a false positive test.

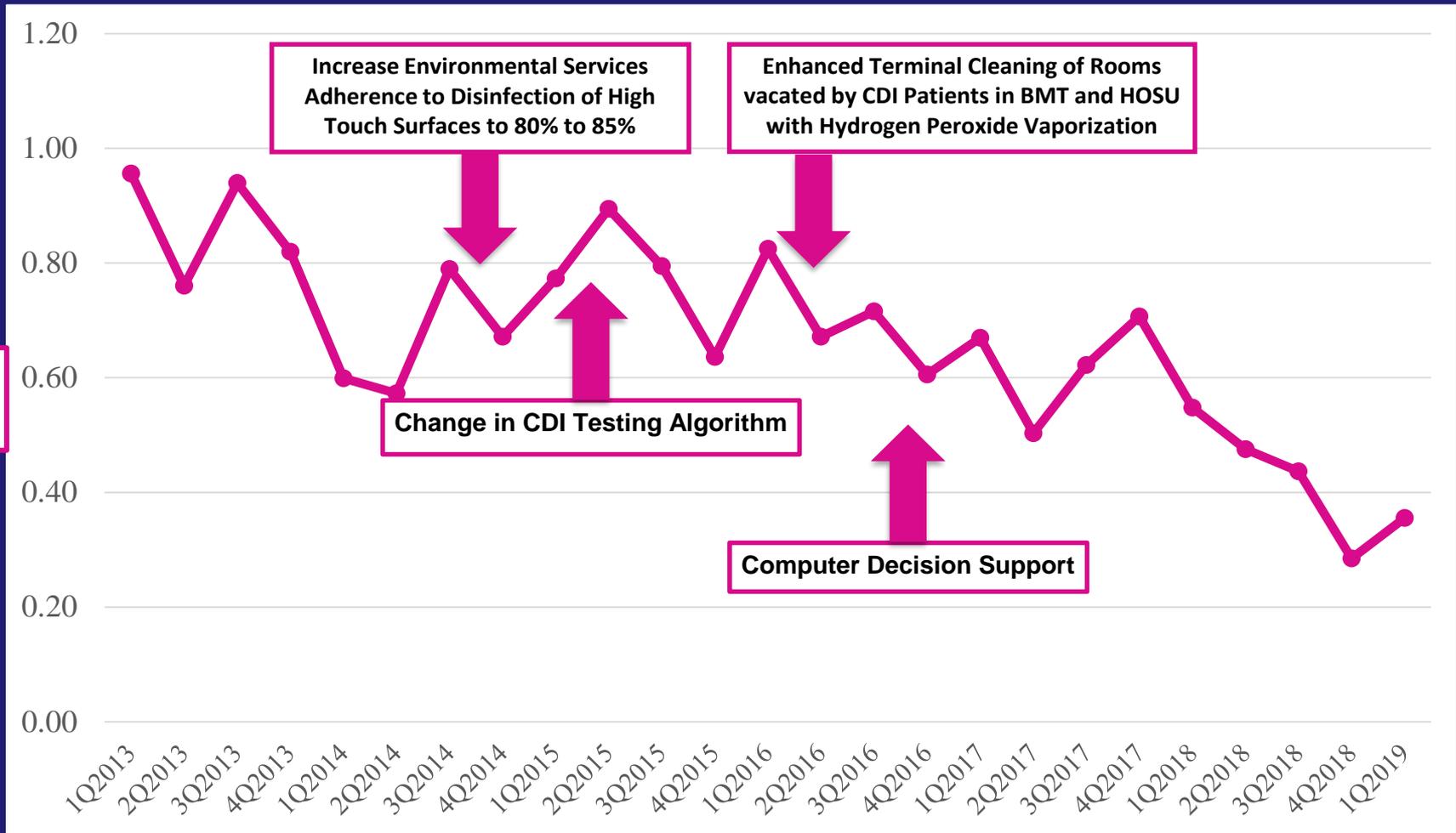
Alert Action

- Cancel the order. Will hold this med for 48 hrs and reorder.**
- I understand a positive result will be of no value, order the test.**

OK

UAB Hospital HO-CDI Lab-ID Event SIR 2013-2019

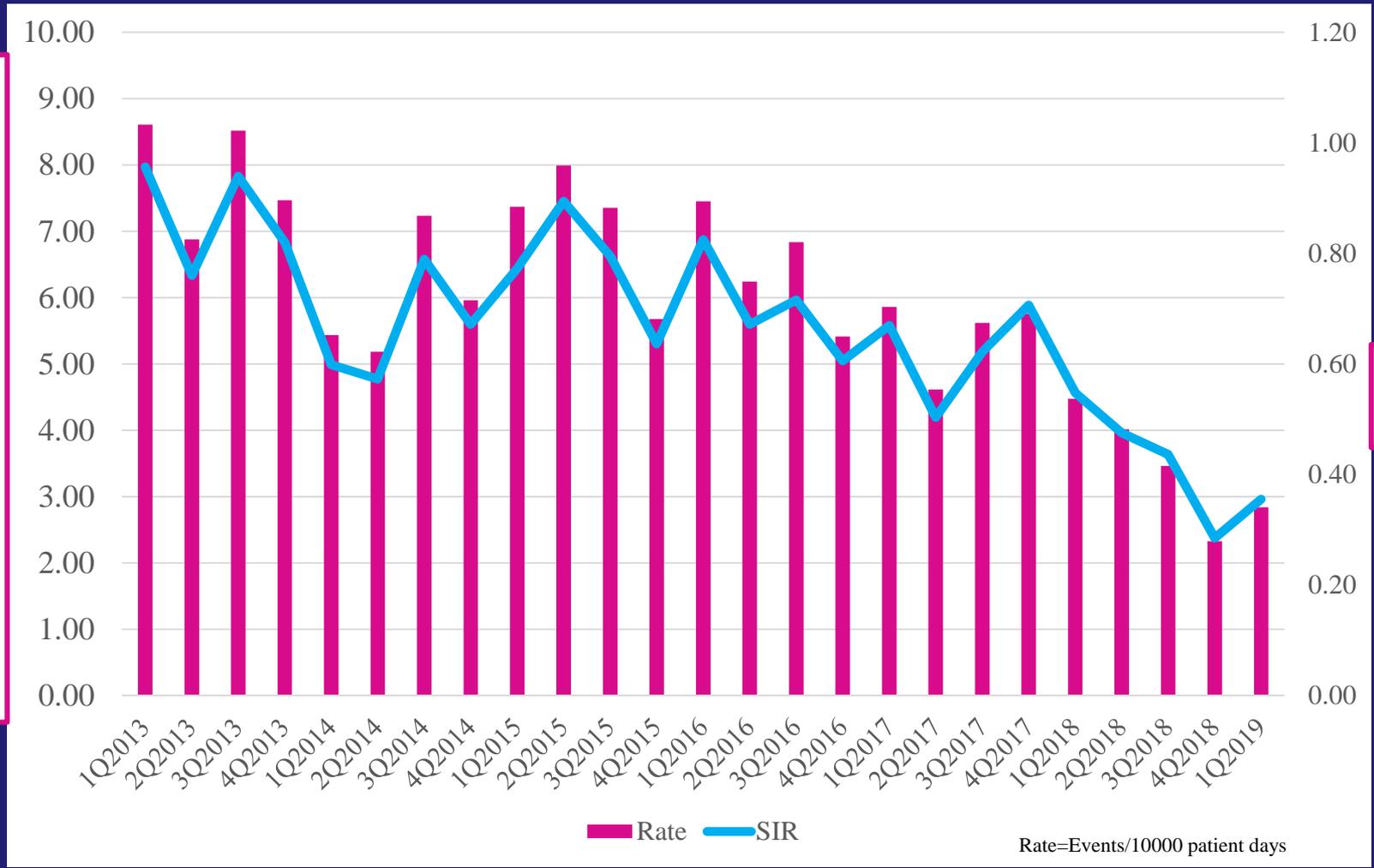
SIR



UAB Hospital HO-CDI Lab-ID Quarterly Events and SIR (2013-2019)

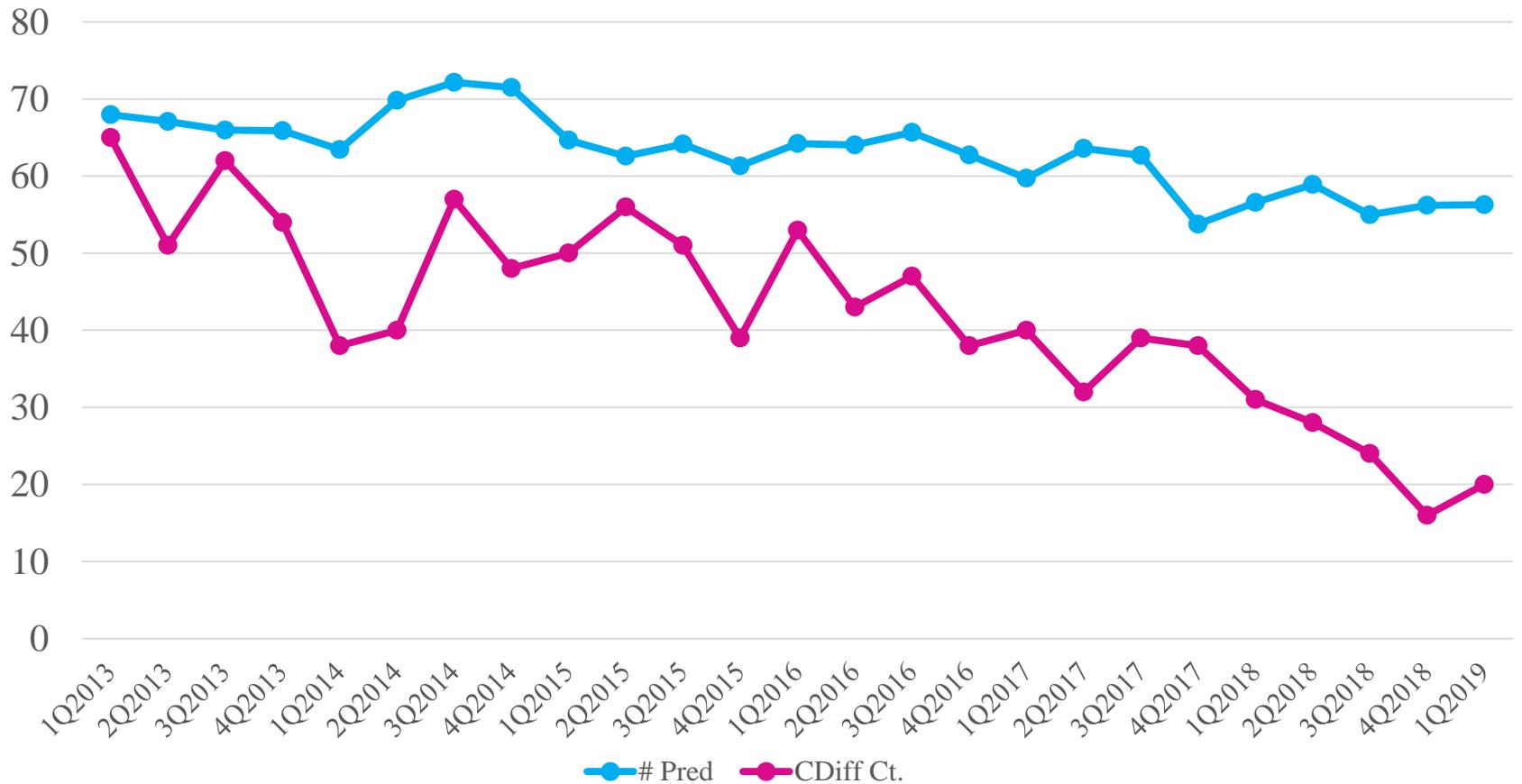
Incidence in Events/10000 patient-days

SIR

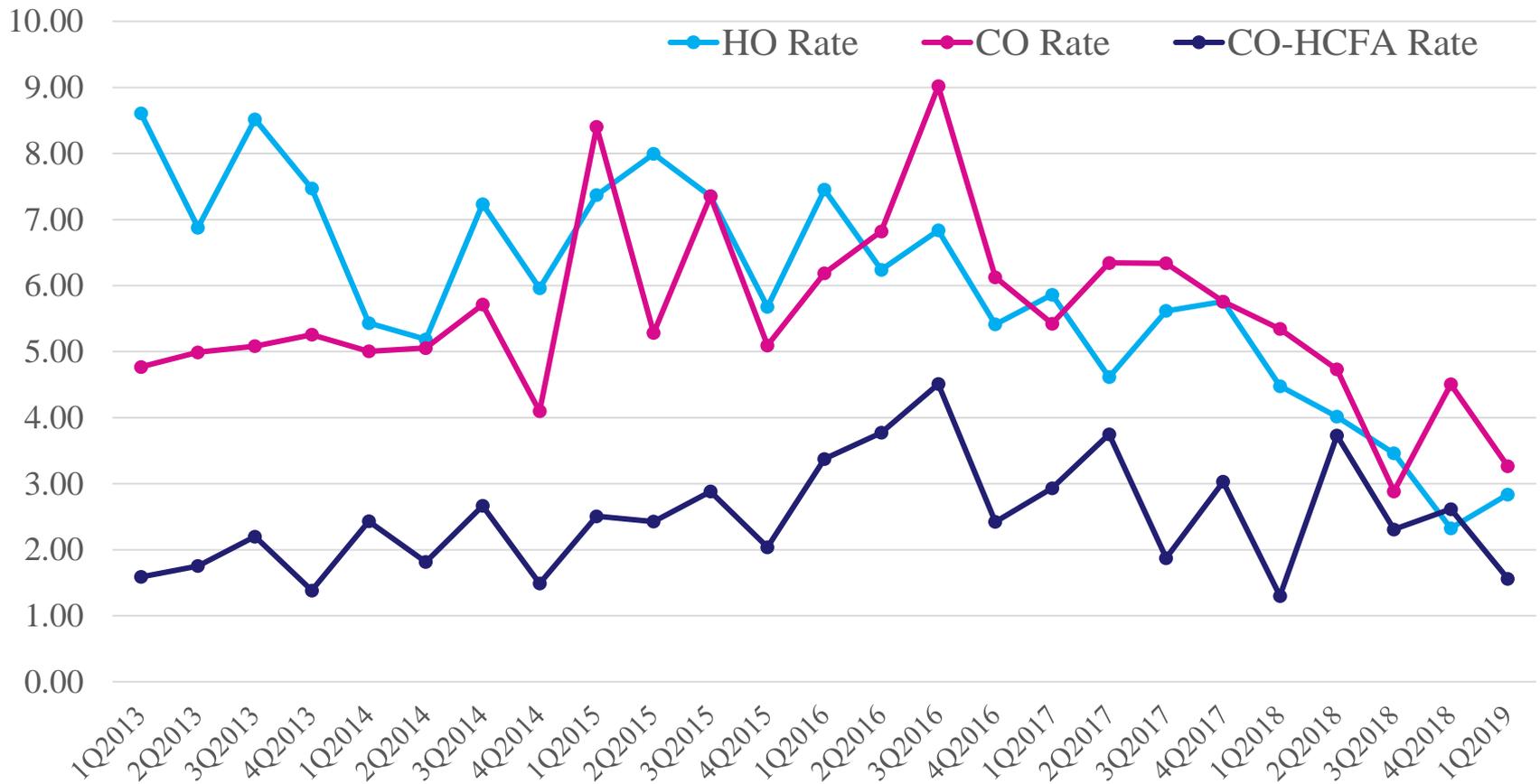


Rate=Events/10000 patient days

UAB Hospital Expected/Observed HO-CDI Lab ID Events 2013-2019

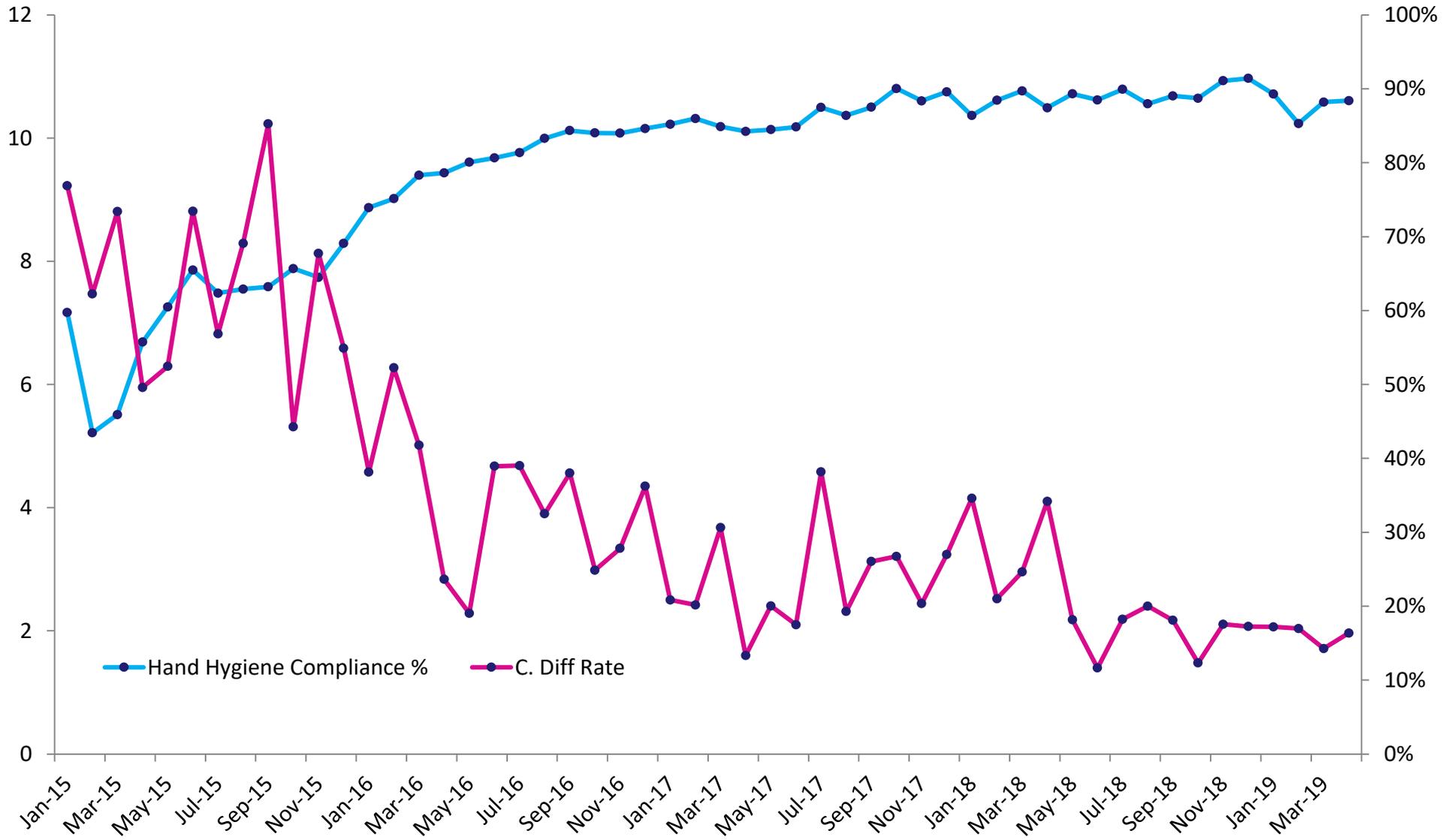


UAB Hospital CID Lab-ID Events 2013-2019



Rate=Events/10000 patient days

Hand Hygiene Compliance and C. Diff Rates, System



*Data Source: JCTST, Accessed 6/17/2019. Jan 2015 – Apr 2019 data.

**Celebrate your successes and
share your experiences**

Introduction

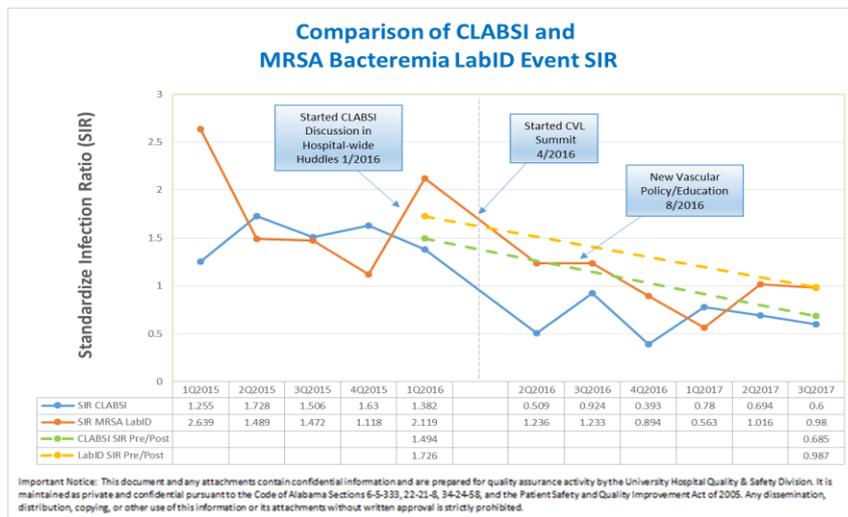
The Centers for Medicare and Medicaid Services (CMS) mandates that acute-care hospitals report central line-associated bloodstream infections (CLABSI) and MRSA bacteremia LabID events. We compare these indicators and how our efforts to reduce CLABSI affects our MRSA bacteremia LabID Events.

Methods

- During the period of January 2015 through September 2017, University of Alabama at Birmingham Medical Center, Birmingham, Alabama, a 1,157-bed academic, tertiary hospital, had a total of 899,023 patient days and 266,533 central venous line (CVL) days.
- Interventions implemented 1/2016
 - CLABSI presented at daily “bed huddle”
 - Event reviewed by nurse manager and medical director with discussion on opportunities for improvement
 - Interdisciplinary committee formed for CVL Summit to discuss updates to catheter care processes
- New Vascular Access Guidelines partially implemented 4/2016
- Complete implementation of Vascular Access Guidelines 8/2016 with new interventions
 - Address need for central lines
 - Ensure proper insertion, maintenance, and removal practices
 - Escalation pathway for obtaining blood cultures

Objectives

- Compare and contrast CLABSI and MRSA bacteremia LabID event definitions
- Describe processes to reduce central line-associated bloodstream infections (CLABSI)
- Discuss how efforts to decrease CLABSI reduced MRSA bacteremia LabID events

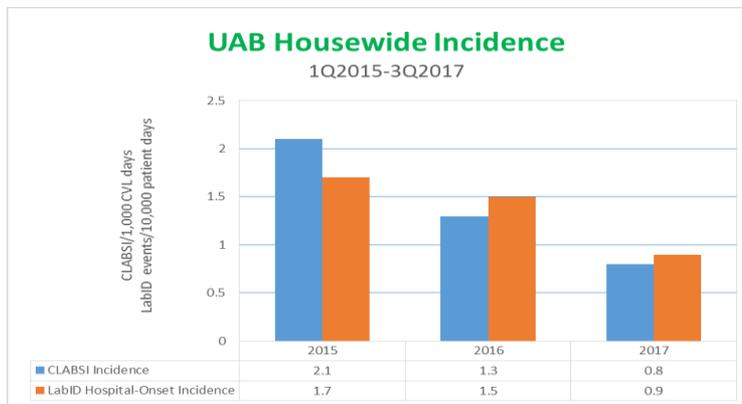


Results

- Observed decreasing house-wide CLABSI incidence from 2015 to 2017 (2.1, 1.3, 0.8 CLABSI/1,000 CVL days)
- Observed decreasing MRSA LabID hospital-onset incidence during same period were 1.7, 1.5, 0.9 events/10,000 patient days
- Proportion of CLABSIs that were MRSA bacteremia LabID events decreased post-intervention from 42.5% to 30.2% (p=0.22)
- Implementation of CLABSI prevention interventions resulted in relative reduction of 40.6% in the MRSA LabID event incidence
- Decrease in the SIR for LabID events from 1.73 to 0.99 (p<0.001)
- Decrease in CLABSI SIR from 1.5 to 0.69 (p<0.001) during the same period

Conclusion

Efforts to decrease CLABSI had a positive outcome in reducing MRSA bacteremia LabID events; therefore, improving patient quality. Our efforts of continuous review of our processes by key stakeholders in both leadership and the bedside enabled us to accomplish our goals of reducing our goals of reducing not only CLABSI, but also MRSA bacteremia LabID events.



Options for Publishing in *AJIC*

Brief Report

- ▶ abstract of 50 to 75 words
- ▶ 1000 words or less
- ▶ may include two illustrations or tables
- ▶ maximum of 10 references

Practice forum

- ▶ Reports of infection prevention and control practices and related applications of epidemiology
- ▶ limited to two to five typed double-spaced pages, referenced whenever appropriate

Conclusions

- ▶ Sustaining reductions in HAI incidence require everyone's attention
 - Whack-a-mole
- ▶ Engage all healthcare providers in the process
- ▶ Find other dedicated partners (i.e., simulation center)
- ▶ Celebrate your successes and share them through conferences and publications



"I think it's important to note that we really did try hard."

Acknowledgements



UAB Hospital Infection Prevention Team 2017



Mount Sinai Health System Infection Prevention Team February 2019

Questions?

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