Figure 1: Rolling 12 months performance (normalized to 1 at baseline) for HOBSI and the 2 infection scores.

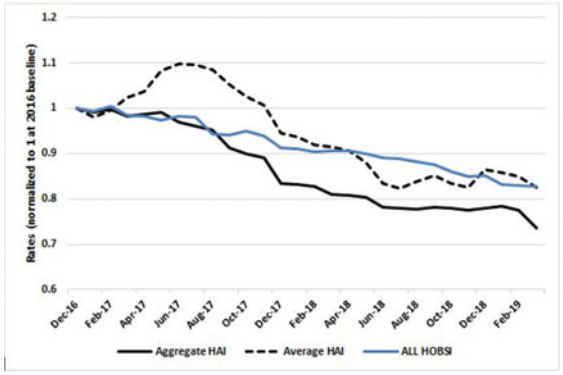

Fig. 1.

SSI. We calculated 2 "infection composite scores" to account for the 6 HAIs based on all observed or predicted events (score 1) and an average of the 6 HAI standardized infection ratios (SIRs; score 2). We normalized both measures to 1 for a 12-months rolling baseline. We evaluated the HO-BSI rate change over time and compared it to the change in the infection score over the same period. We compared the change in the 12-month rolling rates of the 2 HAI scores and the HO-BSI rate. **Results:** During the 39-month period, 3,288 HO-BSI events occurred over 9,775,118 patient days. The source of HO-BSI events included *S. aureus* (33.5%), *P. aeruginosa* (10.2%), *E. coli* (19.7%), *K. pneumoniae* (13.8%), and *Candida* spp (22.8%). HO-BSI event rates decreased by 17.3% from 12-month rolling baseline to last 12 months (3.70 vs 3.06 per 10,000 patient days). Similarly, 7,648 HAI events were observed, with the source of events being *Clostridioides difficile* (57.0%), CAUTI (15.1%), CLABSI (12.8%), MRSA (7.0%), colon SSI (6.4%), and abdominal hysterectomy SSI (1.7%). The 2 HAI scores and the HO-BSI rate all showed a notable decrease from the 2016 baseline period (Fig. 1). The reductions in the HAI scores were both strongly correlated with the reduction in the HO-BSI rate, with the HAI score 1 having a stronger correlation ($r = 0.949$; $P < .001$) than was observed for HAI score 2 ($r = 0.867$; $P < .001$). **Conclusions:** Utilization of a HO-BSI measure may prove useful as a correlated but distinct marker of infection prevention improvement or trends. HO-BSI could be useful as an objective electronically obtainable measure to assist in the evaluation of performance within and across facilities.

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Knowledge of Adverse Events Following Immunization Reporting Tool and System Among Primary Healthcare Workers in Jigawa State

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Background: Adverse events following immunization (AEFI) surveillance largely depends on the ability of the healthcare worker (HCW) to timely detect and report cases using the correct reporting tools through an appropriate system. AEFI surveillance is carried out regularly during both routine immunization services and supplemental immunization activities in the state. **Objective:** We assessed knowledge of adverse events following immunization reporting tools and system among primary HCWs in Jigawa state, northwestern Nigeria. **Method:** A descriptive cross-sectional design was used for this study. A multistage sampling technique was used to select 290 HCWs that had spent at least 6 months in immunization units of primary healthcare centers of Jigawa state. Data were collected using pretested self-administered structured questionnaire with open and closed ended questions and were analyzed using IBM SPSS version 20 software. All statistical tests were 2-tailed with $P < .05$ as the statistical significance level. **Results:** Most of the primary HCWs (93.2%) had AEFI reporting forms in their health facilities, and 68.9% said that the AEFI reporting form could be obtained from a focal or contact person in the health facility. Up to 96.4% of the primary HCWs were aware of how to report AEFI. Also, ~76.6% of primary HCWs knew the correct AEFI reporting flow, but only 15.8% knew that only serious AEFIs are reported. Furthermore, ~78.8% and 19.4% of HCWs mentioned telephone and filling forms as some of the appropriate methods of AEFI notification, respectively. **Conclusions:** Most primary HCWs had reporting forms in their health facilities and were aware of how to report an AEFI. Most of the respondents knew the correct AEFI reporting flow. The state in collaboration with local government authorities should provide quality training on AEFI reporting and reporting system.

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KPC-Producing *Enterobacter cloacae* Transfer Through Pipework Between Hospital Sink Waste Traps in a Laboratory Model System

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Background: Carbapenemase-producing Enterobacterales (CPE) have become an increasingly common cause of hospital-acquired infections while their reservoirs within the clinical setting remain poorly understood. Outbreaks have been linked to hospital sinks, which have been shown to harbor and, under certain conditions, disperse CPE to surrounding surfaces. Hospital and laboratory studies have proposed that Gram-negative organisms, including CPE, can migrate through plumbing biofilms, leading to widespread contamination of the drainage system. **Methods:** To assess the prevalence of CPE in hospital sinks, drain swabs and waste trap water samples were taken from 10 sinks in 10 hospitals. Hospitals were in different regions of England; 4 had reported recent cases of CPE infection. To investigate spread and dispersal of CPE, waste traps from a single hospital were installed in a laboratory model sink system. Built to simulate a clinical setting, the model incorporated 12 sinks, 6 of which were connected through a common waste pipe. All 12 taps were automatically flushed. Drainage was automatically controlled. Nutrients were provided daily to maintain

the bacterial populations, which were regularly sampled to monitor their composition. At 3 weeks after installation, the waste traps were subjected to a drainage backflow event. Waste trap water populations continued to be monitored, and when transfer between sinks was suspected, isolates were characterized and compared using whole-genome sequencing. **Results:** Between January and June 2019, 200 samples were taken from 103 sinks. In total, 24 (23%) sinks (in 8 hospitals) harbored CRE; of which 10 (in 5 hospitals) harbored at least 1 CPE. Immediately after a backflow event in the laboratory model system, 2 KPC-producing *E. cloacae* were recovered from a waste trap in which CPE had not been previously detected. The isolates were identified as ST501 and ST31 and were genetically indistinguishable from those colonizing sinks elsewhere in the system. Following intersink transfer, KPC-producing *E. cloacae* ST501 successfully integrated into the microbiome of the recipient sink and was detected in the waste trap water at least 6 months after the backflow event. At 2 and 3 months after the backflow, other intersink transfers involving *Escherichia coli* and KPC-producing *E. cloacae* were also observed. **Conclusions:** Sink waste traps and drains are a reservoir for CPE in hospitals. Once established, CPE contamination might not be confined to a single sink and could spread through wastewater plumbing. Hospitals frequently report drainage problems, which could cause or facilitate CPE transfer between sinks and could lead to long-term establishment.

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Laboratory Testing, Diagnostic Coding, and Treatment for Electronic Identification of *Clostridioides difficile* Infection

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Background: Accurate identification of *Clostridioides difficile* infections (CDIs) from electronic data sources is important for surveillance. We evaluated how frequently laboratory findings were supported by diagnostic coding and treatment data in the electronic health record. **Methods:** We analyzed a retrospective cohort of patients in the Veterans' Affairs Health System from 2006 through 2016. A CDI event was defined as a positive laboratory test for *C. difficile* toxin or toxin genes in the inpatient, outpatient, or long-term care setting with no prior positive test in the preceding 14 days. Events were classified as incident (no CDI in the prior 56 days), or recurrent (CDI in the prior 56 days) and were evaluated for evidence of clinical diagnosis based on *International Classification of Disease, Ninth Revision, Clinical Modification* (ICD-9-CM) and ICD-10-CM codes and at least 1 dose of an anti-CDI agent (intravenous or oral metronidazole, fidaxomicin, or oral vancomycin). We further assessed the possibility of treatment without testing by quantifying positive laboratory tests and diagnostic codes among inpatients receiving an anti-CDI agent. A course of anti-CDI therapy was defined as continuous treatment with the same drug. **Results:** Among 119,063 incident and recurrent CDI events, 70,114 (58.9%) had a diagnosis code and 15,850 (13.3%) had no accompanying treatment. The proportion of patients with ICD codes was highest among patients treated with fidaxomicin (82.6% of 906) or oral vancomycin (74.3% of 30,777) and was lower among patients receiving metronidazole (63.3% of 103,231) and those without treatment (29.9% of 15,850). The proportion of events with ICD codes and treatment was similar between incident and recurrent episodes. During the study period, there were ~470,000 inpatient courses of metronidazole, fidaxomicin, and oral vancomycin. Table 1 shows the presence of ICD codes and positive laboratory tests by anti-CDI agents. Among 51,100 courses of oral vancomycin, 51% had an ICD code and 44% had a positive test for *C. difficile* within 7 days of treatment initiation. Among 1,013 courses of fidaxomicin, 79% had an ICD code and 56% had a positive laboratory test. **Conclusions:** In this large cohort, there was evidence of substantial CDI treatment without confirmatory *C. difficile* testing and, to a lesser extent, some positive tests without accompanying treatment or coding. A combination of data sources may be needed to more accurately identify CDI from electronic health records for surveillance purposes.

Treatment	ICD+ n(%)	Lab + n(%)	Total n(%)
Oral Vancomycin	25,954(50.8%)	22,272(43.6%)	51,100(10.9%)
Metronidazole	64,192(15.4%)	71,940(17.3%)	416,381(88.9%)
Fidaxomicin	804(79.4%)	567(56.0%)	1,013(0.2%)
Total	90,950(19.4%)	94,779(20.2%)	468,494

Table. 1.

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Lack of Evidence of Transmission of Bloodborne Viruses by Improperly Reprocessed Fiberoptic Endoscopes

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Background: A sterile processing service (SPS) technician was found to inadequately clean fiberoptic endoscope channels during reprocessing prior to high-level disinfection. Channels were only brushed once and 7 of 30 audited scopes had measurable bioburden. Consistent with VA policy, a retrospective investigation, along with public disclosure, was performed. **Methods:** A potentially exposed case (PEC) was defined as any patient who had flexible fiberoptic endoscopy between April 19, 2015, and June 23, 2017, when the identified SPS technician worked in the endoscope reprocessing station. Using the internal log of the automated high–level disinfection equipment (Medivators/Cantel, Minneapolis, MN), device serial numbers were matched to patients in endoscopy suite procedure logs. Additionally, the VA Corporate Data Warehouse (CDW) was queried for CPT and *International Classification of Disease, Ninth Revision* (ICD-9) and ICD-10