

## Improving the Quality of Healthcare-Associated Infection Reporting in New Mexico, 2015-2017

Healthcare-associated infections (HAIs) are infections that patients may contract while they are receiving treatment for medical or surgical conditions. Because modern healthcare employs many kinds of invasive procedures (e.g. surgeries) and devices (e.g. urinary and central line catheters, ventilators, endoscopes) involved in treating patients, many HAIs are preventable. HAIs are significant causes of morbidity and mortality in the United States each year, and are known to be associated with a substantial increase in health care costs. At any one time in the United States, one out of every 25 hospitalized patients are affected by an HAI.<sup>1</sup>

Among healthcare-associated infections in New Mexico, three have been the target of increased scrutiny and surveillance in recent years. These include *Clostridioides difficile* infections (CDI), methicillin-resistant *Staphylococcus aureus* (MRSA) infections, and catheter-associated urinary tract infections (CAUTI). Nationwide, CDI incidence has increased markedly in the past decade and now is one of the most common HAI pathogens.<sup>2</sup> A 2015 Centers for Disease Control and Prevention (CDC) study found that CDI caused almost half a million infections in a single year, and estimated that nationally, 15,000 deaths could be directly attributable to *C. difficile* infections. Although New Mexico's acute care facility-onset incidence rate of CDI was somewhat lower than the 2015 national baseline, it did not meet reduction targets designated by the U.S Department of Health and Human services (HHS).<sup>3</sup>

Methicillin-resistant *Staphylococcus aureus* (MRSA) is another HAI pathogen of public concern related to higher hospital readmission rates and poorer prognoses.<sup>4</sup> Comparison between the state specific aggregate of MRSA infections in acute care hospitals and the national baseline indicates that New Mexico is perform-

**William B. Hudspeth, PhD, MPH**  
*Epidemiology and Response Division*  
*New Mexico Department of Health*

ing better than the nation.<sup>3</sup>

Finally, CAUTIs are yet another source of concern to acute care hospitals nationwide. Urinary tract infections (UTIs) are the most common type of healthcare-associated infection, and the majority of hospital-acquired UTIs are associated with a catheter.<sup>4,5</sup> Comparison between state specific aggregates of acute care incidence rates and the 2015 national baseline for CAUTI data has shown that the New Mexico rate is statistically worse than that of the nation.<sup>3</sup> These figures indicate some worsening in New Mexico CAUTI rates beginning in 2015 .

CDC's National Healthcare Safety Network (NHSN) is the nation's primary healthcare-associated infection (HAI) tracking system. NHSN provides facilities, states, regions, and the nation with data needed to identify problem areas, measure progress of prevention efforts, and ultimately eliminate healthcare-associated infections (HAI). In order to assure that HAI data reported to NHSN are both of high quality, and suitable for providing accurate benchmarks and measures of performance, the New Mexico Department of Health (NMDOH) performs an annual external validation of NHSN HAI reporting by acute care hospitals in the state.

Data validation is a key element to assure quality, accuracy, and reliability of surveillance data and public reports, and has been an ongoing part of the NM HAI

Prevention Plan. In recent years (2010, 2011, 2013), the NM HAI program has completed three phases of adult, pediatric, and neonatal intensive care unit (ICU & NICU) central line-associated bloodstream infection (CLABSI) validation. Two phases of validation for acute care hospital, catheter-associated urinary tract infections (CAUTI) were completed for 2016 and 2017, and three phases of external validation (2015, 2016, and 2017) were completed for CDI and MRSA LabID. These validation projects included blinded, independent review of medical records to determine if these events were properly ascertained, defined, and reported to NHSN. Benefits from validation include improved surveillance knowledge and the ability of the healthcare institutions to apply NHSN surveillance definitions consistently. This study reviews results from the 2015, 2016, and 2017 validation periods, with a focus on CDI LabID, MRSA LabID, and CAUTI.

## Methods

The procedures and methodology for performing an external validation of acute care hospital reporting of HAIs to NHSN are carefully outlined in an annual “NHSN External Validation Guidance and Toolkit”. In these toolkits, CDC provides guidance and tools for validation of six healthcare-associated infection (HAI) metrics: Central-Line Associated Blood Stream Infection (CLABSI), Catheter-Associated Urinary Tract Infection (CAUTI), selected Surgical Site Infections (following colon (COLO) and abdominal hysterectomy (HYST) procedures), methicillin-Resistant *Staphylococcus aureus* (MRSA) Bacteremia LabID Event and *Clostridium difficile* infection (CDI) LabID Event. The purpose of external validation is to assure high quality surveillance data through accountability and by identifying, understanding, and correcting reporting problems.<sup>6</sup>

NMDOH external validation commenced with the selection of facilities to be audited for CDI LabID, MRSA LabID, and CAUTI. The selection of which acute care facilities to audit is based on a measure called the Standardized Infection Ratio (SIR). The SIR compares the observed number of HAIs reported to the number that would be predicted, given the standard population (i.e., NHSN baseline), and adjusting for several risk factors that have been found to be significantly associated with differences in infection inci-

dence. SIR values greater than 1.0 indicate a facility where more HAIs were observed than predicted, while an SIR less than 1.0 indicates that fewer HAIs were observed than predicted.<sup>6</sup> For the validation years described here, exposure and SIR data from all acute care facilities reporting CDI, MRSA, and/or CAUTI were used to select facilities under the NHSN Targeted Facility Selection guidelines. The recommended approach to facility selection is targeted to prioritize validation of facilities where HAIs are most expected. For each HAI, facilities are sorted based on the predicted number of events. These steps ultimately produce a list of facilities that are then targeted for medical record review.<sup>6</sup>

Once facilities have been selected, external validation proceeds to the selection of medical records from each facility for chart review. Medical record reviews were conducted using the annual toolkit Medical Record Abstraction Tools (MRAT) to guide case determination. NMDOH epidemiologists sought to identify CAUTI, CDI and MRSA events for which incorrect determinations may have been made by hospital infection control staff. Over-reported events were those events entered in NHSN by facility staff, but were determined by NMDOH to be non-reportable. These events frequently included duplicates (e.g. positive CDI toxin-positive collected from the same patient in same location within 14 days of prior specimen collection in an episode of care). Under-reported events were those that were not reported to NHSN, but were determined to be reportable by NMDOH. These cases are frequently caused by improper assessment of reportable events by infection preventionists (IPs) that lead to not reporting an event in NHSN.

## Results

The most important metric used by NHSN to assess accurate reporting of HAI's by health care facilities is the number of discrepancies observed by validators both within individual facilities, as well as across the state as a whole. Between 2015 and 2017, NMDOH gradually increased the number of facilities that were selected for NHSN external validation, ranging from 14 facilities in 2015, to 18 facilities in 2016, to 20 facilities in 2017. Figure 1 shows a bar graph of the number of records validated for each condition between 2015 and 2017. In 2015, NMDOH was able to validate 285 records for CDI LabID (n=205) and

MRSA LabID (n=80). With the addition of CAUTIs in 2016, the total number of records validated reached 764 (CDI=302; MRSA=171; CAUTI=291). These counts were little changed in 2017, when 762 records were audited across acute care hospitals in New Mexico (CDI=280; MRSA=147; CAUTI=273).

Despite the increase in records validated between 2015 and 2016, the number of discrepancies (both over- and under-counts) identified in acute care facilities decreased monotonically. Figure 2 shows the number of discrepancies identified during each year of validation. In 2015, 41 records were discrepant for determinations made by facilities and NMDOH (CDI=25, MRSA=16). This number dropped to only 15 records in 2016 (CDI=10, MRSA=2, CAUTI=3) and 5 records in 2017 (CDI=4, MRSA=0, CAUTI=1), even though there were nearly 3 times as many records validated for these two years compared to 2015. Expressed as a percentage of total records validated each year, the number of discrepant cases fell from 14.39% in 2015 to 1.96% in 2016 and only 0.65% in 2017.

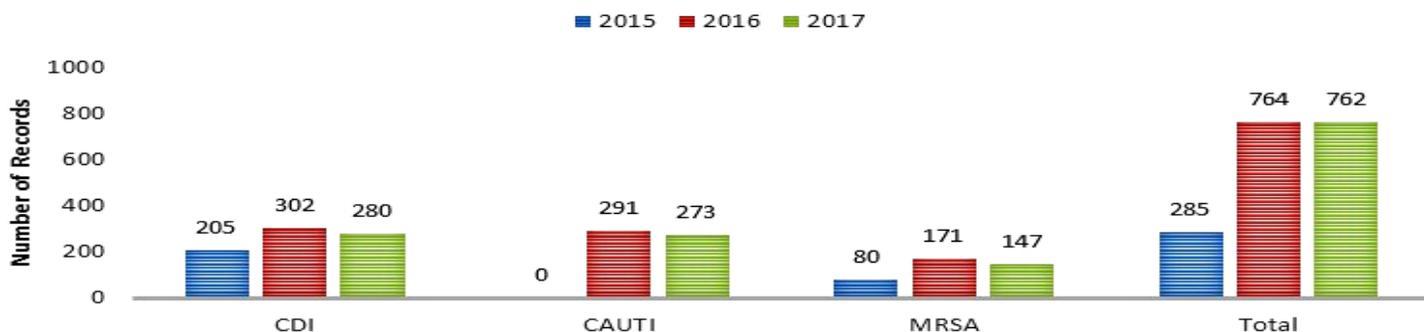
### Discussion

The trends observed above in the number of discrepancies in NHSN reporting suggest that acute care hospital infection IP's in New Mexico have become more skilled and knowledgeable when making correct determinations about case status. NHSN surveys completed by state IP's indicate that New Mexico hospitals have emphasized NHSN training through various media, including in person attendance at CDC training events, access to online training materials, and peer-to-peer interaction.

The external validation of NHSN HAI events provides an opportunity for NMDOH HAI program epidemiologists, in concert with acute care hospital staffs, to mutually learn from one another, with the goal of ensuring accurate and reliable findings, and to improve NHSN data quality. These efforts lead to an improved understanding and application of NHSN surveillance definitions, as well as a more competent workforce at both the facility and state levels. The post-review, collaborative discussion between NMDOH and facility IPs regarding discordant determinations of case status is an invaluable tool for training for both parties. These conversations permit NMDOH auditors to maximize educational opportunities about surveillance methods, denominator counting, case determination criteria, and hospital data collection practices.

In addition, these exercises provide the opportunity to strengthen relationships between the NMDOH HAI program and hospital IP staffs. Because of the high turnover rates of IPs at many facilities, NMDOH found that current IP staffs who had not participated in NHSN events surveillance from prior years often could not comment on why certain determinations were made. In many cases, NMDOH discovered that institutional knowledge was lost with the departure of staff responsible for NHSN reporting, and new IPs were often unable to reproduce the determination of case status on the part of former staff. In addition, we have discovered that individuals among the professional network of IPs in the state of New Mexico have volunteered repeatedly to assist new IPs in state acute care hospitals to learn and apply the NHSN definitions.

**Figure 1. Number of Records Validated for CDI, MRSA LabID, and CAUTI in Acute Care Hospitals, New Mexico, 2015 and 2017**



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Michael G. Landen, M.D., M.P.H.  
State Epidemiologist & Editor

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**Figure 2. Number of Discrepancies Found for CDI, MRSA LabID, and CAUTI in Acute Care Hospitals , New Mexico, 2015-2017**

