

**Los Angeles County  
Healthcare-Associated Infections  
2016 Regional Summary Report**

*Los Angeles County Department of Public Health | May 2018*

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Cover image: Methicillin-resistant *Staphylococcus aureus* (MRSA) bacteria, National Institute of Allergy and Infectious Diseases (NIAID), 2009, 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, 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 requested acute care hospitals (ACHs) voluntarily report carbapenem-resistant *Enterobacteriaceae* (CRE) into NHSN and confer rights for any catheter-associated urinary tract infection (CAUTI) data reported to NHSN.

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. 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 health 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 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 a "winnable battle" and urgent public health priority. Beginning with methicillin-resistant *Staphylococcus aureus* (MRSA) in 2008, through the reporting of carbapenem-resistant *Klebsiella pneumoniae* in 2010-12 and current mandated reporting of carbapenem-resistant *Enterobacteriaceae*, LACDPH recognizes MDROs as a public health problem that is affecting not only individual facilities but the entire county as patient's access care from a variety of settings. We know that robust surveillance will help facilities track and respond to these emerging threats, especially now as we see CRE becoming more prevalent on the West Coast.

### Significance of Device Associated HAIs

Several types of priority HAIs are associated with the use of invasive devices or with procedures used to help treat patients or help them recover. These unanticipated infections can result in significant patient morbidity and mortality, prolong the duration of hospital stays, necessitate additional diagnostic and therapeutic interventions, and even 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. These infections are targeted in most public health and infection prevention programs because they are mostly

preventable through 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

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 2016, LACDPH completed a number of projects aimed at strengthening infection prevention and antimicrobial stewardship, and curbing the spread of multi-drug resistance in local healthcare settings. Projects included the *Clostridium difficile* Infection Prevention Collaborative, the Healthcare Worker Influenza Vaccination Improvement Project, semiannual Infection Prevention Basics Course, Infection Control Assessment and Response visits to acute care, long-term care, ambulatory surgery settings, and emergency medical service agencies, annual visits to each acute care hospital, quarterly meetings of the LAC Healthcare-Associate Infections and Antimicrobial Resistance Committee, carbapenem-resistant Enterobacteriaceae enhanced lab surveillance and a Skilled Nursing Facility Symposium.

Analysis of HAI data, including the results included in this report, will help 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. The goal of reducing HAI, particularly MDROs, in LAC can be achieved through working partnerships between healthcare facilities and public health.

### Acknowledgements

The LACDPH Healthcare Outreach Unit would like to thank the infection prevention, quality/risk management, laboratory, and information technology staff in L.A. County hospitals for their collaboration in providing the data in this report. LACDPH staff members contributing to this report include Angie Ghanem, Chelsea Foo, Dawn Terashita, Kelsey OYong, and Wendy Knight.

# Methods

## Data Sources

This report includes all data reported through participation in the NHSN LACDPH Reporting Group from January through December 2016. All 97 hospitals in L.A. County (excluding the two VA facilities) submitted data. Due to incomplete reporting, the number of hospitals reporting varies by module and is noted within each section. For the purposes of this report, data from Pasadena and Long Beach hospitals are included.

## 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 *Clostridium 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 2016. 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.

Furthermore, comparisons are made to California statewide and national SIRs, where available. 2015 and 2016 California comparisons were obtained from the [CDPH Healthcare-Associated Infections in California Hospitals Annual Report](#), except when they were not available, then 2015 comparisons were obtained from the [CDC 2015 National and State Healthcare-associated Infection Data Report](#) (e.g., for CAUTI). National SIRs were also obtained from CDC 2015 reports. Longitudinal comparisons are limited to starting in 2015 because of changes to the NHSN SIR methodology (“rebaseline” described below). Target SIRs are also included and based on the U.S. Department of Health and Human Services (HHS) 2020 targets and metrics. Additionally, the percentage of influenza vaccination coverage among healthcare personnel is reported and compared to the Healthy People 2020 goal.

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 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 for LTAC hospitals. The GACH section excludes all data from LTAC hospitals. Facility specific HAI statistics for 2016 can be found in the [CDPH 2016 Healthcare-Associated Infections in California Hospitals Annual Report](#).

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

**Table 1. New 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, types 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.

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

In 2015, NHSN implemented a “rebaseline” which updated the source of aggregate data (standardizing the baseline time period to 2015) and the risk adjustment methodology used to create the original baselines. 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. The SIR is currently not calculated when the predicted number of infections is less than one. 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, new 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

$$\text{Community onset (CO) rate} = \frac{\text{Number of facility – wide CO events}}{\text{Number of facility – wide admissions}} \times 100$$

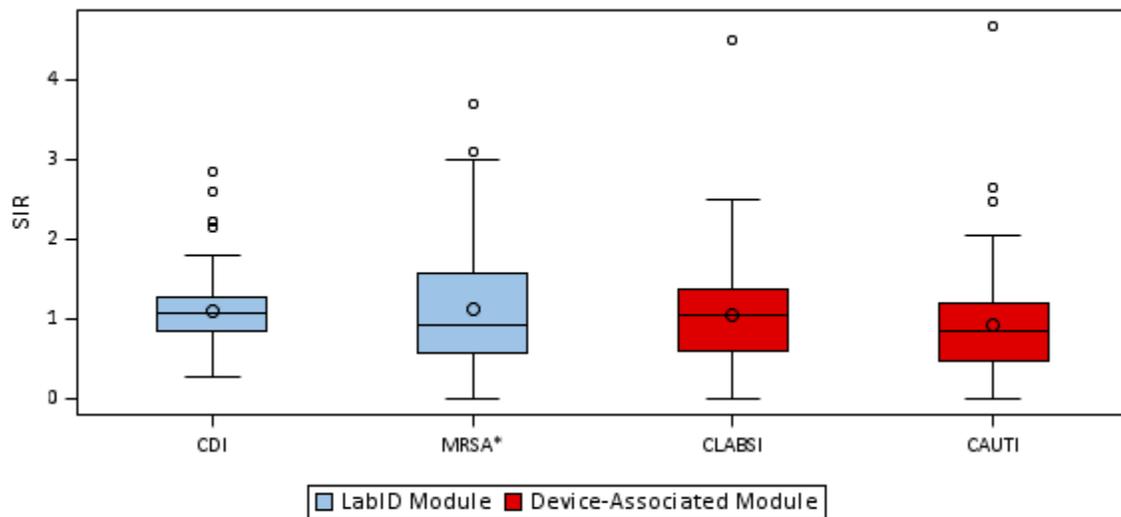
$$\begin{aligned} \text{Healthcare – facility onset (HO) rate} \\ = \frac{\text{Number of facility – wide HO events}}{\text{Number of facility – wide patient – days}} \times 10,000 \end{aligned}$$

# Results

## Summary of Findings

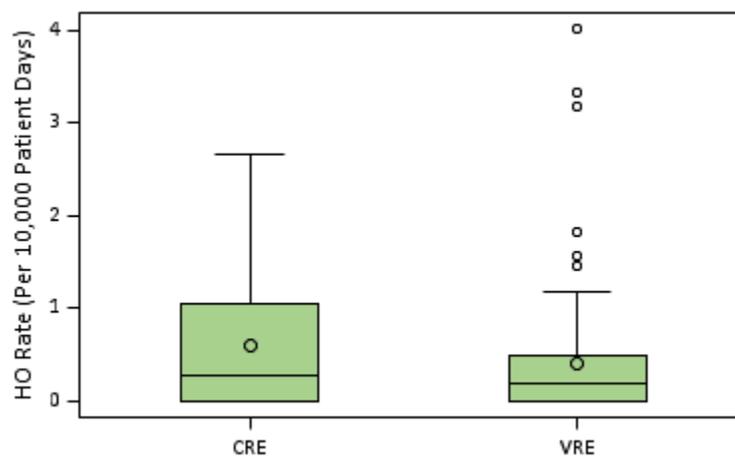
Figures 1 and 2 display the distribution of SIRs and rates by infection type among acute care hospitals in L.A. County, which includes general, oncology, orthopedic, and children's hospitals. Facilities that reported at least one month of data in 2016 are included in these figures, except where an SIR 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, 2016**



\*One hospital with an SIR more than 5 standard deviations away from the mean was excluded from the figure to preserve formatting.

**Figure 2: Boxplots of Healthcare Facility-Onset Infection Rates, General Acute Care Hospitals, L.A. County, 2016**



## CLABSI

L.A. County general acute care hospitals (GACHs) reported more infections than predicted (SIR=1.07), though this was a decrease from 2015 (SIR=1.12). Neonatal intensive care unit (NICU) locations have reported fewer CLABSIs than predicted. The number of CLABSIs in LTAC hospitals remain significantly higher than predicted (SIR=1.66), a slight increase from 2015 (SIR=1.62). Other than NICU locations in general acute care hospitals, LAC SIRs are far above the HHS HAI prevention goals.

## CAUTI

L.A. County GACHs reported more infections than predicted in 2016, although the difference was not statistically significant. The SIR (1.05) was also slightly lower than in 2015. LTAC hospitals reported fewer infections than predicted in 2016, however the difference was not statistically significant. The SIR (0.85) was also slightly lower than in 2015 (0.89). While SIRs are improving, facilities (both GACHs and LTAC hospitals) in L.A. County have not reached the HHS prevention goal.

## LabID – MDRO Events

### **MRSA Bacteremia**

In 2016, L.A. County GACHs reported fewer healthcare facility-onset (HO) MRSA bloodstream infections compared to 2015. Although the number of HO infections in 2016 was less than predicted (SIR=0.99), the difference was not statistically significant. Conversely, the number of MRSA infections reported in LTAC hospitals was both higher than reported in 2015 and statistically significantly higher than the number predicted for 2016 (SIR=1.94).

### **CDI Events**

The SIR for L.A. County GACHs (1.10) decreased compared to 2015 (1.17). Conversely, an upward trend was observed for LTAC hospitals, with an SIR increase from 2015 (0.97) to 2016 (1.12). HHS prevention goals for reducing CDI have not been met for either GACHs or LTAC hospitals.

### **VRE Bacteremia**

Among LA County GACHs, the rate of HO VRE bloodstream infections per 10,000 patient days was 0.47, a decrease from 0.51 in 2015. However, this rate increased in LTAC hospitals, from 1.89 to 2.51. Rates in both facility types remained above those of California state.

### **CRE Infections**

CRE appears to remain a significant burden in L.A. County, particularly for LTAC hospitals. GACHs had a HO rate of 0.74 infections per 10,000 patient days, while LTAC hospitals had a rate of 15.8. However, data is limited and longitudinal comparisons cannot be drawn. CRE events were reported voluntarily during 2016 and in previous years; however, starting in 2017, CRE reporting became mandated in L.A. County.

## SSI

The overall number of complex admission/readmission SSIs reported by GACHs for adult procedures was significantly lower than predicted in 2016 (SIR=0.81). Nine procedures had SIRs that were significantly better than predicted (small bowel surgery, bile duct/liver/pancreatic surgery, gastric surgery, open reduction of fracture, pacemaker surgery, cardiac surgery, rectal surgery, abdominal aortic aneurysm

repair, and heart transplant) and no procedures had an SIR that was significantly worse than predicted. The overall number of complex admission/readmission SSIs reported by GACHs for pediatric procedures was not significantly different than predicted in 2016 (SIR=1.054).

#### Influenza Vaccination Coverage Among Health-Care Personnel

The average overall vaccination coverage for GACHs and LTAC hospitals increased in 2016 to 76.5% and 64.0%, respectively, but remains below the 90% Healthy People 2020 goal. Among healthcare personnel categories in both GACHs and LTAC hospitals, licensed independent practitioners had the lowest average vaccination coverage and highest average unknown vaccination status. Adult students/trainees and volunteers in LTAC hospitals were the only healthcare personnel category with average vaccination coverage that met the Healthy People 2020 Goal.

## 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)

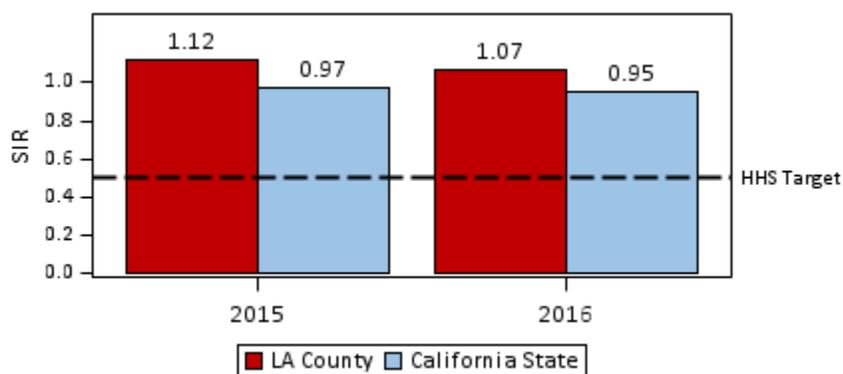
For neonatal intensive care unit (NICU) locations in acute care hospitals, the number of predicted CLABSIs calculated under the 2015 baseline is risk-adjusted based on the following variables found to be statistically significant predictors:

- Birthweight

Based on 82 hospitals reporting in L.A. County, the overall CLABSI SIR is 1.07 (95% CI: 1.001, 1.141), which is significantly higher than predicted (worse).

CLABSI SIR varies when stratified by location type, ranging from 0.665 in NICU locations to 1.104 in adult/pediatric intensive critical care locations (which exclude NICU locations); only NICU locations had a significantly different number of infections than predicted (better). Pediatric-specific CLABSI SIRs are presented in Appendix Table A1.

**Figure 3. CLABSI Standardized Infection Ratios, General Acute Care Hospitals, All Locations, L.A. County, 2015-16**



**Table 2. CLABSI Standardized Infection Ratios, General Acute Care Hospitals, by CDC Location Type, L.A. County, 2016**

	Number of Hospitals Reporting (% with 12 months)	Pooled number of infections	Pooled number of central line days	LAC SIR (95% CI)	2016 CA SIR	2015 National SIR
<b>All</b>	82 (63.4)	895	847,983	<b>✗ 1.07</b> (1.001, 1.141)	0.95	0.994

<b>Critical care (Adult and Pediatric)</b>	77 (94.8)	302	265,068	1.085 (0.967, 1.212)	N/A	1.000
<b>Oncology Critical Care</b>	2 (100)	8	5,362	1.706 (0.792, 3.240)	N/A	N/A
<b>Neonatal critical Care</b>	42 (100)	41	44,776	★ 0.665 (0.484, 0.894)	N/A	0.992
<b>Ward</b>	79 (65.8)	286	363,025	0.939 (0.835, 1.052)	N/A	0.976
<b>Oncology Ward</b>	15 (93.3)	190	110,167	✖ 1.412 (1.222, 1.624)	N/A	N/A

### 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:

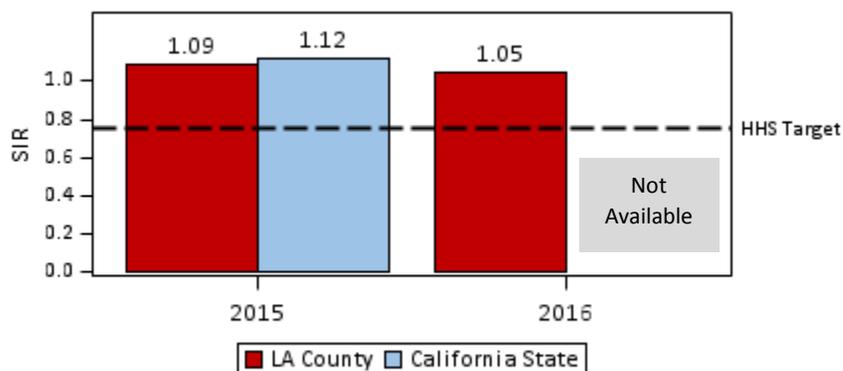
- Type of patient care location
- Medical school affiliation (major, graduate, and undergraduate/non-teaching)
- Facility bed size
- Facility type

Based on 79 hospitals reporting in L.A. County, the overall CAUTI SIR is 1.048 (95% CI: 0.984, 1.116), which is not significantly different than predicted.

CAUTI SIR varies when stratified by location type, ranging from 0.943 in Ward locations to 1.23 in Oncology Ward locations, but none are significantly different than predicted. Pediatric-specific CAUTI SIRs are presented in Appendix Table A1.

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 overall, or in any specific location type.

**Figure 4. CAUTI Standardized Infection Ratios, General Acute Care Hospitals, All Locations, L.A. County, 2015-16\***



\*2015 California SIR obtained from CDC 2015 National Report, 2016 currently not available

**Table 3. CAUTI Standardized Infection Ratios, General Acute Care Hospitals, by CDC Location Type, L.A. County, 2016**

	Number of Hospitals Reporting (% with 12 months)	Pooled number of infections	Pooled number of catheter days	LAC SIR (95% CI)	2015 CA SIR*	2015 National SIR
<b>All</b>	79 (58.2)	965	882,894	1.048 (0.984, 1.116)	1.120	0.993
<b>Critical Care (Adult and Pediatric)</b>	75 (96)	419	304,360	✖ 1.114 (1.011, 1.224)	1.160	1.002
<b>Oncology Critical Care</b>	2 (100)	0	4,637	0 (0, 0.750)	N/A	N/A
<b>Ward</b>	76 (60.5)	412	481,998	0.943 (0.855, 1.037)	1.089	0.984
<b>Oncology Ward</b>	15 (80)	33	20,087	1.23 (0.861, 1.707)	N/A	N/A

\*2015 California SIR obtained from CDC 2015 National Report, 2016 currently not available

#### 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, *Clostridium 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)

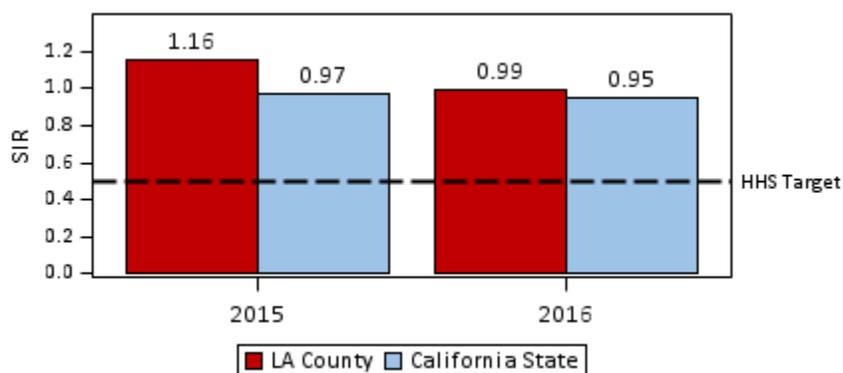
The MRSA bacteremia LabID event SIR includes specimens classified as healthcare facility-onset (HO) collected from any inpatient location in the facility, excluding CMS-certified inpatient psychiatric units.

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

A total of 83 acute care hospitals reported MRSA bacteremia in 2016 resulting in an overall SIR of 0.988 (95% CI: 0.868, 1.121) which was lower compared to 2015, but not significantly different from what was predicted this year. The HHS target goal of a 50% reduction of MRSA has not been met.

**Figure 5. Healthcare Facility-onset MRSA Bacteremia Standardized Infection Ratios, General Acute Care Hospitals, L.A. County, 2015-16**



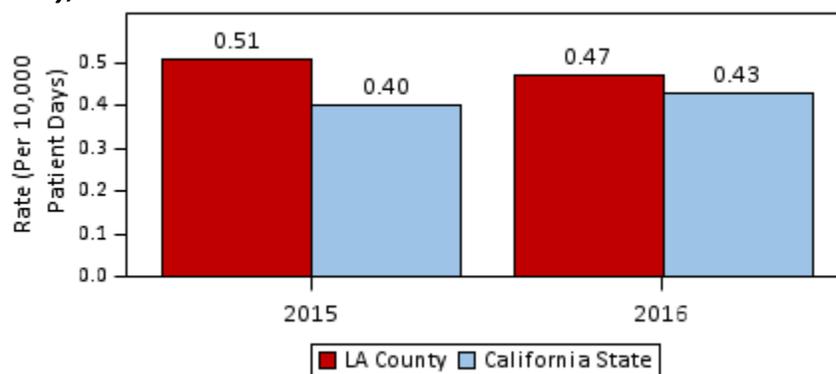
**Table 4. Healthcare Facility-onset MRSA bacteremia Standardized Infection Ratios, General Acute Care Hospitals, L.A. County, 2016**

	Number of Hospitals Reporting (% with 12 months)	Pooled number of events	Pooled number of patient days	LAC SIR (95% CI)	2016 CA SIR	2015 National SIR
<b>MRSA</b>	83 (98.8)	235	4,472,046	0.988 (0.868, 1.121)	0.95	0.998

**Vancomycin-resistant *Enterococci* (VRE) & Carbapenem-resistant *Enterobacteriaceae* (CRE)**

Pooled rates have been calculated for VRE bacteremia and CRE infections because SIRs are not available. In 2016, a total of 84 hospitals reported VRE and had a pooled rate of 0.47 HO infections per 10,000 patient days. This rate was lower than that of 2015. A total of 38 hospitals reported CRE in 2016 and had a pooled rate of 0.74 HO infections per 10,000 patient days. CRE event reporting to NHSN was voluntary at this time; however, a LACDPH Health Officer Order was issued in 2017 requiring all CRE events be reported to NHSN.

**Figure 6. Healthcare Facility-onset VRE Bacteremia Rates per 10,000 patient days, General Acute Care Hospitals, L.A. County, 2015-16**



**Table 5: Healthcare Facility-onset VRE Bacteremia and CRE Infection Pooled Healthcare Facility-Onset Rates, General Acute Care Hospitals, L.A. County, 2016**

	Number of Hospitals Reporting (% with 12 months)	Number of HO Infections	LAC HO Rate (per 10,000 patient days)	2016 CA HO Rate	National HO Rate

<b>VRE</b>	84 (96.4)	212	0.474	0.43	N/A
<b>CRE</b>	38 (76.3)	161	0.735	N/A	N/A

### *Clostridium difficile* Infection (CDI)

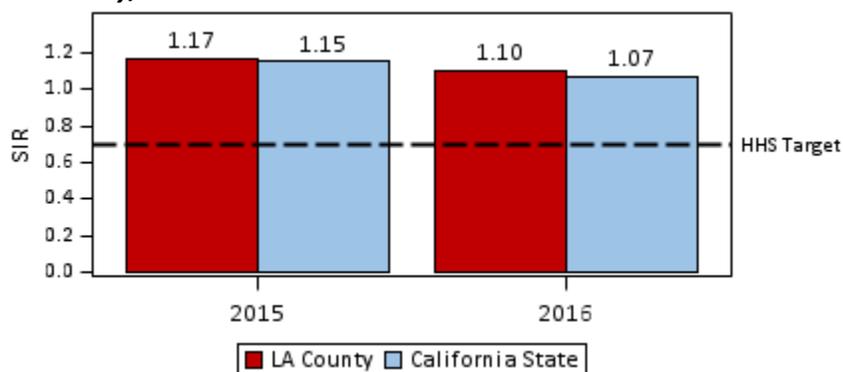
The CDI LabID event SIR includes specimens classified as healthcare facility-onset (HO) collected from any inpatient location in the facility, excluding CMS-certified inpatient psychiatric units, neonatal critical care units, and well-baby units.

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

84 LAC acute care hospitals reported CDI in 2016 resulting in an overall SIR of 1.102 (95% CI: 1.064, 1.141) which is significantly higher than predicted based on the national baseline (worse). HHS targeted a reduction of CDI by 30%, however this goal was not met.

**Figure 7. Healthcare Facility-onset *C. difficile* Infection Standardized Infection Ratios, General Acute Care Hospitals, L.A. County, 2015-16**



**Table 6. Healthcare Facility-onset *C. difficile* Infection Standardized Infection Ratios, General Acute Care Hospitals, L.A. County, 2016**

	Number of Hospitals Reporting (% with 12 months)	Pooled number of events	Pooled number of patient days	LAC SIR (95% CI)	2016 CA SIR	2015 National SIR
<b>CDI</b>	84 (98.8)	3212	4,128,732	✘ 1.102 (1.064, 1.141)	1.07	0.993

### Surgical Site Infections (SSIs)

L.A. County-wide surgical site infection (SSI) data are presented in Table 7. 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](#).

83 facilities reported SSI data in 2016 (0 facilities had 12 full months of reporting for all procedures). In L.A. County, this represents 913 infections and an overall complex admission/readmission SIR of 0.81 (95% CI: 0.759, 0.864), which is significantly lower than predicted (better).

Of note, 19 facilities reported 0 complex SSIs overall. The highest SIR resulted for kidney transplant, exploratory laparotomy, knee prosthesis, ovarian surgery, and laminectomy. Nine procedures had SIRs that were significantly better than predicted (small bowel surgery, bile duct/liver/pancreatic surgery, gastric surgery, open reduction of fracture, pacemaker surgery, cardiac surgery, rectal surgery, abdominal aortic aneurysm repair, and heart transplant) 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 a SIR, therefore only overall L.A. County pediatric SSI and procedure numbers are reported. 73 facilities reported pediatric SSI data. There were 41 infections reported and 7146 procedures representing 18 types of procedures. The complex admission/readmission SIR is 1.054 (95% CI: 0.766, 1.416).

**Table 7. Complex Admission/Readmission Surgical Site Infection Standardized Infection Ratios by Procedure, General Acute Care Hospitals, L.A. County, 2016**

NHSN Procedure Code	Procedure	Facilities Reporting (% with 12 months)	Pooled number of SSI events	Pooled Number of Procedures	LAC SIR (95% CI)	2016 CA SIR	2015 National SIR
KTP	Kidney transplant	12 (33.3)	8	813	1.689 (0.784, 3.206)	1.240	0.991
XLAP	Exploratory laparotomy	78 (67.9)	88	13835	1.155 (0.932, 1.416)	1.120	1.011
KPRO	Knee prosthesis	72 (72.2)	59	14774	0.966 (0.742, 1.237)	0.860	1.000
OVR	Ovarian surgery	73 (61.6)	6	9300	0.955 (0.387, 1.986)	1.120	0.951
LAM	Laminectomy	63 (61.9)	28	8889	0.938 (0.636, 1.337)	0.900	1.002
VHYS	Vaginal hysterectomy	64 (37.5)	11	2401	0.921 (0.484, 1.601)	0.810	3.756
HYST	Abdominal hysterectomy	73 (64.4)	47	7203	0.894 (0.664, 1.178)	0.840	1.003
COLO	Colon surgery	78 (59.0)	157	7245	0.882 (0.752, 1.028)	0.960	0.999
CSEC	Cesarean section	58 (86.2)	54	41236	0.876 (0.665, 1.135)	1.020	0.991
CHOL	Gallbladder Surgery	80 (78.8)	46	13731	0.865 (0.641, 1.144)	0.880	0.997
LTP	Liver transplant	3 (100)	12	303	0.801 (0.636, 1.337)	0.960	0.990
HPRO	Hip prosthesis	78 (62.8)	58	11166	0.797 (0.611, 1.023)	0.870	0.998

<b>FUSN</b>	Spinal fusion	60 (56.7)	53	8845	0.797 (0.603, 1.035)	0.840	1.005
<b>SB</b>	Small bowel surgery	74 (45.9)	85	4996	★ 0.784 (0.630, 0.965)	0.900	0.995
<b>BILI</b>	Bile duct, liver or pancreatic surgery	58 (27.6)	61	2708	★ 0.749 (0.578, 0.955)	0.950	1.008
<b>APPY</b>	Appendix surgery	78 (74.4)	25	8312	0.738 (0.488, 1.073)	0.960	0.973
<b>THOR</b>	Thoracic surgery	65 (52.3)	14	5750	0.722 (0.411, 1.183)	0.610	0.988
<b>CBGB</b>	Coronary bypass, chest & donor incisions	38 (60.5)	17	3238	0.706 (0.425, 1.107)	0.880	1.004*
<b>GAST</b>	Gastric surgery	69 (31.9)	29	6121	★ 0.687 (0.469, 0.974)	0.810	0.997
<b>FX</b>	Open reduction of fracture	79 (65.8)	38	9290	★ 0.621 (0.446, 0.844)	0.900	1.011
<b>NEPH</b>	Kidney surgery	57 (31.6)	4	2438	0.497 (0.158, 1.199)	0.770	0.996
<b>CBGC</b>	Coronary bypass, chest incision only	34 (11.8)	2	635	0.449 (0.075, 1.483)	0.890	
<b>PACE</b>	Pacemaker surgery	70 (44.3)	3	4589	★ 0.365 (0.093, 0.994)	1.010	0.994
<b>SPLE</b>	Spleen surgery	51 (7.8)	1	503	0.331 (0.017, 1.633)	1.120	0.992
<b>CARD</b>	Cardiac surgery	51 (35.3)	3	3745	★ 0.214 (0.054, 0.581)	0.720	0.995
<b>REC</b>	Rectal surgery	61 (19.7)	4	1474	★ 0.156 (0.050, 0.376)	0.580	0.996
<b>AAA</b>	Abdominal aortic aneurysm repair	31 (3.2)	0	185	★ 0.000 (0, 2.381)	0.520	0.998
<b>HTP</b>	Heart transplant	4 (50.0)	0	239	★ 0.000 (0, 1.959)	0.120	0.965

\* 2016 CDPH report specifies a combined coronary bypass procedure SIR only

## 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, a 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 immediate 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 2015/2016 influenza season (October 1, 2015 through March 31, 2016) is presented in this report.

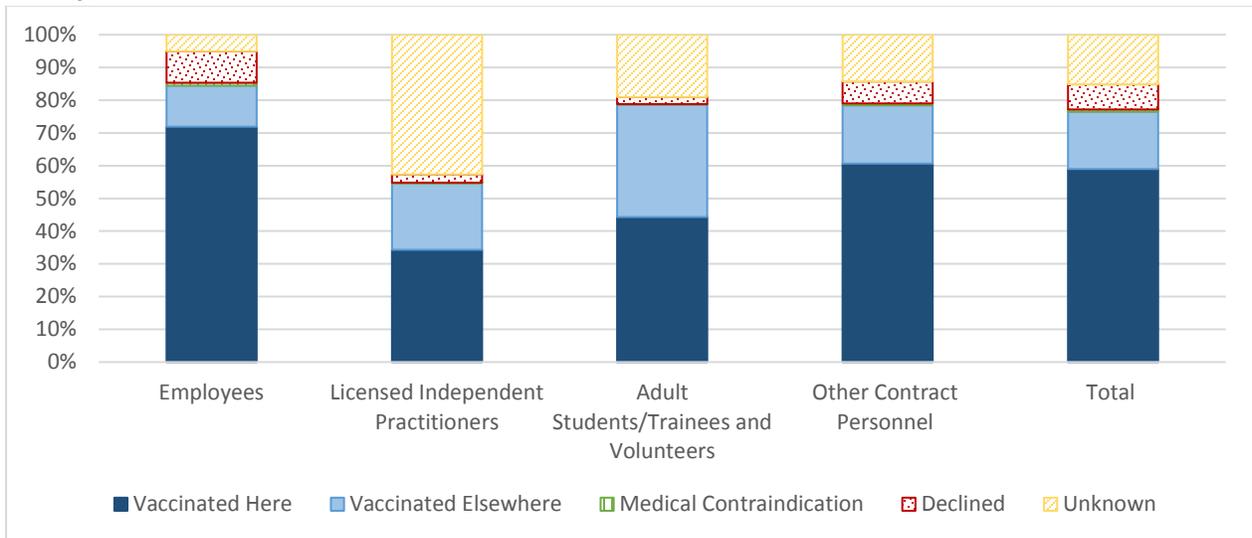
Among 86 reporting GACH facilities, the average vaccination coverage among HCP is 76.5% (range: 38.2% - 98.0%). This coverage represents an increase from the previous influenza season, but remains below the Healthy People 2020 Goal of 90%.

Vaccination coverage varied by HCP category. Employees had the highest coverage (84.5%), while licensed independent practitioners had the lowest (54.5%). Employees also had the highest proportion of individuals who declined vaccination (9.7%). On average, 42.7% of licensed independent practitioners had unknown vaccination statuses.

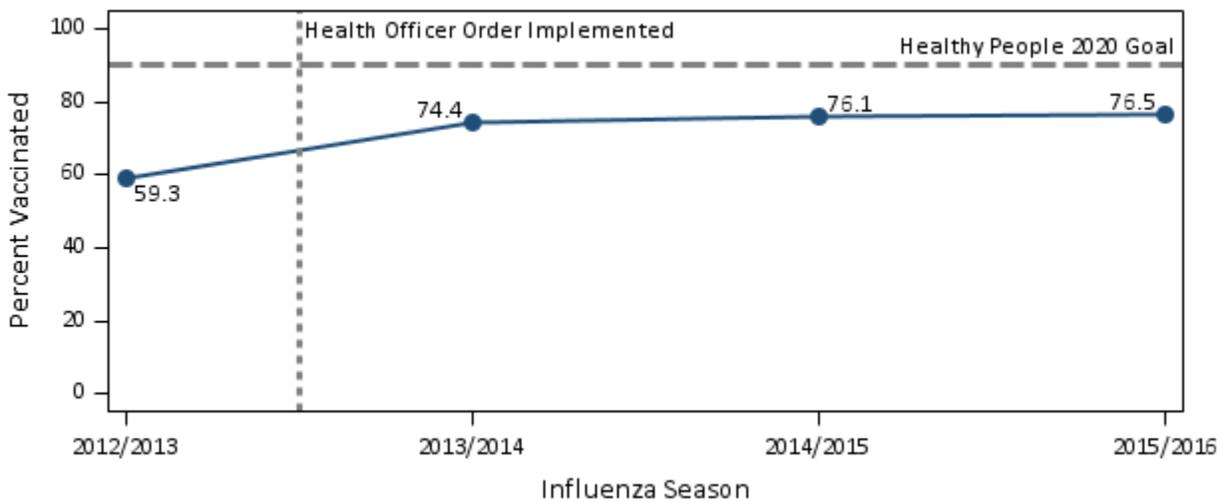
**Table 8. Healthcare Personnel (HCP) Seasonal Influenza Vaccination Rates, General Acute Care Hospitals, L.A. County, 2016**

Personnel Category	Number of Hospitals Reporting	Mean	Minimum	Maximum
<b>Employees</b>	86	84.5	40.9	96.9
<b>Licensed Independent Practitioners</b>	85	54.5	2.0	100.0
<b>Adult Students/Trainees and Volunteers</b>	76	78.7	0.0	100.0
<b>Other Contract Personnel</b>	71	78.5	20.0	100.0
<b>All Healthcare Personnel in Aggregate</b>	86	76.5	38.16	97.95

**Figure 8. Seasonal Influenza Vaccination Status by HCP Categories, General Acute Care Hospitals, L.A. County, 2016**



**Figure 9. Average HCP Influenza Vaccination Rate by Season, General Acute Care Hospitals, L.A. County, 2012/2013-2015/2016**



## Long Term Acute Care (LTAC) Hospitals

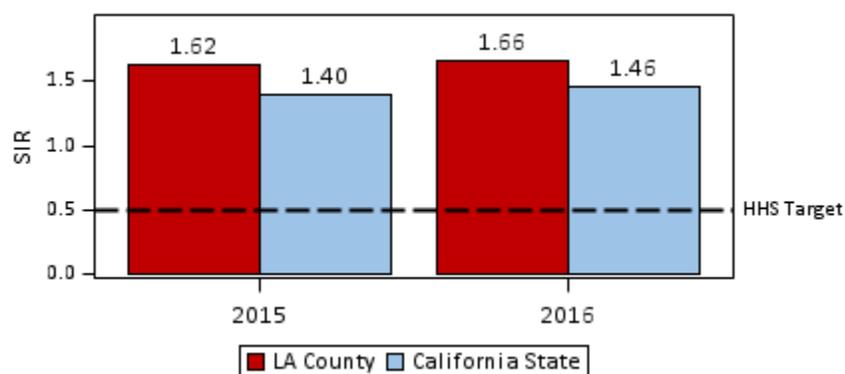
### Central Line-Associated Bloodstream Infection (CLABSI) Events

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
- Proportion of admissions on a ventilator
- Proportion of admission on hemodialysis

Based on 9 LTAC hospitals reporting in L.A. County, the overall CLABSI SIR is 1.664 (95% CI: 1.44, 1.915), which is significantly higher than predicted (worse). When stratified by location types, all aggregated locations reported significantly more CLABSI than predicted.

**Figure 10. CLABSI Standardized Infection Ratios, Long-term Acute Care Hospitals, All Locations, L.A. County, 2015-16**



**Table 8. CLABSI Standardized Infection Ratios, Long-term Acute Care Hospitals, by CDC location type, L.A. County, 2016**

	Number of Hospitals Reporting (% with 12 months)	Pooled number of infections	Pooled number of central line days	LAC SIR (95% CI)	2016 CA SIR	2015 National SIR
<b>All LTAC hospitals</b>	9 (88.9)	189	78,622	✗ 1.664 (1.44, 1.915)	1.46	0.995
<b>Critical Care</b>	6 (83.3)	24	6,838	✗ 1.449 (1.95, 2.124)	N/A	0.943
<b>Ward</b>	9 (88.9)	165	71,784	✗ 1.701 (1.456, 1.976)	N/A	1.000

### Catheter-associated Urinary Tract Infection (CAUTI) Events

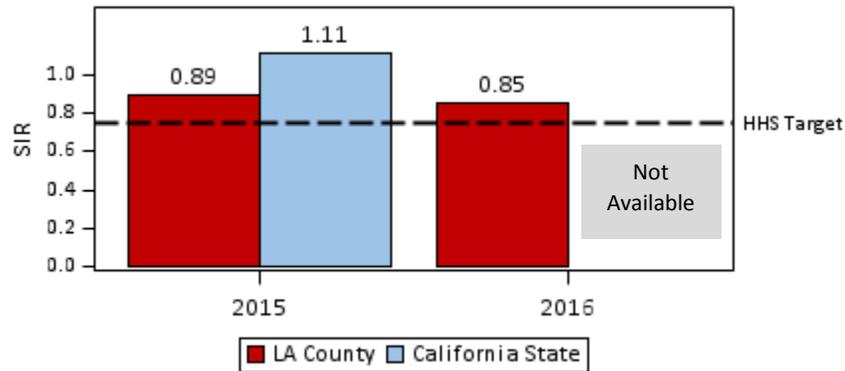
Facility-wide CAUTI data were also obtained from LTAC hospitals in L.A. County through voluntarily conferring rights to LACDPH through NHSN. The number of predicted CAUTI is calculated based on risk adjustment for the following variables found to be significant predictors:

- 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 0.851 (95% CI: 0.711, 1.010), which is not significantly different than predicted. Critical care and ward location types performed similarly in L.A. County.

The HHS target is to reduce CAUTI by 25%. LTAC hospitals in L.A. County have not reached this goal overall, or for any specific location type.

**Figure 11. CAUTI Standardized Infection Ratios, Long-term Acute Care Hospitals, All Locations, L.A. County, 2015-16\***



\*2015 California SIR obtained from CDC 2015 National Report, 2016 currently not available

**Table 10. CAUTI Standardized Infection Ratios, Long-term Acute Care Hospitals, by CDC Location Type, L.A. County, 2016**

	Number of Hospitals Reporting (% with 12 months)	Pooled number of infections	Pooled number of catheter days	LAC SIR (95% CI)	2015 CA SIR*	2015 National SIR
<b>All LTAC hospitals</b>	8 (87.5)	125	78,758	0.851 (0.711, 1.010)	1.108	0.992
<b>Critical Care</b>	7 (85.7)	15	7,573	0.858 (0.498, 1.383)	N/A	0.970
<b>Ward</b>	8 (87.5)	110	71,185	0.850 (0.702, 1.020)	N/A	0.994

\*2015 California SIR obtained from CDC 2015 National Report, 2016 currently not available

#### 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:

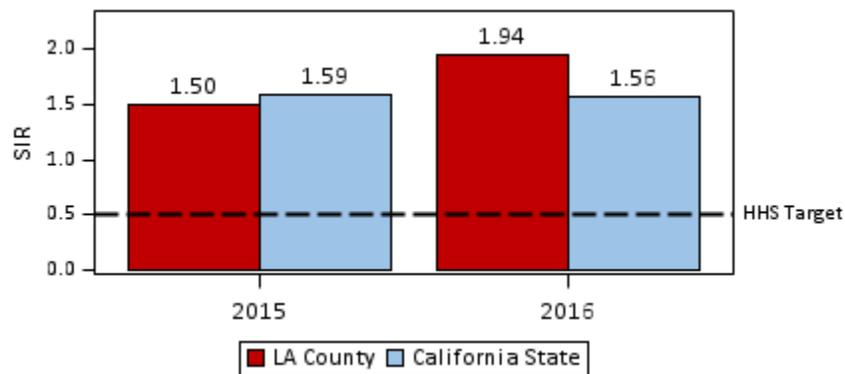
- Inpatient community-onset prevalence rate
- Average length of stay
- Medical school affiliation

- Facility type
- Number of ICU beds
- Ventilator admission

All 9 L.A. County LTAC hospitals reported 12 months of healthcare facility-onset MRSA bacteremia data resulting in an SIR of 1.942 (95% CI: 1.505, 2.469), which was 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 9 LTAC hospitals reported VRE in 2016 and had a pooled rate of 2.51 infections per 10,000 patient days. This rate represented an increase from that of 2015. Three LTAC hospitals voluntarily reported CRE and had a pooled rate of 15.8 infections per 10,000 patient days. CRE event reporting to NHSN was voluntary at this time; however, a LACDPH Health Officer Order was issued in 2017 requiring all CRE events be reported to NHSN.

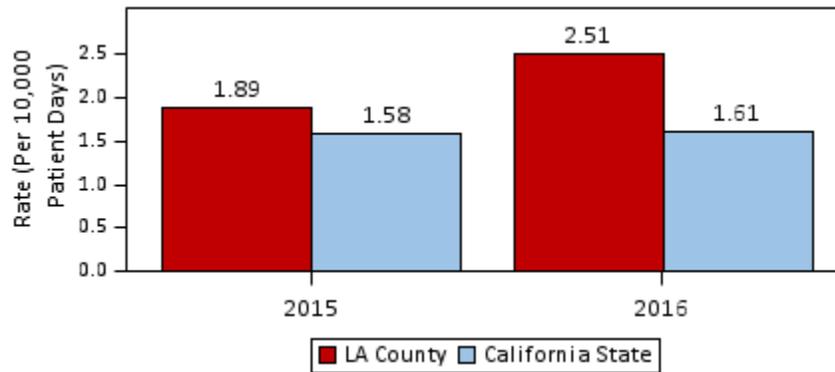
**Figure 12. Healthcare Facility-onset MRSA Bacteremia Standardized Infection Ratios, Long-term Acute Care Hospitals, L.A. County, 2015-16**



**Table 11. Healthcare Facility-onset MRSA Bacteremia Standardized Infection Ratios, Long-term Acute Care Hospitals, L.A. County, 2016**

	Number of Hospitals Reporting (% with 12 months)	Pooled number of events	Pooled number of patient days	LAC SIR (95% CI)	2016 CA SIR	2015 National SIR
<b>MRSA</b>	9 (100)	63	199,123	✘ 1.942 (1.505, 2.469)	1.56	0.965

**Figure 13. Healthcare Facility-onset VRE Bacteremia Rates per 10,000 patient days, Long-term Acute Care Hospitals, 2015-16**



**Table 12. Healthcare Facility-onset VRE bacteremia and CRE infection Pooled Healthcare Facility-Onset Rates, Long-term Acute Care Hospitals, L.A. County, 2016**

	Number of Hospitals Reporting (% with 12 months)	Number of HO Infections	LAC HO Rate (per 10,000 patient days)	2016 CA HO Rate	National HO Rate
<b>VRE</b>	9 (100)	50	2.51	1.61	N/A
<b>CRE</b>	3 (100)	99	15.8	N/A	N/A

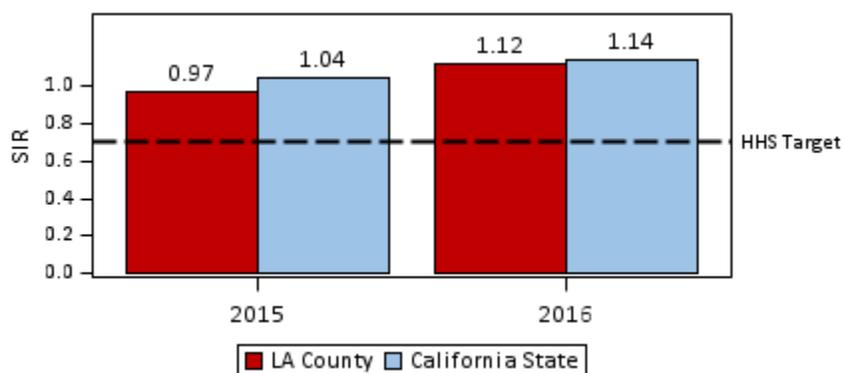
#### *Clostridium difficile* Infection (CDI) LabID Events

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
- Hospital affiliation with a medical school
- Facility type
- Number of ICU beds
- Type of ED Reporting
- Ventilator admission
- Percent of single occupancy rooms

All 9 L.A. County LTAC hospitals reported 12 months of healthcare facility-onset CDI data resulting in an SIR of 1.115 (95% CI: 0.986, 1.257), however the difference from the predicted value was not statistically significant.

**Figure 14. Healthcare Facility-onset *C. difficile* Infection Standardized Infection Ratios, Long-term Acute Care Hospitals, L.A. County, 2015-16**



**Table 11. Healthcare Facility-onset *C. difficile* Infection Standardized Infection Ratios, Long-term Acute Care Hospitals, L.A. County, 2016**

	Number of Hospitals Reporting (% with 12 months)	Pooled number of events	Pooled number of patient days	LAC SIR (95% CI)	2016 CA SIR	2015 National SIR
<b>CDI</b>	9 (100)	260	199,123	1.115 (0.986, 1.257)	1.14	0.944

#### Influenza Vaccination Coverage Among Health-Care Personnel

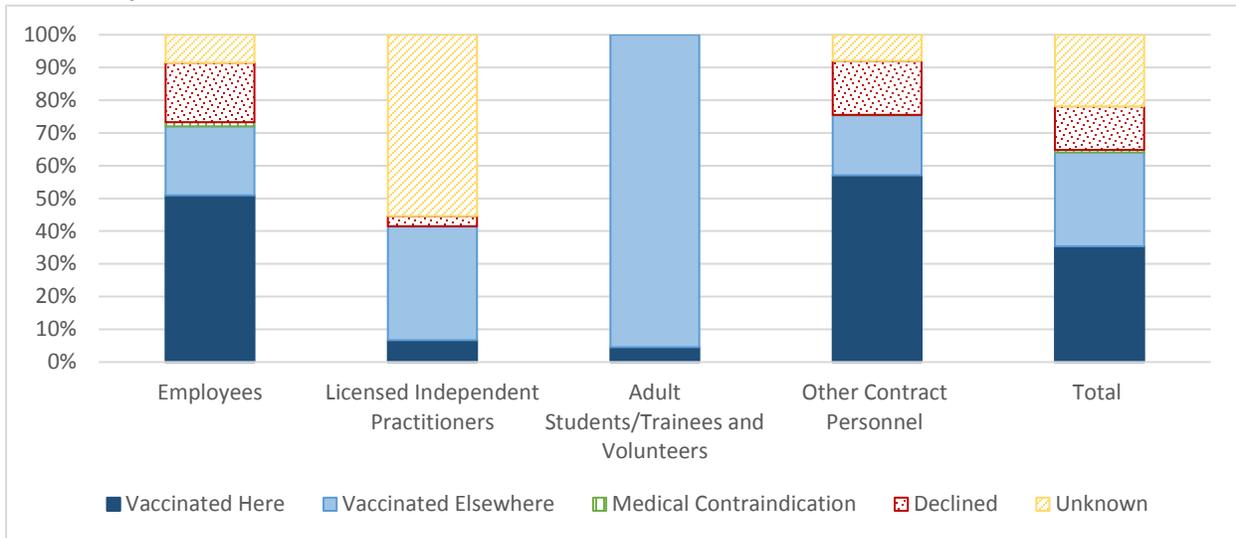
LTAC hospitals report influenza vaccination information on healthcare personnel (HCP) physically present for one or more days during the influenza season, per CDPH requirements. Since 2013, a L.A. County Health Officer Order has mandated that all HCP in LTAC hospitals be vaccinated against influenza, or wear a protective mask during the influenza season. Data for the 2015/2016 influenza season (October 1, 2015 through March 31, 2016) is presented in this report.

Among 9 reporting LTAC facilities, the average vaccination coverage among HCP is 64.0% (range: 34.4% - 82.2%), 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 (100.0%), followed by other contract personnel (75.4%). Similar to acute care hospitals, licensed independent practitioners had the lowest vaccination coverage (41.5%) and largest proportion of unknown vaccination status (55.4%).

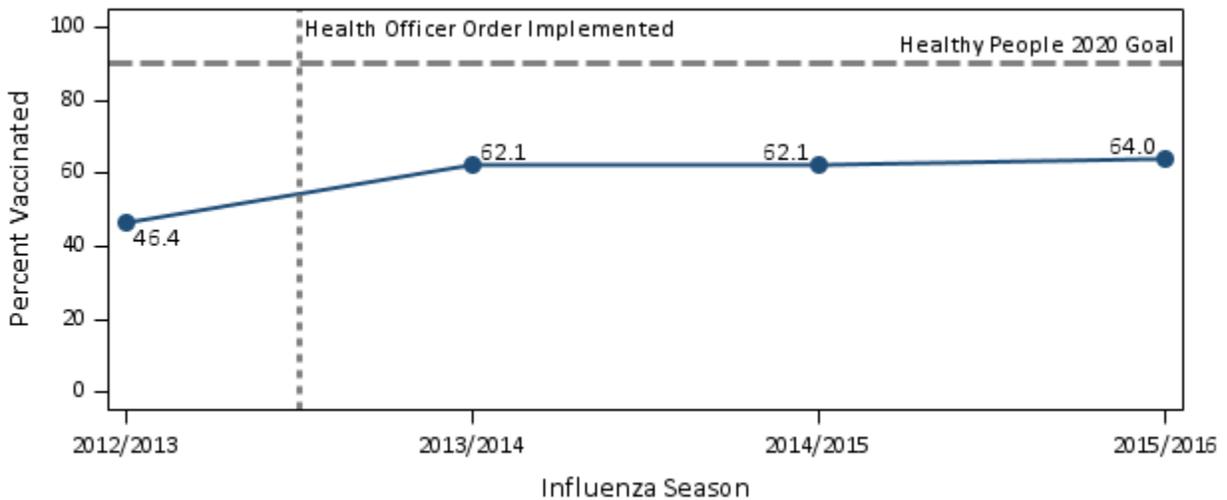
**Table 12. Healthcare Personnel (HCP) Seasonal Influenza Vaccination Rates, Long Term Acute Care Hospitals, L.A. County, 2016**

Personnel Category	Number of Hospitals Reporting	Mean	Minimum	Maximum
<b>Employees</b>	9	72.0	55.7	90.5
<b>Licensed Independent Practitioners</b>	9	41.5	4.7	62.5
<b>Adult Students/Trainees and Volunteers</b>	7	100.0	100.0	100.0
<b>Other Contract Personnel</b>	9	75.4	49.2	100.0
<b>All Healthcare Personnel in Aggregate</b>	9	64.0	34.4	82.2

**Figure 15. Seasonal Influenza Vaccination Status by HCP Categories, Long Term Acute Care Hospitals, L.A. County, 2016**

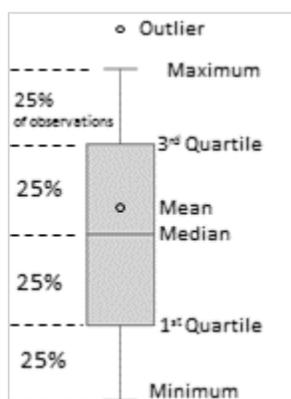


**Figure 16. Average HCP Influenza Vaccination Rate by Season, Long Term Acute Care Hospitals, L.A. County, 2012/2013-2015/2016**



# 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, 2016**

	Number of Hospitals Reporting (% with 12 months)	Pooled number of infections	Pooled number of catheter-days	LAC SIR (95% CI)
<b>Critical Care</b>	13 (100)	35	21,905	0.848 (0.727, 1.414)
<b>Oncology Critical Care</b>		N/A		
<b>Ward</b>	24 (87.5)	33	26,709	1.158 (0.810, 1.607)
<b>Oncology Ward</b>	4 (100)	53	26,953	1.428 (1.081, 1.854)

**Table A2. Pediatric-specific CAUTI Standardized Infection Ratios, General Acute Care Hospitals, by CDC Location Type, L.A. County, 2016**

	Number of Hospitals Reporting (% with 12 months)	Pooled number of infections	Pooled number of catheter-days	LAC SIR (95% CI)
<b>Critical Care</b>	12 (100)	9	9,050	0.639 (0.312, 1.173)
<b>Oncology Critical Care</b>		N/A		
<b>Ward</b>	23 (87)	3	2,895	1.275 (0.324, 3.470)
<b>Oncology Ward</b>	4 (75)	2	1,341	0.903 (0.151, 2.984)

Multidrug-Resistant Organism (MDRO) and Clostridium 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, 2016**

	Number of Hospitals Reporting (% with 12 months)	Number of CO Infections	LAC CO Rate (per 100 admissions)
<b>MRSA</b>	83 (98.8)	718	0.063
<b>CDI</b>	84 (98.8)	4506	0.43

**Table A4. VRE Bacteremia and CRE Infection Pooled Community-onset Rate, General Acute Care Hospitals, L.A. County, 2016**

	Number of Hospitals Reporting (% with 12 months)	Number of CO Infections	LAC CO Rate (per 100 admissions)
<b>VRE</b>	84 (90.5)	99	0.0087
<b>CRE</b>	38 (65.8)	223	0.0392

**Table A5. MRSA Bacteremia and C. difficile Infection Pooled Community-onset Rate, Long-term Acute Care Hospitals, L.A. County, 2016**

	Number of Hospitals Reporting (% with 12 months)	Number of CO Infections	LAC CO Rate (per 100 admissions)
<b>MRSA</b>	9 (100)	11	0.15
<b>CDI</b>	9 (100)	83	1.16

**Table A6. VRE Bacteremia and CRE Infection Pooled Community-onset Rate, Long-term Acute Care Hospitals, L.A. County, 2016**

	Number of Hospitals Reporting (% with 12 months)	Number of CO Infections	LAC CO Rate (per 100 admissions)
<b>VRE</b>	9 (100)	4	0.0559
<b>CRE</b>	3 (100)	22	0.906