

Presentation Type:

Oral Presentation

Regional Public Health Response to Emerging Carbapenemase-Producing Organisms in Central Florida, 2019

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Background: Detection of unusual carbapenemase-producing organisms (CPOs) in a healthcare facility may signify broader regional spread. During investigation of a VIM-producing *Pseudomonas aeruginosa* (VIM-CRPA) outbreak in a long-term acute-care hospital in central Florida, enhanced surveillance identified VIM-CRPA from multiple facilities, denoting potential regional emergence. We evaluated infection control and performed screening for CPOs in skilled nursing facilities (SNFs) across the region to identify potential CPO reservoirs and improve practices. **Methods:** All SNFs in 2 central Florida counties were offered a facility-wide point-prevalence survey (PPS) for CPOs and a nonregulatory infection control consultation. PPSs were conducted using a PCR-based screening method; specimens with a carbapenemase gene detected were cultured to identify the organisms. Infection control assessments focused on direct observations of hand hygiene (HH), environmental cleaning, and the sink splash zone. Thoroughness of environmental cleaning was evaluated using fluorescent markers applied to 6 standardized high-touch surfaces in at least 2 rooms per facility. **Results:** Overall, 21 (48%) SNFs in the 2-county region participated; 18 conducted PPS. Bed size ranged from 40 to 391, 5 (24%) facilities were ventilator-capable SNFs (vSNFs), and 12 had short-stay inpatient rehabilitation units. Of 1,338 residents approached, 649 agreed to rectal screening, and 14 (2.2%) carried CPOs. CPO-colonized residents were from the ventilator-capable units of 3 vSNFs (KPC-CRE=7; KPC-CRPA=1) and from short-stay units of 2 additional facilities (VIM-CRPA, n = 5; KPC-CRE, n = 1). Among the 5 facilities where CPO colonization was identified, the prevalence ranged from 1.1% in a short-stay unit to 16.1% in a ventilator unit. All facilities had access to soap and water in resident bathrooms; 14 (67%) had alcohol-based hand rubs accessible. Overall, mean facility HH adherence was 52% (range, 37%–66%; mean observations per facility = 106) (Fig. 1). We observed the use of non-EPA-registered disinfectants and cross contamination from dirty to clean areas during environmental cleaning; the overall surface cleaning rate was 46% (n = 178 rooms); only 1 room had all 6 markers removed. Resident supplies were frequently stored in the sink splash zone. **Conclusions:** A regional assessment conducted in response to emergence of VIM-CRPA identified a relatively low CPO prevalence at participating SNFs; CPOs were primarily identified in vSNFs and among short-stay residents. Across facilities, we observed low adherence to core infection control practices that could facilitate spread of CPOs and other resistant organisms. In this region, targeting ventilator and short-stay units of SNFs for surveillance and infection control efforts may have the greatest prevention impact.

Figure 1. Box Plot of Percent Adherence to Hand Hygiene (HH) and Percent of Fluorescently Marked Surfaces Completely Cleaned, by Facility Type (n=21). Whiskers denote minimum and maximum values.

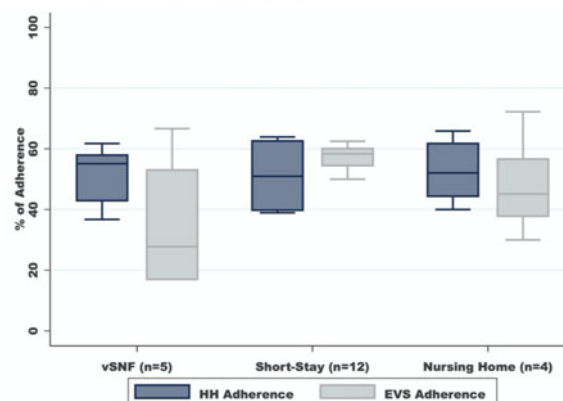


Fig. 1.

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Room for Improvement: Results of a Baseline Evaluation of Environmental Cleaning in a Resource-Limited Neonatal Unit

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Background: Contamination of the near-patient hospital environment including work surfaces and equipment, contributes to skin colonization and subsequent invasive bacterial infections in hospitalized neonates. In resource-limited settings, cleaning of the neonatal ward environment and equipment is seldom standardized and infrequently audited. **Methods:** A baseline multimodal assessment of surface and equipment cleaning was performed in a 30-bed high-care neonatal ward in Cape Town, South Africa, October 7–9, 2019. Adequacy of routine cleaning

was evaluated using ATP bioluminescence assays, fluorescent ultraviolet (UV) markers, and quantitative bacterial surface cultures. For flat surfaces (eg, tables, incubators, trolleys), a 10×10-cm template was used to standardize the swab inoculum; for small equipment and devices with complex surfaces (eg, humidifiers, suction apparatus, stethoscopes), a standard swabbing protocol was developed for each item. Swabs in liquid transport medium were processed in the laboratory by vortexing for 30 seconds, plating onto blood and MacConkey agars, and incubating at 37°C for 48 hours. Manual counting of bacterial colony forming units was performed, followed by conventional biochemical testing and/or VITEK automated identification. **Results:** Of 100 swabs (58 from surfaces and 42 from equipment), 11 yielded growth of known neonatal pathogens (Enterobacteriaceae, *A. baumannii*, *P. aeruginosa*, *S. aureus*, *S. agalactiae*, and enterococci), 36 isolated potential neonatal pathogens (mostly coagulase-negative staphylococci). In addition, 4 grew environmental organisms and 49 showed no growth. The highest aerobic colony counts (ACCs) were obtained from swabs of suction tubing, milk kitchen surfaces, humidifiers, and sinks; the median ACC from swabs with any bacterial growth (n = 51) was 3 (IQR, 1–22). Only 40% of the 100 surface and equipment swabs had ATP values <200 relative light units (RLU) threshold for cleanliness. Median ATP values were 301 (IQ range, 179–732) RLU for surface swabs versus 230 (IQ range, 78–699) RLU for equipment swabs (*P* = .233). Of the 100 fluorescent UV markers placed on near-patient surfaces and high-touch equipment, only 23% had been removed after 2 staff shift changes (24 hours later). Surfaces had a higher proportion of UV marker removal than equipment (19 of 58 [32.8%] vs 4 of 42 [9.5%]; *P* = .008). **Conclusions:** Environmental cleaning of this neonatal ward was suboptimal, especially for equipment. Improvement of environmental cleaning practices is an important intervention for neonatal infection prevention in resource-limited settings. Future studies should evaluate the impact of staff training, environmental cleaning tools and repeated audit with feedback, on the adequacy of cleaning in neonatal wards.

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Significant Regional Differences in Antibiotic Use Across 576 US Hospitals and 11,701,326 Million Admissions, 2016–2017

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Background: Reducing inappropriate antibiotic use is critical for fighting antibiotic resistance. Quantifying the amount and diversity of antibiotic use in US hospitals is foundational to these efforts but hampered by limited national surveillance. The current study aims to address this knowledge gap by examining adult inpatient antibiotic usage, including regional, facility, and case-mix differences, across 576 hospitals and nearly 12 million encounters in 2016–2017. **Methods:** We conducted a retrospective cohort study of patients aged ≥18 years discharged from hospitals in the Premier Healthcare Database, a repository of nearly 1 of every 4 annual US hospitalizations, between January 1, 2016, and December 31, 2017. Detailed hospital- and patient-level data were extracted for each admission. Facilities were classified geographically by census division. Using daily antibiotic charge data, we mapped antibiotics to 18 mutually exclusive classes and to categories based upon spectrum of activity. Patient-level data were transformed into hospital case-mix variables (eg, hospital mean patient age), and relationships between antibiotic days of therapy (DOTs), and these and other facility-level variables were evaluated in negative binomial regression models. **Results:** The study included 11,701,326 adult admissions, totaling 64,064,632 patient days across 576 US hospitals. Overall, antibiotics were used in 65% of all hospitalizations, at a rate of 870 DOTs per 1,000 patient days. The most commonly used classes per patient days were

β-lactam/β-lactamase inhibitor combinations (206 DOTs), third- and fourth-generation cephalosporins (128 DOTs), and glycopeptides (113 DOTs) (Fig. 1). By spectrum of activity, antipseudomonal agents (245 DOTs) were the most common. Crude usage rates varied by geographic region (Fig. 2). In multivariable analyses, teaching hospitals, and/or larger bed sizes were independently associated with lower use across a range of antibiotic classes (adjusted IRR ranges, 0.90–0.94 and 0.96–0.98, respectively). Significant regional differences also persisted. Compared to the South Atlantic region (chosen as the reference category because it had the largest representation in the cohort), rates of total antibiotic use were 6%, 15%, and 18% lower on average in the Pacific, New England, and the Middle Atlantic regions, respectively. By class, carbapenems reflected the most geographic variability. **Conclusions:** In a large, diverse cohort of US hospitals, adult inpatients received antibiotics at a rate similar to, but higher than, previously published estimates. In adjusted models, lower antibiotic

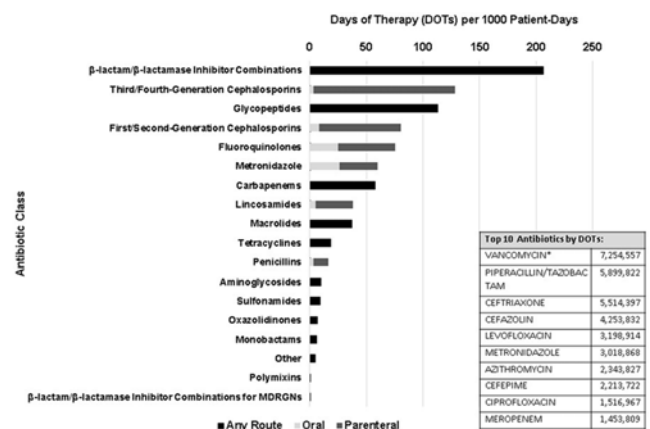


Figure 1. Inpatient Antibiotic Days of Therapy (DOTs) per 1000 Patient-Days, by Antibiotic Class and Administration Route for Selected Agents

Abbreviations: Multidrug-resistant Gram-Negative Organisms, MDRGNS; *Vancomycin routes of administration, by DOT: Parenteral = 6,555,702; Oral = 627,706; Miscellaneous = 71,149.

Fig. 1.