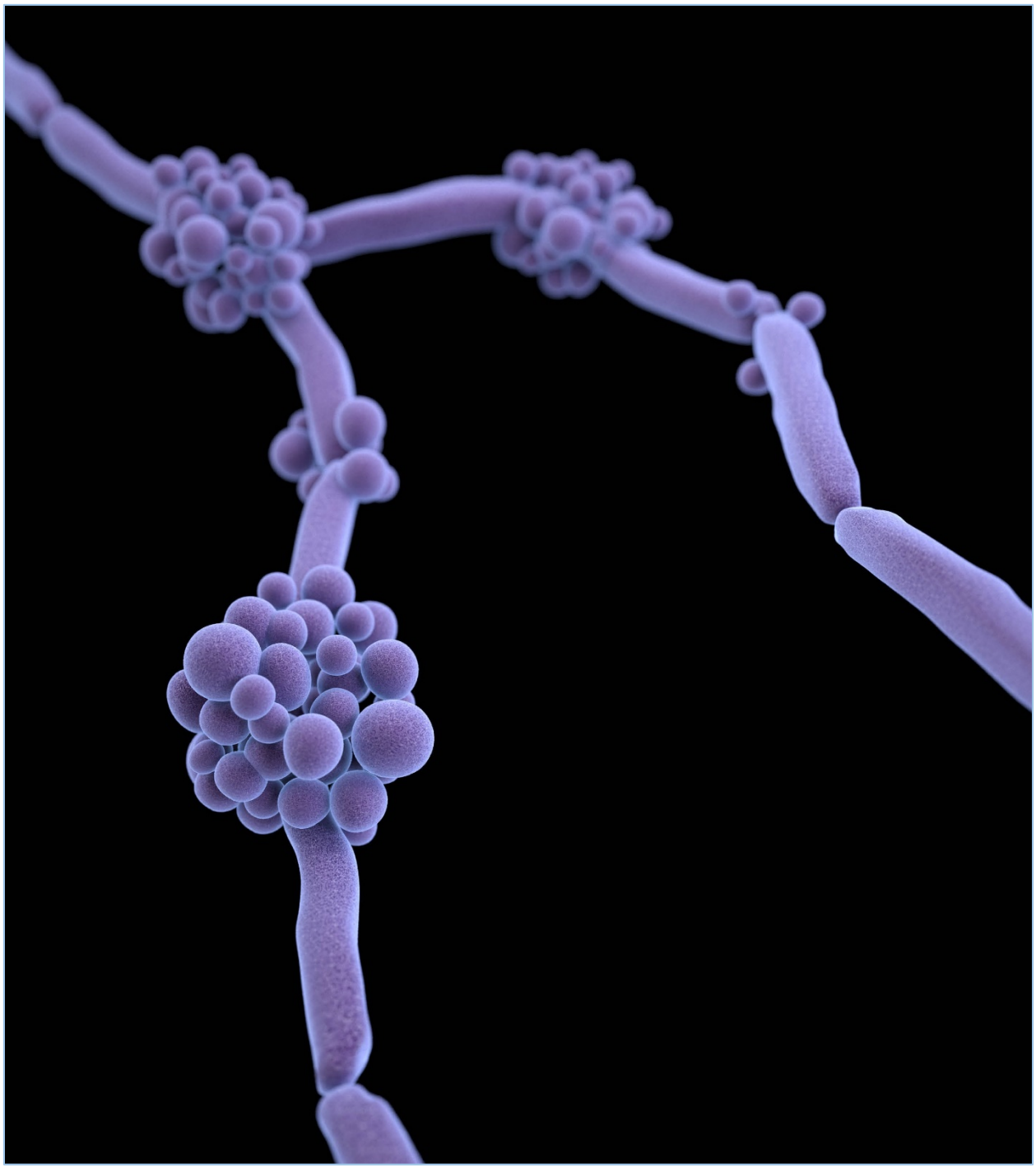


Los Angeles County Healthcare-Associated Infections 2018 Regional Summary Report

Los Angeles County Department of Public Health | August 2019

Table of Contents

Cover image: Fluconazole-resistant *Candida* fungus, U.S. Centers for Disease Control and Prevention - Medical Illustrator 2013, Public Health Image Library.

Overview

Purpose of This Report

Since 2010, healthcare-associated infections (HAIs) including central line-associated bloodstream infections (CLABSI), methicillin resistant *Staphylococcus aureus* (MRSA) bloodstream infections (BSIs), vancomycin-resistant *Enterococci* (VRE) BSI, *Clostridioides* (formerly *Clostridium*) *difficile* infections, and surgical site infections (SSIs) associated with 28 selected procedure categories have been mandated reportable by Section 1255.8 of the California Health and Safety Code. Hospitals self-report their HAI data using the Centers for Disease Control and Prevention's (CDC) National Healthcare Safety Network (NHSN), a free, web-based software system. The Los Angeles County Department of Public Health (LACDPH) obtained voluntary conferral of rights to these data from all hospitals in LAC, excluding the two Veteran Affairs (VA) facilities to which the reporting mandate does not apply. Additionally, LACDPH issued a Health Officer Order to mandate that acute care hospitals (ACHs) report carbapenem-resistant Enterobacteriaceae (CRE) into NHSN beginning in 2017, where in prior years reporting had been voluntary. This year's report includes results from the second year of mandated CRE reporting in the county. Finally, LACDPH began receiving voluntarily conferred catheter-associated urinary tract infection (CAUTI) in NHSN beginning in 2018.

Since obtaining access to NHSN data, the LACDPH Healthcare Outreach Unit has provided guidance to infection preventionists (IPs) and other facility staff in entering, reporting, and tracking infections in NHSN. The Unit also works together with facilities to reduce HAI rates by using NHSN data to target outreach. LAC is a unique area within California, encompassing nearly 25% of hospitals in the state, as well as 25% of the state's population. Due to the large size and complexity of the healthcare in the area, a local perspective of HAI trends is helpful. This regional summary of HAI data will provide trend analysis to identify areas where improvements have been achieved and where prevention efforts must be focused.

This report will also provide an update regarding efforts to increase influenza vaccination of healthcare personnel. Prioritizing influenza vaccination is important for reducing the morbidity associated with influenza transmitted in the healthcare setting.

Why Are Multi-Drug Resistant Organisms a Public Health Concern?

Multi-drug resistant organisms (MDROs) pose a threat to patient safety and have been designated by CDC as an urgent public health priority. The CDC estimates that 10% to 15% of hospitalized patients and 65% of nursing home residents are colonized with at least one MDRO. As patients access care from an increasing variety of settings, the early detection and containment of MDROs is vital to avoiding transmission between individuals, as well as healthcare facilities.

Significance of Device-Associated HAIs

Several types of priority HAIs are associated with the use of invasive devices. These infections can result in significant patient morbidity and mortality, prolong the duration of hospital stays, necessitate additional diagnostic and therapeutic interventions, and increase the costs of health care. Urinary tract

infections are the most common HAI and about 75% are associated with the use of a urinary catheter. CLABSIs result in thousands of deaths each year and a significant added burden on the healthcare system. Device-associated infections can often be prevented by ensuring appropriate use, limiting the duration of device utilization, and implementing proper patient hygiene and environmental cleaning techniques

L.A. County's Role in Fighting HAIs and MDROs

The goal of reducing HAIs, particularly MDROs, in LAC can be achieved through working partnerships between healthcare facilities and public health. Analysis of HAI data, including the results included in this report, helps LACDPH identify MDROs and/or HAIs with higher incidence and elucidate targets for further intervention. LACDPH engages facilities in infection prevention and antimicrobial stewardship collaboratives, provides educational resources, and works toward HAI infection control gap mitigation. LACDPH connects healthcare facilities to resources, provides infection control consultation, and disseminates best practices identified through collaboration with local healthcare facilities, quality improvement organizations, the California Department of Public Health (CDPH), and CDC.

In 2018, LACDPH continued its work of improving infection prevention and antimicrobial stewardship and containing multi-drug resistant organisms. Projects included the creation of a long-term acute care facility collaborative, a healthcare personnel influenza vaccination project with 11 hospitals, targeted infection prevention assessments in 10 hospitals with high HAI SIRs, antimicrobial stewardship evaluations and consultations, annual visits to each acute care hospital, quarterly meetings of the LAC Healthcare-Associate Infections and Antimicrobial Resistance Committee, an emergency department antimicrobial stewardship collaborative, carbapenem-resistant Enterobacteriaceae enhanced lab surveillance, and hosting antimicrobial stewardship educational events, semiannual Infection Prevention Basics Courses, and a Skilled Nursing Facility Symposium.

Acknowledgements

The LACDPH Healthcare Outreach Unit would like to thank the infection prevention, quality/risk management, laboratory, and information technology staff of hospitals in L.A. County for their collaboration in providing the data in this report. LACDPH staff members contributing to this report include Stacy Hartmann, Jennifer Nyugen, Dawn Terashita, and Kelsey OYong. Questions and/or comments on this report can be sent to hai@ph.lacounty.gov.

Methods

Data Sources

This report includes all data reported through participation in the NHSN LACDPH Reporting Group for January through December 2018. All 92 hospitals in L.A. County (number excludes two Veteran Affairs facilities) submitted data. Due to incomplete reporting, the number of hospitals reporting varies by module and is noted within each section. Hospitals that reported zero infections are included in this count. For the purposes of this report, data from Pasadena and Long Beach hospitals are included.

L.A. County comparisons are made to statewide and national data, where available. State comparisons for 2015, 2016, and 2017 were obtained from the CDPH Healthcare-Associated Infections in California Hospitals Annual Report. Data were obtained from the CDC 2018 National and State Healthcare-Associated Infections (HAI) Progress Report for 2018 National and state comparisons, and when California state comparisons were not available (e.g., for CAUTI).. Targets are based on the U.S. Department of Health and Human Services (HHS) 2020 targets and metrics (Table 1). Finally, the percentage of influenza vaccination coverage among health-care personnel is reported and compared to the Healthy People 2020 goal.

HAI Types in This Report

This report presents data on healthcare personnel influenza vaccination and seven HAIs:

1. Central line-associated bloodstream infections (CLABSI)
2. Catheter-associated urinary tract infections (CAUTI)
3. Surgical site infections (SSI) following 28 surgical procedure categories (previously 29, however, spinal refusion is no longer distinguished from spinal fusion after transitioning to ICD-10 medical coding)
4. Positive laboratory identified methicillin-resistant *Staphylococcus aureus* (MRSA) found in the bloodstream
5. Positive laboratory identified vancomycin-resistant *Enterococcus* (VRE) found in the bloodstream
6. Positive laboratory identified *Clostridioides difficile* infection (CDI) in stool specimens
7. Positive laboratory identified carbapenem-resistant Enterobacteriaceae (CRE) in any specimen

All HAIs were defined following the NHSN Patient Safety Component Manual and the NHSN Healthcare Personnel Safety Component Protocol.

Analysis

In this report, the pooled number of HAIs, pooled denominator information, standardized infection ratio (SIR), and 95% confidence intervals are displayed for each HAI type aggregated across facilities in LAC for 2018. Because risk adjustment models are not available for VRE bacteremia or CRE infections, pooled counts and rates per 10,000 patient days are presented. For MDROs and CDI, all cases meeting the

NHSN definition as healthcare-facility onset (specimen collected >3 days after admission to the facility) are included in SIRs or pooled healthcare-facility onset (HO) rates.

Throughout this report a green star (★) indicates an SIR that is significantly better than predicted and a red X (✖) indicates an SIR that is significantly worse than predicted based on the national rebaseline. The SIR is currently not calculated when the predicted number of infections is less than one. Longitudinal comparisons do not precede 2015 because of changes to the NHSN SIR methodology ("rebaseline" described below). In this report, a checkmark (✓) indicates when the HHS 2020 Target goal has been met.

The data presented are aggregated for L.A. County as they are meant to provide an overview of HAI incidence countywide. However, statistics for L.A. County are separated into general acute care hospital (GACH) and long-term acute care (LTAC) hospital sections because of variation in risk stratification models. The GACH section excludes all data from LTAC hospitals.

LACDPH does not publicly release facility-specific HAI statistics. Facility specific HAI statistics for 2017 can be found in the CDPH 2017 Healthcare-Associated Infections in California Hospitals Annual Report.

All analyses were conducted in the NHSN web-based Analysis Tools and all figures were generated in SAS 9.3 and Microsoft Excel.

Table 1. Targets for national acute care hospital metrics (U.S. Department of Health and Human Services (HHS))

Measure (and data source)	2020 Target (from 2015 baseline)
CLABSI (NHSN)	50% reduction
CAUTI (NHSN)	25% reduction
MRSA (NHSN)	50% reduction
CDI (NHSN)	30% reduction
SSI (NHSN)	30% reduction
Influenza Vaccination (NHSN)	90% vaccination coverage by 2020*

* Influenza vaccination target based on Healthy People 2020 goal

Standardized Infection Ratio Methodology

Using the SIR in this report allows for a consistent assessment of HAI performance among facilities in LAC. The SIR allows for a fair comparison of performance by adjusting the predicted number of infections for differences between healthcare facilities and/or patient-level factors such as comorbidities, age, type of procedure, facility type and bed size, type of patient care location, and affiliation with a medical school. The exact characteristics included in risk stratification vary slightly by infection type and procedure type for SSIs. The SIR is calculated by dividing the number of observed infections by the number of predicted infections.

$$SIR = \frac{Number\ of\ observed\ infections}{Number\ of\ predicted\ infections}$$

In 2015, NHSN implemented a "rebaseline" which updated the source of aggregate data (standardizing the baseline period to 2015) and the risk adjustment methodology used to create the original baselines. SIRs calculated using the 2015 rebaseline cannot be directly compared to SIRs calculated using a previous baseline. As such, comparisons in this report do not precede 2015. Additional information about SIRs and risk adjustment factors included in the 2015 "rebaseline" can be found in the CDC guide to the NHSN SIR.

The SIR summary measure shows whether LAC hospitals, in aggregate, had significantly more, fewer, or about the same number of HAIs observed compared to the number predicted for all facilities based on national baseline data for a baseline time period. When the SIR is calculated there are three possible results:

- **The SIR is less than 1.0** – this indicates that there were fewer infections reported during the surveillance period than would have been predicted given the baseline data.
- **The SIR is equal to 1.0** – as in any ratio, the value of 1 indicates that the numerator and denominator are equal. In this case, the number of infections reported during the surveillance period is the same as the number of infections predicted given the baseline data.
- **The SIR is greater than 1.0** – this indicates that there were more infections reported during the surveillance period than would have been predicted given the baseline data.

While an SIR less than 1.0 is an indicator that fewer infections are occurring than are predicted, target metrics are increasingly being set much lower than 1.0, including the HHS CLABSI target SIR of 0.5. This implies that simply having fewer than the expected number of infections is not enough to mark improvements in HAI prevention.

Pooled Rate Calculations

$$Community\ onset\ (CO)\ rate = \frac{Number\ of\ facility-wide\ CO\ events}{Number\ of\ facility-wide\ admissions}\ x\ 100$$

$$Healthcare-facility\ onset\ (HO)\ rate = \frac{Number\ of\ facility-wide\ HO\ events}{Number\ of\ facility-wide\ patient-days}\ x\ 10{,}000$$

Results

Summary of Findings

Figures 1 and 2 display the distribution of SIRs and rates by infection type among acute care hospitals in L.A. County, which includes general, oncology, orthopedic, and children's hospitals. Facilities that reported at least one month of data in 2018 are included in these figures, except where an SIR could not be calculated. The boxplots indicate the pooled mean SIR for L.A. County and where there are hospitals with significantly higher SIRs than the typical distribution. See Appendix Figure A1 for a general explanation of boxplot displays.

Figure 1: Boxplots of Standardized Infection Ratios, General Acute Care Hospitals, L.A. County, 2018

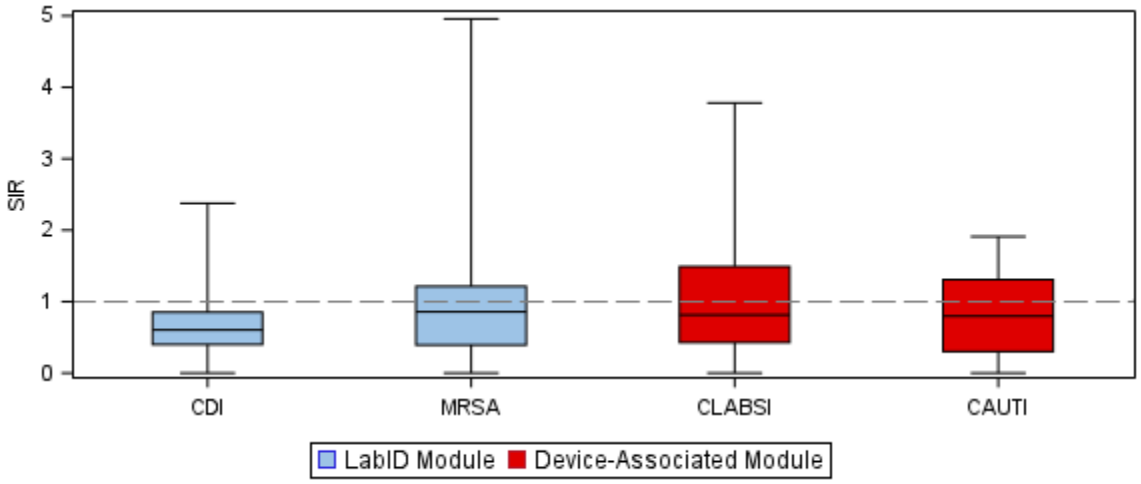


Figure 2: Boxplots of Healthcare Facility-Onset Infection Rates, General Acute Care Hospitals, L.A. County, 2018

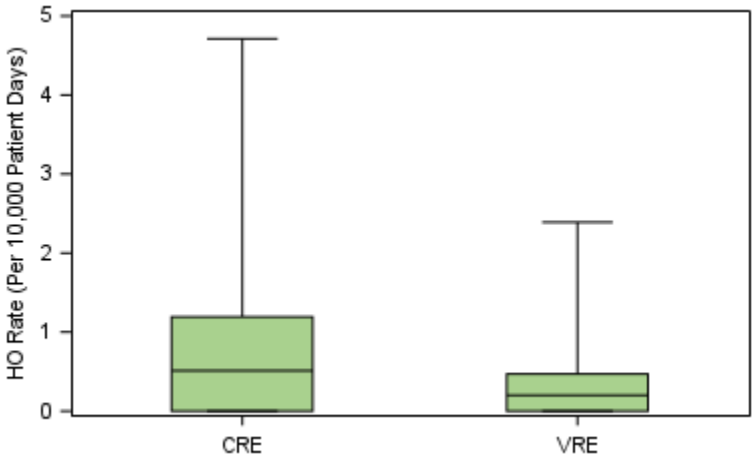


Figure 3: Boxplots of Standardized Infection Ratios, Long Term Acute Care Hospitals, L.A. County, 2018

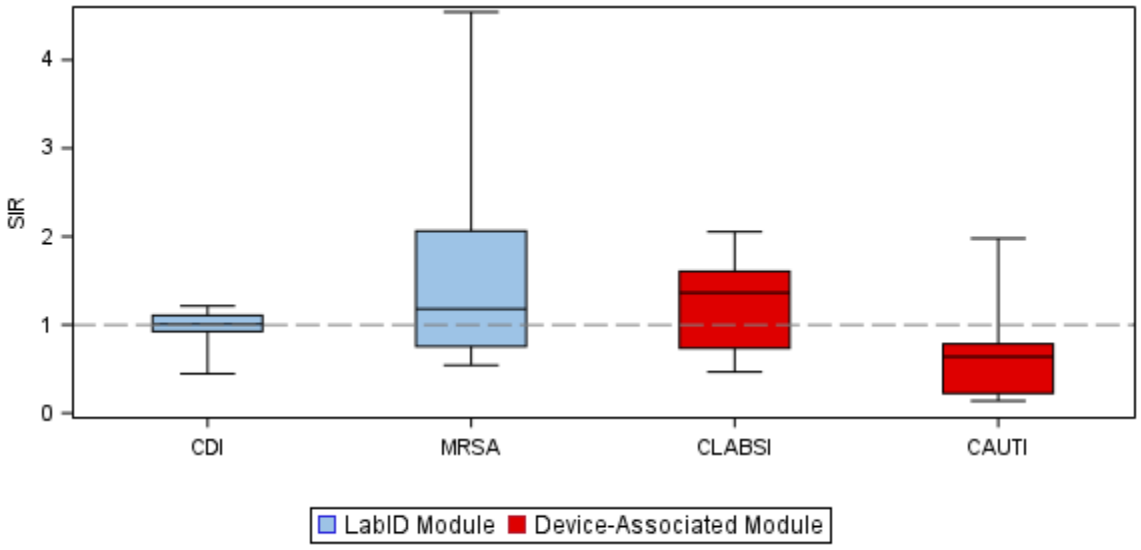
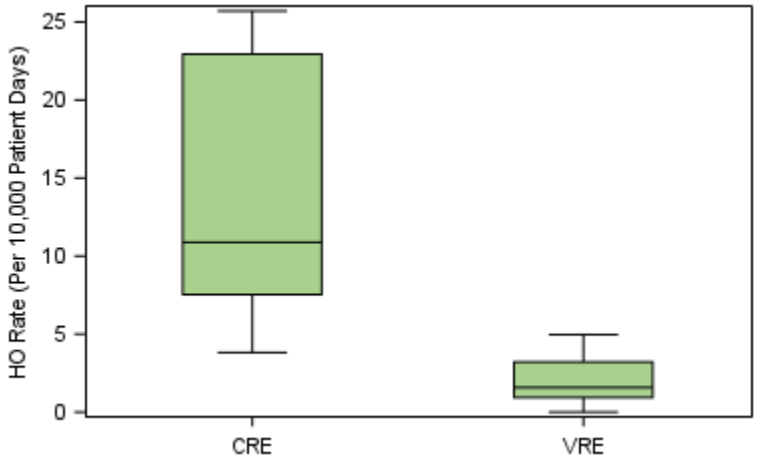


Figure 4: Boxplots of Healthcare Facility-Onset Infection Rates, Long Term Acute Care Hospitals, L.A. County, 2018



Key Findings:

- L.A. County LTACs have reached and surpassed the HHS HAI prevention goals for **CAUTI** of a 25% reduction from the 2015 baseline rates.

- GACHs reported significantly better than expected rates for **CAUTI** and **CDI**, with no HAIs significantly worse than expected compared to the 2015 baseline.

- LTACs reported significantly better than expected rates for **CAUTI** in 2018 compared to the 2015 baseline. The **MRSA** SIR was significantly worse than expected.

- **CLABSI** SIRs in 2018 increased in GACHs and decreased in LTACs, but neither are significantly different from expected rates.

- Healthcare facility-onset **MRSA** bacteremia SIRs for GACHs continued to decrease yet the number of reported infections is not significantly lower than predicted.

- In 2018, rates of **VRE** bacteremia in LAC GACH increased from 2017 and are now nearly twice 2017 California state rate. However, **VRE** bacteremia rates in LTACs have decreased compared to from 2017.

- During the second year of mandated reporting, data show that **CRE** remains a significant burden in L.A. County, particularly for LTACs. GACHs had a HO rate of 0.822 infections per 10,000 patient days, while LTACs had a rate of 13.59.

- The overall number of complex admission/readmission **SSIs** reported by GACHs was again lower than predicted. Ten procedures had SIRs that were better than predicted and no procedures had SIRs that were worse than predicted.

- **Influenza vaccination** among healthcare personnel increased in both GACHs and LTACs from 2017 to 2018, 82.3% to 83.0% and 75.3% to 81.1%, respectively. Progress remains to reach the Healthy People 2020 goal of 90%.

General Acute Care Hospitals

Central Line-Associated Bloodstream Infection (CLABSI) Events

CLABSI reporting through NHSN is mandated by the California Department of Public Health and for participation in CMS Inpatient Quality Reporting. For general acute care hospitals, the number of predicted CLABSIs calculated under the 2015 baseline is risk adjusted based on the following variables found to be statistically significant predictors:

- Type of patient care location
- Hospital affiliation with a medical school
- Bed size of the facility
- Facility type (based on NHSN enrollment)

For neonatal intensive care unit (NICU) locations in acute care hospitals, the number of predicted CLABSIs calculated under the 2015 baseline is risk adjusted based on the following variables found to be statistically significant predictors:

- Birthweight

Based on 82 hospitals reporting in L.A. County, the overall CLABSI SIR is 0.97 (95% CI: 0.90, 1.04). CLABSI SIR varies when stratified by location type, ranging from 0.69 in NICU locations to 1.33 in oncology critical care locations. SIRs increased in both adult critical care and ward locations. NICU had a significantly different number of infections than predicted (better). Pediatric-specific CLABSI SIRs are presented in Appendix Table A1.

Figure 5. CLABSI Standardized Infection Ratios, General Acute Care Hospitals, All Locations, L.A. County, 2015-18

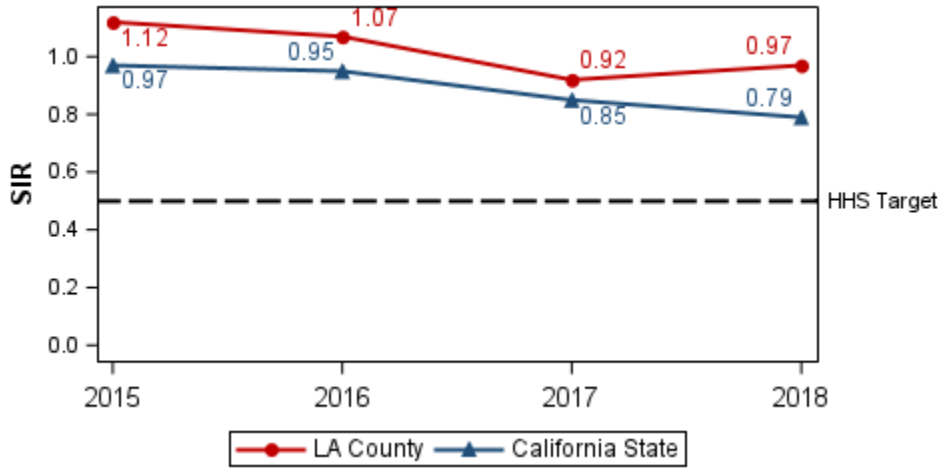


Table 2. CLABSI Standardized Infection Ratios, General Acute Care Hospitals, by CDC Location Type, L.A. County, 2018

	Number of Hospitals Reporting (% with 12 months)	Pooled number of infections	Pooled number of central line days	LAC SIR (95% CI)	2018 CA SIR	2018 National SIR
All	81 (98.8)	757	790,590	0.965 (0.898, 1.035)	0.793	0.739
Critical care (Adult)	72 (96)	258	231,895	1.089 (0.962, 1.228)	0.899	0.752*
Oncology Critical Care	2 (100)	6	5,142	1.334 (0.541, 2.775)	N/A	N/A
Neonatal critical Care	42 (100)	39	41,143	★ 0.686 (0.495, 0.929)	0.613	0.662
Ward	77 (98.7)	240	304,069	0.944 (0.830, 1.070)	0.751	0.711*
Oncology Ward	13 (100)	78	85,883	0.845 (0.672, 1.048)	N/A	N/A

*Includes pediatric locations

Catheter-associated Urinary Tract Infection (CAUTI) Events

Although CAUTI reporting is not reportable to CDPH, many hospitals report based on participation in CMS Inpatient Quality Reporting requirements and voluntarily conferred reporting rights to LACDPH. The number of predicted CAUTI is calculated based on risk adjustment for various factors that were found to be statistically significant predictors including:

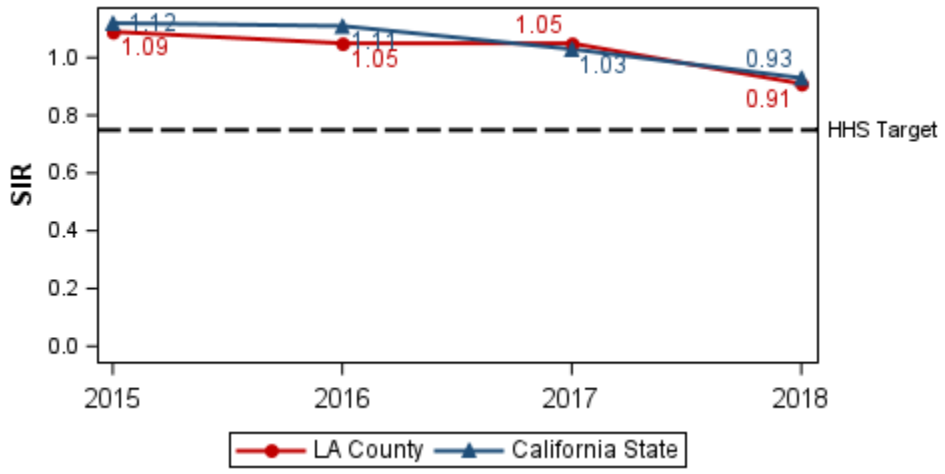
- Type of patient care location
- Medical school affiliation (major, graduate, and undergraduate/non-teaching)
- Facility bed size
- Facility type

Eighty-two of the 92 reporting hospitals conferred rights to L.A. County in 2018 (improved from 81 hospitals in 2017). The overall CAUTI SIR among these hospitals is 0.914 (95% CI: 0.849, 0.982), which is significantly lower than predicted. The SIR for adult and pediatric wards is 0.867 (95% CI: 0.776, 0.965), significantly lower than predicted.

CAUTI SIR varies when stratified by location type, ranging from 0.474 in Oncology Critical Care locations (based on only 2 infections) to 0.987 in Oncology Ward locations. All locations are below 1.0. Pediatric-specific CAUTI SIRs are presented in Appendix Table A2.

The HHS target is to reduce CAUTI by 25% from the 2015 baseline. General acute care hospitals in L.A. County have not reached this goal.

Figure 6. CAUTI Standardized Infection Ratios, General Acute Care Hospitals, All Locations, L.A. County, 2015-18*



*California SIR obtained from CDC National Report

Table 3. CAUTI Standardized Infection Ratios, General Acute Care Hospitals, by CDC Location Type, L.A. County, 2018

	Number of Hospitals Reporting (% with 12 months)	Pooled number of infections	Pooled number of catheter days	LAC SIR (95% CI)	2018 CA SIR*	2018 National SIR
All	82 (98.8)	730	772,690	★0.914 (0.849, 0.982)	0.934	0.809
Critical Care (Adult and Pediatric)	76 (96.1)	319	271,038	0.952 (0.852, 1.061)	0.989	0.763
Oncology Critical Care	2 (100)	2	4,891	0.474 (0.079, 1.566)	N/A	N/A
Ward (Adult and Pediatric)	78 (98.7)	324	421,926	★0.869 (0.778, 0.968)	0.890	0.852
Oncology Ward	13 (100)	24	19,040	0.946 (0.608, 1.408)	N/A	N/A

*California SIR obtained from CDC National Report

Multidrug-Resistant Organism (MDRO) LabID Events

The NHSN LabID Event reporting module consists of laboratory-identified methicillin-resistant *Staphylococcus aureus* (MRSA) and vancomycin-resistant *Enterococci* (VRE) bloodstream infections, *Clostridioides difficile* infections (CDI), and carbapenem-resistant Enterobacteriaceae (CRE), which include *Klebsiella oxytoca*, *Klebsiella pneumoniae*, *Escherichia coli*, and *Enterobacter sp*. Community-

onset (CO) events for MRSA, VRE, CRE, and CDI are captured in NHSN and reported in our analysis as pooled rates (see Appendix).

Methicillin-resistant *Staphylococcus aureus* (MRSA)

The MRSA bacteremia LabID event SIR includes specimens classified as healthcare facility-onset (HO) collected from any inpatient location in the facility, excluding CMS-certified inpatient psychiatric units.

The number of predicted MRSA events in acute care hospitals are risk adjusted based on the following variables found to be statistically significant predictors of incidence:

- Inpatient community-onset prevalence rate
- Average length of stay
- Medical school affiliation
- Facility type
- Number of ICU beds

In 2018, a total of 80 acute care hospitals reported MRSA bacteremia. The overall SIR for L.A. County was 0.896 (95% CI: 0.783, 1.020), which was lower compared to 2017, but not significantly different from what was predicted. The HHS target goal of 50% reduction of MRSA has not been met.

Figure 7. Healthcare Facility-onset MRSA Bacteremia Standardized Infection Ratios, General Acute Care Hospitals, L.A. County, 2015-18

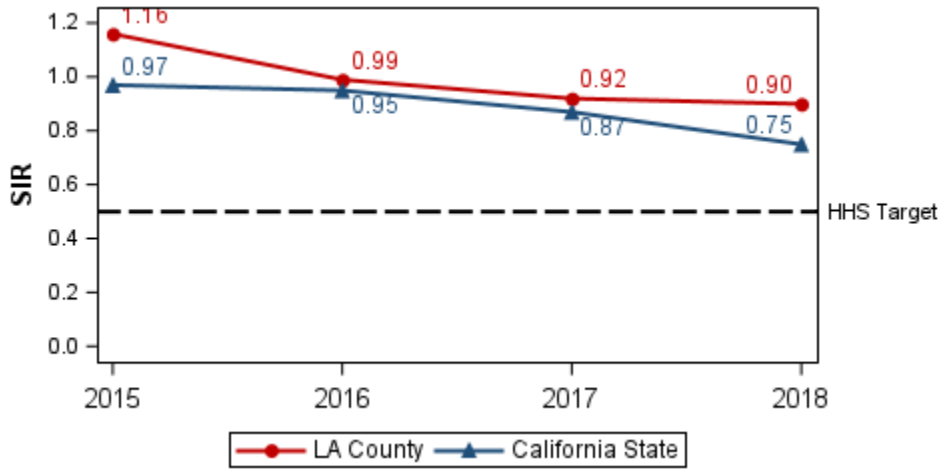


Table 4. Healthcare Facility-onset MRSA bacteremia Standardized Infection Ratios, General Acute Care Hospitals, L.A. County, 2018

	Number of Hospitals Reporting (% with 12 months)	Pooled number of events	Pooled number of patient days	LAC SIR (95% CI)	2018 CA SIR	2018 National SIR
MRSA	80 (98.8)	219	4,424,402	0.896 (0.783, 1.020)	0.752	0.840

Vancomycin-resistant *Enterococci* (VRE)

SIRs are not available for VRE bacteremia, therefore pooled rates have been calculated. In 2018, 81 hospitals reported VRE and had a pooled healthcare facility-onset rate of 0.615 infections per 10,000 patient days. The VRE rate increased markedly this year after decreasing consistently since 2015.

Figure 8. Healthcare Facility-onset VRE Bacteremia Rates per 10,000 patient days, General Acute Care Hospitals, L.A. County, 2015-18

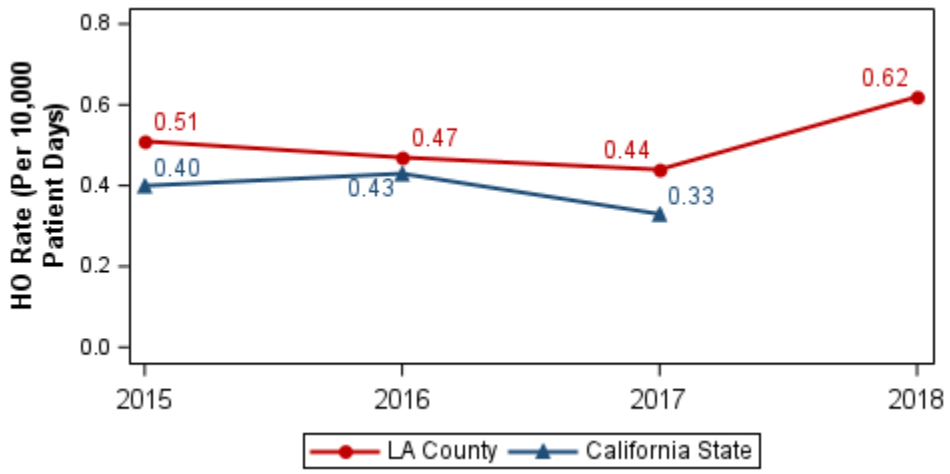


Table 5: Healthcare Facility-onset VRE Bacteremia Pooled Healthcare Facility-Onset Rates, General Acute Care Hospitals, L.A. County, 2018

	Number of Hospitals Reporting (% with 12 months)	Number of HO Infections	LAC HO Rate (per 10,000 patient days)	2017 CA HO Rate*	2018 National HO Rate
VRE	81 (98.8)	272	0.615	0.33	N/A

*2018 CA rate not yet available

Carbapenem-resistant Enterobacteriaceae (CRE)

SIRs are not available for CRE infections; therefore, pooled rates have been calculated. A total of 84 hospitals reported CRE in 2018 and had a pooled rate of 0.822 infections per 10,000 patient days. The number of hospitals reporting CRE in 2018 increased from 2017, when the number jumped substantially since CRE event reporting to NHSN became compulsory by a LACDPH Health Officer Order.

Figure 9. Healthcare Facility-onset CRE Rates per 10,000 patient days, General Acute Care Hospitals, L.A. County, 2017-2018

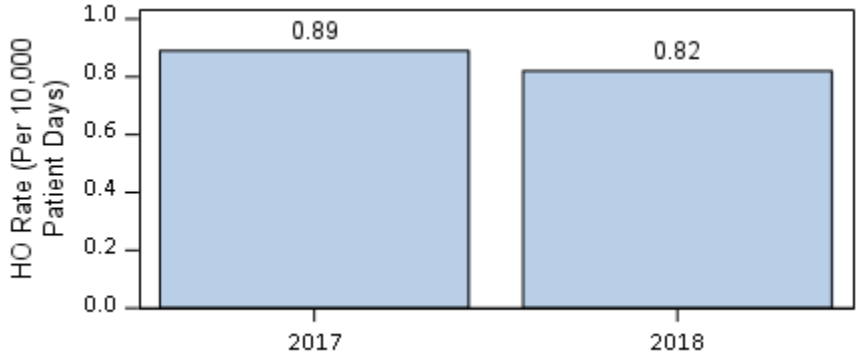


Table 6: Healthcare Facility-onset CRE Infection Pooled Healthcare Facility-Onset Rates, General Acute Care Hospitals, L.A. County, 2018

	Number of Hospitals Reporting (% with 12 months)	Number of HO Infections	LAC HO Rate (per 10,000 patient days)	2018 CA HO Rate	2018 National HO Rate
CRE	84 (98.8)	363	0.822	N/A	N/A

Clostridioides difficile Infection (CDI)

The CDI LabID event SIR includes specimens classified as healthcare facility-onset (HO) collected from any inpatient location in the facility, excluding CMS-certified inpatient psychiatric units, neonatal critical care units, and well-baby units.

The number of predicted CDI events in acute care hospitals are risk adjusted based on the following variables found to be statistically significant predictors of incidence:

- Inpatient community-onset prevalence rate
- CDI test type
- Hospital affiliation with a medical school
- Facility type
- Number of ICU beds
- Type of ED Reporting
- Bed size

Eighty-two LAC acute care hospitals reported healthcare facility-onset CDI in 2018, resulting in an overall SIR of 0.724 (95% CI: 0.691, 0.758) which is statistically significantly lower than predicted. This is a reduction compared to the 2017 LAC SIR of 0.91. However, the HHS targeted reduction of CDI by 30% was not met.

Figure 10. Healthcare Facility-onset C. difficile Infection Standardized Infection Ratios, General Acute Care Hospitals, L.A. County, 2015-18

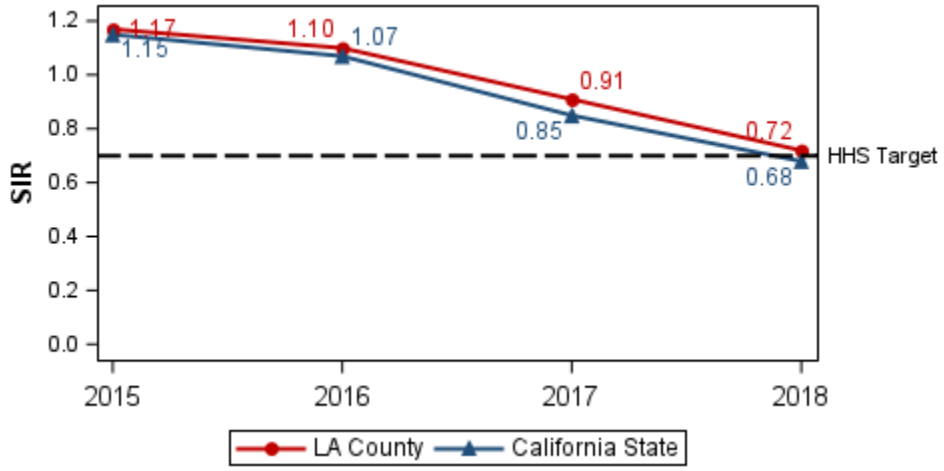


Table 7. Healthcare Facility-onset C. difficile Infection Standardized Infection Ratios, General Acute Care Hospitals, L.A. County, 2018

	Number of Hospitals Reporting (% with 12 months)	Pooled number of events	Pooled number of patient days	LAC SIR (95% CI)	2018 CA SIR	2018 National SIR
CDI	82 (98.8)	1,767	4,088,566	★0.724 (0.691, 0.758)	0.677	0.711

Surgical Site Infections (SSIs)

L.A. County-wide surgical site infection (SSI) data are presented in Table 8. The overall "complex admission/readmission" SIRs as defined by NHSN are included in this report. Complex SIRs only include primary deep incisional and organ/space SSIs attributed to inpatient procedures identified on admission or readmission to the facility. This SIR is used for the annual CDPH and CDC publications of national benchmarks. The universal "exclusion criteria" for SSI SIRs are outlined in Table 2 of the CDC guide to the NHSN SIR. The number of predicted events calculated under the 2015 baseline for SSI is risk adjusted based on the several variables found to be statistically significant predictors of SSIs and differs per type of procedure. These variables are also outlined in Tables 3a-3f of the CDC guide to the NHSN SIR.

In 2018, 83 facilities reported SSI data. In L.A. County, this represents 933 infections and an overall complex admission/readmission SIR of 0.824 (95% CI: 0.772, 0.878), which is significantly lower than predicted (better).

Of note, 25 facilities reported 0 complex SSIs overall. The highest SIRs resulted for heart transplant, laminectomy, and coronary bypass with a chest and donor incision. Five procedures had SIRs that were significantly better than predicted (small bowel surgery, cesarean section, liver transplant, vaginal hysterectomy, and rectal surgery) and no procedures had an SIR that was significantly worse than predicted.

Robust pediatric SSI risk adjustment is not available for many procedures and often insufficient data is reported to NHSN to estimate an SIR; therefore, only overall L.A. County pediatric SSI and procedure

numbers are reported. Eighty-three facilities reported pediatric SSI data. There were 31 infections reported and 6934 procedures representing 18 types of procedures. The complex admission/readmission SIR is 0.79 (95% CI: 0.546, 1.107).

Table 8. Complex Admission/Readmission Surgical Site Infection Standardized Infection Ratios by Procedure, General Acute Care Hospitals, L.A. County, 2018

NHSN Procedure Code	Procedure	Facilities Reporting (% Who Performed Procedure)	Pooled number of SSI events	Pooled Number of Procedures	LAC SIR (95% CI)	2018 CA SIR	2018 National SIR
HTP	Heart transplant	29 (10.3)	3	195	2.404 (0.611, 6.542)	0*	1.726
XLAP	Exploratory laparotomy	81 (98.8)	72	11438	1.116 (0.879, 1.397)	0.93*	1.121
KTP	Kidney transplant	29 (24.1)	6	852	1.102 (0.447, 2.291)	0.86*	1.632
BILI	Bile duct, liver or pancreatic surgery	78 (69.2)	86	2814	1.084 (0.872, 1.332)	1.21*	1.133
FUSN	Spinal fusion	73 (74.0)	77	9711	0.995 (0.791, 1.237)	0.877	1.036
SPLE	Spleen surgery	77 (64.9)	3	501	0.984 (0.250, 2.677)	0.77*	0.903
PACE	Pacemaker surgery	79 (86.1)	8	4801	0.943 (0.438, 1.791)	1.16*	1.501
COLO	Colon surgery	83 (94.0)	181	7534	0.962 (0.812, 1.086)	0.960	0.887
THOR	Thoracic surgery	76 (85.5)	18	5292	0.936 (0.572, 1.450)	0.68*	0.744
APPY	Appendix surgery	79 (97.5)	30	8148	0.915 (0.629, 1.290)	1.02*	0.852
CBGC	Coronary bypass, chest incision only	60 (50.0)	4	669	0.891 (0.283, 2.150)	1.01*	N/A
CBGB	Coronary bypass, chest & donor incisions	60 (61.7)	22	3159	0.864 (0.555, 1.287)	0.79*	N/A
LAM	Laminectomy	76 (76.3)	13	4451	0.849 (0.472, 1.415)	0.978	1.106
CHOL	Gallbladder Surgery	81 (95.1)	43	13346	0.827 (0.613, 1.117)	0.959	1.030
FX	Open reduction of fracture	82 (95.1)	49	9231	0.800 (0.598, 1.048)	1.029	1.114
HPRO	Hip prosthesis	81 (95.1)	53	10824	★ 0.749 (0.567, 0.972)	1.016	1.016

KPRO	Knee prosthesis	81 (86.4)	44	14149	★0.742 (0.546, 0.987)	0.869	1.055
CSEC	Cesarean section	67 (82.1)	41	34158	★0.729 (0.530, 0.980)	0.919	1.116
OVRY	Ovarian surgery	79 (89.9)	3	6263	0.707 (0.180, 1.925)	1.16*	1.194
SB	Small bowel surgery	81 (88.9)	97	6539	★✓ 0.688 (0.561, 0.835)	0.74*	0.793
GAST	Gastric surgery	81 (86.4)	25	5326	★✓ 0.684 (0.452, 0.994)	0.58*	0.658
HYST	Abdominal hysterectomy	81 (88.9)	29	5890	★✓ 0.656 (0.448, 0.930)	0.878	0.938
CARD	Cardiac surgery	65 (73.8)	9	3603	0.596 (0.291, 1.093)	0.822	0.781
LTP	Liver transplant	28 (14.3)	9	389	★✓ 0.463 (0.226, 0.849)	0.58*	0.723
VHYS	Vaginal hysterectomy	78 (73.1)	3	1749	★✓ 0.326 (0.083, 0.889)	0.753	0.916
NEPH	Kidney surgery	73 (72.6)	2	2168	★✓ 0.280 (0.047, 0.924)	0.86*	0.900
REC	Rectal surgery	78 (78.2)	3	1514	★✓ 0.110 (0.028, 0.299)	0.440	0.436
AAA	Abdominal aortic aneurysm repair	73 (28.8)	0	93	N/A^	0.863	0.913

*For procedures not included in the 2018 CDC HAI Report, SIR obtained from the 2017 CDPH HAI Report
^SIR not calculated if the predicted number of infections <1

Influenza Vaccination Coverage Among Health-Care Personnel

Facilities report influenza vaccination information on healthcare personnel (HCP) physically present for one or more days during the influenza season, per CDPH requirements. Since 2013, an L.A. County Health Officer Order has mandated that all HCP in acute care hospitals be vaccinated against influenza, or wear a protective mask. Since the health officer order applies to all individuals working in acute care hospitals who have direct patient contact or work in patient areas during the influenza season, this portion of the report includes data from all reporting general acute care facilities, which includes critical access, children's, general, oncology, orthopedic, psychiatric, and rehabilitation hospitals. Data for the 2018/2019 influenza season (November 1, 2018 through April 30, 2019) is presented in this report.

Among 82 reporting GACH facilities, the average vaccination coverage among HCP is 83% (range: 29.4% - 98%). This coverage represents an increase from the previous influenza season but remains below the Healthy People 2020 Goal of 90%.

Vaccination coverage varied by HCP category. Adults students/trainees and volunteers had the highest coverage (90.4%), while licensed independent practitioners had the lowest (71.9%). On average, 25% of licensed independent practitioners had unknown vaccination status, the highest of any HCP category.

Table 9. Healthcare Personnel (HCP) Seasonal Influenza Vaccination Rates, General Acute Care Hospitals, L.A. County, 2018/2019

Personnel Category	Number of Hospitals Reporting	Mean	Minimum	Maximum
Employees	82	85.8	29.5	98.2
Licensed Independent Practitioners	82	71.9	8.6	100
Adult Students/Trainees and Volunteers	77	90.4	31.1	100
Other Contract Personnel	71	82.4	15.6	100
All Healthcare Personnel in Aggregate	82	83.0	29.4	98.0

Figure 11. Seasonal Influenza Vaccination Status by HCP Categories, General Acute Care Hospitals, L.A. County, 2018/2019

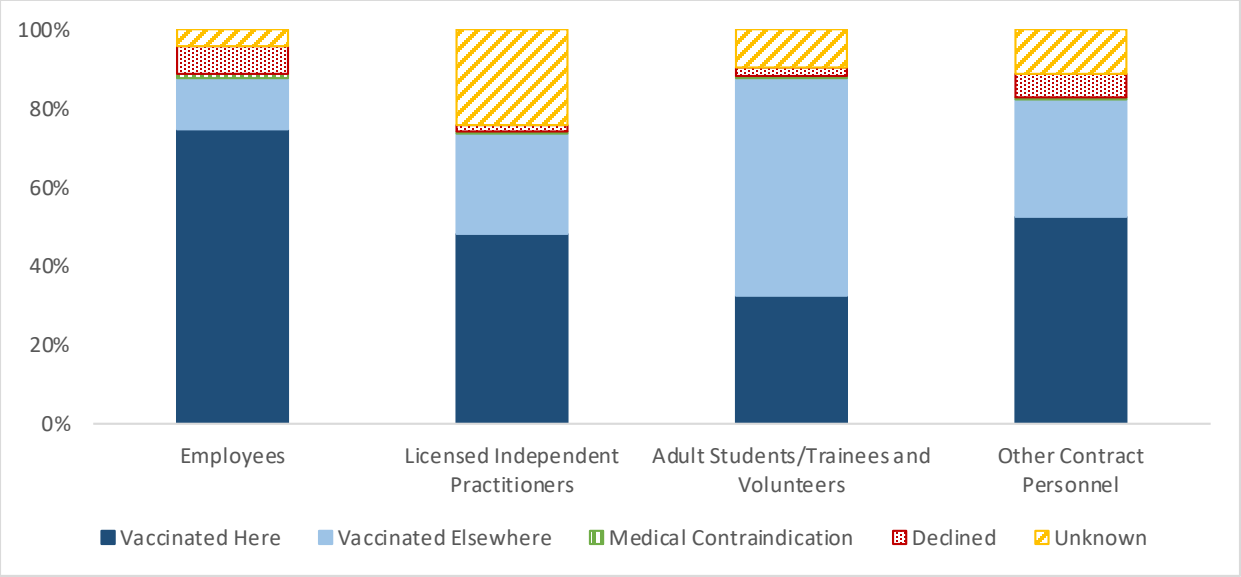
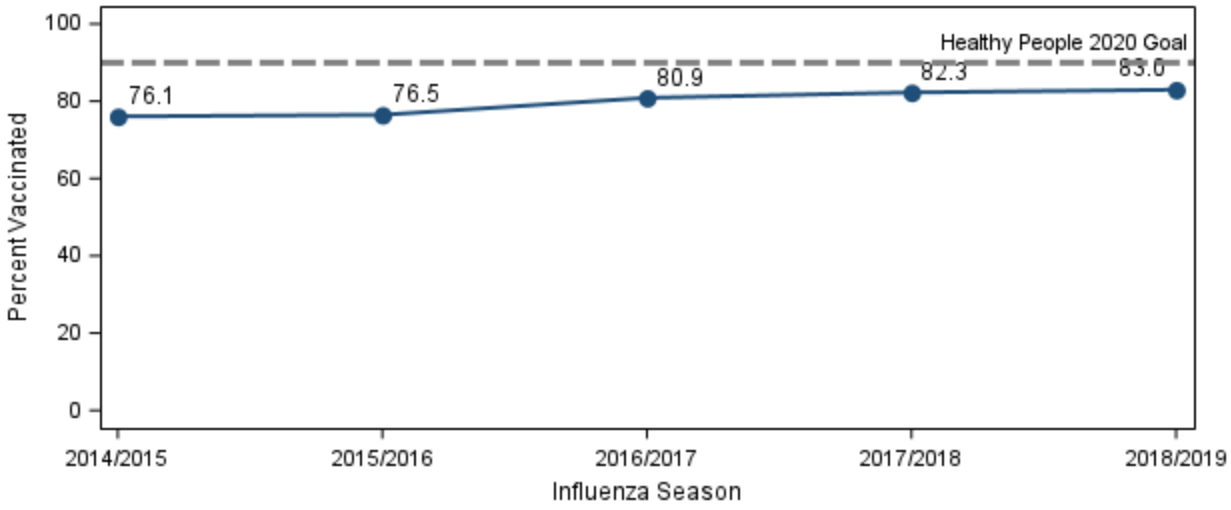


Figure 12. Average HCP Influenza Vaccination Rate by Season, General Acute Care Hospitals, L.A. County, 2014/2015-2018/2019



Long Term Acute Care (LTAC) Hospitals

Central Line-Associated Bloodstream Infection (CLABSI) Events

For L.A. County long-term acute care hospitals, the number of predicted CLABSIs calculated under the 2015 baseline is risk adjusted based on the following variables found to be statistically significant predictors:

- Type of patient care location
- Bed size of the facility
- Average length of stay

From 8 LTAC hospitals reporting in L.A. County, the overall CLABSI SIR is 1.04 (95% CI: 0.86, 1.25), which is slightly higher than predicted. No location types reported significantly more CLABSI than predicted.

Figure 13. CLABSI Standardized Infection Ratios, Long-term Acute Care Hospitals, All Locations, L.A. County, 2015-18

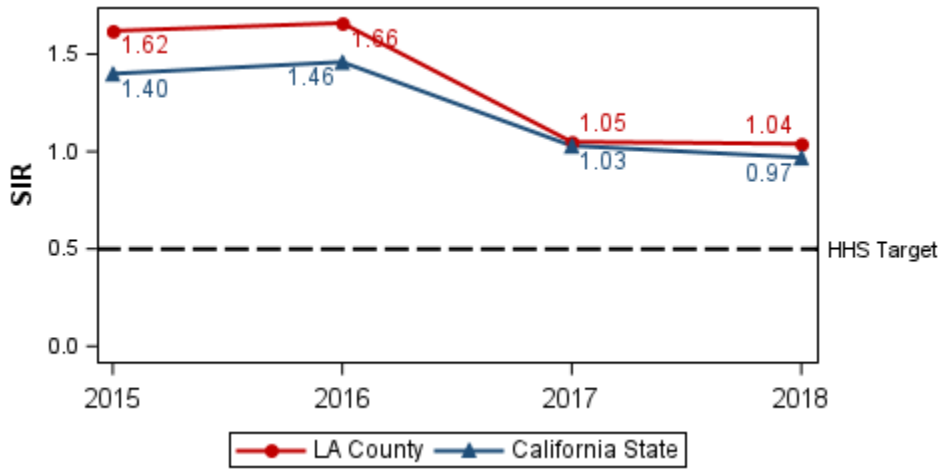


Table 10. CLABSI Standardized Infection Ratios, Long-term Acute Care Hospitals, by CDC location type, L.A. County, 2018

	Number of Hospitals Reporting (% with 12 months)	Pooled number of infections	Pooled number of central line days	LAC SIR (95% CI)	2018 CA SIR	2018 National SIR
All LTAC hospitals	8 (100)	109	70,567	1.041 (0.858, 1.250)	1.092	0.865
Critical Care	6 (100)	20	6,681	1.225 (0.769, 1.859)	N/A	0.840
Ward	8 (100)	89	63,886	1.006 (0.813, 1.233)	N/A	0.868

Catheter-associated Urinary Tract Infection (CAUTI) Events

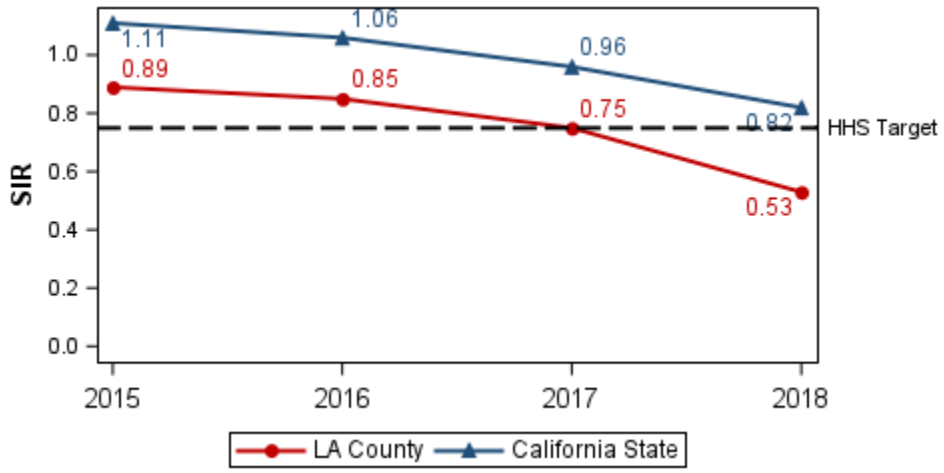
Facility-wide CAUTI data were also obtained from LTAC hospitals in L.A. County through voluntarily conferring rights to LACDPH through NHSN. The number of predicted CAUTI is calculated based on risk adjustment for the following variables found to be significant predictors:

- Average length of stay
- LTAC hospital setting (freestanding vs. within a hospital)
- Location type (ICU vs. Ward).

Based on 8 LTAC hospitals reporting, the overall CAUTI SIR is 0.534 (95% CI: 0.421, 0.669), which is significantly lower than predicted. The SIR for critical care locations is 0.309 (95% CI: 0.125, 0.643) and 0.572 (95% CI: 0.446, 0.723) for ward locations, both significantly lower than predicted.

The HHS target is to reduce CAUTI by 25%. LTAC hospitals in L.A. County have reached this goal overall, as well as for critical care and ward locations in 2018.

Figure 14. CAUTI Standardized Infection Ratios, Long-term Acute Care Hospitals, All Locations, L.A. County, 2015-18*



*California SIR obtained from CDC National Report

Table 11. CAUTI Standardized Infection Ratios, Long-term Acute Care Hospitals, by CDC Location Type, L.A. County, 2018

	Number of Hospitals Reporting (% with 12 months)	Pooled number of infections	Pooled number of catheter days	LAC SIR (95% CI)	2018 CA SIR*	2018 National SIR
All LTAC hospitals	8 (100)	72	68,841	★✓0.534 (0.421, 0.669)	0.824	0.877
Critical Care	7 (100)	6	7,991	★✓ 0.309 (0.125, 0.643)	N/A	0.752
Ward	8 (100)	66	60,850	★✓ 0.572 (0.446, 0.723)	N/A	0.889

*California SIR obtained from CDC National Report

Multidrug-Resistant Organism (MDRO) LabID Events

The number of predicted healthcare facility-onset (HO) MRSA bloodstream infection events in long-term acute care hospitals are risk adjusted based on the following variables found to be statistically significant predictors of incidence:

- Percent of admissions on ventilator

Among the 8 LTAC hospitals in L.A. County, the pooled SIR was 1.688 (95% CI: 1.242, 2.246). This number represents an increase from 2016 and is statistically significantly higher than what was predicted (worse).

Pooled rates have been calculated for VRE bacteremia and CRE infections because SIRs are not available. All 8 LTACs reported VRE in 2018 and had a pooled rate of 2.35 infections per 10,000 patient days. This rate represented a decrease from that of 2017. All 8 LTACs reported CRE and had a pooled rate of 13.59 infections per 10,000 patient days, an increase from 2017.

Figure 15. Healthcare Facility-onset MRSA Bacteremia Standardized Infection Ratios, Long-term Acute Care Hospitals, L.A. County, 2015-18

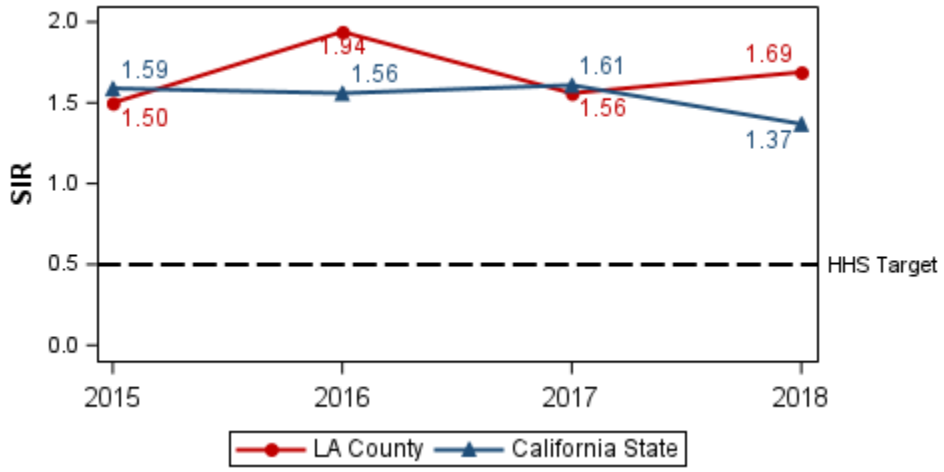


Table 12. Healthcare Facility-onset MRSA Bacteremia Standardized Infection Ratios, Long-term Acute Care Hospitals, L.A. County, 2018

	Number of Hospitals Reporting (% with 12 months)	Pooled number of events	Pooled number of patient days	LAC SIR (95% CI)	2018 CA SIR	2018 National SIR
MRSA	8 (100)	44	178,776	✖ 1.688 (1.242, 2.246)	1.374	0.744

Figure 16. Healthcare Facility-onset VRE Bacteremia Rates per 10,000 patient days, Long-term Acute Care Hospitals, L.A. County, 2015-18

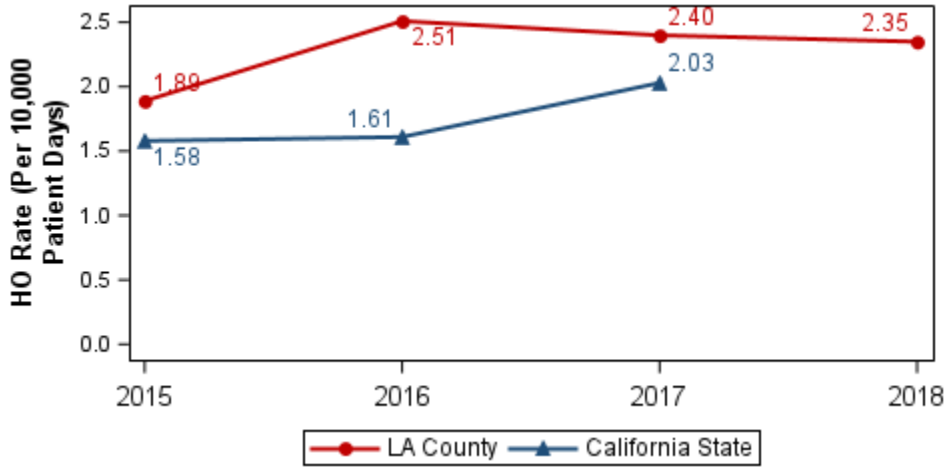


Table 13. Healthcare Facility-onset VRE bacteremia Pooled Healthcare Facility-Onset Rates, Long-term Acute Care Hospitals, L.A. County, 2018

	Number of Hospitals Reporting (% with 12 months)	Number of HO Infections	LAC HO Rate (per 10,000 patient days)	2017 CA HO Rate*	2018 National HO Rate
VRE	8 (100)	42	2.35	2.03	N/A

*2018 CA rate not yet available

Figure 17. Healthcare Facility-onset CRE Rates per 10,000 patient days, Long-term Acute Care Hospitals, L.A. County, 2017-2018

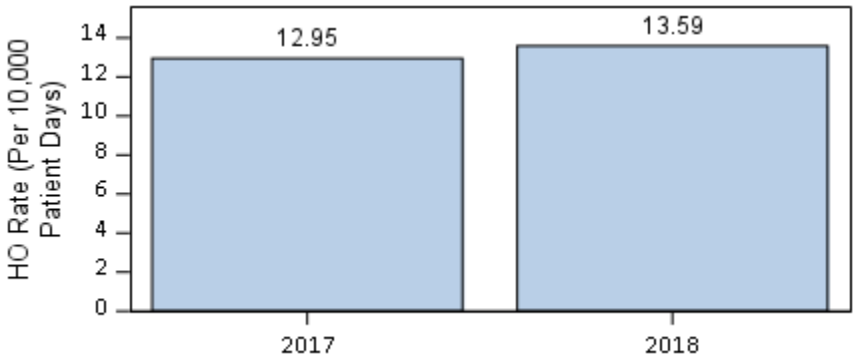


Table 14. Healthcare Facility-onset CRE infection Pooled Healthcare Facility-Onset Rates, Long-term Acute Care Hospitals, L.A. County, 2018

	Number of Hospitals Reporting (% with 12 months)	Number of HO Infections	LAC HO Rate (per 10,000 patient days)	2018 CA HO Rate	2018 National HO Rate
CRE	8 (100)	243	13.59	N/A	N/A

Clostridioides difficile Infection (CDI) LabID Events

The number of predicted CDI events in long-term acute care hospitals are risk adjusted based on the following variables found to be statistically significant predictors of incidence:

- Inpatient community-onset prevalence rate
- CDI test type
- Percent of admissions on ventilator
- Percent of single occupancy rooms

The 2018 SIR for healthcare facility-onset CDI in LAC LTAC hospitals was 0.93 (95% CI: 0.804, 1.063); the difference from the predicted value was not statistically significant. The LAC SIR has been steadily decreasing since 2016 but remains higher than the most recent national CDI SIR.

Figure 18. Healthcare Facility-onset C. difficile Infection Standardized Infection Ratios, Long-term Acute Care Hospitals, L.A. County, 2015-17

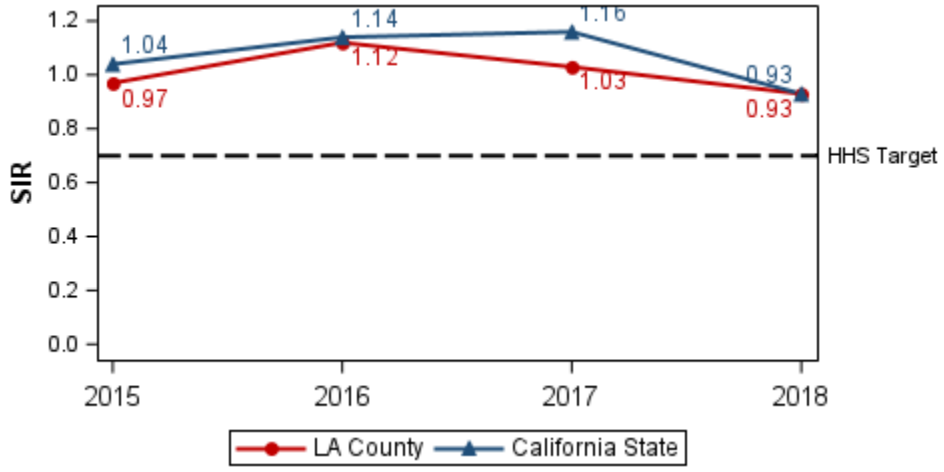


Table 15. Healthcare Facility-onset C. difficile Infection Standardized Infection Ratios, Long-term Acute Care Hospitals, L.A. County, 2018

	Number of Hospitals Reporting (% with 12 months)	Pooled number of events	Pooled number of patient days	LAC SIR (95% CI)	2018 CA SIR	2018 National SIR
CDI	8 (100)	197	178,776	0.926 (0.804, 1.063)	0.928	0.628

Influenza Vaccination Coverage Among Health-Care Personnel

LTAC hospitals report influenza vaccination information on healthcare personnel (HCP) physically present for one or more days during the influenza season, per CDPH requirements. Since 2013, an L.A. County Health Officer Order has mandated that all HCP in LTAC hospitals be vaccinated against influenza, or wear a protective mask during the influenza season. Data for the 2018/2019 influenza season (November 1, 2018 through April 30, 2019) is presented in this report.

Among 8 reporting LTAC facilities, the average vaccination coverage among HCP is 81.1% (range 71.3% - 86.5%), which is lower than that of acute care hospitals and the Healthy People 2020 Goal of 90%.

Vaccination coverage varied by HCP category. Adult students/trainees and volunteers had the highest vaccination coverage (100%), followed by contract personnel (85.5%). On average, licensed independent practitioners had the highest proportion of unknown vaccination status (24%).

Table 16. Healthcare Personnel (HCP) Seasonal Influenza Vaccination Rates, Long Term Acute Care Hospitals, L.A. County, 2018/2019

Personnel Category	Number of Hospitals Reporting	Mean	Minimum	Maximum
Employees	8	83.01	74.28	90.13
Licensed Independent Practitioners	8	68.46	29.89	82.78
Adult Students/Trainees and Volunteers	6	100	100	100
Other Contract Personnel	7	85.47	75	100
All Healthcare Personnel in Aggregate	8	81.09	71.26	86.53

Figure 19. Seasonal Influenza Vaccination Status by HCP Categories, Long Term Acute Care Hospitals, L.A. County, 2018/2019

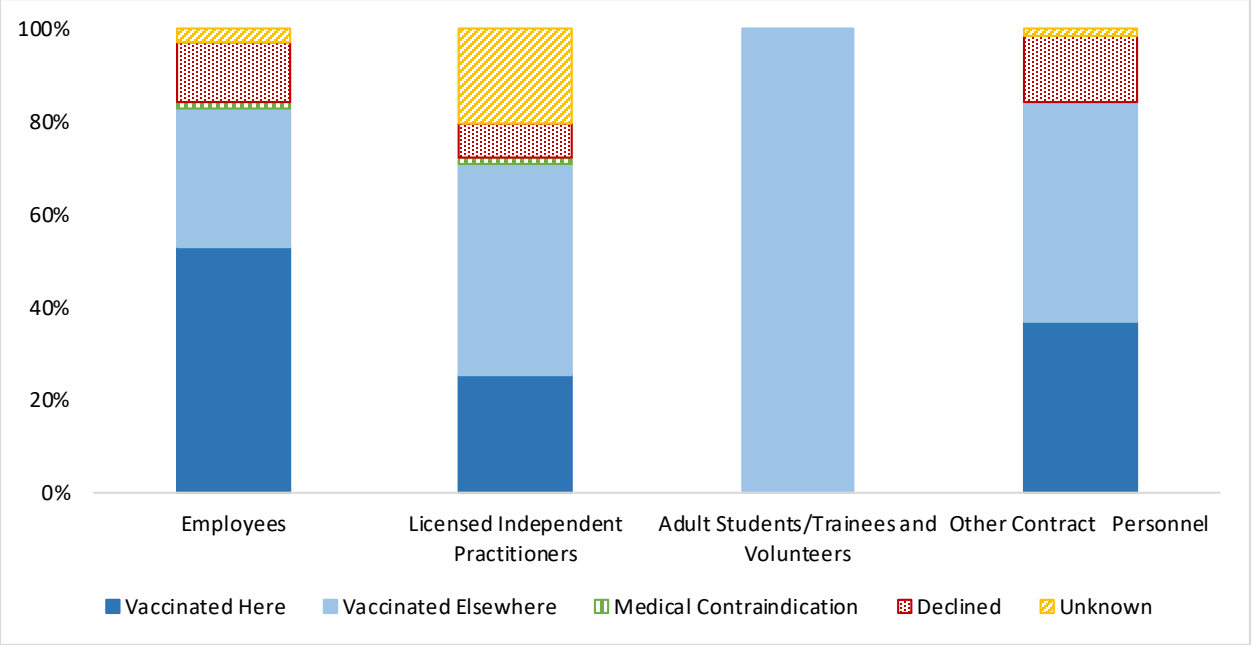
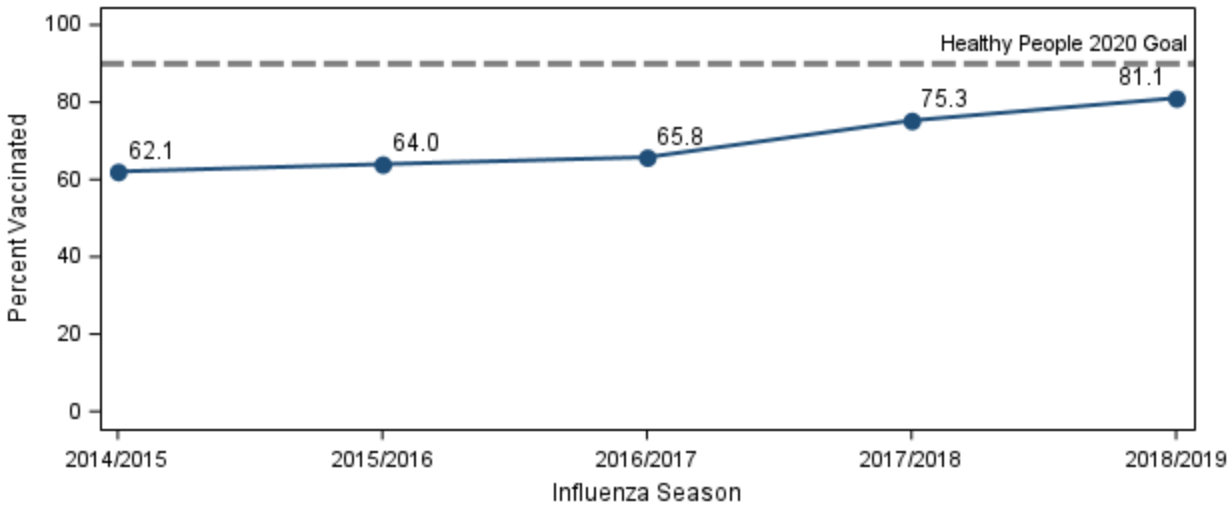
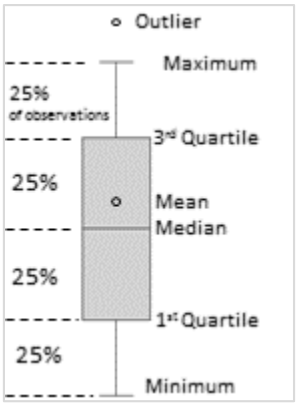


Figure 20. Average HCP Influenza Vaccination Rate by Season, Long Term Acute Care Hospitals, L.A. County, 2014/2015-2018/2019



Appendix

Figure A1. Explanation of a Boxplot Display



Pediatric-specific Central Line-Associated Bloodstream Infection (CLABSI) and Catheter-associated Urinary Tract Infection (CAUTI) Events

Table A1. Pediatric-specific CLABSI Standardized Infection Ratios, General Acute Care Hospitals, by CDC Location Type, L.A. County, 2018

	Number of Hospitals Reporting (% with 12 months)	Pooled number of infections	Pooled number of catheter-days	LAC SIR (95% CI)
Critical Care	13 (100)	11	19,697	★ ✓ 0.357 (0.188, 0.621)
Oncology Critical Care		N/A		
Ward	25 (96.2)	22	23,446	0.877 (0.563, 1.306)
Oncology Ward	4 (100)	36	28,724	0.919 (0.653, 1.259)

Table A2. Pediatric-specific CAUTI Standardized Infection Ratios, General Acute Care Hospitals, by CDC Location Type, L.A. County, 2018

	Number of Hospitals Reporting (% with 12 months)	Pooled number of infections	Pooled number of catheter-days	LAC SIR (95% CI)
Critical Care	13 (100)	16	7,210	1.412 (0.836, 2.243)
Oncology Critical Care		N/A		
Ward	26 (96.2)	2	3,699	0.575 (0.107, 2.110)
Oncology Ward	2 (100)	1	209	N/A^

^ SIR not calculated if predicted <1

Multidrug-Resistant Organism (MDRO) and Clostridioides difficile Infection (CDI) Module: LabID Event Reporting – Community-Onset cases

Table A3. MRSA Bacteremia and C. difficile infection Pooled Community-onset Rate, General Acute Care Hospitals, L.A. County, 2018

	Number of Hospitals Reporting (% with 12 months)	Number of CO Infections	LAC CO Rate (per 100 admissions)
MRSA	84 (98.8)	657	0.057
CDI	82 (98.8)	3540	0.339

Table A4. VRE Bacteremia and CRE Infection Pooled Community-onset Rate, General Acute Care Hospitals, L.A. County, 2018

	Number of Hospitals Reporting (% with 12 months)	Number of CO Infections	LAC CO Rate (per 100 admissions)
VRE	81 (98.8)	74	0.0065
CRE	84 (98.8)	487	0.043

Table A5. MRSA Bacteremia and C. difficile infection Pooled Community-onset Rate, Long-term Acute Care Hospitals, L.A. County, 2018

	Number of Hospitals Reporting (% with 12 months)	Number of CO Infections	LAC CO Rate (per 100 admissions)
MRSA	8 (100)	8	0.16
CDI	8 (100)	23	0.45

Table A6. VRE Bacteremia and CRE Infection Community-onset Rate, Long-term Acute Care Hospitals, L.A. County, 2018

	Number of Hospitals Reporting (% with 12 months)	Number of CO Infections	LAC CO Rate (per 100 admissions)
VRE	8 (100)	1	0.02
CRE	8 (100)	88	1.72