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Impact of removing mucosal barrier injury laboratory confirmed bloodstream infections from central line-associated bloodstream infection rates in the National Healthcare Safety Network, 2014

Isaac See, MD, **Minn M Soe, MD, MPH**, **Lauren Epstein, MD, MS**, **Jonathan R Edwards, MStat**, **Shelley S Magill, MD, PhD**, and **Nicola D Thompson, PhD**

Division of Healthcare Quality Promotion, Centers for Disease Control and Prevention, Atlanta, GA, USA

Abstract

Central line-associated bloodstream infection (CLABSI) event data reported to the National Healthcare Safety Network from 2014, the first year of required use of the mucosal barrier injury laboratory-confirmed bloodstream infection (MBI-LCBI) definition, were analyzed to assess the impact of removing MBI-LCBI events from CLABSI rates. CLABSI rates decreased significantly in some location types after removing MBI-LCBI events, and MBI-LCBI events will be removed from publicly reported CLABSI rates.

Keywords

central line-associated blood stream infection; oncology; surveillance; public reporting

Introduction

In 2013, the National Healthcare Safety Network (NHSN) introduced the mucosal barrier injury laboratory confirmed bloodstream infection (MBI-LCBI) definition in the NHSN protocol for surveillance of bloodstream infections. The MBI LCBI definition was developed to enable surveillance staff in hospitals to identify and report bloodstream infections in oncology patients that likely were the result of mucosal barrier injury and therefore not preventable through recommended central line insertion and maintenance practices [1]. Analysis of the first year of MBI-LCBI data reported to NHSN suggested that excluding MBI-LCBI events from central line-associated bloodstream infection (CLABSI) rates would result in large (>40%) overall reductions in CLABSI rates from inpatient oncology locations but would only reduce CLABSI rates modestly nationwide [2]. However, reporting whether CLABSIs fulfilled the MBI-LCBI criteria during 2013 was an optional part of the CLABSI protocol [2]. Whether required reporting of MBI-LCBI would result in a different impact on overall CLABSI rates was unclear. Here, we describe the epidemiology

Corresponding author: Isaac See, Division of Healthcare Quality Promotion, Centers for Disease Control and Prevention, 1600 Clifton Rd., MS A-16, Atlanta, GA 30329-4027, Phone: 404-639-0028, Fax: 404-929-1598.

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of MBI-LCBI events reported to NHSN in 2014, the first year that identification of MBI-LCBI events was required by the NHSN CLABSI protocol.

Methods

We analyzed all 2014 CLABSI data reported to NHSN from inpatient locations in short-term acute care hospitals. Other hospital types were excluded because few or no MBI-LCBI events were reported. Inpatient location types (e.g., adult and pediatric ward and critical care, adult and pediatric oncology ward and critical care) were designated by the reporting hospitals [3]. Definitions of CLABSI and MBI-LCBI can be found in the NHSN CLABSI protocol [4]. We described hospital and location types reporting MBI-LCBI events. For simplicity all location types not specified as pediatric are referred to here as “adult.” Pooled mean CLABSI rates per 1000 central line-days were calculated as (number of CLABSI) × 1000 / (number of central line-days), both including and excluding MBI-LCBI events. Pooled mean rates for 2014 were stratified by inpatient location type. All analyses were performed with SAS 9.3 (SAS Institute, Cary, North Carolina, USA).

Results

CLABSI data were reported from 16,755 inpatient locations from 3,293 hospitals in 2014. The most common hospital types were general (95.4%) and children’s (2.3%), and the most common location types were adult ward (47.3%), adult critical care (30.5%), and neonatal intensive care (6.0%).

During 20,691,116 central line days of surveillance, these hospitals and inpatient locations reported 19,130 CLABSI of which 2017 (10.5%, 95% confidence interval [CI], 9.3–11.8%) were reported as MBI-LCBI events (Table). The majority of MBI-LCBI events were reported from general hospitals (71.0%), oncology hospitals (15.3%), and children’s hospitals (13.2%). The largest number of MBI-LCBI events were reported from adult oncology (1172 [58.1% of all MBI-LCBI]) and pediatric oncology (327 [16.2%]) ward locations. In addition, among non-oncology locations, the proportion of CLABSI that were MBI-LCBI was greater in pediatric critical care and ward locations (4.1% and 11.9%, respectively) than in adult critical care and ward locations (1.9% and 5.1%, respectively).

Excluding MBI-LCBI events from CLABSI rates resulted in the greatest reductions in pooled mean CLABSI rates in pediatric oncology ward (48.2% reduction, 95% CI, 43.9–51.8%), adult oncology ward (45.8%, 95% CI, 43.6–47.8%), and adult oncology critical care locations (29.8%, 95% CI, 5.2–44.3%) (Table). Reductions in pooled mean CLABSI rates were smaller among non-oncology locations, including pediatric ward (11.9% reduction, 95% CI, 1.5–20.3%), adult ward (5.1%, 95% CI, 2.3–7.8%), and adult critical care locations (1.9%, 95% confidence interval, −0.4–4.0%). The CLABSI rate including MBI-LCBI was 1.8/1000 central line days for adult oncology wards; when MBI-LCBI events were excluded, the rate dropped to 1.0/1000 central line days. In contrast, in adult non-oncology wards, exclusion of MBI-LCBI events had no impact on the CLABSI rate, which was 0.7/1000 central line days with and without MBI-LCBI events.

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Discussion

Quantification of the impact of removing MBI-LCBIs from CLABSI data is necessary to enable accurate interpretation of CLABSI trends over time, and inform changes to state and federal reporting programs. This examination of data from the first year of required MBI-LCBI reporting in NHSN found that overall approximately 1 in 10 (10.5%) CLABSI met the MBI-LCBI definition. Most MBI-LCBI were reported from oncology locations, and pediatric locations (both ward and critical care) had a higher proportion of CLABSI that were MBI-LCBI events compared to their adult counterparts. Importantly, our findings show the exclusion of MBI-LCBI events from the calculation of CLABSI rates primarily reduced the pooled mean CLABSI rates in oncology locations; by ~30% (in adults critical care oncology) and up to 48% (in pediatric oncology wards). Excluding MBI-LCBI events reduced differences between CLABSI rates in these oncology location types and the corresponding non-oncology locations. Although in pediatric oncology critical care locations reductions in CLABSI rates appear to be more modest, few events overall were reported in this location type making comparisons limited. These findings are largely consistent with what was seen from optional CLABSI reporting [2]. This analysis does not directly address potential differences in patient mix among a single NHSN location type, though the MBI-LCBI definition is likely to be of benefit when such differences are related to the presence of oncology patients in some locations and not others.

CDC is using 2015 NHSN data to update models used for risk adjustment of healthcare-associated infection rates, including CLABSI. MBI-LCBI events will be excluded from publicly reported CLABSI rates in the updated models beginning with 2015 data. This change should bolster efforts to identify locations or facilities where improvements in central line care are most needed for CLABSI prevention [5,6]. In addition, although the MBI-LCBI definition was developed to enable identification of BSIs that may not be related to central line care and maintenance, MBI-LCBI events in themselves are important targets for prevention as they also represent significant healthcare-related adverse events. The development of the MBI-LCBI definition and the subsequent refinement of the CLABSI definition highlight NHSN's commitment to ensuring the utility of its data for directing prevention needs locally and guiding public policy decisions.

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References

1. See I, Iwamoto M, Allen-Bridson K, Horan T, Magill SS, Thompson ND. Mucosal barrier injury laboratory-confirmed bloodstream infection: results from a field test of a new National Healthcare Safety Network definition. Infect Control Hosp Epidemiol. 2013 Aug; 34(8):769–76. [PubMed: 23838215]

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2. Epstein L, See I, Edward JR, Magill SS, Thompson ND. Mucosal barrier injury laboratory confirmed bloodstream infections (MBI-LCBI): descriptive analysis of data reported to National Healthcare Safety Network (NHSN), 2013. Infect Control Hosp Epidemiol. 2016 Jan; 37(1):2–7. [PubMed: 26456954]

3. CDC locations and descriptions and instructions for mapping patient care locations. National Healthcare Safety Network; website. http://www.cdc.gov/nhsn/pdfs/pscmanual/15locationsdescriptions_current.pdf. Published 2016. Accessed June 28, 2016

4. Centers for Disease Control and Prevention. , editor. Central line associated bloodstream infection (CLABSI) event. 2014 National Healthcare Safety Network patient safety component manual.

5. Centers for Disease Control and Prevention. The Targeted Assessment for Prevention (TAP) Strategy. https://www.cdc.gov/hai/prevent/tap.html. Published 2015. Last accessed July 1, 2016

6. Soe MM, Gould CV, Pollock D, Edwards J. Targeted Assessment for Prevention of Healthcare-Associated Infections: A New Prioritization Metric. Infect Control Hosp Epidemiol. 2015 Dec; 36(12):1379–84. [PubMed: 26310913]

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Table 1

Central line associated bloodstream infection (CLABSI) rates reported to the National Healthcare Safety Network from short-term acute care hospitals, stratified by location type and calculated both including and excluding mucosal barrier injury laboratory confirmed bloodstream infection (MBI-LCBI) events, 2014.

Location type	No. locations	No. CLABSI	No. MBI-LCBI	Central line-days	CLABSI rate[a] (including MBI-LCBI events)	CLABSI rate[a] (excluding MBI-LCBI events)	% change in CLABSI rate when MBI-LCBI excluded (95% confidence interval)
Adult							
Adult critical care	5117	7585	141	8,595,842	0.88	0.87	1.9%, (−0.4–4.0%)
Adult specialty care area	34	86	5	84,947	1.01	0.95	5.8%, (−19.4–22.3%)
Adult step down	961	764	16	1,034,532	0.74	0.72	2.1%, (−5.4–8.6%)
Adult ward	7932	4604	236	6,536,683	0.70	0.67	5.1%, (2.3–7.8%)
Other adult location[b]	215	144	15	202,575	0.71	0.64	10.4%, (−7.1–23.0%)
Oncology							
Adult oncology critical care	19	57	17	53,337	1.07	0.75	29.8%, (5.2–44.3%)
Adult oncology ward	413	2559	1172	1,392,652	1.84	1.00	45.8%, (43.6–47.8%)
Oncology step down	9	11	1	23,004	0.48	0.43	9.1%, (−122.3–42.9%)
Pediatric oncology critical care	3	8	2	2724	2.94	2.20	25.0%, (−144.3–55.7%)
Pediatric oncology ward	88	679	327	330,884	2.05	1.06	48.2%, (43.9–51.8%)
Pediatric							
Neonatal critical care	1010	1539	8	1,426,777	1.08	1.07	0.5%, (−4.7–5.3%)
Pediatric critical care	405	679	28	585,476	1.16	1.11	4.1%, (−3.7–44.3%)
Pediatric specialty care area	1	4	0	4313	0.93	0.93	0.0%, –
Pediatric step down	25	28	0	22,745	1.23	1.23	0.0%, –
Pediatric ward	501	346	41	361,638	0.96	0.84	11.9%, (1.5–20.3%)
Other pediatric location[b]	22	37	8	32,987	1.12	0.88	21.6%, (−15.6–40.7%)
All locations	16,755	19,130	2017	20,691,116	0.92	0.83	10.5%, (9.3–11.8%)

[a] Pooled mean CLABSI rate/1000 central line-days shown

[b] Other adult locations include mixed acuity and long-term care location types. Other pediatric locations included mixed acuity pediatric locations.