

Background: Extended-spectrum β -lactamase-producing Enterobacteriaceae (ESBL-Ent) have emerged as a significant antimicrobial-resistance threat in the community in recent years. To better characterize ESBL-Ent in the community, we examined associations between community-associated ESBL-Ent incidence rates and area-based socioeconomic status (SES) characteristics. **Methods:** Cases were identified through active, laboratory- and population-based surveillance for ESBL-Ent in 3 Emerging Infections Program (EIP) sites (New Mexico, New York, and Tennessee) from October through December 2017. We defined a case as first isolation of *Escherichia coli*, *Klebsiella pneumoniae*, or *K. oxytoca* from a normally sterile body specimen or urine in a surveillance-site resident, with resistance to ≥ 1 extended-spectrum cephalosporin and nonresistance to all carbapenems tested. Epidemiologic data were abstracted from medical records. Cases were considered community associated if no significant prior healthcare exposures (ie, inpatient healthcare facility stay, surgery, chronic dialysis, indwelling devices, or external catheters) were documented. Case residential addresses were geocoded and linked to US Census Bureau data to obtain census-tract level SES measures. Census tracts were dichotomized by the percentage living in rural areas (0–49% or $\geq 50\%$); census tracts were stratified into quartiles for all other characteristics. Incidence rate ratios (IRR) for each measure, controlling for EIP site, were calculated using Poisson regression. **Results:** Among 742 ESBL-Ent cases with medical records available, 355 (47.1%) were community associated; of these, 327 case addresses (92.1%) were successfully geocoded. The combined annualized 2017 incidence rate for community-associated ESBL-Ent was 83.2 cases per 100,000 persons. The highest incidence of community-associated ESBL-Ent was seen in census tracts with the lowest median income (IRR, 1.4; 95% CI, 1.0–2.0) and with the highest percentages of persons without health insurance (IRR, 1.3; 95% CI, 1.0–1.7), with <12th-grade education (IRR, 1.5; 95% CI, 1.1–2.1), living in urban areas (IRR, 1.5; 95% CI, 1.0–2.2), foreign-born (IRR, 1.4; 95% CI, 1.0–2.0), or speaking limited English (IRR, 1.5; 95% CI, 1.1–2.0). There were no significant differences across quartiles for population density, income inequality, the percentage of the population living below poverty, or the percentage of households with crowding (>1 occupant or room). **Conclusions:** Social determinants of health, such as coverage for healthcare, appear to be important contributors to community-associated ESBL-Ent transmission. Higher rates in areas with more foreign-born persons and persons with limited English proficiency suggest a role for recent travel in importation and spread in specific communities. These findings provide additional information about the epidemiology of ESBL-Ent in the community and have potential implications for control efforts.

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Artificial Neural Networks Applied to Prediction to Assess the Likelihood of Surgical Site Infection in Different Surgeries

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Background: Based on data obtained from hospitals in the city of Belo Horizonte (population $\sim 3,000,000$), we evaluated relevant factors such as death, age, duration of surgery, potential for contamination and surgical site infection, plastic surgery, and craniotomy. The possibility of predicting surgical site infection (SSI) was then analyzed using pattern recognition algorithms based on MLP (multilayer perceptron). **Methods:** Data were collected by the hospital infection control committees (CCIHs) in hospitals in Belo Horizonte between 2016 and 2018. The noisy records were filtered, and the occurrences were analyzed. Finally, the predictive power of SSI of 5 types MLP was evaluated experimentally: momentum, backpropagation standard, weight decay, resilient propagation, and quick propagation. The model used 3, 5, 7, and 10 neurons in the occult layer and with resamples varied the number of records for testing (65% and 75%) and for validation (35% and 25%). Comparisons were made by measuring the AUC (area under the curve (range, 0–1)). **Results:** From 1,096 records of craniotomy, 289 were usable for analysis. Moreover, 16% died; averaged age was 56 years (range, 40–65); mean time of surgery was 186 minutes (range, 95–250 minutes); the number of hospitalizations ranged from 1 (90.6%) to 8 (0.3%). Contamination among these cases was rated as follows: 2.7% contaminated, 23.5% potentially contaminated, 72.3% clean. The SSI rate reached 4%. The prediction process in AUCs ranged from 0.7 to 0.994. In plastic surgery, from 3,693 records, 1,099 were intact, with only 1 case of SSI and no deaths. The average age for plastic surgery was 41 years (range, 16–91); the average time of surgery was 218.5 minutes (range, 19–580 minutes); the number of hospitalizations ranged from 1 (77.4%) to 6 times (0.001%). Contamination among these cases was rated as follows: 27.90% potential contamination, 1.67% contaminated, and 0.84% infected. The prediction process ranged in AUCs from 0.2 to 0.4. **Conclusions:** We identified a high noise index in both surgeries due to subjectivity at the time of data collection. The profiles of each surgery in the statistical analyses were different, which was reflected in the analyzed structures. The MLP for craniotomy surgery demonstrated relevant predictive power and can guide intelligent monitoring software (available in www.sacihweb.com). However, for plastic surgeries, MLPs need more SSI samples to optimize outcomes. To optimize data collection and to enable other hospitals to use the SSI prediction tool, a mobile application was developed.

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