Table 1.

Year	Number of Locations	Central Line Days	Number of Events		SIR	p-value	95% CI for SIR	
			Observed (#MBIs)	Predicted			Lower	Upper
2015	2434	2,552,666	2,515	2381.535	1.056	0.0069	1.015	1.098
2016	2592	2,697,045	2,902	2550.229	1.138	0.000	1.097	1.18
2017	2714	2,749,553	3,584	2603.467	1.377	0.000	1.332	1.422
2018	2823	2,859,820	3,723	2730.778	1.363	0.000	1.32	1.408

account for the impact of an expansion in the MBI-LCBI organism list in 2017 from 489 organisms (32 genera) to 1,003 organisms (89 genera), we removed the MBI-LCBI events that met the newly added MBI organisms and generated additional MBI SIRs for 2017 and 2018. **Results:** The annual SIRs remained above 1 since 2015, indicating a greater number of MBI-LCBIs identified than were predicted based on the 2015 national data (Fig. 1). Each year's SIR was significantly different than the national baseline, and the highest SIR was observed in 2017 (SIR, 1.377). In 2017, 12% of MBI events were attributed to an organism that was added to the MBI organism list, and in 2018 it was 10%. After removal of MBIs attributed to the expanded organisms, the 2017 and 2018 SIRs remained higher than those of previous years (1.241 and 1.232, respectively). **Conclusions:** The distinction of MBI-LCBIs from all other CLABSIs provides an opportunity to assess the burden of this infection type within specific patient populations. Since 2015, the increase of these events in the oncology population highlights the need for greater attention on prevention strategies pertinent to MBI-LCBI in this vulnerable population.

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Incidence Rate and Risk Factors for Recurrent *Clostridium difficile* Infection in Pediatric At-Risk Groups

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Background: Recurrence rates and risk factors of *Clostridium difficile* infection (CDI) are well established in adults, though little is known about the rate of recurrent CDI (rCDI) within the pediatric population. The purpose of this study was to identify rates and risk factors of rCDI in pediatric at-risk groups to guide the optimization of targeted prevention efforts against disease recurrence. **Methods:** We report on the ongoing retrospective cohort study of pediatric patients at the CHU Sainte-Justine with a laboratory confirmed diagnosis of CDI between April 1, 2012, and March 31, 2017. Incidence rates of rCDI were obtained per 100 cases. Frequencies of rCDI were compared using the Fisher exact test. Univariate and multivariate logistic regression were used to identify risk factors for rCDI. Two-tailed $P < .05$ was considered significant. All statistical calculations were performed using R version 3.5.2 software. **Results:** Of 80 patients analyzed with CDI, 16 had rCDI, for a rCDI rate in this population of 20%. Most recurrences were observed in secondarily immunosuppressed patients including, but not limited to, oncology patients undergoing chemotherapy and/or radiotherapy (30.4%) and patients with inflammatory bowel disease (IBD, 29.2%). Patients that were administered vancomycin orally (PO) had recurrent infection less often than patients that administered metronidazole PO or IV (8.3% vs 23.4%, respectively). This trend was observed in all at-risk patient groups. Patients with secondary immunodeficiency had 7.4 times increased odds of recurrence compared to nonimmunodeficient patients (adjusted OR, 7.43,; 95% CI, 1.84–50.4; $P = .0126$). **Conclusions:** Initial vancomycin PO therapy seems to be associated with a lower risk of recurrence. Pediatric patients with IBD and with secondary immunodeficiency are at increased risk of rCDI. Given that these populations have an increased underlying risk of diarrhea, it would be worthwhile to determine whether toxin is actually produced (EIA testing) and to prioritize prevention efforts.

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Incidence Trends of Central-Line–Associated Bloodstream Infections in Acute-Care Hospitals, NHSN, 2009–2018

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Background: Central-line–associated bloodstream infections (CLABSIs) are an important cause of healthcare-associated morbidity and mortality in the United States. CLABSI surveillance in the CDC NHSN began in 2005 and has been propelled by state CLABSI reporting requirements, first introduced in 2005, and subsequently by the CMS requirements for intensive care units (ICUs) in 2011 and select ward locations in 2015. Although trend analyses were previously reported, no recent assessment of the NHSN CLABSI incidence rate changes has been performed. In this analysis, we evaluated trends in CLABSI rates in nonneonatal ICUs and all wards reported from acute-care hospitals. **Methods:** CLABSI rates, including blood stream infections attributed to mucosal barrier injury reported to the NHSN from 2009 to 2018, were analyzed. To evaluate trends in CLABSI incidence and to account for the potential impact of definitional changes in catheter-associated urinary tract infections (CAUTIs) that indirectly impacted CLABSI rates, as well as the CMS mandate for select wards, we conducted an interrupted time-series analysis using negative binomial random-effects modeling with an interruption in 2015. ICUs and ward locations were analyzed separately. Models were adjusted for patient care location type and hospital-level characteristics: hospital type, medical affiliation, teaching status, bed size, number of ICU beds, and average length of inpatient stay. Random intercept and slope models were used to account for differential baseline incidence and trends among reporting hospitals. **Results:** The overall crude incidence of CLABSI per 1,000 central-line days decreased from 1.6 infections in 2009 to 0.9 infections in 2018,

Table 1: Overall Crude and stratified CLABSI incidence rates/1,000 central line days from ACHs, non-neonatal ICUs and Wards, 2009-2018

	Overall				*ICU*				*Ward*			
Year	No. of hospitals	No. of events	No. of central line days	CLABSI RATE	No. of locations	No. of events	No. of central line days	CLABSI RATE	No. of locations	No. of events	No. of central line days	CLABSI RATE
2009	1,306	9,772	6,039,399	1.618	2,413	7,149	4,240,072	1.686	1,917	2,623	1,799,327	1.458
2010	2,059	11,746	9,403,184	1.249	3,581	7,147	5,496,411	1.300	4,071	4,599	3,906,773	1.177
2011	3,224	16,352	15,097,516	1.083	5,500	10,068	9,191,058	1.095	5,353	6,284	5,906,458	1.064
2012	3,235	16,508	15,773,453	1.047	5,546	9,867	9,167,675	1.076	6,310	6,641	6,605,778	1.005
2013	3,267	17,149	17,116,596	1.002	5,567	9,127	9,206,605	0.991	7,504	8,022	7,909,991	1.014
2014	3,289	17,365	18,983,677	0.915	5,505	8,220	9,196,847	0.894	9,693	9,145	9,786,830	0.934
2015	3,496	27,353	25,674,293	1.065	5,537	9,929	9,307,357	1.067	16,701	17,424	16,366,936	1.065
2016	3,494	25,713	25,512,882	1.008	5,525	9,341	9,177,308	1.018	17,098	16,372	16,335,574	1.002
2017	3,556	24,077	24,854,592	0.969	5,533	8,528	8,888,416	0.959	17,508	15,549	15,966,176	0.974
2018	3,527	22,373	24,471,423	0.914	5,474	7,487	8,606,746	0.870	17,879	14,886	15,864,677	0.938

Table 2: CLABSI Trend Model Coefficients, Incidence Rate Ratios and Annual Percentage Change by Location Type

Model Parameter[a]	Estimate	Standard Error	p-value	Incidence rate ratio (95% CI)	Percent change per year[b] (95%CI)
ICUs					
Time Trend:2009-14 (β_1)	-0.1067	0.003723	<.0001	0.898(0.892,0.905)	-10.12 (-12.28, -09.63)
Immediate effect of interruption at 2015(β_2)	0.2575	0.01891	<.0001	1.288(1.241,1.336)	28.75 (24.07, 33.62)
Change in slope direction after 2015 (β_3)	0.03667	0.007144	<.0001	1.037 (1.023,1.052)	03.73(02.29,05.20)
Time trend:2009-18 ($\beta_1+\beta_3$)	-0.07004	0.006155	<.0001	0.932 (0.921, 0.944)	-06.76 (-7.88, -5.63)
WARDS					
Time Trend (β_1)	-0.08299	0.004629	<.0001	0.920(0.912, 0.929)	-07.96(-08.8, -07.12)
Immediate effect of interruption at 2015(β_2)	0.2573	0.01751	<.0001	1.2930 (1.25,1.34)	29.34 (24.98, 33.86)

[a]Negative binomial mixed model adjusted for patient care location types, facility type, and annual survey level variables of teaching status, hospital bed size, total number of beds in intensive care units, and average length of patient stay in hospital.
[b]Percent change= (incidence rate ratio-1) x 100

except for an increase in 2015. Similar trends were observed by location type. Among the ICUs, adjusted CLABSI incidence decreased by 10% annually in 2009–2014, increased nearly 29% in 2015, and thereafter decreased at an average of 6.8% per year. Among the wards, adjusted CLABSI incidence decreased at an average of 7.9% annually, except for a 29.3% increase in 2015. **Conclusions:** Substantial progress has been made in reducing CLABSIs in both ICUs and wards over the last 10 years. Indirect effects of CAUTI definitional changes may explain the immediate increase in ICUs, whereas the CMS mandate may explain the similar increase in wards in 2015. Despite this increase, these findings suggest that policies and practices aimed at prevention of CLABSI have likely been effective on a national level.

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Increased Isolation of Pathogens After Resin-Containing Blood Culture Bottle Implementation

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Background: Resin-containing blood culture bottles (RBB) are used to increase the isolation of microorganisms by binding antimicrobials in sampled blood. Since RBB implementation in April 2018, our infection preventionists noted an increase in positive blood cultures on routine surveillance. **Objective:** To describe the change in bacterial isolation post-RBB implementation. **Methods**: All positive blood culture sets drawn in adult inpatient units or the emergency room between October 2017 and September 2018 and their associated organisms were obtained from the hospital laboratory database. Then, regardless of central-line placement or "present on admission" designation, the 2019 NHSN surveillance definitions for laboratory-confirmed bloodstream infection (LCBI-1 and LCBI-2) were applied to categorize all positive cultures as "common commensals" (CCs) or pathogens. A univariate analysis was performed using the Mantel-Haenszel χ^2 test (OpenEpi version 3.01). **Results:** Although the number of monthly blood cultures drawn remained effectively stable before and after implementation (pre-RBB median, 3,512.5; post-RBB median, 3,626), the rate ratio of positive

Figure 1: Monthly Incidence Rate of Positive Blood Cultures by Organism Type

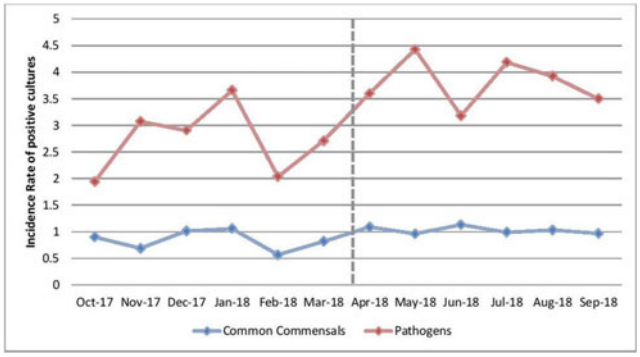

Fig. 1.

cultures increased by 1.36 times: pre-RBB median, 127 sets per month and post-RBB median, 172.5 sets per month ($\chi^2 = 5.785$; $P = .008$). The rate ratio of pathogen-containing cultures increased by 1.40 times (pre-RBB median, 98 sets per month and post-RBB median, 137.5 sets per month; $\chi^2 = 5.615$; $P = .009$) with only a 1.24 increase in CCs (pre-RBB median, 29 and post-RBB median, 36; $\chi^2 = 0.553$; $P = .229$) (Fig. 1). **Conclusions:** After RBB implementation, the monthly incidence rate of pathogen-containing sets increased. Additionally, the increase in these sets as well as of overall positive blood cultures was statistically significant. Current literature on RBBs does not suggest preferential increased isolation of pathogens. Further study is needed to determine whether our findings are related to blood-culturing practices or the RBBs themselves.

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Increased Return Clinic Visits for Adults with Group A Streptococcal Pharyngitis Treated with a Macrolide

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Background: A multicenter audit-and-feedback intervention was conducted to improve management of acute respiratory infections (ARIs) including group A streptococcal (GAS) pharyngitis within 6 VA medical Centers (VAMCs). A relative reduction (24.8%) in azithromycin prescribing after the intervention was observed. Within these facilities during 2015–2018, 2,266 cases of GAS occurred, and susceptibility to erythromycin ranged from 55% to 70%. We evaluated whether prescribing a macrolide for GAS pharyngitis was associated with an increase in outpatient return visits. **Methods:** A cohort of ambulatory adults treated for GAS pharyngitis (years 2014–2019) at 6 VAMCs was created. Demographic, diagnostic, treatment, and revisit data were extracted from the Corporate Data Warehouse. GAS pharyngitis was defined by an acute pharyngitis diagnostic code combined with a GAS-positive rapid strep test or throat culture ≤3 days of index date. Antibiotic prescriptions were included if filled ≤3 days of index date and were classified as first line (penicillin/amoxicillin), second line (cephalexin/clindamycin), macrolides (azithromycin,