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Background. Carbapenem-resistant Enterobacteriaceae (CRE) are an urgent US public health threat. CDC reported CRE incidence to be 2.93/100,000 population in 2012–2013 in selected sites but changed the CRE surveillance case definition in 2016 to improve sensitivity for detecting carbapenemase-producing (CP) CRE. We describe CRE epidemiology before and after the change.

Methods. Eight CDC Emerging Infections Program sites (CO, GA, MD, MN, NM, NY, OR, TN) conducted active, population-based CRE surveillance in selected counties. A case was defined as having an isolate of E. coli, Enterobacter, or Klebsiella meeting a susceptibility phenotype (figure) at a clinical laboratory from urine or a normally sterile body site in a surveillance area resident in a 30-day period. We collected data from medical records and defined cases as community-associated (CA) if no healthcare risk factors were documented. A convenience sample of isolates were tested for carbapenemase genes at CDC by real-time PCR. We calculated incidence rates (per 100,000 population) by using US Census data. Case epidemiology and the proportion of CP-CRE isolates in 2015 versus 2016 were compared.

Results. In total, 442 incident CRE cases were reported in 2015, and 1,149 cases were reported in 2016. Most cases were isolated from urine: 87% in 2015 and 92% in 2016 (P < .001). The crude overall pooled mean incidence in 2015 was 2.9 (range: 0.4–7.19) and in 2016 was 7.49 (range: 3.13–13.93). The most common CRE genus was Klebsiella (51%) in 2015, and in 2016 was Enterobacter (41%, P < 0.001). Of the subset of CRE isolates tested at CDC, 109/227 (48%) were CP-CRE in 2015 and 109/551 (20%) were CP-CRE in 2016. In 2015, 52/442 (12%) of cases were CA CRE, and in 2016, 267/1,149 (23%) were CA CRE (P < 0.001). In 2016, 3/111 (2.7%) of CA CRE isolates tested were CP-CRE.

Conclusion. A large increase in reported CRE incidence was observed after the change in the case definition. The new case definition includes a substantially larger number of Enterobacter cases. A decrease in CP-CRE prevalence appears to be driven by an increase in non-CRE CRE cases. Although CP-CRE in the community still appear to be rare, a substantial proportion of phenotypic CRE appear to be CA, and CDC is undertaking efforts to further investigate CA CRE, including CP-CRE.

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1763. Estimating Median Survival Time to Central Line-Associated Bloodstream Infection (CLABSI) Among Patients in Intensive Care Units Reported to National Healthcare Safety Network (NHSN) Minn Soe, MBBS, MPH1 and Jonathan R. Edwards, MStat2, 3Centers for Disease Control and Prevention, Atlanta, Georgia and 4Division of Healthcare Quality Promotion, Centers for Disease Control and Prevention, Atlanta, Georgia

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Background. Duration of free line of central- line-associated bloodstream infection (CLABSI) in a hospital may vary by type of patient population. We estimated patients’ median time to CLABSI by intensive care unit (ICU) type among acute care hospitals.

Methods. The study population was ICU patients whose CLABSI data were reported to National Healthcare Safety Network (NHSN) in 2016 under the reporting requirement of the Centers for Medicare and Medicaid. The unit of analysis was ICU location, not an individual patient. We conducted competing risk survival analysis method to compute time (day) to a CLABSI beginning from day 1 of first reporting month in 2016 in a given ICU location. Once a CLABSI occurred in a location, the start time of follow-up was reset to day 1 after the date of event. The Cox regression method was used to explore the hospital and location-level characteristics that are potentially associated with the daily hazard of CLABSI for an ICU. We also assessed the proportionality hazard assumption of these factors. Adjusting for the vector of means of covariates, we then estimated median time to CLABSI by ICU location type, which is defined as follow-up time (days) by which 50% of events have happened in a given ICU type.

Results. In 2016, 6,935 ICUs at 3,384 hospitals reported CLABSI data to NHSN, with a total of 10,985 CLABSIs and 2,449,361 follow-up time in days. Factors associated with an increased daily hazard of CLABSI were the following: admission to a hospital with a large bed size, major teaching status, and admission to a patient care location with a higher device utilization ratio (Table 1). Adjusted survival curves showed that median time to event (median CLABSI-free time) among ICUs ranged from 66 days (level III neonatal ICU), 90 days (burn units) to 275 days (oncology units), and 284 days (cardiothoracic units) (Table 2, Figure 1).

Conclusion. The study demonstrated that ICUs with level III care for neonatal patients and ICUs with burn patients were least likely to achieve the target of “zero” infection in a defined period and may warrant further targeted interventions. Similar research to investigate infection control performance through estimating median infection-free time is needed beyond ICUs and across multiple ICU types and facility settings.

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Table 1: Facility and location-level characteristics associated with daily hazard of CLABSI and their p-values estimated from Cox regression model, NHSN, 2016

Table 2: Facility and location-level characteristics associated with daily hazard of CLABSI and their p-values estimated from Cox regression model, NHSN, 2016

Table 3: Facility and location-level characteristics associated with daily hazard of CLABSI and their p-values estimated from Cox regression model, NHSN, 2016

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1762. The Adjusted Ranking Metric (ARM) and Its Use in Composite Measures for HAI Prevention in the National Healthcare Safety Network (NHSN) Mathew R. Sapiano, PhD, Jonathan R. Edwards, MStat and Daniel Pollock, M.Div,Division of Healthcare Quality Promotion, Centers for Disease Control and Prevention, Atlanta, Georgia

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Background. The National Healthcare Safety Network (NHSN), developed and used by the Centers for Disease Control and Prevention (CDC) for surveillance of healthcare-associated infections (HAIs), provides benchmark measures, such as standardized infection ratio (SIRs), that CDC and its partners in healthcare and public health use for prevention purposes. NHSN provides benchmarks for each HAI measure separately, but a composite measure that is flexible, customizable, and transparent. The current implementation of the framework is intended to assist in prevention efforts and can be easily modified to include cost weights, if desired. Flexibility in weighting the HAIs provides an opportunity for different stakeholders to customize the composite measure to their own needs.

Methods. We introduce a framework for calculating a composite HAI measure that is flexible, customizable, and transparent. The current implementation of the framework is intended to assist in prevention efforts and can be easily modified to include cost weights, if desired. Flexibility in weighting the HAIs provides an opportunity for different stakeholders to customize the composite measure to their own needs.

Conclusion. A composite measure provides a meaningful measure of overall facility performance that is less prone to the biases that afflict simple combinations of SIRs.
1764. The Gut: A Veiled Reservoir for Multidrug-resistant Organisms (MDROs) Below the Tip of the Iceberg

Below the Tip of the Iceberg

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1764. The Gut: A Veiled Reservoir for Multidrug-resistant Organisms (MDROs)

had a positive clinical culture for any target MDRO during their MICU stay (table).

of subsequent study samples were positive for that MDRO. Only 13 (5.8%) patients

19.8% ESBL, 4.4% CRPA, and 0.7% CRAB. New MDRO acquisition was observed in 58

19.8% ESBL, 4.4% CRPA, and 0.7% CRAB. New MDRO detected in any study sample, 82.2%

length of MICU stay was 3 (3–4) days. A total of 156 (37.8%) patients had a target

completed microbiologic analysis. Median (IQR) patient age was 65 (51–75) years and

patients) and included here data from 413 unique admissions (397 patients) with com-

results during MICU stay were extracted from the hospital information

Results.

We collected 5,086 study samples from 1,661 unique admissions (1,419

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Background. Clinical culture results are sometimes used to estimate the burden of

MDROs in hospitals. The association between positive clinical culture results and prevalence of MDROs in the gut is incompletely understood.

Methods. Rectal swab or stool samples were collected daily from adult medi-

ci-cal intensive care unit (MICU) patients and cultured for target MDROs using selec-

tive media between January 2017 and January 2018 at Rush University Medical

Center, New York, New York and

PhD

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Table. Comparison of study and clinical culture results for target MDROs

No. (%) of patients with a positive culture for a target MDRO during MICU stay

| Study | Clinical | Study or Clinical (Denominator) |
|-------|----------|---------------------------------|
| VRE   | 92 (98.9)| 5 (5.4)                         |
| CRE   | 27 (100) | 1 (3.7)                         |
| ESBL  | 82 (100) | 4 (4.9)                         |
| CRPA  | 17 (94.4)| 2 (11.1)                        |
| CRAB  | 2 (66.7) | 1 (33.3)                        |
| TOTAL | 220 (98.7)| 13 (5.8)                       | 223

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1765. Use of a Natural Language Processing-Based Informatics Pipeline for Infectious Disease Syndrome Surveillance

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Background. Automated surveillance for infectious disease syndromes (IDS) in hospitals mostly relies on structured data (e.g., diagnosis codes). Natural language processing (NLP) enables screening and concept extraction from large repositories of unstructured data (e.g., clinician notes). We demonstrate the use of an NLP-based pipeline to improve case finding for a specific IDS (urinary tract infection [UTI]) and compare this to surveillance using ICD-10 codes.

Methods. Inpatient hospitalizations in 2016 with ICD-10 codes for UTI at a children’s hospital were identified. Records of inpatients with positive urine cultures for 2016 were reviewed to identify missed cases. Notes for inpatient hospitalizations for 2016 were processed using an NLP pipeline. The NLP pipeline receives real-time data, accounts for institution-specific document structure, performs named-entity recognition on clinical problems/symptoms, and matches these terms to concept unique identifiers (CUI) in the unified medical language system (UMLS). We used the UMLS CUI for urinary tract infections (C0040290) to identify notes of interest. To minimize false positives, we selected as the threshold for case positivity—the mean UTI CUI mentions per patient during 2016.

Results. Among 10,681 hospitalized patients, there were 181 unique patients that were identified with UTI using ICD-10 codes. An additional 85 UTI cases were identified using chart review of positive urine cultures (n = 409). A total of 289,344 notes were screened by the NLP pipeline to identify UTI patients. Using the predefined threshold (n = 6), all cases of UTI identified by ICD-10 screening were detected by the NLP-based method. Of the additional cases missed by ICD-10 codes, 84 of 85 (98.9%) were positive by the NLP-based method. To identify these 84 true cases, an additional 275 charts without UTI, flagged as positive by the NLP method, would have to be reviewed (ratio of ~1:3).

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