**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 SACHII 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 per hospital-day [0.0; 9.4]; risk of central line-associated primary bloodstream infections [0.0%; 10.3%]; incisional hernia rate per 1,000 surgical procedures [1.1%; 6.1%]; catheter-associated urinary tract infections [0.0%; 6.3%]; and incidence density rate of HAI per 1,000 patient-days [10.8; 35.7]. Surgical site infection benchmarks: Cesarean section [0.0; 9.4]; central line-associated bloodstream infection [0.0%; 6.3%]; exploratory abdominal surgery [4.1%; 5.3%]; craniotomy [5%; 6.5%]; abdominal hysterectomy [0.7%; 4.1%]; and thoracic surgery [0.8%; 1.5%]; hip prosthesis [3%; 4.3%]; knee prosthesis [2.3%; 3.5%]; pacemaker surgery [1.9%; 3.1%]; breast surgery [0.3%; 0.9%]; bile duct, liver or pancreatic surgery [7%; 9%]; 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.

**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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**Session:** 237. Healthcare Epidemiology: HAI Surveillance

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**Background.** Geographic variability of antibiotic-resistant (AR) healthcare-associated infections (HAIs) has been reported. This study aimed to identify factors influencing these geographic differences.

**Methods.** We used data from the CDC’s Antibiotic Resistance Patient Safety Atlas, 2018. For each HAIR, we calculated the percentage of HAIs in each state. We then used multivariable linear regression to identify factors associated with HAIR, controlling for other factors such as state demographics and healthcare indicators.

**Results.** In our analysis, we found that the percentage of HAIs in each state was significantly associated with the state’s population density, the percentage of residents with a college education, and the percentage of residents with health insurance. Additionally, states with higher rates of poverty had lower rates of HAIs.

**Conclusion.** Our findings suggest that geographic variability of AR HAIs is influenced by a combination of factors, including population density, education levels, and healthcare access.

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

| 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                             | 1.3   | 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              |
| Periperal vascular disease                  | 1.3   | 1.1 1.4              |
| 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, stay in ICU, and had positive BSI culture more than 48 hours after admission. Risk of CR BSIs increased for patients with congestive heart failure, peripheral vascular disease, dementia, renal disease, and any malignancy.

### 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-R 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 four 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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