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 (XDR) 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 XDR 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 submitted 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 timeline varied by facility type (hospitals: 8 days; SNF: 10 days; and LTACH: 55 days). Of patients on CP for 1+ days, 60% did not report to the registry. 14% 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.

470. Antibiotic Resistance Increases with Local Temperature
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Background. Antibiotic resistance is considered 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.

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