Results. The methicillin resistance rate of *S. aureus* decreased from 59.4% (2007) to 48.6% (2016), and the decreasing trend kept significant through the study period but 2009 (mean annual decrease: 1.2%, $P < 0.05$). Inpatients of hospital B had higher age ($\beta = 0.01$, $P < 0.001$), and more male ($\beta = 0.005$, $P < 0.05$), but their resistance rate was not significantly higher ($\beta = 0.05$, $p = 0.12$) compared with hospital A. Age stratified analysis for all hospitals found the youngest group (younger than 35 years old) of both sex had steadily low resistance rates through the period, while the older groups had higher rates, but their rates decreased continuously.

Conclusion. The methicillin resistance rates of *S. aureus* decreased throughout 2007 to 2016 except 2009. The patients of the hospitals newly joining JANIS were higher in age, but the resistance rate of *S. aureus* was not statistically different from the hospitals having joined JANIS before 2014. Also, among JANIS member hospitals, older patients had higher resistance rates than younger patients, but their rates were continuously decreasing.

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2474. The 10 Years Scientific Contribution of the Cologne Cohort of Neutropenic Patients (CoCoNut) for Evaluating Treatment and Outcome of Healthcare-associated Infections

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Session: 260. HAI: Surveillance, International
Saturday, October 5, 2019: 12:15 PM

Background. Healthcare-associated infections (HAIs) are a leading cause for morbidity and mortality in neutropenic patients.

Methods. The Cologne Cohort of Neutropenic Patients (CoCoNut) is an ongoing, prospective, longitudinal cohort, collecting inpatient data for analysis of epidemiology, risk factors, and outcome of neutropenic patients (at least one day of absolute neutrophil count < 500/µL) at risk for HAIs. The CoCoNut contains comprehensive data, i.e. patient characteristics, medication, chemotherapy, clinical data (e.g., diarrhea, body temperature), as well as laboratory, microbiological, virologic, and radiological results. The purpose of this cohort is to improve the knowledge on HAIs and management of anti-infective prophylaxis and therapy.

Results. To date, the CoCoNut includes 8,176 inpatient stays from 3,354 neutropenic patients treated at the hematology/oncology department of the University Hospital of Cologne between January 2009 and December 2018. Hodgkin and Non-Hodgkin lymphoma (32%), acute leukemia (28%), and chronic leukemia (10%) were the predominant underlying diseases; comprising 843/8,176 (10%) inpatient stays with allogenic stem cell transplantation. The overall number of neutropenic days and fever days (body temperature ≥ 38 °C) was 56,824 and 25,347, respectively. Blood stream infections (occurrence of fever and positive blood culture) occurred in 1,283/8,176 (16%) inpatient stays, and the overall mortality rate was 9% ($n = 716/8,176$). By now, 17 peer-reviewed articles analyzing epidemiology, treatment, and outcome of HAIs were published based on data from the CoCoNut.

Conclusion. Data extracted from the CoCoNut underlines the important role of evaluating innovative treatment strategies. Considering the remaining high infection rate for HAIs of neutropenic patients, the growing development of antimicrobial drug resistance, and the existing powerful methods for data processing (e.g., artificial intelligence), we will continue to utilizing and expanding the CoCoNut in the future.

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

2475. Incidence of Multidrug-Resistant, Extensively Drug-Resistant and Pandrug-Resistant Gram-Negative Bacteria in Brazilian Intensive Care Units

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Session: 260. HAI: Surveillance, International
Saturday, October 5, 2019: 12:15 PM

Background. The Centers for Disease Control and Prevention (CDC) proposed standard definitions for acquired resistance in bacterias. Resistant bacteria were categorized as multidrug-resistant (MDR), extensively drug-resistant (XDR) and pandrug-resistant (PDR). This study describes the incidence of Gram-negative MDR, XDR and PDR in 12 private and adult intensive care units (ICU's) from Belo Horizonte, Minas Gerais, the sixth most populated city in Brazil, with approximately 3 million inhabitants.

Methods. Data were collected between January/2013 to December/2017 from 12 ICU's. The hospitals used prospective healthcare-associated infections (HAI) surveillance protocols, in accordance to the CDC. Antimicrobial resistance from six Gram-negatives, causing nosocomial infections, were evaluated: *Acinetobacter sp., Klebsiella sp., Proteus sp., Enterobacter sp., Escherichia coli,* and *Pseudomonas sp.*. We computed the three categories of drug-resistance (MDR+XDR+PDR) to define benchmarks for the resistance rate of each Gram-negative evaluated. Benchmarks were defined as the superior limits of 95% confidence interval for the resistance rate.

Results. After a 5 year surveillance, 6,242 HAI strains were tested: no pan-drug-resistant bacteria (PDR) was found. *Acinetobacter sp.* was the most resistant Gram-negative: 206 strains from 1,858 were XDR (11%), and 1,638 were MDR (88%). *Pseudomonas sp.*: 41/1,159 = 3.53% XDR; 180/1,159 = 15.53% MDR. *Klebsiella sp.*: 2/1,566 = 0,1% XDR; 813/1,566 = 52% MDR. *Proteus sp.*: 0/507 = 0% XDR; 163/507 = 32% MDR. *Enterobacter sp.*: 0/471 = 0% XDR; 148/471 = 31% MDR. *Escherichia coli*: 0/681 = 0% XDR; 157/681 = 23% MDR. Benchmarks for the global resistance rate of each Gram-negative (MDR+XDR+PDR): *Acinetobacter sp.* = 92%; *Klebsiella sp.* = 62%; *Proteus sp.* = 40%; *Enterobacter sp.* = 48%; *Escherichia coli* = 33%; *Pseudomonas sp.* = 30%.

Conclusion. This study has calculated the incidence of Gram-negative MDR, XDR and PDR, and found a higher incidence of MDR *Acinetobacter sp.,* with an 88% multiresistance rate. Henceforth, developing countries healthcare institutions must be aware of an increased risk of infection by *Acinetobacter sp.*. Benchmarks have been defined, and can be used as indicators for healthcare assessment.

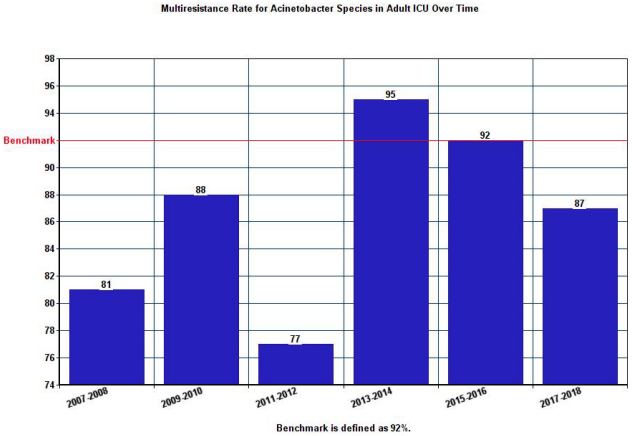

Table 2 - Benchmarks and Multiresistance Rates for Each Nosocomial Bacterium

Microorganism	Total of Tested Strains	Multiresistant Strains	Multiresistance Rate	Benchmark
Acinetobacter sp.	1858	1638	88%	92%
Klebsiella sp.	1566	815	52%	62%
Proteus sp.	507	163	32%	40%
Enterobacter sp.	471	148	31%	48%
E. coli	681	157	23%	33%
Pseudomonas sp.	1159	221	19%	30%

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2476. External and Internal Validation of the Healthcare-associated Infection Data in the Korean National Healthcare-associated Infectious Surveillance System (KONIS)

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Session: 260. HAI: Surveillance, International
Saturday, October 5, 2019: 12:15 PM

Background. National surveillance data should be validated to identify data quality issues. This study tested the validity of healthcare-associated infection (HAI) data in the Korean National Healthcare-associated Infections Surveillance System (KONIS), intensive care unit (ICU) module.

Methods. The validation process consisted of external (EV) and internal (IV) validation phases. For the 10 hospitals that were selected based on the HAI rate, among the 193 participating hospitals between July 2016 and June 2017, both EV and IV were performed. For the EV, the validation team reviewed 295 medical records of 60 patients with reported HAIs, including 20 urinary tract infections (UTIs), 27 bloodstream infections (BSIs), and 13 cases of pneumonia (PNEU), and 235 patients with no reported HAI during 1-day visits conducted in November and December 2017. The reviewer's diagnosis of HAI was regarded as the reference standard. IV was conducted by the staff of each hospital and evaluated whether UTI or BSI were present. Primary IV was performed for 279 patients who were subject to EV. Secondary IV was performed on 203 patients in another 11 selected participating hospitals that did not report HAIs to KONIS during the 1-year study period.

Results. In the EV, the diagnosis of UTI in the participating hospitals had a sensitivity of 72.0% and specificity of 99.3%. The sensitivity of BSI and PNEU was 63.2% and 70.6%, respectively, and specificity was 98.8% and 99.6%. The agreement (kappa) between the EV and primary IV was significant, with $\kappa = 0.754$ for UTI and $\kappa = 0.674$ for BSI. The results of the secondary IV showed that the hospitals that had no reports of HAI had few hospital beds and performed few blood or urine culture tests. In the secondary IV, eight UTIs and three BSIs were newly diagnosed in three hospitals, respectively. The reasons for not reporting the HAIs were presumed to be a lack of understanding of the surveillance standards and fear of the disadvantages of disclosing the HAI.

Conclusion. This study shows the need for ongoing validation and continuous training of surveillance personnel to maintain the accuracy of surveillance data. We also confirmed that IV can be used as an alternative monitoring method to examine validity and accuracy.

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2477. Antimicrobial Resistance patterns of *Enterobacteriaceae* and *Pseudomonas aeruginosa* from Colombian clinical isolates. 2017–2018

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Session: 260. HAI: Surveillance, International
Saturday, October 5, 2019: 12:15 PM

Background. The Study for Monitoring Antimicrobial Resistance Trends (SMART) is a worldwide initiative to monitor in vitro susceptibility of clinical Gram-negative isolates to several antimicrobial agents. Surveillance initiatives are essential to provide real-world evidence to support local guidelines development. Colombia has participated since 2012 with isolates from complicated intrabdominal infections (cIAI), complicated urinary tract infections (cUTI) and respiratory tract infections (RTI). This study describes resistant patterns of *Escherichia coli* (Eco), *Klebsiella pneumoniae* (Kpn) and *Pseudomonas aeruginosa* (Pae) clinical isolates collected in Colombian hospitals in a 2 years period (2017–2018).

Methods. Isolates from patients with cIAI, cUTI and RTI were collected. Identification confirmation was done in central laboratory. Minimum inhibitory concentrations (MIC) were performed by broth microdilution and interpreted according to 2018 CLSI guidelines, same criteria for Extended-spectrum β-lactamase (ESBL) classification. The antimicrobial activity was evaluated for aztreonam (ATM), ceftolozane/tazobactam (C/T), ceftazidime (CAZ), colistin (COL), ertapenem (ETP), cefepime (FEP), imipenem (IMP), meropenem (MEM) and piperacillin–tazobactam (TZP).

Results. During 2017–2018, 1492 isolates were collected. The main organism was Eco (51%) followed by Kpn (29%) and Pae (20%). In vitro susceptibility activity is presented in Table 1. COL, C/T, ETP, MEM and IPM exhibited over 95% susceptibility in Eco. ESBL prevalence was 18% for Eco (53/314) and 22% for Kpn (36/165). COL and C/T were the most active agents against Pae isolates. For Kpn, $MIC_{50/90}$ values were: MEM (0.12 / 8), C/T (0.5 / 8) and for TZP (8 / > 64), meanwhile for Pae were MEM (0.5 / 32), C/T (0.5 / 32) and for TZP (8 / > 64).

Conclusion. Continued antimicrobial resistance surveillance initiatives are critical to guide the empiric treatments decision in a multidrug resistance era. This study shows that Ceftolozane/Tazobactam, MEM and COL have the best susceptibility profile against Eco, Kpn and Pae of cIAI, cUTI and RTI cases in Colombia. The C/T susceptibility rates and low MIC distribution provide evidence to support its use as a non-carbapenem therapeutic alternative for Gram-negative infections.

Table 1

Escherichia coli, Klebsiella pneumoniae and Pseudomonas aeruginosa in vitro susceptibility (%S), Colombia 2017-2018

Organism	ATM %S	C/T %S	CAZ %S	COL %S	ETP %S	FEP %S	IPM %S	MEM %S	TZP %S
Escherichia coli (767)	81.52	97.77	82.33	98.55	96.52	82.12	96.24	97.44	89.24
Klebsiella pneumoniae (n=428)	62.62	77.12	65.96	98.52	75.90	65.20	77.03	78.17	64.25
Pseudomonas aeruginosa (n=297)	64.59	86.26	76.51	99.05	-	76.51	63.03	66.45	71.39

Aztreonam (ATM), Ceftolozane/Tazobetam (C/T), Ceftazidime (CAZ), Colistin (COL), Ertapenem (ETP), Cefepime (FEP), Imipenem (IPM), Meropenem (MEM), Piperacillin/Tazobactam (TZP)

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2478. Surveillance of antibacterial resistance among clinical isolates from hospitals in Shanghai: results of 2018

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Session: 260. HAI: Surveillance, International
Saturday, October 5, 2019: 12:15 PM

Background. To investigate the current state of antibacterial resistance of clinical isolates from hospitals in Shanghai, China.

Methods. Antimicrobial susceptibility testing (AST) was carried out for the clinical isolates from 50 hospitals (including 30 grade A tertiary hospitals and 20 grade B tertiary hospitals/grade A secondary hospitals, and there were 3 children hospitals among them) according to a unified protocol using Kirby–Bauer(KB) method or automated AST systems. Results were analyzed according to CLSI 2018 breakpoints.

Results. Of the 144373 clinical isolates, Gram-positive cocci and Gram-negative bacilli accounted for 29.6% and 70.4%, respectively. The overall prevalence of MRSA in *Staphylococcus aureus* was 45.9% and 78.4% for MRCNS in coagulase-negative *Staphylococcus*. No strains were found resistant to vancomycin in *Staphylococcus* spp. 84.1% of the 1204 strains of non-meningitis *S. pneumoniae* isolated from children were penicillin-susceptible (PSSP), 15.9% were penicillin-nonsusceptible, including penicillin-intermediate (PISP, 10.5%) and penicillin-resistant (PRSP, 5.4%) strains. Of the 361 strains isolated from adults, 94.5%, 3.0% and 2.5% were PSSP, PISP, and PRSP, respectively. Vacomycin-resistance *E. feacium* was 0.7% and no vacomycin-resistant *E. feacalis* were identified. According to PCR results, most of these resistant strains were *van*A genotype. The prevalence linezolid-nonsusceptible *E. faecalis* was about 1.6%, few *E. feacium* was resistant to Linezolid. The overall prevalence of ESBL-producing strains was 54.0% in *E. coli*, 35.0% in *Klebsiella pneumoniae* and 47.1% in *Proteus mirabilis*. *Enterobacteriaceae* isolates were still mainly susceptible to carbapenems. Overall, 11.7% and 11.2% of the *Enterobacteriaceae* isolates were resistant to imipenem and meropenem, respectively. The predominant organism of CRE isolates was *K. pneumoniae*. The prevalence of CRAB and CRPA were 62.5% and 28.7%, respectively.

Conclusion. Antimicrobial resistance remains to be a problematic issue in healthcare settings, especially in Gram-negative bacilli, effective infection-control measures should be promoted to tackle this critical threat.

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2479. Trends and Regional Differences in Extended Spectrum β-lactamase (ESBL)-producing Enterobacteriaceae, 2012–2017

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Session: 261. HAI: Surveillance, Regional
Saturday, October 5, 2019: 12:15 PM

Background. Extended spectrum β-lactamase-producing Enterobacteriaceae (ESBLs) have been identified as a serious antibiotic-resistant threat. Studies have shown that ESBL infection rates were increasing through 2014. Our objective was to examine more recent ESBL trends and to evaluate differences across regions in the United States.

Methods. We measured the incidence of positive clinical cultures from inpatient encounters in a cohort of hospitals submitting data to the Premier Healthcare Database and Cerner Health Facts from 2012 through 2017. We included *Escherichia coli* and *Klebsiella* spp. cultures and defined ESBL as non-susceptibility to cefotaxime, ceftriaxone, ceftazidime, or cefepime. Cultures collected on days 1, 2, or 3 of hospitalization were considered community-onset (CO); cultures from day 4 or later were considered hospital onset (HO). We developed weights using a raking procedure to match the American Hospital Association distribution for acute care hospitals based on US census division, bed size category, teaching status, and urban/rural designation. We used weighted multivariable logistic regression adjusting for hospital characteristics to examine trends and regional differences in ESBL rates.

Results. In 2017, the estimated rate of ESBLs was 40.3 per 10,000 discharges for CO and 6.4 per 10,000 discharges for HO; 86% of all ESBLs were CO. The percent that were ESBLs among all included cultures increased for CO (8.2% in 2012 to 11.6% in 2017) and HO (13.1 to 16.8%) cultures. From 2012 – 2017, adjusted ESBL rates increased for CO (7.9% annually, $P < 0.0001$), while HO rates did not change significantly over time ($P = 0.39$, Figure 1). We found significant regional differences in the rates of ESBL ($P < 0.0001$) across US census divisions in 2017 (Figure 2). Estimated rates for 2017 varied 5-fold from 15.3 ESBLs per 10,000 discharges in the Northwest Central to 82.4 ESBLs in the Mid-Atlantic.

Conclusion. We estimated a 40% increase in the rate of CO-ESBLs among hospitalized patients from 2012 to 2017, but no increase in HO rates. ESBL rates varied greatly by region of the country and are estimated as much as 5× higher in some areas. A better understanding of factors contributing to community transmission and regional variation is necessary in order to inform ESBL prevention efforts.