Regional Difference of Extended-spectrum β-lactamases (ESBLs) Susceptibility in USA Hospitals in 2015-2016

**Abstract**

We examined the regional differences in susceptibility of ESBL-producing E. coli (EC), K. pneumoniae (KP), and P. mirabilis (PM) isolates in different settings. Methods: We analyzed an electronic research dataset of Becton, Dickinson & Company from January 1, 2015 to June 30, 2016. All non-duplicate EC, KP, and PM isolates (first isolate of a species per 30-day period) from all sources were categorized as ESBL-positive per clinical or intermediate/resistant to either ceftriaxone, cefotaxime, cefazidime, or ceftepime. Positive isolates were categorized into 3 settings by the specimen collection time: a) Admission: within 3 days of an inpatient admission and no previous admission within 14 days; b) Ambulatory (either a or b); Geographic regions were classified into NHSN categories. Results: The overall ESBL rate was 6.5% (50,932/787,777). The ESBL rates for admission, hospital-onset settings, and hospital-onset cultures were 5.9% (30,377,653), 12.5% (128,106,704), and 13.5% (115,583,682), respectively. Compared to Region 10, all regions, except for “Other”, had significantly higher ESBL rates, ranging from 4.1% to 7.8% (all p<0.01) for admission; from 7.1% to 11.8% (all p<0.01) for admission and 15.2% to 17.5% (all p<0.01) for hospital-onset cultures. Conclusions: ESBL rates were highest in the hospital setting with significant regional differences. The highest ESBL region had a rate approximately twice that of the lowest region in all three settings. Regional and setting differences in ESBL epidemiology should be considered when making empiric antibiotic treatment decisions.

**Methods**

We analyzed an electronic research dataset of Becton, Dickinson & Company from January 1, 2015 to June 30, 2016. All non-duplicate EC, KP, and PM isolates (first isolate of a species per 30-day period) from all sources were categorized as ESBL-positive per the clinical or intermediate/resistant to either ceftriaxone, cefotaxime, cefazidime, or ceftepime. Positive isolates were categorized into 3 settings by the specimen collection time: a) Admission: within 3 days of an inpatient admission and no previous admission within 14 days; b) Ambulatory (either a or b); Geographic regions were classified into NHSN categories.

**Background**

Each year in the United States, at least 2 million people acquire serious infections with bacteria that are resistant to one or more of the antibiotics commonly used to treat those infections. The CDC has categorized pathogens exhibiting extended-spectrum β-lactamases (ESBLs) of serious concern and required prompt and sustained action to ensure the problem does not grow.

**Results**

The overall ESBL rate was 6.5% (50,932/787,777). The ESBL rates for admission, hospital-onset settings, and hospital-onset cultures were 5.9% (30,377,653), 12.5% (128,106,704), and 13.5% (115,583,682), respectively. Compared to Region 10, all regions, except for “Other”, had significantly higher ESBL rates, ranging from 4.1% to 7.8% (all p<0.01) for admission; from 7.1% to 11.8% (all p<0.01) for admission and 15.2% to 17.5% (all p<0.01) for hospital-onset cultures.

**Conclusions:** ESBL rates were highest in the hospital setting with significant regional differences. The highest ESBL region had a rate approximately twice that of the lowest region in all three settings. Regional and setting differences in ESBL epidemiology should be considered when making empiric antibiotic treatment decisions.

**Limitations**

These data were collected from the laboratory information system feeds provided by participating hospitals and relied on interpretative results at each hospital’s own discretion. The ESBL definition for this evaluation differed from CLSI recommendations in that we included intermediate or resistant to ESBL (see Methods).

**References**


