measures to minimize the economic impact of these infections and improve clinical outcomes in hospitalized patients.

| Table 1. LOS and Hospital Cost |
|-------------------------------|
|                            | Mean (SD) | Median | P-value |
| Hospital LOS (days)          |           |        |         |
| MDR PA                       | 21 (19)   | 14     | <0.0001 |
| Non-MDR PA                   | 17 (16)   | 12     |         |
| CR PA                        | 22 (20)   | 14     | <0.0001 |
| Non-CR PA                    | 17 (16)   | 12     |         |
| Hospital Costs (US $)        |           |        |         |
| MDR PA                       | 91,178 (106,913) | 51,845 | 0.0007  |
| Non-MDR PA                   | 69,116 (74,389)  | 39,973 |         |
| CR PA                        | 85,819 (101,457) | 49,135 | 0.0007  |
| Non-CR PA                    | 61,434 (62,717)  | 39,632 |         |

**Disclosures.** Derek MacFadden, PhD, MS; Sarah McGough, MSc; and John Brownstein, PhD; the Emerging Infections Program Network, Centers for Disease Control and Prevention, Atlanta, Georgia, Florida Emerging Infections Program, Tallahassee, Florida, and Minnesota Emerging Infections Program, Saint Paul, Minnesota. No reported disclosures.

470. Antibiotic Resistance Increases with Local Temperature

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**Background.** Antibiotic resistance is considered as one of our greatest emerging public health threats. Current understanding of the factors governing spread of antibiotic-resistant organisms and mechanisms among populations is limited.

**Methods.** We explored the roles of local temperature, population density, and additional factors on the distribution of antibiotic resistance across the United States, using a database of regional antibiotic resistance that incorporates over 1.6 million bacterial isolates from human clinical isolates over the years 2013–2015.

**Results.** We identified that increasing local temperature as well as population density were associated with increasing antibiotic resistance in common pathogens. An increase in temperature of 10°C was associated with increases in antibiotic resistance of 4.2%, 2.2%, and 3.6% for the common pathogens Escherichia coli, Klebsiella pneumoniae, and Staphylococcus aureus. The effect of temperature on antibiotic resistance was robust across almost all classes of antibiotics and pathogens and strengthened over time.

**Conclusion.** These findings suggest that current forecasts of the burden of antibiotic resistance could be significant underestimates in the face of a growing population and warming planet.

471. Molecular Characterization of Carbapenem-Resistant Enterobacteriaceae in the USA, 2011–2015

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**Background.** Carbapenem-resistant Enterobacteriaceae (CRE) are a group of multidrug-resistant bacteria that cause ~9,000 infections annually; ~50% of CRE bloodstream infections are fatal. The use of contact precautions (CP) for CRE patients can prevent transmission. To improve CRE surveillance and interfacility communication about positive patients, Illinois implemented the extensively drug-resistant organism (XDRO) registry in 2013. Healthcare facilities must report a patient’s first positive CRE culture per stay ≤7 days from culture confirmation. Facilities can query the registry at patient admission to identify CRE status and implement transmission precautions. We assessed facility timeliness of reporting and querying frequency and registry usefulness in identifying patients who should be on CP.

**Methods.** We analyzed Chicago XDRO data for November 2013–October 2016. Variables were facility type (hospital, long-term acute care hospital (LTACH), and skilled nursing facility (SNF)), culture date, and report date. Timeliness was time from culture collection to reporting. Nine facilities (2 hospitals, 4 LTACHs and 3 SNFs) completed a survey on querying frequency, all but 1 LTACH provided single day census and contact precaution lists. We compared these with the XDRO registry to identify CRE patients for whom querying would have initiated CP use.

**Results.** Chicago facilities reported 2,469 CRE cases. Median timeliness varied by facility type (hospitals: 8 days; SNF: 10 days; and LTACH: 55 days). Of patients on CP for CRE but not reported to the registry, 11/12 (92%) were in LTACHs. Reported querying frequency was daily for 1 hospital and rarely for other facilities. Overall, 91 patients at 8 facilities were in the registry; of these, 0/1 (0%) hospital, 3/27 (11%) LTACH, and 28/63 (44%) SNF patients were not on CP.

**Conclusion.** Timeliness of reporting CRE patients to the XDRO registry varied by facility type and exceeded the 7-day timeframe. Routine registry querying can identify CRE patients who should be on CP. Querying was uncommon in surveyed facilities, identifying an opportunity to improve transmission precautions among CRE patients, particularly in SNFs. We recommend facilities report cases in a timely manner and query the registry at patient admission.

**Disclosures.** Derek MacFadden, PhD, MS; Sarah McGough, MSc; and John Brownstein, PhD. Infectious Diseases, University of Toronto, Toronto, ON, Canada; Harvard School of Public Health, Boston, Massachusetts; and University of Toronto, Toronto, ON, Canada, "Harvard Medical School, Boston, Massachusetts.

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**Background.** Carbapenem-resistant Enterobacteriaceae (CRE) have emerged as an important cause of healthcare-associated infections. We characterized the molecular epidemiology of CRE in isolates collected through the Emerging Infections Program (EIP) at the Centers for Disease Control and Prevention (CDC).

**Methods.** From 2011–2015, 8 U.S. EIP sites (CO, GA, MD, MN, NY, NM, TN, and OR) collected CRE (Escherichia coli, Enterobacter aerogenes, Enterobacter cloacae complex, Klebsiella pneumoniae, and Klebsiella oxytoca) isolated from a normally sterile site or urine. Isolates were sent to CDC for reference antimicrobial susceptibility testing and real-time PCR detection of carbapenemase genes (blaKPC, blaNdm-1, and blaOXA-48). Phenotypically confirmed CRE were analyzed by whole genome sequencing (WGS) using an Illumina MiSeq benchtop sequencer.

**Results.** Among 639 Enterobacteriaceae evaluated, 414 (65%) were phenotypically confirmed as CRE using CDC’s current surveillance definition (resistant to ertapenem, imipenem, doripenem, or meropenem). Among isolates confirmed as CRE, 303 (73%) were carbapenemase-producers (CP-CRE). The majority of CP-CRE originated from GA (39%), MD (35%) and MN (11%); most non-CPE CREs originated from MN (27%), CO (25%) and OR (17%). K. pneumoniae was the predominant carbapenemase-producing species (78%) followed by E. cloacae complex spp (12%), E. coli (7%), E. aerogenes (0.9%) and K. oxytoca (0.6%). The most common carbapenemase genes detected were blaKPC, (76%) and blaOXA-48 (19%); blafra, and blamce genes were detected in 1.6% and 0.3% of isolates, respectively. For carbapenemase-producing K. pneumoniae, Enterobacter spp, and E. coli, the predominant sequence types (ST) were ST258 (65%), ST17 (35%) and ST31 (29%), respectively.

**Conclusion.** The distribution of CP and non-CP CRE varied across the catchment sites. Among CP-CRE, KPC-producing K. pneumoniae predominated; other carbapenemases were rarely identified in the locations under surveillance. Strain types known to have increased epidemic potential (ST258 and ST131) were common among carbapenemase-producing K. pneumoniae and E. coli isolates, respectively.

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472. Instituting Public Health Laboratory Surveillance for Methicillin-resistant Staphylococcus aureus (MRSA), Extended-Spectrum β-Lactamase Producing Enterobacteriaceae (ESBL), and Carbapenem-resistant Enterobacteriaceae (CRE) in a Large Metropolitan County

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**Background.** Healthcare facilities must report a patient’s first positive CRE culture per stay ≤7 days from culture confirmation. Facilities can query the registry at patient admission to identify CRE status and implement transmission precautions. We explored the roles of local temperature, population density, and additional factors on the distribution of antibiotic resistance across the United States, using a database of regional antibiotic resistance that incorporates over 1.6 million bacterial pathogens from human clinical isolates over the years 2013–2015.

**Results.** We identified that increasing local temperature as well as population density were associated with increasing antibiotic resistance in common pathogens. An increase in temperature of 10°C was associated with increases in antibiotic resistance of 4.2%, 2.2%, and 3.6% for the common pathogens Escherichia coli, Klebsiella pneumoniae, and Staphylococcus aureus. The effect of temperature on antibiotic resistance was robust across almost all classes of antibiotics and pathogens and strengthened over time.

**Conclusion.** These findings suggest that current forecasts of the burden of antibiotic resistance could be significant underestimates in the face of a growing population and warming planet.
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Background. The community spread of multi drug-resistant organisms (MDROs) presents a significant public health threat. The Orange County Health Care Agency (OHCFA) is collaborating with the Centers for Disease Control and Prevention (CDC) on a countywide decolonization collaborative involving 38 healthcare facilities. To characterize our county's MDRO epidemiology and assess the effectiveness of these efforts, the OCHCA instituted local mandatory reporting for Methicillin-resistant Staphylococcus aureus (MRSA), extended-spectrum β-lactamase producing Enterobacteriaceae (ESBL), and carbapenem-resistant Enterobacteriaceae (CRE).

Methods. In July 2016 a health officer order was signed requiring all laboratories serving any county hospital, long-term acute care hospital (LTAC), or skilled nursing facility (SNF), to report all ESBL- and CRE-positive laboratory results, and all inpatient MRSA-positive reports to OHCFA. For this analysis, we reviewed reports received from July 2016 to March 2017.

Results. 12 laboratories serving 24 of 32 hospitals, all 3 LTACs, and 65 of 72 SNFs have been routinely reporting electronically. To date, we validated MDRO data from 13 hospitals, all LTACs, and all SNFs by comparing with parallel reporting systems. Validated hospitals reported 98 MRSA- and 115 ESBL-positive blood culture events. SNFs reported 754 ESBL-culture positive events from all culture types.

| Table 1. MDROs Reported to OHCFA |
|---------------------------------|
| Facility | Culture Type | CBE | ESBL | MRSA |
| - | - | - | - | - |
| Validated Hospital (13) | Screening | 0 | 84 | 1671 |
| Clinical | 50 | 118 | 720 |
| Blood | 7 | 115 | 79 |
| Unin | 26 | 903 | 71 |
| Total | 50 | 1265 | 2373 |
| LTAC (3) | Screening | 73 | 4 | 223 |
| Clinical | 4 | 219 | 129 |
| Blood | 8 | 27 | 73 |
| Unin | 10 | 18 | 8 |
| Total | 118 | 223 | 352 |
| SNF (65) | Screening | 0 | 0 | 0 |
| Clinical | 36 | 754 | 165 |
| Blood | 36 | 683 | 83 |
| Unin | 36 | 754 | 165 |

Conclusion. MDROs are significant causes of invasive disease in Orange County. ESBL colonization or infection was commonly identified in SNF residents, highlighting the need for improved infection control and antibiotic use in these settings. Comprehensive wide surveillance provided objective data to assess the magnitude of MDROs. Local public health surveillance for CRE, ESBL, and MRSA can be effectively instituted in a large community, but is resource-intensive and requires extensive facility outreach.

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474. 2015 NHSN CAUTI Definition Change and Its Impact on CLABSI Rates at an Academic Medical Center

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Background. The National Healthcare Safety Network (NHSN) revised their catheter-associated urinary tract infection (CAUTI) definition in January 2015 to exclude funguria. This definition change led to an increase in diagnosis of catheter-related fungemia in other health systems, due to the exclusion of CAUTI as an attributable source. We evaluated the effect of the NHSN CAUTI definition change on central line-associated blood stream infection (CLABSI) rates at our hospital.

Methods. This is a retrospective study that was conducted at an 1,154-bed academic medical center. We looked at the trend of our house-wide and intensive care unit (ICU) CLABSI and CAUTI incidence rates (IR) from January 2013 to December 2016. Our institutional vascular access policy was updated in 2016 to revise insertion and maintenance practices and introduce new guidelines for drawing blood cultures in setting of central lines.

Results. With the 2015 CAUTI definition, our house-wide CAUTI IR decreased by > 75% from 2014 to 2015 (3.42 to 0.92 per 1,000 catheter days (CD); P < 0.05). Conversely, there was an initial increase in our house-wide CLABSI IR from 2014 to 2015 (1.34 to 2.1 per 1,000 CD, P < 0.05), followed by a significant decline to 1.31 per 1,000 CD in 2016 (P < 0.05). Similarly, our ICU CLABSI IR increased slightly in 2015 (1.93 to 1,000 CD, P < 0.05) followed by a significant decline in 2016 (1.83 to 1.91 per 1,000 CD, P < 0.05, Table 1). This initial increase in our ICU CLABSI IR in 2015 was mainly driven by gram-positive organisms. Despite exclusion of yeast as pathogens from the 2015 CAUTI definition, our rates of catheter-related fungemia remained relatively stable (Figure 1).

Conclusion. The 2015 NHSN CAUTI definition resulted in a significant decline in our CAUTI rates. We did not see a sustained increase in our CLABSI rates as reported by other health systems. In fact, our CLABSI rates and catheter-related fungemia rates decreased in 2016. This could be related to implementation of new vascular access guidelines and CLABSI prevention efforts.

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Table 1: Incidence rates (IR) per 1000 catheter days using applicable NHSN definition

| Year | House-wide CAUTI IR | House-wide CLABSI IR | ICU CAUTI IR | ICU CLABSI IR |
|------|---------------------|----------------------|--------------|---------------|
| 2012 | 4.96                | 1.54                 | 3.75         | 2.02          |
| 2014 | 3.42                | 1.34                 | 2.54         | 1.59          |
| 2015 | 0.92                | 2.1                  | 0.78         | 1.83          |
| 2016 | 0.80                | 1.31                 | 1.06         | 0.91          |

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