

Surveying for Superbugs: A Survey on Carbapenem-Resistant *Enterobacteriaceae* (CRE) Rates and Laboratory Practices in New Jersey, 2014

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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 data 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

9,000 DRUG-RESISTANT INFECTIONS PER YEAR

600 DEATHS

7,900 CARBAPENEM-RESISTANT KLEBSIELLA SPP

1,400 CARBAPENEM-RESISTANT E. COLI

CRE HAVE BECOME RESISTANT TO ALL OR NEARLY ALL AVAILABLE ANTIBIOTICS

NATIONAL SUMMARY DATA

Estimated minimum number of illnesses and deaths caused by antibiotic resistance:

- 2,049,442 illnesses
- 23,000 deaths

Estimated minimum number of illnesses and deaths due to carbapenem-resistant *E. coli* (CRE) and carbapenem-resistant *Klebsiella* spp. (CRK), by priority related to antibiotic use and resistance:

- 250,000 illnesses
- 14,000 deaths

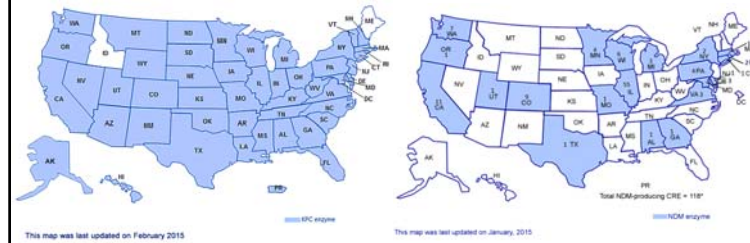
WHERE DO INFECTIONS HAPPEN?

Background on CRE

- 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)

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

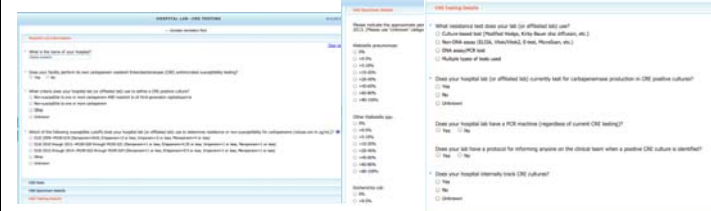
- Survey was developed in Hippocrates, a NJ-specific application aimed at capturing, managing, displaying, and disseminating health information



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

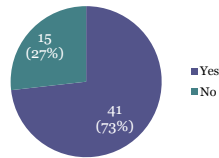


- Survey results were exported and summarized in Microsoft Excel 2010 and SAS 9.3

Results-Overall Response and Testing

- 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

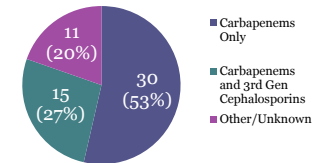
Performed Susceptibility Testing at Facility?



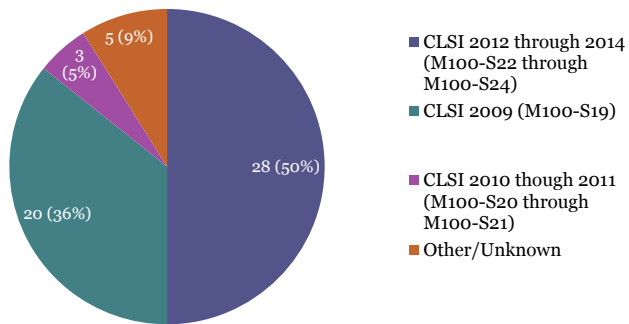
Results-Susceptibility Definition

- 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

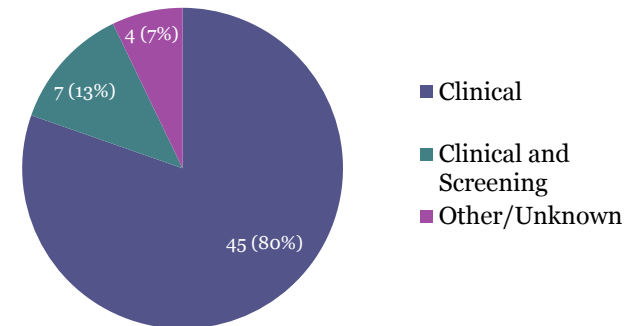
Antibiotic Included in Clinical Case Definition



Results-Susceptibility Cutoffs Utilized

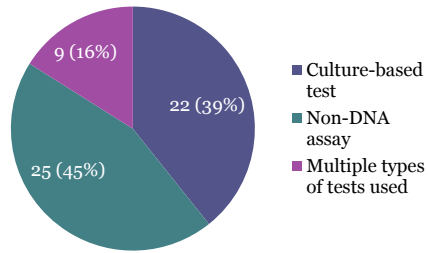


Results-Reason for Sample Collection



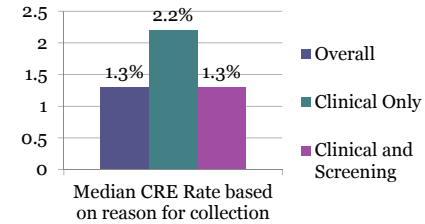
Results-Test Type

- 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



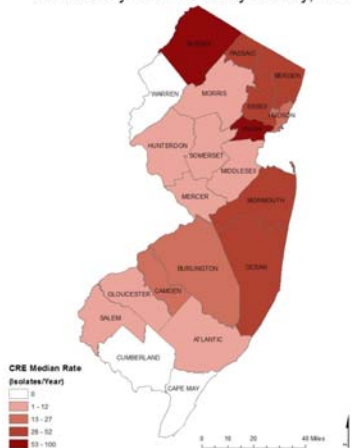
Results-Rate and Organisms

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

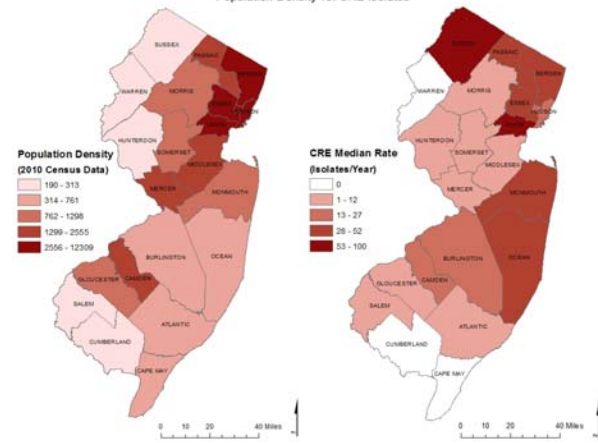


- The top 3 bacteria for CRE positive isolates were *Klebsiella* spp., *Enterobacter* spp., and *Escheria coli*

New Jersey CRE Rates by County, 2014



Population Density vs. CRE Isolates



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

Acknowledgments

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Questions?

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