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Detection of carbapenem-resistant Enterobacteriaceae (CRE) clusters in Tennessee healthcare facilities in 2018 using space-time scan statistic

Background/Significance: Carbapenem-resistant Enterobacteriaceae (CRE) are a family of bacteria that are resistant to carbapenems, a class of antibiotics typically used to treat severe bacterial infections. CRE is most likely to be acquired in healthcare settings. In Tennessee, healthcare providers are required to report cases of CRE to the local, regional, or state health department. These cases are documented using the National Electronic Disease Surveillance System (NEDSS). Timely detection of potential CRE clusters can help prevent the spread of these dangerous infections in hospitals, nursing homes, and other healthcare facilities.

Methods: Using SaTScan, a free software capable of analyzing space-time data, a retrospective analysis reviewed all 2018 Tennessee CRE cases reported in NEDSS to detect potential clusters within healthcare facilities lasting one to 28 days. For each cluster, SaTScan generated an expected number of cases, which was then compared to the number of observed cases. All CRE cases were analyzed together to detect clusters containing organisms of one or more genera. Cases involving the three most common genera (Enterobacter, Escherichia, and Klebsiella) were analyzed separately to detect within-facility clusters of a single genus.

Findings: SaTScan detected 28 distinct clusters involving two to eight patients each (68 patients total). Genus-specific analyses of

Enterobacter, Escherichia, and Klebsiella cases detected five, three, and five clusters, respectively. While clusters of a single genus may reveal the spread of a single organism within a facility, clusters containing multiple genera could indicate lacking infection prevention (IP) practices either in the facility where the cluster was detected or in other facilities that routinely transfer patients to the cluster facility.

Conclusion: SaTScan is a free tool that health departments can use to identify potential clusters of CRE within healthcare facilities. Based on findings, facility IP policies and practices can be evaluated to help prevent future transmission.

