
Lindsay Hamilton, MPH
CDC/CSTE Applied Epidemiology Fellow
New Jersey Department of Health

Objectives

- Participants will...
  1. Understand the threat of CRE and usefulness of having CRE surveillance
  2. Gain insight into CRE incidence and laboratory practices in New Jersey

Danger of CRE

- Nationally, carbapenem-resistant Enterobacteriaceae (CRE) infections are estimated to have 50% mortality or higher, based on underlying conditions and length of stay
- CRE detected in approximately 5% of acute care hospitals in the US (using CLABSI and CAUTI date from NHSN)
  ▪ This percentage is estimated to be 10% in Northeastern states
- CDC’s latest Vital Signs (Aug 2015), outlined the need for a coordinated facility approach

CRE in the Media

- California outbreak highlights problem of antibiotic resistance
- National summary data
- CDC has become resistant to all or nearly all available antibiotics
- Executive Order - Combating Antibiotic-Resistant Bacteria
• Carbapenem-Resistant Enterobacteriaceae are gram negative family of bacteria
  ▫ Includes many species including the more notable Escherichia coli, Klebsiella pneumoniae, Enterobacter spp., Serratia spp., and Proteus spp.

• CRE are either resistant to carbapenem antibiotics or produce an enzyme that destroys it (carbapenemase)
  ▫ There are 11 or more types of carbapenemases found in carbapenemase-producing CRE (CP-CRE)
  ▫ The two most problematic in the US are KPC (Klebsiella pneumoniae carbapenemase) and NDM (New Delhi Metallo-beta-lactamase)

Background on CRE

Spread of CRE
• KPC and NDM are spreading across US, as are others like OXA-48 (an OXA-type carbapenemase) and VIM (Verona Integron-Mediated Metallo-beta-lactamase)

Methods
• Survey was developed in Hippocrates, a NJ-specific application aimed at capturing, managing, displaying, and disseminating health information

Methods
• Survey question topics included: susceptibility testing practices and cutoffs used, known or estimated rate of CRE positive isolates, species isolated, and notification of clinical team

Methods
• Survey was sent electronically to all acute care hospital laboratory directors and supervisors
  ▫ Distribution list provided by NJ Public Health and Environmental Laboratories

Methods
• Survey results were exported and summarized in Microsoft Excel 2010 and SAS 9.3
Survey had a 78% response rate with 56 out of 72 acute care hospitals participating.

Forty-one hospitals performed their own susceptibility testing.
- Fifteen others used commercial labs or affiliated hospital labs.

For the testing criteria, 30 hospitals used non-susceptibility to one or more carbapenems AND resistance to all third-generation cephalosporins.
- 15 hospitals used just non-susceptibility to one or more carbapenem.

Results-Susceptibility Cutoffs Utilized

- **CLSI 2012 through 2014 (M100-S22 through M100-S24):** 3 (9%)
- **CLSI 2009 (M100-S19):** 20 (56%)
- **CLSI 2010 through 2011 (M100-S20 through M100-S21):** 28 (50%)
- **Other/Unknown:** 5 (15%)

Results-Reason for Sample Collection

- **Clinical:** 45 (80%)
- **Clinical and Screening:** 7 (13%)
- **Other/Unknown:** 4 (7%)
Results-Test Type

- For specific types of tests used, the most common culture test was **Modified Hodge** test, and the most common non-DNA assay was the **Vitek 2** testing system.

![Chart showing test types](image)

Results-Rate and Organisms

- Median estimated rate of CRE in NJ in hospitalized patients tested was **1.31%** (Range=0-7%)

![Bar chart showing CRE rate](image)

- The top 3 bacteria for CRE positive isolates were **Klebsiella spp., Enterobacter spp., and Escheria coli**

![Map showing CRE rates by county](image)
Results-Capacity and Communication

- There were 33 (59%) hospitals that had PCR testing capabilities, which is relevant for future testing of carbapenemase production
- There were 19 (34%) hospitals that currently tested for carbapenemase production, although not all the time
- There were 50 (89%) hospitals that had a protocol for informing someone on the clinical team
  - Of those, 34 (68%) of informed the infection preventionist (IP) or nursing team

Limitations

- Not all hospitals knew their numerator and denominator data, so about 52% of hospitals had to estimate their CRE rate
- Possible volunteer bias
- Possible misclassification bias due to varied susceptibility cutoffs used

Conclusion

- This survey was the first study to assess CRE rates and testing in New Jersey
- Hospitals can also compare where they stand in their testing practices and capabilities when the results of the survey are disseminated back to the NJ hospitals
- NJDOH is more informed of the species to consider for future CRE reporting considerations

Next Steps

- NJDOH is now in the process of sending out a second survey directed at acute care hospital IPs
  - This survey will be aimed at assessing common practice for CRE positive patients and also other cases of resistant organisms
- Together with the lab survey results, NJDOH will gain a more complete preliminary picture of hospital practice and prevention of CRE and other resistant organism infections
- Further studies should be conducted for more reliable and accurate results
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Questions?

Lindsay Hamilton
New Jersey Department of Health
Lindsay.hamilton@doh.state.nj.us
609-826-5964