Making Healthcare Safer for All Californians

Healthcare-Associated Infections in California Hospitals

Annual Report | January to December 2020

Report to the Legislature and the People of California
by the Healthcare-Associated Infections Program,
Center for Health Care Quality,
California Department of Public Health | October 2021

Healthcare-Associated Infections Program
Center for Health Care Quality
California Department of Public Health
850 Marina Bay Parkway, Building E
Richmond, California 94804
Phone: 510-412-6060
Email: HAIProgram@cdph.ca.gov
Website: www.cdph.ca.gov/hai

Table of Contents

MESSAGE FROM THE CHIEF OF THE HEALTHCARE-ASSOCIATED INFECTIONS PROGRAM

For the past five years, CDPH annually reported on California hospitals' incremental progress towards achieving 2020 HAI prevention goals. By 2019, California hospitals' HAI incidence was significantly lower than national baselines for all reportable infection types, and nearly 30 percent of hospitals were on track to achieve 2020 reduction targets for at least three infection types. In 2020, however, California hospitals' statewide incidence for central line associated bloodstream infections (CLABSI) and methicillin resistant Staphylococcus aureus bloodstream infections (MRSA BSI) were higher when compared with the prior year and had returned to 2015 levels.

As described in this report, CDPH HAI epidemiologists conducted in-depth analyses on the impacts of the COVID-19 pandemic on HAI and antimicrobial resistance (AR) reporting and incidence. Our findings of substantial and significant increases in CLABSI and MRSA BSI mirror the national experience. A growing body of literature cites multiple factors that likely contribute to increased HAI incidence and emergence and spread of AR during the COVID-19 pandemic, including: diversion of resources from infection prevention activities; disruptions in routine care practices; personal protective equipment (PPE) supply shortages and conservation (extended use and reuse); PPE overuse with multiple gown and glove layers; and antimicrobial prescribing changes.

CDPH is engaging the California HAI Advisory Committee and other hospital partners to identify and support implementation of strategies for building resiliency and maintaining the highest possible quality hospital infection prevention and control practices while managing ongoing pandemic- and surge-related challenges. CDPH will also seek advice from the HAI Advisory Committee about re-establishing short and long-term goals for HAI and AR prevention in California hospitals. Ultimately our goal is to leverage lessons learned during the pandemic to advocate for resources and improve IP practices to eventually achieve even greater HAI/AR prevention outcomes in the post-pandemic era and beyond.

Erin Epson, MD
Medical Director & Chief
Healthcare-Associated Infections Program
Center for Health Care Quality

ACKNOWLEDGEMENTS

The HAI Program would like to recognize the contributions of California hospitals that diligently track and report HAI data using the National Healthcare Safety Network protocols and definitions and for their continued dedication to ensuring the accuracy of the data used to produce this public report.

HAI Advisory Committee

The HAI Program Advisory Committee makes recommendations to CDPH on issues related to HAI surveillance, reporting, and prevention in California hospitals. The HAI Advisory Committee is comprised of voting members with HAI expertise or interest and non-voting liaison members who represent California HAI stakeholder organizations. The HAI Program thanks each member for their support and contributions.

Members

Robert Bernstein, MD, PhD, MPH, PACPM
Anjali Bisht, MPH, CIC, CLSGB
Keith Bradkowski, MS, RN, NEA-BC
Theresa Caughlin, RN, MHA, CIC
Sarah Doernberg, MD MAS
Silvia Gnass, MSc, CIC
David Ha, PharmD, BCIDP
Marian Hollingsworth
Marisa Holubar, MD, MS
Cristine Lacerna, RN, MPH, CIC
Tashia Orr
Geany Ryan, RN, MSN, NP
Zachary Rubin, MD
Arianna Samspon, PA-C
Patricia Sung, MPH, CIC
Amber Theel, BSN, MBA, CPHRM, CPHQ

Liaison Members

BJ Barteson, RN, MS, NEA-BC, California Hospital Association
Michael Butera, MD, California Medical Association
Kathy Dennis, RN, California Nurses Association
Louise McNitt, MD, California Association for Professionals in Infection Control and Epidemiology
Howard Pitluk, MD, MPH, FACS, Health Services Advisory Group (HSAG) of California
Jeffrey Silvers, MD, Infectious Disease Association of California

EXECUTIVE SUMMARY

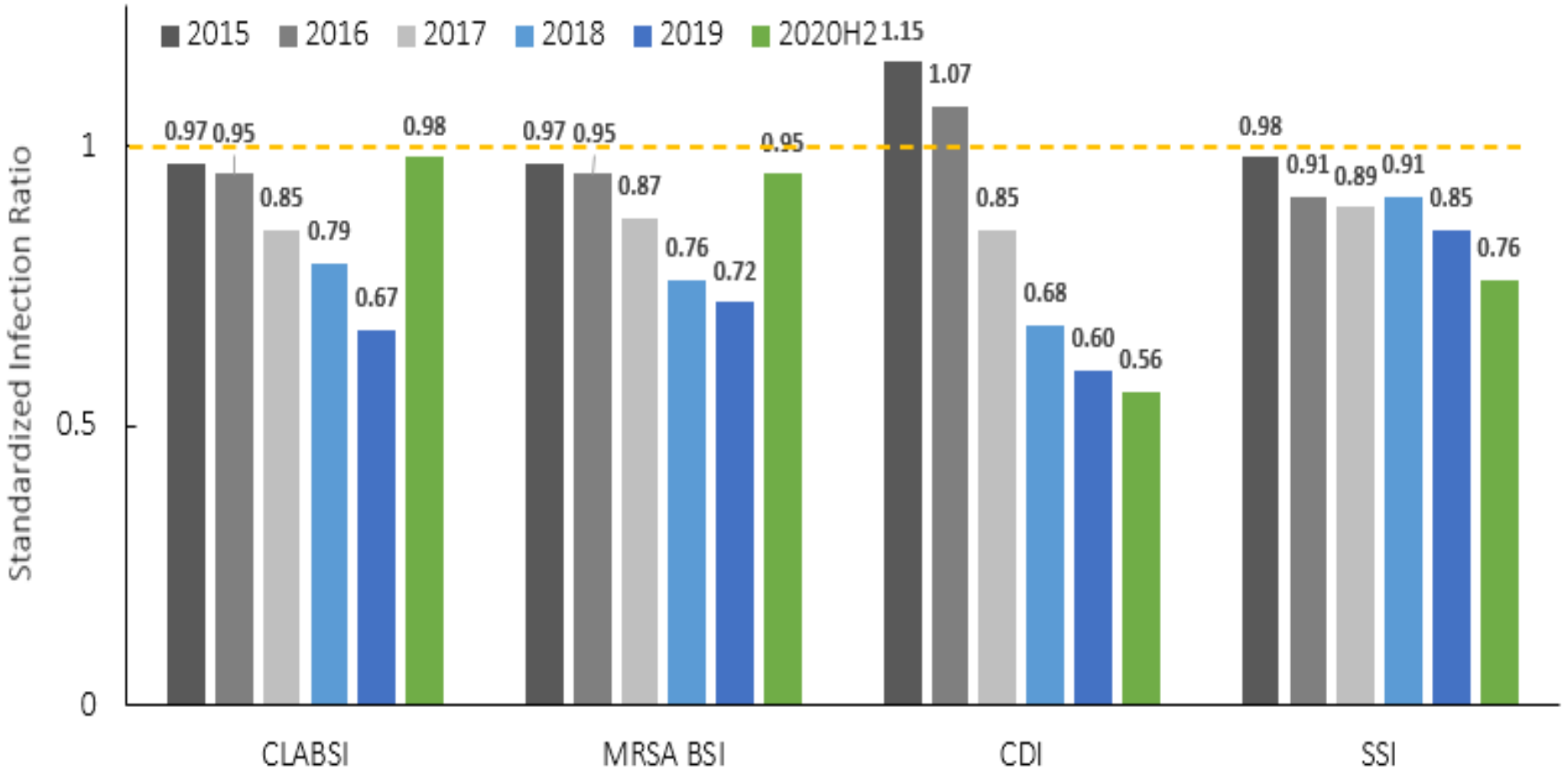
The California Department of Public Health (CDPH) publishes healthcare-associated infections (HAI) data annually to provide information about the quality of hospital care and to monitor prevention progress (Health and Safety Code (HSC) section 1288.55). This report presents California hospital HAI data for the first and latter six months of calendar year 2020. In response to the Governor's COVID-19 state of emergency declaration, CDPH distributed All Facilities Letter (AFL) 20-26 on March 20, 2020, temporarily waiving hospital licensing requirements and suspending regulatory enforcement requirements in Chapter 2 of Division 2 of HSC sections 1250-1339.59 (except for adverse event and unusual occurrence reporting, HSC 1279.1).

The suspension included hospital HAI reporting requirements for central line-associated bloodstream infections (CLABSI), methicillin-resistant *Staphylococcus aureus* (MRSA) bloodstream infections (BSI), vancomycin-resistant enterococci (VRE) BSI, *C. difficile* infections *(CDI),* and surgical site infections (SSI) (HSC sections 1288.55 and 1288.8). CDPH took no regulatory action for missing or incomplete HAI data during January 1–June 30, 2020. Additionally, the Centers for Medicare and Medicaid Services (CMS) issued an HAI reporting exception for 2020-Q1—2020-Q2. However, hospitals reporting data via automated electronic mechanisms were encouraged to maintain those systems for reporting data to National Healthcare Safety Network (NHSN).

Despite the suspension in HAI reporting requirements during the first half of the year, California's 398 general acute care hospitals reported a total of 10,995 HAI in 2020, including 6,105 reported during the second half of the year. CDPH published all reported HAI numerator and denominator data for 2020 on the California Health and Human Services (CalHHS) Open Data Portal, but in separate files for the first and second halves of the year. To ensure fair comparisons across hospitals, CDPH published risk-adjusted incidence measures only for HAI data reported during the second half of 2020.

Statewide incidence for CDI and SSI continued to be lower (better) than 2015 national baselines, but for CLABSI and MRSA BSI the incidence returned to the 2015 national baseline levels (Figure 1). **For the first time since 2015, the statewide incidence for CLABSI and MRSA BSI was higher when compared with the prior year**.

Figure 1. Healthcare-Associated Infection Incidence in California Hospitals, 2015-2020*



NOTE. Dashed horizontal line reflects the national baseline for the standardized infection ratio (SIR). An SIR below the dashed line represents HAI prevention progress if the reduction was statistically significant. *Latter six months of 2020 (2020H2).

ANNUAL REPORT

Patients in hospitals are exposed to invasive devices, procedures, and medications that put them at risk for **healthcare-associated infections (HAI).** Most HAI can be prevented if health care providers and staff consistently adhere to infection prevention care practices [1].

This report provides an annual summary of HAI data reported by California hospitals to CDPH, in accordance with Health and Safety Code sections 1288.5 and 1288.55.

METHODS

California acute care hospitals track and report to CDPH five types of hospital-onset infections (Health and Safety Code section 1288.5):

Central line-associated bloodstream infections (CLABSI), methicillin-resistant *Staphylococcus aureus* (MRSA) bloodstream infections (BSI), vancomycin-resistant enterococci (VRE) BSI, *Clostridioides difficile* infections (CDI), and surgical site infections (SSI).

This report summarizes HAI data reported to CDPH via the Centers for Disease Control and Prevention (CDC) National Healthcare Safety Network (NHSN) and provides the data for the first half and second half of 2020 separately.

In 2020, CDPH received HAI data from 328 acute care hospitals (including 224 community, 94 major teaching, and 10 pediatric acute care hospitals), 22 long-term acute care (LTAC) hospitals, 34 critical access hospitals, and 77 acute care rehabilitation hospitals and units. CDPH reports the 2020, the first and later six months, HAI data from LTAC, critical access, and rehabilitation hospitals in separate sections of this report because risk-adjustment methods are different for each hospital type.

Thirty-six (9%) California general acute care hospitals did not report complete HAI data for the second half of 2020 (Appendix A).

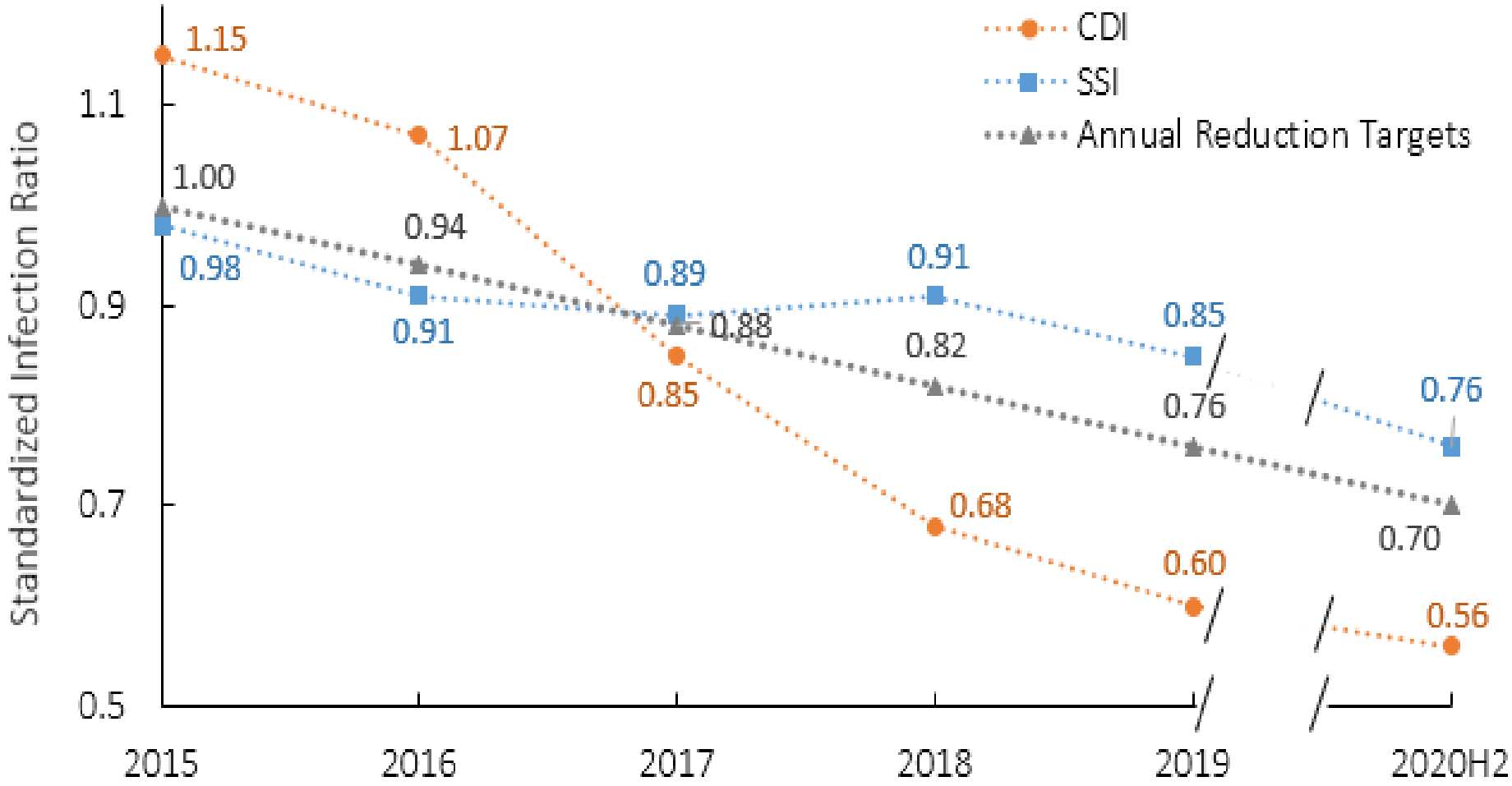
CDPH calculates and presents HAI risk based on national referent data (baselines) to track California hospital HAI prevention progress from year to year [2]. When available, CDPH reports HAI incidence using a measure called the **standardized infection ratio (SIR)**. The SIR is calculated by comparing the number of HAI that were reported by the hospital with the number of HAI that were predicted using 2015 national baseline data [3]. The predicted number of infections is determined by a risk adjustment process that accounts for differences in hospital and patient characteristics.

CDPH presents VRE BSI incidence as rates (per 10,000 patient days) because a risk adjustment model and SIR are not available.

In 2015, the California HAI Advisory Committee recommended that CDPH track each hospital's progress in meeting national HAI reduction goals [4]. From 2015 to 2020, all California hospitals were expected to achieve 50% reductions in CLABSI and MRSA BSI incidence and 30% reduction in CDI and SSI. To be considered on track, hospitals had to achieve SIRs at or below incremental targets each year (Figures 2 and 3). However, due to the COVID-19 pandemic and the suspension of regulatory enforcement of HAI reporting requirements by CDPH during January 1–June 30, 2020, this report presents SIRs for only the second half of 2020 without indicating whether individual hospitals met 2020 HAI reduction goals. CDPH will be working with the California HAI Advisory Committee and hospital partners to reestablish the target goals for 2021 and beyond.

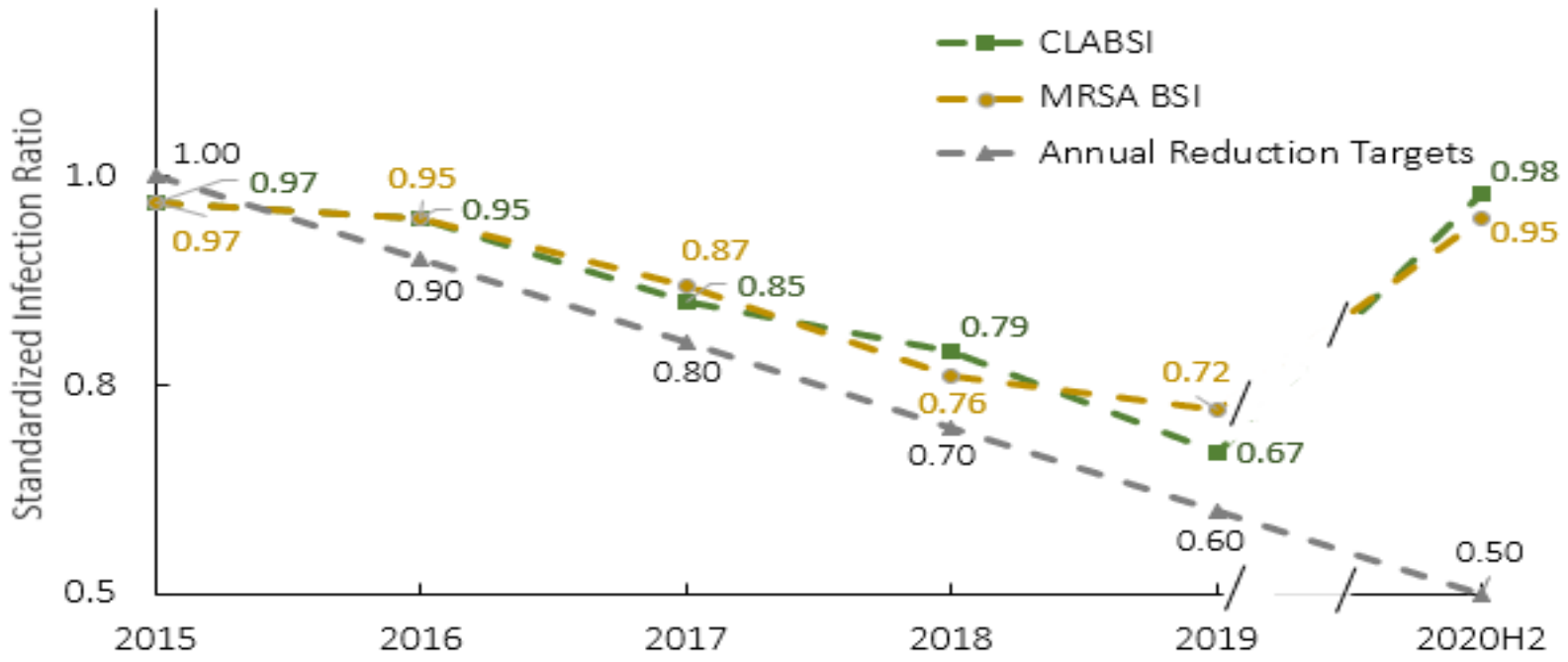
Figures 2 and 3. Standardized Infection Ratio (SIR) Targeted Reduction Goals by Year, HAI Infection Type, and Progress to Date among California Hospitals

Figure 2



Note: 2020H2 denotes the latter six months of 2020

Figure 3



Note: 2020H2 denotes the latter six months of 2020

CDPH publishes annual HAI findings on its website (www.cdph.ca.gov/HAI). The webpage includes this report and two-page HAI profiles for each California hospital. The profiles show detailed HAI data reported in the second half (July–December) of 2020 and graphs of annual infection trends since 2015 with the 2020 data presented for the latter six months. The profiles are also available via the CDPH interactive map, "My Hospital's Infections" (www.cdph.ca.gov/Programs/CHCQ/HAI/Pages/HAImap.aspx).

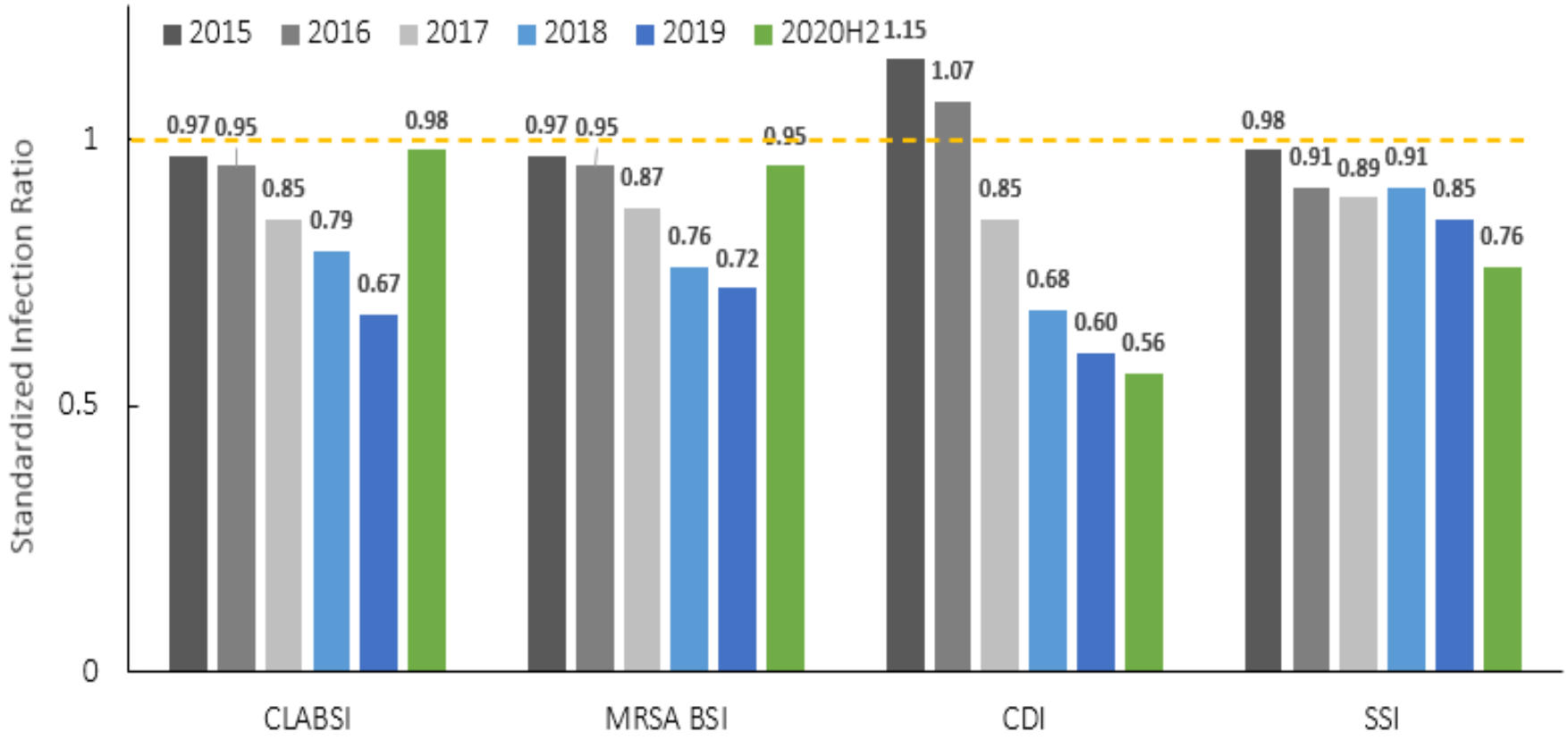
All HAI hospital-specific data tables with the data separated into first half (January–June) and second half of 2020 are available for viewing or downloading at the California Health and Human Services Open Data Portal (data.chhs.ca.gov).

The Key Findings section of this report presents HAI data for the majority (327) of California hospitals.

KEY FINDINGS

In the second half of 2020, the statewide risk for CDI and SSI is significantly lower or better than national baselines and for CLABSI and MRSA BSI the risk is the same as the national baselines (Figure 1). In the latter six months of 2020, 145 (44%) hospitals in 33 counties have HAI incidence significantly better (★, green star) than the national baseline (or statewide VRE BSI rate) and 55 (17%) hospitals in 20 counties have HAI incidence significantly worse (✖, red X) for at least one infection type (Appendix B).

Figure 1. Healthcare-Associated Infection Incidence in California Hospitals, 2015-2020*



NOTE. Dashed horizontal line reflects the national baseline for the standardized infection ratio (SIR). An SIR below the dashed line represents HAI prevention progress if the reduction was statistically significant. *Latter six months of 2020 (2020H2).

CLABSI

In the first half of 2020, California hospitals reported 845 CLABSI, and in the second half of 2020 reported 1,327 infections (89% of all reported CLABSI). The statewide CLABSI incidence (SIR) in the latter six months is 0.98, which is not significantly different than the national baseline. Of 294 hospitals with a calculated SIR in the second half of 2020, 243 (83%) hospitals were no different than the national baseline ("same"), 23 (8%) were significantly better, and 28 (9%) hospitals were significantly "worse" (Appendix B).

MRSA BSI

In the first six months of 2020, hospitals reported 297 MRSA BSI and in the last six months of 2020, 390 infections. The statewide SIR in the latter six months is 0.95, the same compared with the national baseline. Of 263 hospitals with a calculated SIR in the second half of 2020, 11 (4.2%) hospitals were significantly "worse" than the national baseline. None of the hospitals were better than the national baseline. Two hundred and fifty-two hospitals were no different than the national baseline ("same") (Appendix B).

CDI

In the first six months of 2020, California hospitals reported 1,814 *C. difficile* infections and in the latter six months reported 2,167 *C. difficile* infections. The statewide CDI SIR across hospitals in the latter six months of 2020 is 0.56. Of 307 hospitals with a calculated SIR, 122 (40%) had a CDI SIR that was significantly better than the national baseline in the latter six months of 2020. Three facilities (1%) had a CDI SIR that was significantly worse than the national baseline (Appendix B).

CDI can spread among hospitals, skilled nursing facilities, and medical clinics that share patients who are colonized or infected with C. difficile. For this reason, understanding CDI incidence by county can help inform state-wide prevention efforts. In the latter six months of 2020, CDI incidence was significantly better than the national baseline in 27 (60%) of 45 counties with at least one acute care hospital. No counties had an SIR significantly above 1.0.

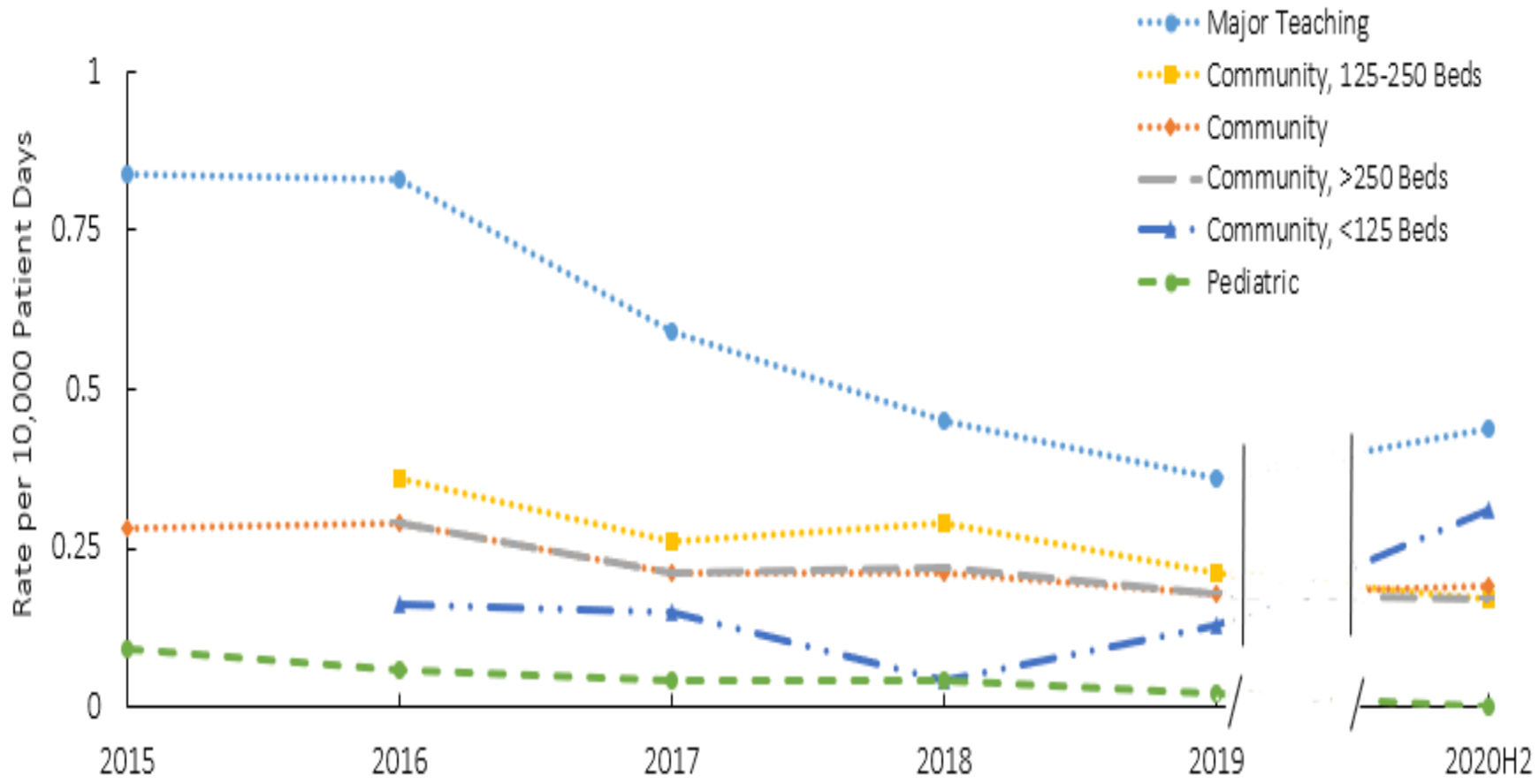
VRE BSI

In the first six months of 2020, hospitals reported 206 VRE BSI infections and major teaching hospitals accounted for the largest proportion of VRE BSI infections (60%).

In the last six months of 2020, hospitals reported 214 VRE BSI infections. Major teaching hospitals had the highest VRE BSI rate (0.44 per 10,000 patient days) and accounted for the largest proportion of VRE BSI infections (67%)

reported by hospitals. Ten hospitals were significantly worse (3.1%) than the statewide pooled average. None of the hospitals were significantly better than the statewide pooled average (Appendix B).

Figure 4. Unadjusted VRE Bloodstream Infection Rates by California Hospital Type, 2015-2020*



*Latter six months of 2020 (2020H2)

SSI

CDPH reports SSI data separately for adult (18 years and older) and pediatric (younger than 18 years) surgical patients because different risk adjustment models are applied to account for differences in the two patient groups.

Among adult patients, California hospitals reported 1,343 SSI in the first six months of 2020, and 1,542 SSI in the latter six months. The majority of SSI (98%) were reported among 18 surgical procedure types, which accounted for 95% of surgeries among the 28 surgical procedure types that hospitals are required to report (Table 1).

The statewide all-procedure adult SSI SIR is 0.76 for the latter half of 2020. SSI risk was better than national baseline for 13 procedures and worse than national baseline for one procedure (kidney surgery). Thirty-three facilities had low SSI incidence for all procedure categories, and 8 facilities had significantly high SSI incidence for all procedure categories. (Appendices B and C).

Among pediatric patients, hospitals reported 31 SSI in 9,757 surgical procedures during the first six months of 2020, and in the latter six months reported 54 SSI in 10,827 procedures. The pediatric SSI SIR for the second half of 2020 is 0.77.

Table 1. Hospital Surgical Site Infection Incidence in Adult Surgical Patients for 18 Most Common Surgical Procedure Categories in the Latter 6 Months of 2020

Surgical procedure category	Standardized Infection Ratio 2020H2*	2020H2 Compared with National Baseline*
Appendix surgery	0.53	Better
Cardiac surgery	0.94	Same
Cesarean section	0.72	Better
Colon surgery	0.75	Better
Coronary bypass, chest and donor incisions	0.60	Better
Exploratory abdominal surgery (laparotomy)	0.80	Better
Gallbladder surgery	0.80	Same
Gastric surgery	0.47	Better
Hip prosthesis	0.95	Same
Hysterectomy, abdominal	0.68	Better
Knee prosthesis	1.03	Same
Laminectomy	0.65	Better
Open reduction of fracture	0.90	Same
Ovarian surgery	0.54	Same
Pacemaker surgery	0.80	Same
Small bowel surgery	0.71	Better
Spinal fusion	0.92	Same
Thoracic surgery	0.62	Better

*2020H2 refers to the latter six months of 2020.

Hospitals with High HAI Incidence

Three hospitals have HAI incidence that is significantly higher (worse) than national baselines for multiple HAI types in 2020 (Table 2).

Table 2. Hospitals with HAI Incidence Worse than National Baselines in the Second Half of 2020 for Multiple Infection Types

Hospital Name	County	HAI Type	Worse than 2015 National Baseline
San Joaquin General Hospital	San Joaquin	CLABSI MRSA BSI	2020H2 2020H2
Alvarado Hospital Medical Center	San Diego	CDI MRSA BSI	2020H2 2020H2
Kaweah Delta Medical Center	Tulare	MRSA BSI SSI	2020H2 2020H2

LONG-TERM ACUTE CARE (LTAC) HOSPITALS

LTAC hospitals provide complex care to patients that typically require prolonged acute care (greater than 25 days) for respiratory ventilation, multiple intravenous (IV) medications, or complex wound care.

In the first half of 2020, 4 (18%) LTAC hospitals were incomplete reporters for CLABSI, MRSA BSI, VRE BSI, and CDI (Appendix A).

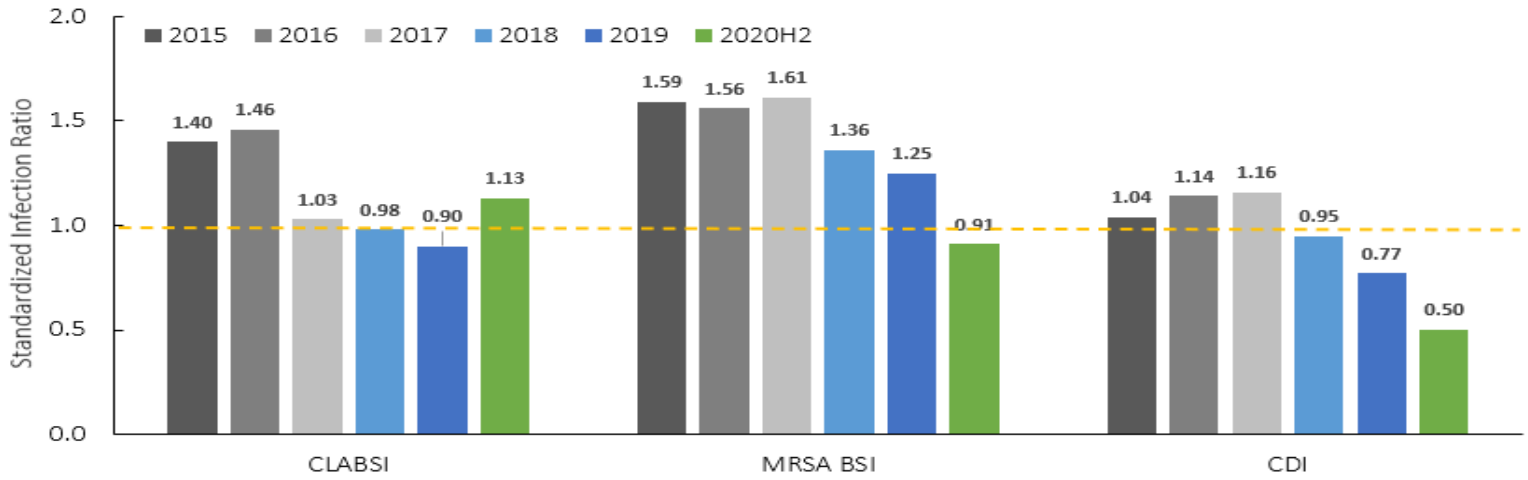
One LTAC hospital, Kindred Hospital, Santa Ana (Orange County), had significantly high incidence for both CLABSI and VRE BSI in the second half of 2020.

CLABSI in LTAC Hospitals

In the first half of 2020, LTAC hospitals reported 108 CLABSI and in the second half reported 156 (10%). The statewide CLABSI incidence (SIR) is 1.13, which is not significantly different than the national baseline.

Of 22 LTAC hospitals reporting data in the second half of 2020, 2 (9%) were significantly better, and 4 (18%) LTAC hospitals had an SIR significantly worse than the national baseline.

Figure 5. Healthcare-Associated Infection Incidence in California Long-Term Acute Care Hospitals, 2015-2020*



NOTE. Dashed horizontal line reflects the national baseline for the standardized infection ratio (SIR). An SIR below the dashed line represents HAI prevention progress if the reduction was statistically significant. *Latter six months of 2020 (2020H2).

MRSA BSI in LTAC Hospitals

In the first six months of 2020, LTAC hospitals reported 38 MRSA BSI and in the latter six months reported 32 MRSA BSI. The statewide MRSA BSI incidence is 0.91 and is the same compared with the national baseline. Two hospitals (9.0%) had SIRs worse than the national baseline. None of the LTAC hospitals were better than the national baseline.

VRE BSI in LTAC Hospitals

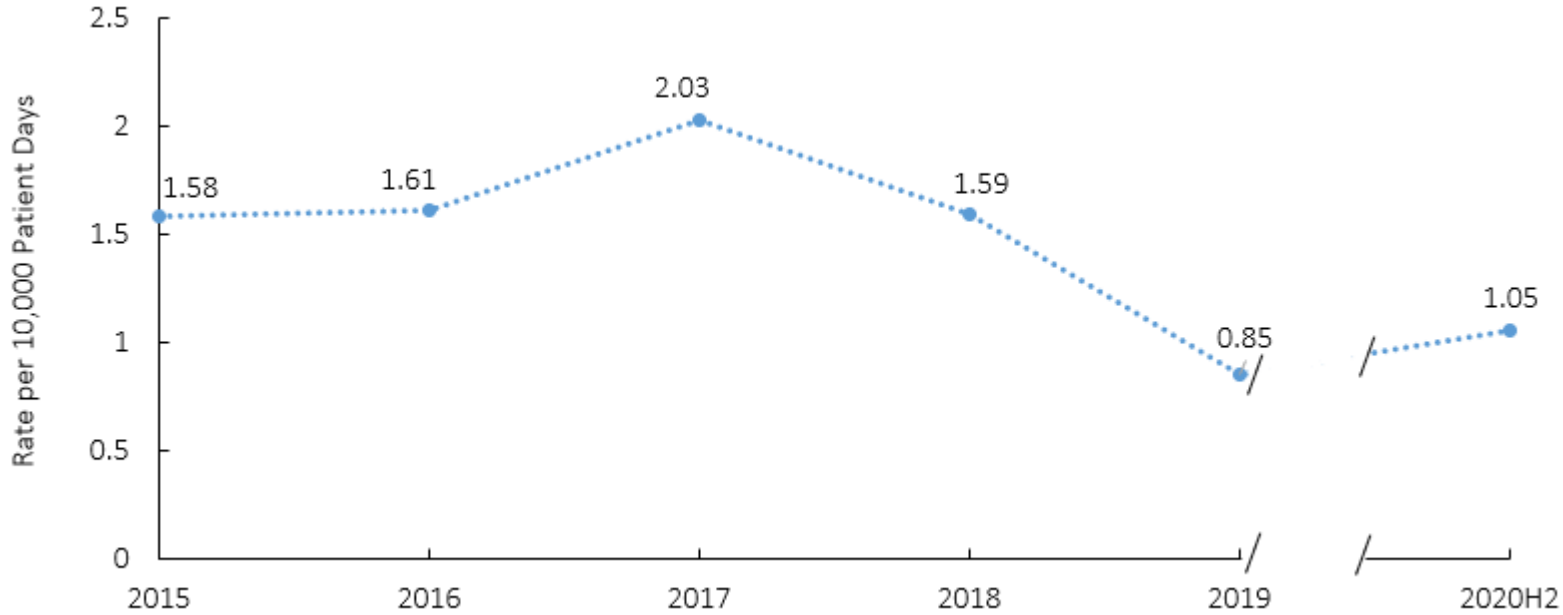
In the first six months of 2020, LTAC hospitals reported 28 VRE BSI infections and in the latter six months reported 24 VRE BSI. LTAC hospitals continued to have the highest VRE BSI incidence among all other hospital types (1.05 per 10,000 patient days). One (4.5%) LTAC hospital had an incidence rate better and another (4.5%) LTAC hospital had an incidence rate worse than the statewide pooled average rate.

CDI in LTAC Hospitals

In the first six months of 2020 California LTAC hospitals reported 123 CDI and in the latter six months reported 131 CDI. The statewide SIR among LTAC hospitals in the latter six months of 2020 is 0.42.

Ten (48%) LTAC hospitals had a CDI SIR that was significantly better than the national baseline in the latter six months of 2020. No LTAC hospitals were significantly worse than the national baseline.

Figure 6. Unadjusted VRE Bloodstream Infection Rates among Long-Term Acute Care Hospitals, 2015-2020*



NOTE. Dashed horizontal line reflects the national baseline for the standardized infection ratio (SIR). An SIR below the dashed line represents HAI prevention progress. *Latter six months of 2020 (2020H2).

CRITICAL ACCESS HOSPITALS

Critical access hospitals have 25 beds or less and are located more than 35 miles from another hospital (with some exceptions). Patients in critical access hospitals stay on average four days or less.

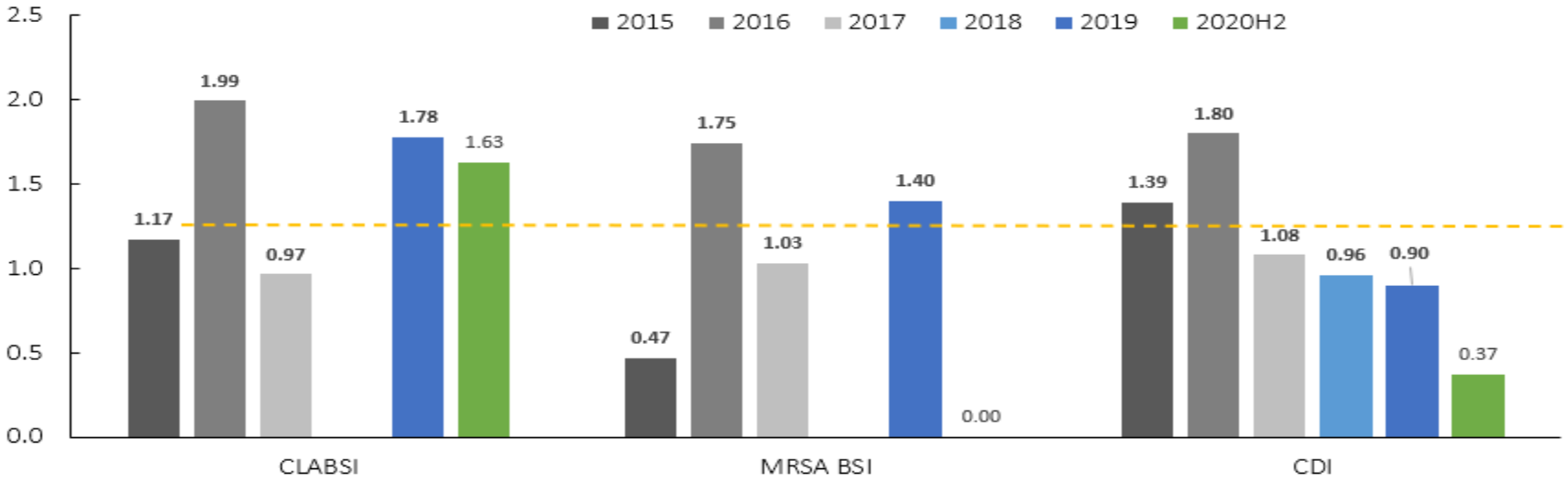
Six critical access hospitals were incomplete reporters in the second half of 2020 (Appendix A).

In the first half of 2020, 34 California critical access hospitals reported seven hospital-onset CDI and in the latter six months reported two CLABSI and five CDI.

In the second half of 2020, the statewide CLABSI incidence (SIR) was 1.63, which is not significantly different than the national baseline. The infections reported occurred within two critical access hospitals. CDPH calculated the SIR for only one facility due to the lower number of predicted infections (<0.20) in the other facility.

The statewide CDI SIR is 0.37. The statewide MRSA BSI SIR is zero and the same as compared with the national baseline. No critical access hospitals had a CDI, MRSA BSI, or VRE BSI incidence that was better or worse than the national baseline or statewide pooled average rate.

Figure 7. Healthcare-Associated Infection Incidence in California Critical Access Hospitals, 2015-2020*



NOTE. Dashed horizontal line reflects the national baseline for the standardized infection ratio (SIR). An SIR below the dashed line represents HAI prevention progress if the reduction was statistically significant. *Latter six months of 2020 (2020H2).

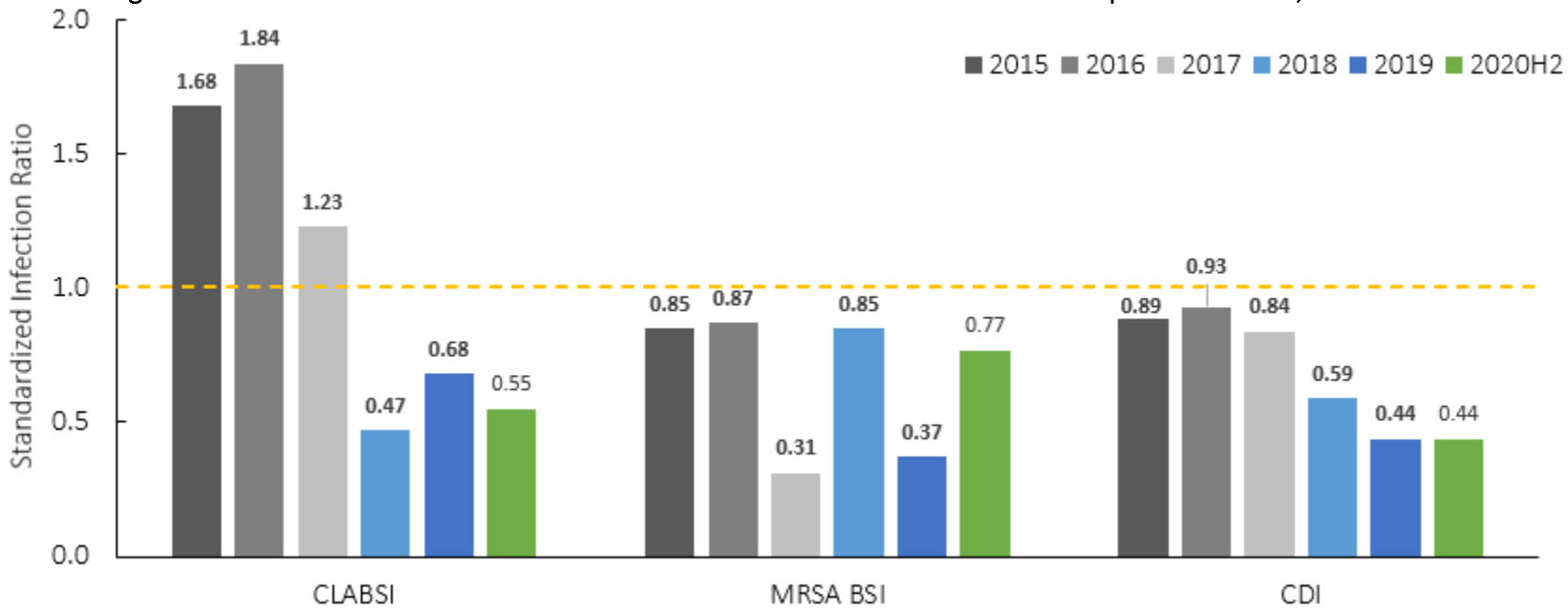
REHABILITATION HOSPITALS AND UNITS

Acute care rehabilitation hospitals and units evaluate and restore function to patients who suffer from acute or chronic pain, musculoskeletal problems, stroke, and catastrophic events resulting in complete or partial paralysis.

In the first half of 2020, 14 freestanding rehabilitation hospitals and 63 hospital-based acute care rehabilitation units reported one CLABSI, one MRSA BSI, zero VRE BSI, and 48 CDI.

In the second half of 2020, rehabilitation hospitals and units reported five CLABSI, four MRS BSI, zero VRE BSI, and 52 CDI. The statewide CLABSI and MRSA BSI incidence is not significantly different than the national baseline, and the CDI incidence is statistically better than the national baseline. However only one (1%) facility has a CDI SIR that is significantly better than the national, and one facility has an SIR that is significantly worse.

Figure 8. Healthcare-Associated Infection Incidence in California Rehabilitation Hospitals and Units, 2015-2020*



NOTE. Dashed horizontal line reflects the national baseline for the standardized infection ratio (SIR). An SIR below the dashed line represents HAI prevention progress if the reduction was statistically significant. *Latter six months of 2020 (2020H2).

PUBLIC HEALTH ACTION

In 2021, CDPH HAI Program epidemiologist staff performed in-depth analyses of the impacts of the COVID-19 pandemic and suspension of HAI reporting requirements on HAI reporting and incidence in California. The detailed findings of these analyses are included in Appendix D We identified possible data quality issues with data from both halves of 2020, despite the resumption of reporting requirements for the second half of the year. Limitations in data quality should be considered when interpreting the HAI data in this report. To assess for effects on HAI incidence, we compared the SIR for the second half of 2020 to the second half of 2019 for CLABSI, CDI, MRSA BSI, and SSI (adult infections, all procedures) in acute care hospitals; because NHSN has not released a risk adjustment model for VRE BSI, we compared the crude incidence of VRE BSI in the second half of 2020 to the second half of 2019. Results are shown in table 3. There were substantial and significant increases in the SIR for CLABSI and MRSA BSI and the crude incidence of VRE BSI. In contrast, the SIR for SSI decreased significantly, and changes in the SIR for CDI were insignificant and unsubstantial. Our findings mirror the national experience, with significant increases in the national SIRs for CLABSI and MRSA bacteremia observed in 2020, and the largest increase for CLABSI [5].

A growing body of literature cites multiple factors that likely contribute to increased HAI incidence and emergence and spread of antimicrobial resistance (AR) during the COVID-19 pandemic, including: diversion of resources from infection prevention activities; disruptions in routine care practices; personal protective equipment (PPE) supply shortages and conservation (extended use and reuse); PPE overuse with multiple gown and glove layers; and antimicrobial prescribing changes [5-16]. **CDPH is engaging the California HAI Advisory Committee and other hospital partners to identify and support implementation of strategies for building resiliency and maintaining the highest possible quality hospital infection prevention and control practices while managing ongoing pandemic- and surge-related challenges. Ultimately our goal is to leverage lessons learned during the pandemic to advocate for resources and improve IP practices to achieve greater HAI/AR prevention outcomes in the post-pandemic era and beyond.**

Table 3. HAI Incidence in Acute Care Hospitals for Second Half of the Year, 2019 Versus 2020

	2019 Half 2 SIR* or Rate**	2020 Half 2 SIR* or Rate**	P-value
CLABSI	0.65	0.98	<0.0001
CDI	0.57	0.56	0.5784
MRSA BSI	0.66	0.95	<0.0001
VRE BSI	2.40**	2.98**	0.0304
SSI†	0.82	0.76	0.0360

*Standardized infection ratio; **Incidence density rate per 100,000 patient days; †All adult surgical procedures

NOTES: The data from LTAC, CAH, and rehabilitation hospitals and units are not included; P-values calculated by SAS ("*mid-p*").

Additionally, the CDPH HAI Program resumed some of our statewide and regional AR prevention initiatives while continuing to provide infection prevention consultation and support across the continuum of health care as part of the ongoing COVID-19 pandemic response. Specifically, CDPH continues to:

- Provide infection prevention consultation, onsite assessment and support to hospitals, long-term healthcare and other congregate residential facilities to prevent and control COVID-19 transmission.
- Support local health department (LHD) epidemiologic investigation and response to COVID-19 and other HAI/AR outbreaks in healthcare and other congregate residential settings.
- Build the infection preventionist (IP) workforce by continuously offering HAI Program "Basics of Infection Prevention" online training courses tailored for acute care, skilled nursing facility (SNF) and LHD IP staff, and hosting weekly meetings to discuss infection prevention topics.
- Increase LHD IP and HAI/AR prevention and response capacity through training, mentorship, regional coordination and facilitating externship opportunities for public health IP in healthcare settings.
- Improve infection prevention knowledge, attitudes and practices among frontline SNF staff via the Infection Prevention and Control (IPC) Training Corps Project Firstline, which provides infection prevention training courses for Certified Nursing Assistants.
- Engage ventilator-equipped skilled nursing facilities (vSNF) at highest risk for AR emergence and transmission to strengthen core infection prevention practices by convening them in a statewide HAI/AR prevention quality improvement collaborative.
- Support LHD responding to regional outbreaks of novel multidrug-resistant organisms (MDRO) including *Candida a*uris and highly resistant *Acinetobacter baumannii,* including outreach and education, enhanced surveillance and proactive onsite infection control assessments.
- Maintain the California Antimicrobial Stewardship Program (ASP) Honor Roll Program to promote optimal use of antimicrobials, prevent emergence of resistance and *Clostridioides* difficile infections, and publicly recognize California ASP that meet and exceed the CDC's Core Elements by demonstrating meaningful outcomes and engaging their local healthcare community.
- Engage all LTAC hospitals in a statewide collaborative to improve ASP and promote participation in the ASP Honor Roll.
- Provide individual consultation to facilities seeking to strengthen or improve their ASP, especially those with limited resources.
- Promote and foster collaboration through the California ASP Collaboration Network (ASCN) listserv platform where ASP staff from diverse healthcare settings can connect, discuss topics, and form partnerships.
- Complete, disseminate and use results of special analytic studies to inform HAI program priorities and activities, including:
    - Evaluation of the impact of hospital COVID-19 burden on reporting and incidence of selected HAI;
    - Use of a classification tree methodology to predict large COVID-19 outbreaks in SNF;
    - Assessment of associations between resident racial/ethnic composition, neighborhood-level socioeconomic status and novel coronavirus cases in California SNF;
    - Investigation of associations between patient neighborhood characteristics and inappropriate antimicrobial use during hospitalization;

- Description of geographic, healthcare facility, patient demographic and clinical characteristics, and bacterial genetic characteristics of New Delhi Metallo-beta-lactamase (NDM)-producing *Klebsiella* species and *E. coli* in California, 2013–2021;
- Description of AR among pathogens associated with pediatric device- and procedure-associated HAI reported via NHSN.
- Produce a comprehensive AR report summarizing data from NHSN and other CDPH surveillance systems, focusing on *Candida* auris and carbapenemase-producing organisms.

REFERENCES

1. Umscheid CA, Mitchell MD, Doshi JA, et al. Estimating the proportion of healthcare-associated infections that are reasonably preventable and the related mortality and costs. *Infect Control Hosp Epidemiol*. 2011;32(2):101-14. 10.1086/657912
2. Centers for Disease Control and Prevention. Paving the Path Forward: 2015 Rebaseline. Accessed August 2021. www.cdc.gov/nhsn/2015rebaseline
3. Centers for Disease Control and Prevention. The NHSN Standardized Infection Ratio (SIR): A Guide to the SIR, March 2018. Accessed August 2021. https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/nhsn-sir-guide.pdf
4. U.S. Department of Health and Human Services, U.S. Department of Defense, U.S. Department of Labor and U.S. Department of Veterans Affairs. National Action Plan to Prevent Health Care-Associated Infections: Road Map to Elimination, 2013. Accessed August 2021. health.gov/hcq/prevent-hai-action-plan.asp
5. Weiner-Lastinger, L., Pattabiraman, V., Konnor, R., et al. The impact of coronavirus disease 2019 (COVID-19) on healthcare-associated infections in 2020: A summary of data reported to the National Healthcare Safety Network. *Infect Control Hosp Epidemiol*. 2021:1-14. 10.1017/ice.2021.362
6. McMullen KM, Smith BA, Rebmann T. Impact of SARS-CoV-2 on hospital acquired infection rates in the United States: Predictions and early results. *Am J Infect Control*. 2020;48(11):1409-1411. https://doi.org/10.1016/j.ajic.2020.06.209
7. Cole J, Barnard E. The impact of the COVID-19 pandemic on healthcare acquired infections with multidrug resistant organisms. *Am J Infect Control.* 2021;49(5):653-654. 10.1016/j.ajic.2020.09.013
8. Fakih MG, Bufalino A, Sturm L, et al. Coronavirus disease 2019 (COVID-19) pandemic, central-line-associated bloodstream infection (CLABSI), and catheter-associated urinary tract infection (CAUTI): The urgent need to refocus on hardwiring prevention efforts. *Infect Control Hosp Epidemiol*. 2021:1-6. 10.1017/ice.2021.70
9. Baker MA, Sands KE, Huang SS, et al. The Impact of COVID-19 on Healthcare-Associated Infections. Clin Infect Dis. 2021 Aug 9:ciab688. 10.1093/cid/ciab688
10. S Stevens MP, Doll M, Pryor R, et al. Impact of COVID-19 on traditional healthcare-associated infection prevention efforts [published correction appears in Infect Control Hosp Epidemiol. 2020 ;41(10):1249]. *Infect Control Hosp Epidemiol.* 2020;41(8):946-947. 10.1017/ice.2020.141

11. COVID-19 infection prevention and control in healthcare settings: questions and answers. Centers for Disease Control and Prevention website. www.cdc.gov/coronavirus/2019-ncov/hcp/faq.html?CDC_AA_refVal=https%3A%2F%2Fwww.cdc.gov%2Fcoronavirus%2F2019-ncov%2Fhcp%2Finfection-control-faq.html. Accessed August 2021.
12. Sandhu A, Tillotson G, Polistico J, et al. *Clostridioides difficile* in COVID-19 patients, Detroit, Michigan, USA, March–April 2020. *Emerg Infect Dis*. 2020;26(9):2272-2274.
13. Clancy CJ, Nguyen MH. COVID-19, superinfections and antimicrobial development: What can we expect? *Clin Infect Dis*. 2020;71(10):2736-2743. 10.1093/cid/ciaa524
14. Spernovasilis NA, Kofteridis DP. COVID-19 and antimicrobial stewardship: What is the interplay? *Infect Control Hosp Epidemiol*. 2021;42(3):378-379. 10.1017/ice.2020.246
15. Rawson TM, Moore LSP, Zhu N, et al. Bacterial and Fungal Coinfection in Individuals with Coronavirus: A Rapid Review to Support COVID-19 Antimicrobial Prescribing. *Clin Infect Dis.* 2020;71(9):2459-2468. 10.1093/cid/ciaa530
16. Patel PR, Weiner-Lastinger LM, Dudeck MA, et al. Impact of COVID-19 pandemic on central-line-associated bloodstream infections during the early months of 2020, National Healthcare Safety Network. *Infect Control Hosp Epidemiol*. 2021:1-4. 10.1017/ice.2021.108

Appendix A. California General Acute Care Hospitals with Incomplete Reporting of Healthcare-Associated Infections Data in the Later Six Months of 2020

County Hospital	Infection Type(s) with Missing or Incomplete Data in 2020*	Incomplete or Missing Data in Previous Years
Alameda		
Fairmont Hospital	CLABSI, MRSA BSI, VRE BSI	2019
Calaveras		
Mark Twain Medical Center	CLABSI, MRSA BSI, VRE BSI, CDI	
Fresno		
Adventist Health Selma	CDI	
Clovis Community Medical Center	CLABSI, MRSA BSI, VRE BSI, CDI	
Community Regional Medical Center	CLABSI, MRSA BSI, VRE BSI, CDI	
Fresno Heart and Surgical Hospital	CLABSI, MRSA BSI, VRE BSI, CDI	
Glenn		
Glenn Medical Center	CLABSI, MRSA BSI, VRE BSI, CDI	
Inyo		
Southern Inyo Hospital	CLABSI, MRSA BSI, VRE BSI, CDI	2015, 2017, 2018, 2019
Kern		
Bakersfield Heart Hospital	CLABSI	
Los Angeles		
Beverly Hospital	CLABSI	
Catalina Island Medical Center	CLABSI, MRSA BSI, VRE BSI, CDI	2015, 2017
Henry Mayo Newhall Hospital	MRSA BSI, VRE BSI	2015
Kindred Hospital, Baldwin Park	CLABSI, MRSA BSI, VRE BSI, CDI	
Olympia Medical Center	MRSA BSI, VRE BSI, CDI	2019
Southern California Hospital at Culver City	MRSA BSI, VRE BSI, CDI	2015
Whittier Hospital Medical Center	MRSA BSI, VRE BSI, CDI	
Marin		
Kentfield Hospital	CLABSI, MRSA BSI, VRE BSI, CDI	
Modoc		
Surprise Valley Community Hospital	CLABSI, MRSA BSI, CDI	2015, 2016, 2017
Napa		
Adventist Health St. Helena	CLABSI, MRSA BSI, VRE BSI, CDI	
Orange		
Anaheim Global Medical Center	CDI	2019
HealthBridge Children's Hospital, Orange	VRE BSI	2016, 2017, 2018, 2019
West Anaheim Medical Center	MRSA BSI	2019
Plumas		
Plumas District Hospital	CLABSI, MRSA BSI, VRE BSI, CDI	
Seneca District Hospital	MRSA BSI, VRE BSI, CDI	2015, 2017, 2018, 2019

Appendix A. California General Acute Care Hospitals with Incomplete Reporting of Healthcare-Associated Infections Data in the Later Six Months of 2020

Riverside Doctors Hospital of Riverside Hemet Global Medical Center Menifee Global Medical Center	 CLABSI, MRSA BSI, VRE BSI, CDI MRSA BSI, VRE BSI, CDI MRSA BSI, VRE BSI, CDI	
San Bernardino Victor Valley Global Medical Center	 MRSA BSI, VRE BSI, CDI	2017
San Diego Alvarado Hospital Medical Center	 CLABSI, CDI	
San Francisco Kentfield Hospital San Francisco	 CLABSI, MRSA BSI, VRE BSI, CDI	2019
San Mateo AHMC Seton Medical Center Menlo Park Surgical Hospital	 CLABSI, MRSA BSI, VRE BSI, CDI CLABSI, MRSA BSI, VRE BSI, CDI	
Sonoma Sonoma Specialty Hospital	 CLABSI, MRSA BSI, VRE BSI, CDI	2018
Stanislaus Central Valley Specialty Hospital Encompass Health Rehabilitation Hospital of Modesto	 CLABSI, MRSA BSI, VRE BSI, CDI CLABSI	2019
Sutter Sutter Surgical Hospital, North Valley	 CLABSI	2015, 2018

Appendix B. California Hospitals with Healthcare-Associated Infection Incidence Better (★) or Worse (✖) than National Baseline or Statewide Pooled Average Rate, 2020*

Hospitals by County	CDI	CLABSI	MRSA BSI	VRE BSI	SSI
Alameda					
Alta Bates Summit Medical Center	★	★			
Eden Medical Center	★				
Highland Hospital	★				✖
Kaiser Foundation Hospital, Oakland/Richmond	★				✖
Kaiser Foundation Hospital, San Leandro	★				
UCSF Benioff Children's Hospital Oakland		★			
Butte					
Enloe Medical Center, Esplanade		★			
Oroville Hospital	★				
Contra Costa					
John Muir Medical Center, Concord Campus	★				
John Muir Medical Center, Walnut Creek Campus	★				★
San Ramon Regional Medical Center	★				
El Dorado					
Marshall Medical Center	★				
Fresno					
Kaiser Foundation Hospital, Fresno	★				
Saint Agnes Medical Center	★				✖
Imperial					
El Centro Regional Medical Center	★	✖			
Pioneers Memorial Healthcare District		✖			
Kern					
Adventist Health Bakersfield	★	★			
Bakersfield Heart Hospital					✖
Kern Medical Center					✖
Mercy Hospital	★			✖	
Mercy Southwest Hospital	★				
Kings					
Adventist Health Hanford	★	✖			
Los Angeles					
Adventist Health Glendale	★	✖			★
Adventist Health White Memorial	★				
Antelope Valley Hospital	★	✖			★
Beverly Hospital	★				
California Hospital Medical Center, Los Angeles	★				
Cedars-Sinai Marina Del Rey Hospital					★
Centinela Hospital Medical Center	★	★		✖	

Appendix B. California Hospitals with Healthcare-Associated Infection Incidence Better (★) or Worse (✖) than National Baseline or Statewide Pooled Average Rate, 2020*

Hospitals by County	CDI	CLABSI	MRSA BSI	VRE BSI	SSI
Children's Hospital Los Angeles	✖	★			
City of Hope Helford Clinical Research Hospital					★
College Medical Center		✖			
East Los Angeles Doctors Hospital	★				
Emanate Health Foothill Presbyterian Hospital					★
Emanate Health Queen of the Valley Hospital		★			★
Garfield Medical Center					★
Glendale Memorial Hospital and Health Center	★				
Henry Mayo Newhall Hospital	★				✖
Hollywood Presbyterian Medical Center	★				
Kaiser Foundation Hospital, Downey	★				
Kaiser Foundation Hospital, Los Angeles	★				★
Kaiser Foundation Hospital, Panorama City	★				
Kaiser Foundation Hospital, South Bay	★				
Kaiser Foundation Hospital, West LA			✖		★
Keck Hospital of USC				✖	★
LAC+USC Medical Center	★				★
LAC/Harbor UCLA Medical Center		✖			
LAC/Olive View UCLA Medical Center	★	✖			★
Los Angeles Community Hospital	★				
MemorialCare Long Beach Medical Center	★				
Mission Community Hospital	★				
Monterey Park Hospital		✖			
Olympia Medical Center			✖		
Pacifica Hospital of the Valley		✖			
Palmdale Regional Medical Center	★				★
PIH Health Hospital, Downey	★				
PIH Health Hospital, Whittier	★				
Pomona Valley Hospital Medical Center	★				
Providence Cedars-Sinai Tarzana Medical Center					★
Providence Holy Cross Medical Center	★	★			★
Providence Little Company of Mary Medical Center Torrance	★				
Providence Saint John's Health Center					★
Providence Saint Joseph Medical Center	★				★
Ronald Reagan UCLA Medical Center	✖			✖	★
San Gabriel Valley Medical Center	★				
Santa Monica - UCLA Medical Center and Orthopaedic Hospital					★
Southern California Hospital at Culver City	★				

Appendix B. California Hospitals with Healthcare-Associated Infection Incidence Better (★) or Worse (✖) than National Baseline or Statewide Pooled Average Rate, 2020*

Hospitals by County	CDI	CLABSI	MRSA BSI	VRE BSI	SSI
St. Francis Medical Center	★		✖		★
St. Mary Medical Center, Long Beach					★
Torrance Memorial Medical Center	★	★			
USC Kenneth Norris Jr. Cancer Hospital		✖			
Valley Presbyterian Hospital	★	✖			
Madera					
Madera Community Hospital	★				
Valley Children's Hospital		★			★ (Ped)
Mendocino					
Adventist Health Ukiah Valley	★				
Monterey					
Natividad Medical Center	★	✖			
Salinas Valley Memorial Hospital	★				
Orange					
AHMC Anaheim Regional Medical Center	★	✖			
College Hospital Costa Mesa	★				
Fountain Valley Regional Hospital and Medical Center	★				
Hoag Memorial Hospital Presbyterian	★				★
Kaiser Foundation Hospital, Orange County, Anaheim	★	★			
Kaiser Foundation Hospital, Orange County, Irvine	★				
MemorialCare Saddleback Medical Center	★				
Orange County Global Medical Center		✖			
Placentia Linda Hospital		✖			
Providence Mission Hospital	★				★
Providence St. Joseph Hospital, Orange	★				
Providence St. Jude Medical Center	★	✖			
University of California Irvine Medical Center	★	★			
West Anaheim Medical Center			✖		
Placer					
Kaiser Foundation Hospital, Roseville	★				
Sutter Roseville Medical Center	★		✖		
Riverside					
Corona Regional Medical Center	★				
Eisenhower Medical Center	★				
John F. Kennedy Memorial Hospital	★				
Kaiser Foundation Hospital, Moreno Valley	★	✖			
Kaiser Foundation Hospital, Riverside	★	✖			★
Loma Linda University Medical Center, Murrieta	★				
Riverside Community Hospital		★			★

Appendix B. California Hospitals with Healthcare-Associated Infection Incidence Better (★) or Worse (✖) than National Baseline or Statewide Pooled Average Rate, 2020*

Hospitals by County	CDI	CLABSI	MRSA BSI	VRE BSI	SSI
Riverside University Health System - Medical Center	★	★			
Southwest Healthcare System, Wildomar	★				
Temecula Valley Hospital					★
Sacramento					
Kaiser Foundation Hospital, Sacramento	★		✖		
Mercy General Hospital	★				★
Mercy San Juan Medical Center	★				★
Methodist Hospital of Sacramento	★				
Sutter Medical Center, Sacramento	★				
University of California Davis Medical Center	★	★			
San Bernardino					
Arrowhead Regional Medical Center	★				
Barstow Community Hospital		✖			
Community Hospital of San Bernardino		✖			
Desert Valley Hospital	★				
Kaiser Foundation Hospital, Ontario	★				
Loma Linda University Children's Hospital		★			
Loma Linda University Medical Center	★	★		✖	
Providence St. Mary Medical Center, Apple Valley	★	✖		✖	
St. Bernardine Medical Center	★				
San Diego					
Alvarado Hospital Medical Center	✖		✖		
Grossmont Hospital	★	★			
Palomar Medical Center	★				
Palomar Medical Center Poway	★				
Rady Children's Hospital, San Diego	★	★			
Scripps Memorial Hospital, Encinitas	★				
Scripps Memorial Hospital, La Jolla	★				
Scripps Mercy Hospital	★				
Scripps Mercy Hospital Chula Vista	★				
Sharp Chula Vista Medical Center	★				
Sharp Coronado Hospital and Healthcare Center		✖			
Sharp Mary Birch Hospital For Women And Newborns		✖			
Sharp Memorial Hospital	★				
UC San Diego Health La Jolla		★			
San Francisco					
California Pacific Medical Center, Van Ness Campus		★		✖	★
Kaiser Foundation Hospital, San Francisco	★				
Saint Francis Memorial Hospital	★				
St. Mary's Medical Center	★				

Appendix B. California Hospitals with Healthcare-Associated Infection Incidence Better (★) or Worse (✖) than National Baseline or Statewide Pooled Average Rate, 2020*

Hospitals by County	CDI	CLABSI	MRSA BSI	VRE BSI	SSI
San Joaquin					
Adventist Health Lodi Memorial	★		✖		
San Joaquin General Hospital	★	✖	✖		
St. Joseph's Medical Center Of Stockton	★	✖			
San Luis Obispo					
Sierra Vista Regional Medical Center					★
San Mateo					
Kaiser Foundation Hospital, Redwood City	★				
Kaiser Foundation Hospital, South San Francisco	★				
Mills-Peninsula Medical Center	★				
Santa Barbara					
Goleta Valley Cottage Hospital					✖
Marian Regional Medical Center	★				
Santa Clara					
El Camino Health	★				
Good Samaritan Hospital, San Jose	★				
Regional Medical Center of San Jose	★				
Santa Clara Valley Medical Center		✖			
St. Louise Regional Hospital				✖	
Stanford Health Care				✖	
Santa Cruz					
Dominican Hospital	★				
Watsonville Community Hospital				✖	
Shasta					
Mercy Medical Center Redding	★				
Shasta Regional Medical Center	★				
Solano					
Kaiser Foundation Hospital and Rehab Center, Vallejo	★				
Northbay Medical Center	★				
Sutter Solano Medical Center	★				
Sonoma					
Kaiser Foundation Hospital, Santa Rosa	★				
Providence Santa Rosa Memorial Hospital	★	★			★
Stanislaus					
Doctors Medical Center	★				
Memorial Medical Center	★				★
Tulare					
Kaweah Delta Medical Center	★		✖		✖
Sierra View Medical Center			✖		

Appendix B. California Hospitals with Healthcare-Associated Infection Incidence Better (★) or Worse (✖) than National Baseline or Statewide Pooled Average Rate, 2020*

Hospitals by County	CDI	CLABSI	MRSA BSI	VRE BSI	SSI
Ventura					
Adventist Health Simi Valley	★				
Los Robles Hospital & Medical Center	★				
St Johns Regional Medical Center		✖			
Yolo					
Woodland Memorial Hospital	★				
Yuba					
Adventist Health and Rideout		★			

*Latter six months of 2020

Appendix C. California Hospitals with Surgical Site Infection Incidence Better or Worse than National Baseline, 2020*

Hospitals by County	Better	Worse
Alameda		
Kaiser Foundation Hospital, Oakland/Richmond		Bile duct, liver or pancreatic surgery
Kaiser Foundation Hospital, San Leandro		Open reduction of fracture
Contra Costa		
John Muir Medical Center, Walnut Creek Campus		Hip prosthesis
Fresno		
Kaiser Foundation Hospital, Fresno		Spinal fusion
Saint Agnes Medical Center		Knee prosthesis
Kern		
Kern Medical Center		Cesarean section
Los Angeles		
Antelope Valley Hospital		Appendix surgery
City of Hope Helford Clinical Research Hospital	Bile duct, liver or pancreatic surgery; Rectal surgery; Small bowel surgery	
Children's Hospital Los Angeles		Small bowel surgery-pediatric
Henry Mayo Newhall Hospital		Colon surgery
Kaiser Foundation Hospital, Los Angeles	Colon surgery	
Kaiser Foundation Hospital, South Bay		Gallbladder surgery
Kaiser Foundation Hospital, West LA	Small bowel surgery	
Keck Hospital of USC	Bile duct, liver or pancreatic surgery	
Methodist Hospital of Southern California		Exploratory abdominal surgery (laparotomy)
PIH Health Hospital, Whittier		Knee prosthesis
Pomona Valley Hospital Medical Center		Open reduction of fracture
Ronald Reagan UCLA Medical Center	Colon surgery; Liver transplant	
Torrance Memorial Medical Center		Colon surgery
Marin		
Kaiser Foundation Hospital, San Rafael		Small bowel surgery

Appendix C. California Hospitals with Surgical Site Infection Incidence Better or Worse than National Baseline, 2020*

Hospitals by County	Better	Worse
Orange		
Children's Hospital of Orange County		Appendix surgery-pediatric
MemorialCare Orange Coast Medical Center		Exploratory abdominal surgery (laparotomy)
Providence Mission Hospital - Laguna Beach		Hip prosthesis
Providence St. Jude Medical Center		Colon surgery
University of California Irvine Medical Center		Thoracic surgery
Placer		
Sutter Roseville Medical Center	Spinal fusion	
Riverside		
Riverside Community Hospital	Colon surgery	
Sacramento		
Kaiser Foundation Hospital, Sacramento		Colon surgery
Methodist Hospital of Sacramento		Hip prosthesis
University of California Davis Medical Center	Colon surgery	
San Bernardino		
Kaiser Foundation Hospital, Ontario		Knee prosthesis
San Diego		
Scripps Memorial Hospital, La Jolla	Small bowel surgery	
Sharp Memorial Hospital		Kidney surgery
UC San Diego Health La Jolla		Exploratory abdominal surgery (laparotomy)
San Francisco		
UCSF Medical Center	Liver transplant	
San Joaquin		
San Joaquin General Hospital		Spinal fusion
Santa Barbara		
Goleta Valley Cottage Hospital		Hip prosthesis; Knee prosthesis
Santa Clara		
Stanford Health Care	Bile duct, liver or pancreatic surgery	Cardiac surgery; Hip prosthesis
Santa Cruz		
Dominican Hospital		Coronary bypass, chest and donor incisions

Appendix C. California Hospitals with Surgical Site Infection Incidence Better or Worse than National Baseline, 2020*

Hospitals by County	Better	Worse
Stanislaus		
Kaiser Foundation Hospital, Modesto		Cesarean section
Tulare		
Kaweah Delta Medical Center		Spinal fusion
Yolo		
Woodland Memorial Hospital		Hip prosthesis

*Due to the suspension of HAI reporting requirements during the first half of 2020, CDPH only included the SSI data for the latter six months of 2020 for the comparisons.

Appendix D. Impacts of the COVID-19 Pandemic on HAI Reporting and Incidence

Effect on Reporting: due to the suspension of HAI reporting requirements during the first half of 2020 and the impact of COVID-19 pandemic on the logistics and surveillance activities in all facility types, CDPH examined several markers of data completeness and quality for both halves of 2020. Table 4 shows the results of these comparisons. The first comparison is of the number of data quality alerts issued by NHSN that were still outstanding as of the download date for the public report data. Alerts are issued when a facility reports their intention to report HAI data for a particular month, then fails to report adequate data. We compared alerts by HAI type for the first and second half of 2020 to the corresponding half of 2019. We also performed a test for significant differences between the number of alerts issued per facility for 2019 versus 2020, using the Wilcoxon signed-rank test. The number of alerts issued in both halves of 2020 and for all HAI types was significantly higher (at α=0.05) than the number of alerts in the corresponding half of 2019.

Data quality alerts only capture situations where there is a mismatch between a facility's stated intention to report data for a particular HAI and the actual reporting. They would not capture situations where a facility left HAIs out of their monthly plans. For this reason, we also compared the number of facility-months of data reported for CDI, MRSA BSI, VRE BSI, and CLABSI. We also tested the difference for each of the 398 facilities operating in 2020 using the Wilcoxon signed-rank test. The number of facility-months of data reported was higher for 2019 for both halves and all infection types. We did not compare facility months of data for SSIs, as a change in the number of months reported may indicate that certain facilities discontinued some surgical procedures, rather than a data quality issue. The final data quality check was a comparison of the number of facilities with a substantial (greater than 10%) mismatch between the total number of patient days reported for CLABSI versus the total patient days reported for Lab Identified infections (CDI, MRSA BSI, and VRE BSI). While the number of mismatches was higher for each half of 2020 compared with the corresponding half of 2019, the differences were not significant at α=0.05.

In 2020, there was a significant decrease in the number of surgical site infections and surgeries reported by California Hospitals due to the COVID-19 pandemic as compared with 2019. This was due in part to the suspension of the statewide HAI reporting requirement for the first six months of 2020 to allow hospitals to better focus on COVID-19 prevention and response activities. Therefore, number of SSI and procedures reported for the first six months of 2020 are suspected to be under counts of the true number of infections and procedures. Seventy facilities in total (66 in first six months and 62 facilities in the latter six months with 58 facilities overlapping) did not perform any of the 28 surgical procedure types in 2020 versus 55 facilities in 2019.

Additionally, many hospitals in 2020 canceled or postponed various surgical procedures, based on urgency of the procedure, to increase bed availability, ensure proper staffing and sufficient personal protective equipment to care for COVID-19 patients. Many elective surgical procedures that generally do not involve a medical emergency were performed at a substantially lower rate when compared to 2019, such as knee prosthesis surgery (36% lower), hip prosthesis surgery (25% lower), and hysterectomies (43% lower). The number of surgical procedures performed in 2020 that are considered more urgent was also notably lower than 2019, such as Cesarean sections (16% lower), open reduction of fractures (8% lower), cardiac surgeries (19% lower), coronary bypasses (22% lower), kidney surgeries (17% lower), appendix surgeries (18% lower), and gallbladder surgeries (19% lower).

Taken together these comparisons suggest possible data quality issues with data from both halves of 2020, despite the resumption of reporting requirements for the second half of the year. Possible limitations in data quality should be considered when interpreting the HAI data in this report.

Appendix D. Impacts of the COVID-19 Pandemic on HAI Reporting and Incidence

Effect on Incidence: overcrowding, diversion of resources from infection prevention activities, PPE supply shortages, conservation (extended use and reuse) or overuse with multiple gown and glove layers, and antimicrobial prescribing changes during the COVID-19 pandemic could have led to increased HAI incidence and antimicrobial resistance [5-16]. To assess for possible effect on HAI incidence, we compared the SIR for the second half of 2020 to the second half of 2019 for CLABSI, CDI, MRSA BSI, and SSI (adult infections, all procedures) in acute care hospitals. Because NHSN has not released a risk adjustment model for VRE BSI, we compared the crude incidence of VRE BSI in the second half of 2020 to the second half of 2019. Results are shown in table 3. There were substantial and significant increases in the SIR for CLABSI and MRSA BSI and the crude incidence of VRE BSI. In contrast, the SIR for SSI decreased significantly, and changes in the SIR for CDI were insignificant and unsubstantial. Limitations of this analysis are missing data and lack of consideration of long-term trends in HAI incidence in California hospitals. We intend to conduct additional analyses to address these concerns in the future.

Sample size issues related to reporting of the SIR only for the second half of 2020 possibly contributed to the significant increases in the proportion of predicted number of HAIs less than one in the second half of 2020 as compared with 2019. NHSN doesn't calculate an SIR for a specific HAI in a facility when predicted number of infections is less than one while CDPH additionally calculates the SIR for the infections with a predicted greater than or equal to 0.2 and less than one. This could have affected the significant increase in the number facilities without an SIR, incidence for an HAI, or SIRs that would not be as reliable for interpretation or comparison as SIRs based on a larger number of predicted infections in the second half of 2020.

Table 4. HAI Data Quality Indicators in California General Acute Care Hospitals by Half-Year, 2019 Versus 2020

	2019 Half 1	2020 Half 1	Half 1 p-value	2019 Half 2	2020 Half 2	Half 2 P-value
NHSN Alerts	No Data	No Data	No Data	No Data	No Data	No Data
CLABSI	2	120	0.0027	135	390	0.0234
LabID*	2	82	0.0034	90	250	0.0092
SSI	7	977	0.0002	1208	4269	<0.001
Facility-months of data	No Data	No Data	No Data	No Data	No Data	No Data
CLABSI	2305	2119	<0.0001	2272	2218	0.0165
CDI	2315	2126	<0.0001	2289	2217	0.0018
MRSA BSI	2315	2117	<0.0001	2289	2216	0.0012
VRE BSI	2310	2163	<0.0001	2282	2218	0.0049
CLABSI and LabID patient day discrepancies	61	63	0.5786	65	69	0.6240

*Laboratory Identified (LabID) includes CDI, MRSA BSI, and VRE BSI

NOTE: Facility-months of data don't include the rehabilitation hospitals and units.