

Presentation Type:

Poster Presentation

Investigation of the First Case of New Delhi Metallo- β -Lactamase-1-Producing *Pseudomonas aeruginosa* in Texas

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Background: New Delhi metallo- β -lactamases impart resistance to carbapenems. Enterobacteriaceae carrying New Delhi metallo- β -lactamases have been reported before. However, only 7 cases of *bla*NDM-carrying *Pseudomonas aeruginosa* has been reported from 4 states in the United States as of January 1, 2018, according to the CDC. We describe an epidemiologic investigation of the first reported case of *bla*NDM-carrying *Pseudomonas aeruginosa* in Texas and the measures that controlled the spread of the organisms carrying this gene at a 30-bed spinal cord injury unit (SCI) and the acute-care hospital within the Veterans' Affairs North Texas Health Care System. **Methods:** After identification of *bla*NDM-1-carrying *P. aeruginosa* from a urine culture in an SCI patient who received medical treatment in Thailand prior to transfer, we performed a rectal screen for the presence of *bla*NDM in the index patient's hospital roommates. Based on the results, we expanded the investigation to other patient care units that had provided care to the patient. We initiated universal contact isolation precautions, 1:1 nursing care, restricted movement, phased point-prevalence testing, and intense environmental cleaning until the threat of *bla*NDM was mitigated. Whole-genome sequencing (WGS) was performed on clinical isolates from the index patient and the roommates by the CDC. **Results:** Of the 2 roommates of the index, 1 patient had a urine culture positive for *bla*NDM-5-carrying *Escherichia coli*. The second roommate has subsequently grown *bla*NDM-1-carrying *P. aeruginosa* from a clinical culture. A third patient who was in the same unit as the index patient but not in the same room in an acute-care unit tested positive for *bla*NDM in a rectal screen. Of the 54 patients who were hospitalized in the same unit as the index patient, 26 refused to get the test and 28 tested negative. In addition, point-prevalence rectal screening was conducted in the SCI in 3 phases that were 3 to 4 weeks apart. All of these screening tests were negative. WGS revealed that the index patient and roommate 2 had *bla*NDM-1-carrying *P. aeruginosa*, whereas the roommate 1 had *bla*NDM-5-carrying *E. coli*. No further spread occurred.

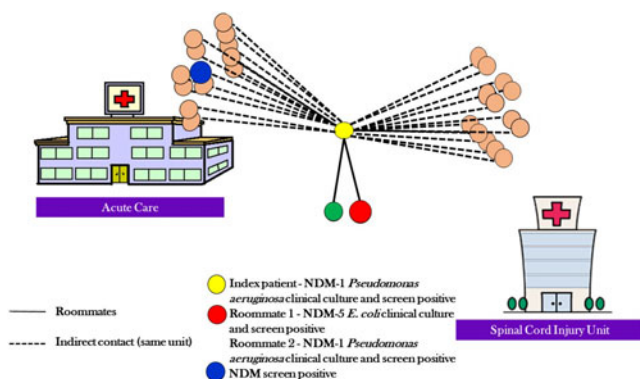


Fig. 1.

Whole Genome Sequencing

TX_1903_WGS_NDM		Antibiotic Resistance Genes	
Source	Species	<i>bla</i> ndm-1(beta-lactam)	<i>bla</i> ndm-5(beta-lactam)
Urine	<i>Pseudomonas aeruginosa</i>	[100/100]C [100/100]S	
Tissue	<i>Pseudomonas aeruginosa</i>	[100/100]C [100/100]S	
Urine	<i>Escherichia coli</i>		[100/100]C [100/100]S

Fig. 2.



Fig. 3.

Conclusions: Our aggressive efforts quickly mitigated further spread of *bla*NDM. Our epidemiologic investigation indicates that an intergenus transfer of *bla*NDM from *P. aeruginosa* to *E. coli* likely took place. In addition, it appears there was an evolution of NDM-1 to NDM-5, which differs from the former by 2 amino acid substitutions at positions 88 (Val→Leu) and 154 (Met→Leu). This type of evolution has been shown by prior studies to confer increased antibiotic resistance in certain resource limited settings.

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Is Hospital-Onset Bloodstream Infection (HOBSI) a Useful Measure to Evaluate Infection Prevention Progress?

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Background: Acute-care hospitals in the United States are required to submit 6 healthcare-associated infection (HAI) metrics to the CMS for reporting and performance purposes prior to payment. We examined the association between HAI rate trends and hospital-onset bloodstream infection (HO-BSI) rate trends across a large, multihospital health system. **Methods:** HO-BSI events were identified across 52 hospitals attributable to *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Escherichia coli*, *Klebsiella pneumoniae*, or *Candida* spp using the NHSN Lab ID event definition of \geq day 4 of admission. We compared the performance from January 2016 to March 2019 for HO-BSI and the 6 NHSN-defined HAIs: central-line-associated bloodstream infection (CLABSI), catheter-associated urinary tract infection (CAUTI), *Clostridioides difficile*, methicillin-resistant *Staphylococcus aureus* (MRSA) bacteremia, abdominal hysterectomy surgical site infections (SSIs), and colon

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

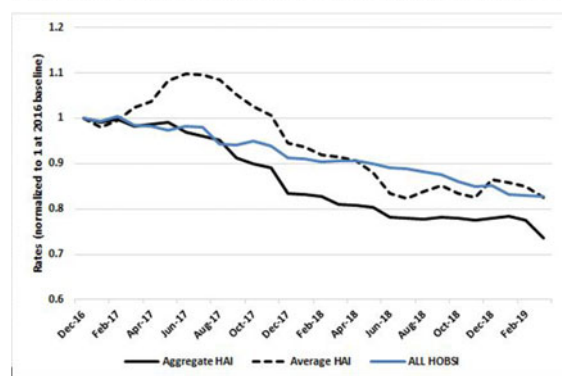


Fig. 1.

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