Conclusion. Standardized ratio methods did not provide clear and actionable information, even with perfect adjustment. Statistically significant fluctuations occurred due to chance which could be mistakenly been attributed to actions taken by the hospital. Several methods, such as the use of percentiles rather than p-values, or presenting simulation-based projections of facility data, may help alleviate these problems.

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2160. Benchmarking Healthcare-Associated Infections for Prevention in Developing Countries

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Background. Applying benchmarks from high resource countries on low resource countries may result in misleading conclusions, thus improvements can be made in order to refine the precision of external benchmarks in developing countries.

Methods. The NOIS Project uses SACIH software to retrieve data from different hospitals at Belo Horizonte, Brazil. The hospitals use prospective Healthcare-Associated Infections—HAI surveillance according to the NHSN/CDC protocols. The objective is to calculate benchmarks for HAI rates from intensive care units, ICU, and surgical procedures. Benchmarks were defined as the 10 percentile and 90 percentile, considering data from 11 hospitals and 13 ICUs, collected between 2013 and 2017.

Results. Hospital-wide and ICUs benchmarks: HAI risk [1.5%; 4.7%]; HAI incidence per 1,000 patient-days [4.4; 12.6]; ICU infection risk [4.0%; 23.8%]; ICU incidence density rate of HAI per 1,000 patient-days [10.8; 35.7]; risk of urinary catheter-associated urinary tract infections[0.0%; 6.3%]; incidence density rate of urinary catheter-associated urinary tract infections per 1,000 urinary catheter-days [0.0; 9.4]; risk of central line-associated primary bloodstream infections [0.0%; 10.3%]; incidence density rate of central line-associated primary bloodstream infections per 1,000 central line-days [0; 16]; risk of ventilator associated pneumonia [0.0%; 13.5%]; incidence density rate of ventilator associated pneumonia per 1,000 ventilator-days [0.0; 20.6]. Surgical site infection benchmarks: Cesarean section [0,6%;0,9%]; open reduction of fracture [3,3%;3,9%]; Gallbladder surgery [0,7%;1%]; herniorrhaphy [1,1%;1,6%]; peripheral vascular bypass surgery [0,6%;1%]; gastric surgery [1,7%;2,4%]; appendix surgery [1,1%;1,8%]; colon surgery [3,0%;4,1%]; exploratory abdominal surgery [4,1%;5,3%]; craniotomy [5%;6,5%]; abdominal hysterectomy [0,7%;1,4%]; limb amputation [4,1%;6,1%]; thoracic surgery [0,8%;1,5%]; hip prosthesis [3%;4,3%]; knee prosthesis [2,3%;3,5%]; pacemaker surgery [1,9%;3,1,0%]; breast surgery [0,3%;0,9%]; bile duct, liver or pancreatic surgery [7%;11%]; ventricular shunt [3,3%;6,5%].

Conclusion. The benchmarks proposed can be used by infection preventionists that decide to monitor selected surgical procedures and/or ICUs, especially in developing countries.

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2161. Pilot Implementation of a Nationwide Automated Multidrug-Resistant Organism Tracking and Alert System in Veterans Affairs

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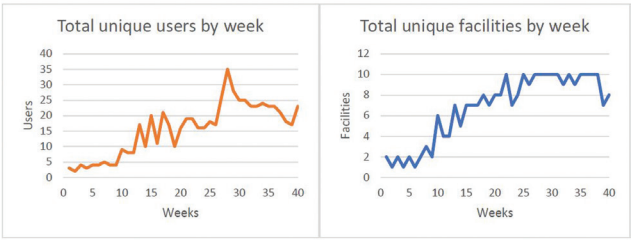
Background. Regional spread of multidrug-resistant organisms (MDROs), including carbapenem-resistant *Enterobacteriaceae* (CRE), can occur when carriers present unbeknownst to healthcare facilities and thereby delay appropriate infection control interventions. Herein, we describe pilot implementation of a novel national system that automatically alerts local facility staff to newly admitted patients with any history of CRE or methicillin-resistant *Staphylococcus aureus* (MRSA) in VA.

Methods. From December 2016 to November 2017, we implemented the alert system in 10 VA medical centers. The system continually monitors the VA Corporate Data Warehouse for new facility admissions nationwide among patients with archived CRE and MRSA data. When such admissions occur, an alert is emailed to Infection Prevention personnel at the local facility. During implementation, we upgraded to a faster, more accurate report, "MDRO Tracker", that provided alerts within 4 hours of admission. We evaluated system utility in three ways: (1) assessing user data and feedback; (2) comparing a dataset identifying all unique patients harboring CRE and MRSA to the subset of patients whose most recent positive result was identified at a different VA facility; and (3) enrolling a convenience sample of CRE and MRSA patients to validate system accuracy and assess whether the new system or existing infrastructure identified the MDRO first. IRB approval was obtained at each site.

Results. The number of users increased over time and are shown in Figure 1. User feedback data are shown in Figure 2; 71/256 (28%) responses indicated that alert data were new and/or timely. Of all CRE- and MRSA-positive patients identified during the study period, 11/101 (11%) and 214/2,390 (9%), respectively, had positive MDRO results originating from a different VA facility. Of the 61 CRE and 1,720 MRSA patients enrolled by research staff, 21% (n = 13) of CRE and 7% (n = 71) of MRSA cases were first identified by the automated system.

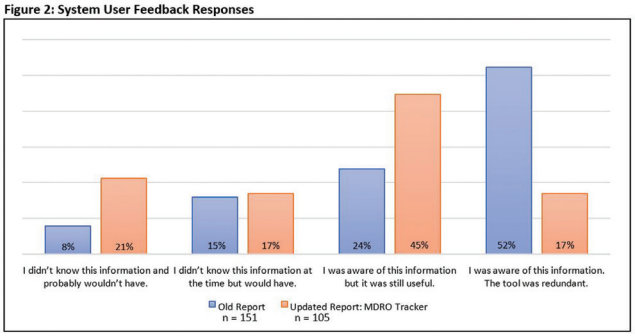
Conclusion. This pilot implementation of a novel automated MDRO alert system shows feasibility and potential for substantial utility of such a system. Further refinement and expanded β-testing of the system is underway.

Figure 1: System Use Data*



*Weeks 1-40 represent consecutive weeks from March through Nov, 2017. **Total unique users per week** displays the total number of unique users across the 10 pilot sites accessing the system during that week. **Total unique facilities per week** represents the same user data but pooled and then stratified by each of the 10 pilot sites.

Figure 2: System User Feedback Responses



Disclosures. **M. A. Gelman**, Cepheid: Speaker, Speaking Fee.

2162. Factors Affecting the Geographic Variability of Antibiotic-Resistant Healthcare-Associated Infections in the United States Using the CDC's Antibiotic Resistance Patient Safety Atlas

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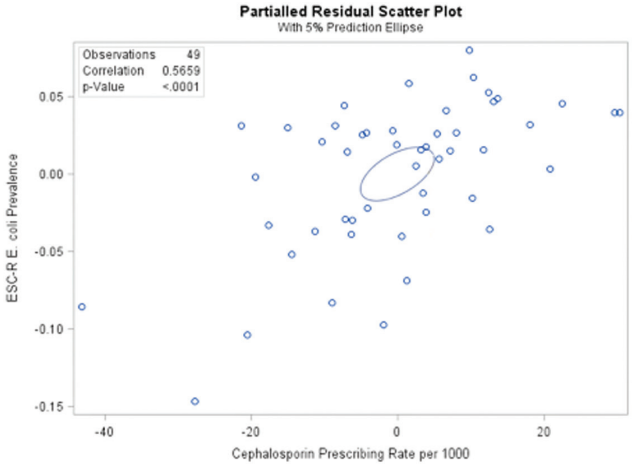
Background. National surveillance is proposed to be part of a National Strategy to Combat Antibiotic Resistance (AR) in the United States; recent access of state-summary metrics around antibiotic use and antibiotic resistance allows an opportunity to evaluate variability in AR among healthcare-associated infections (HAIs) between U.S. states.

Methods. We utilized data from 2016 accessible in the CDCÕs AR Patient Safety Atlas to create state-level values for the no. of HAIs (CLABSI, CAUTI, SSI) by select AR reported to NHSN, prescribing rates of outpatient antibiotics by class, and percentage of hospitals having full antibiotic stewardship programs. Other available data included 2016 CDC's Healthcare-Associated Infections Progress Report and U.S. Census Data. We correlated (Pearson's partial correlation coefficients) the state prevalence (% testing resistant) for multidrug-resistant *P. aeruginosa* (MDR-PA), extended-spectrum cephalosporin-resistant *E. coli* (ESC-*E. coli*), and methicillin-resistant *S. aureus* (MRSA) from HAIs with potential predictors; multivariate logistic regression was used to assess independence.

Results. States prevalence of HAI AR varied and was explained in part by no. of skilled nursing facility bed days for MRSA ($P = 0.002$), % of population black for MRSA ($P < 0.001$) and ESC-*E. coli* ($P < 0.001$), % of population > 65 for ESC-*E. coli* ($P < 0.001$) and MDR-PA ($P < 0.001$), and no. of LTACHs for MDR-PA ($P = 0.01$). After adjusting for these, rates of outpatient fluoroquinolone (FQ) and cephalosporin prescribing (figure) were significant predictors of ESC-R *E. coli* HAIs (adjusted OR 1.02, $P < 0.001$ and 1.01, $P < 0.001$, respectively) and FQ rates for MRSA HAIs (aOR 1.01, $P = 0.004$); the MRSA correlation was slightly elevated in states with a higher population of African-Americans. Of note, % hospitals with inpatient stewardship did not explain geographic variability in any HAI AR studied.

Conclusion. Outpatient antibiotic prescribing rates can explain much of the state-to-state variability in studied HAI-related AR even after adjusting for differences in age and healthcare facility composition. Stewardship across the spectrum of healthcare delivery is likely needed to improve patient safety in acute care hospitals.



Disclosures. **All authors:** No reported disclosures.

2163. Risk Factors for Carbapenem-Resistant Gram-Negative Bloodstream Infections (BSI) in U.S. Hospitals (2010–2015)

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Background. Carbapenem-resistant (CR) Gram-negative (GN) infections are associated with higher mortality and extended hospital stays. Time to effective antibiotic treatment is important for patient survival. Classifying the risk factors for CR GN BSI before identification and susceptibility results are known is critical; this study explores the risk factors associated with CR GN BSI in U.S. hospitals.

Methods. BSI caused by 11 of the most common GN pathogens were identified from 181 acute care hospitals that contributed microbiology and susceptibility test data to the Premier Healthcare Database 2010–2015. We used univariate analyses to select potential risk factors and a multivariate logistic regression model to predict CR BSI with these risk factors.

Results. Among 46,199 patients with GN BSI, 1,592 (3.6%) had CR pathogens. From univariate analyses, the significant factors (P-value <0.05) when comparing CR vs. carbapenem susceptible (CS) infections were age, race, gender, geographic location, admission source, Charlson Comorbidity Index, having BSI while in the ICU or after having stayed in the ICU, and index culture day. Adjusted odds ratios (OR) from multiple logistic regression are shown below.

Effect	OR	95% Confidence Limits	
Compared with 65-years-of-age (yoa)			
18–54	2.3	2.0	2.6
55–64	1.6	1.4	1.9
Male vs. female	1.2	1.05	1.3
Black vs. non-Black	1.2	1.04	1.3
Index culture >48 hours post-admission	2.9	2.5	3.3
Transferred vs. other admission source	2.0	1.7	2.3
Infection in/after ICU	1.5	1.3	1.8
Compared with New England			
East South Central	1.9	1.4	2.7
Middle Atlantic	1.5	1.1	1.9
Mountain	3.1	2.2	4.2
Pacific	1.0	0.8	1.3
South Atlantic	0.8	0.6	1.05
West North Central	0.7	0.5	1.02
West South Central	0.8	0.6	1.05
Myocardial infarction	0.6	0.4	0.8
Congestive heart failure	1.2	1.1	1.4
Peripheral vascular disease	1.3	1.14	1.6
Cerebrovascular disease	0.6	0.4	0.8
Dementia	1.3	1.1	1.4
Renal disease	2.3	1.9	2.8
Malignancy	1.5	1.3	1.7

Conclusion. Patients with CR GN BSIs were more likely to be of a younger age group, transferred from a health care facility, stayed in ICU, and had positive BSI culture more than 48 hours after admission. Risk of CR BSI increased for patients with congestive heart failure, peripheral vascular disease, dementia, renal disease, and any malignancy.

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2164. A Feasibility Study to Investigate the Spread of Antimicrobial Resistance in the Community Suggests Ongoing Dissemination Within Households

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Background. Despite the escalating level of concern regarding the spread of Carbapenem resistant and Extended spectrum β-lactamase (ESBL) producing Enterobacteriaceae (CR-E and ESBL-E), little is still known about their dissemination within households. In this small cohort study, four households were followed-up for 6 months, to track their carriage and spread after discharge.

Methods. Inpatients at Guy's and St Thomas Hospital with confirmed diagnosis of CR- or ESBL-*Klebsiella pneumoniae* infection were approached for recruitment. Inclusion criteria were met only if each household member consented to participate. Each member was then asked to provide a stool sample, a hand swab and to complete a medical history questionnaire. Environmental samples were collected from three different common house areas. Baseline sampling was carried out before patient discharge and subsequently at 1, 2, 3, and 6 months. Colonisation was confirmed by isolation of resistant organisms onto chromogenic agar and organisms identified by Maldi-Tof. Resistance genes were detected by multiplex real-time PCR and resistance profile confirmed by standard susceptibility testing.

Results. A total of 196 inpatients were screened, 58 (29.6%) met the inclusion criteria and 27 (13.7%) were approached. Of these, 6 households (3%) were included in the study. Among them, three were followed-up at all five time-points, one at for time points, while other two were lost to follow-up at T0 and T1, respectively. In three households, discharged patients remained colonised with ESBL-*K. pneumoniae* for all duration of the study. In these patients co-colonisation with ESBL-*E. coli* was also detected at one or more time points after discharge. In these three households, at least one of the other members resulted colonised with one of these two organisms at least at one time point. Furthermore, in three households, *K. pneumoniae* carrying the same resistance genes than inpatients was also isolated from the environment at T1 and at T2.

Conclusion. This study illustrates the challenges, and suggests ongoing household dissemination of resistant bacteria following discharge from hospital. The dynamics of carriage and household dissemination remain to be elucidated.

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2165. Risk Factors for CPE Colonization in Household Contacts of CPE Colonized/Infected Patients

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