KEY FINDINGS AND PUBLIC HEALTH ACTIONS
***Clostridium difficile* Infections in California Hospitals, 2011**

Introduction

Clostridium difficile (*C. difficile*) is a common cause of diarrhea in health care settings resulting in longer hospital stays and higher hospital costs [1]. The *C. difficile* bacteria are usually acquired in a healthcare setting and infection most often occurs following the administration of antimicrobial agents. Virtually all patients with *C. difficile* infection received antimicrobial agents between two weeks and three months prior to onset of their infection [2]. Rates of *C. difficile* infection (CDI) have increased over the past several years, along with increased severity of illness and an increase in mortality. These changes may be due to the emergence of a new *C. difficile* strain that produces more toxin and is resistant to a wider range of antimicrobial agents. This data release, for the reporting period January through December 2011, is the third by the California Department of Public Health (CDPH) and the second [3] using data submitted by hospitals to the Centers for Disease Control and Prevention (CDC) National Healthcare Safety Network (NHSN). Hospital reporting of laboratory-based CDI data to NHSN ensures accurate classification of CDI cases as either hospital related or community related, which in turn provides more accurate information to consumers and providers.

In this release, as in the previous release, we provide both a hospital-onset (HO) rate and a hospital-associated (HA) rate are presented using the NHSN methodology. Both rates may reflect factors in the hospital that can affect the rates, such as transmission of the *C. difficile* bacteria and subsequent use of antimicrobials. HO cases are those for which the positive stool sample for CDI was obtained on day four or later during the hospital stay. HA cases are HO cases plus cases in which a patient who was discharged from the same hospital within the previous four weeks was readmitted to that hospital with a new positive stool sample for CDI during the first three days of admission. For HA cases, the CDI could have occurred as a result of the recent hospitalization or could be related to other healthcare exposures after leaving the hospital. We provided HO and HA CDI rates for long-term acute care (LTAC) hospitals separately from other general acute care hospitals. LTAC patients have longer lengths of stay, which is an established risk factor for CDI [4]. The average length of stay for a patient in California long-term acute care during this reporting period was 28.4 days, compared with 4.3 days in other general acute care hospitals.

New to this release is the inclusion of whether a hospital uses the polymerase chain reaction test (PCR) to detect *C. difficile, which is available in the NHSN data set*. Several laboratory testing methodologies exist for detecting *C. difficile* infection in hospitalized patients, including PCR, enzyme immunoassay (EIA), glutamate dehydrogenase (GDH) antigen, and several others. The sensitivity of PCR, i.e. the ability of the test to detect *C. difficile* when present, can be as much as two times greater than other laboratory testing methods.

In this data release, hospital rates of *C. difficile* infections have not been adjusted to account for the differences in sensitivity between PCR and other laboratory testing methods; therefore, rates from hospitals using different types of laboratory tests are not comparable. In order to compare rates of CDI among different hospitals, rates should be adjusted to account for differences in laboratory testing methodology and differences in patient populations. The CDI rates for this reporting period have not been adjusted for these differences because NHSN only recently released a risk adjustment method (using type of laboratory test, community onset rates, and other risk factors) which will be used for analysis of 2012 CDI data.

Given that antimicrobial use is associated with many CDI cases, judicious use of antimicrobial agents is also important in preventing infections. Antimicrobial stewardship programs promote the appropriate use of antimicrobial agents by optimizing the appropriate agent, dose, duration and route of administration. The HAI Program initiated California Antimicrobial Stewardship Program Initiative, has assisted over 100 healthcare facilities in developing and enhancing their antimicrobial stewardship efforts since 2010 and is the first of its kind in the nation [5]. These strategies strive to improve antimicrobial use in order to decrease secondary pathogenic infections such as *C. difficile*.

Key Findings

- 386 hospitals that operated continuously for the reporting period of January 1, 2011 through December 31, 2011. Of these, 22 were defined as long-term acute care; all other hospitals were considered general acute care hospitals.
- 362 (93.8%) general acute care hospitals reported data for all 12 months of the reporting period, compared to 91% of hospitals for the previous reporting period (18 hospitals reported fewer than 12 months of data and 6 reported no data).
- 361 hospitals provided laboratory testing method data via the NHSN Annual Facility Survey. Of these, 187 (51.8%) indicated that they used PCR in 2011, either as a stand-alone test method or in conjunction with other testing. Whether PCR was used for all or part of 2011 is unknown.
- In general acute care hospitals the pooled mean hospital-onset CDI incidence rate was 7.7 per 10,000 inpatient days, with a range of 0.0 to 22.2 per 10,000 days. In long-term acute care hospitals, the pooled mean hospital-onset incidence rate was 17.9 per 10,000 inpatient days, with a range of 5.8 to 31.6 per 10,000 days.
- In general acute care hospitals, the pooled mean hospital-associated CDI incidence rate was 10.5 per 10,000 inpatient days (range 0.0 to 25.9 per 10,000 days). In long-term acute care hospitals, the pooled mean hospital-associated incidence rate was 18.0 per 10,000 inpatient days (range 5.8 to 31.6 per 10,000 days).
- 37 hospitals reported 0 CDI.
- Differences in rates can result from differences in laboratory testing methodology, patient populations, infection and transmission prevention practices, antibiotic utilization, and/or community onset rates of CDI. Rates from facilities using

different types of laboratory tests are not comparable, as there can be as much as a two-fold difference in test sensitivity. Additionally, some facilities may have changed laboratory testing methodology from one reporting period to the next. Therefore, the hospital-specific rates from different reporting periods are not comparable.

- In healthcare facilities, C. difficile bacteria are commonly transmitted on the hands of personnel. Therefore, infection control precautions including hand hygiene and environmental cleaning are essential in preventing transmission.

Number and percent of hospitals that reported CDI and laboratory testing method data, and pooled mean hospital onset and hospital-associated CDI rates for general acute care hospitals and LTAC hospitals:

Number (%) Reported	362/386 (93.8%)
Number (%) Provided Laboratory Testing Methodology Number (%) Used PCR	361/386 (93.5%) 187/361 (51.8%)
Pooled Mean Hospital Onset Incidence Rate (Range) per 10,000 patient days GACH LTAC hospitals	 7.7 (0 – 22.2) 17.9 (5.8 – 31.6)
Pooled Mean Hospital Associated Incidence Rate (Range) per 10,000 patient days GACH LTAC hospitals	 10.5 (0 – 25.9) 18.0 (5.8 – 31.6)

The statewide pooled mean (average) rate for general acute care and LTAC hospitals is calculated by dividing the sum of all CDI LabID Events by the sum of all inpatient days and multiplying by 10,000.

Public Health Actions

In follow up to this report, CDPH will:

- Continue to work with hospitals to implement strategies to prevent transmission of *C. difficile,* and reduce inappropriate use of antimicrobials through enhanced antimicrobial stewardship efforts.
- Continue to monitor accuracy and completeness of reported data, including laboratory testing methodology in NHSN.
- Plan for the implementation of CDI risk adjustment methods to enable comparison of hospital CDI rates for the 2012 reported data.

All hospitals should review these data and consider:

- Reviewing hospital CDI prevention activities and ensuring consistency with recommendations from the CDC [6], Society for Healthcare Epidemiology of America /Infectious Diseases Society of America [7], and/or Association for Professionals in Infection Control and Epidemiology [8].
- Targeting antimicrobial stewardship strategies to focus on antimicrobials associated with CDI at their facilities.

- Ensuring accuracy and completeness of reported data by strictly following NHSN protocols and definitions for all CDI positive specimens.
- Including accurate laboratory testing methodology in the annual facility survey for appropriate adjustment of CDI rate data.
- Continue hand hygiene programs to decrease risk of transmitting C. difficile between patients.

The public should consider:

- Reviewing the information presented for your hospital, including the context and limitations of the data.
- Asking your health care provider about the actions your hospital is taking to ensure patient safety and CDI prevention, including an antimicrobial stewardship program to ensure appropriate use of antibiotics.
- Asking your health care provider about the actions you can take to ensure your safety in the hospital, including protecting yourself against CDI.

References

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