Two years of Population-based Surveillance for Carbapenem-resistant Enterobacteriaceae (CRE) in Bernalillo County, NM, 2014-2015

Erin Phripps DVM, MPH,1 Nicole Kenslow MPH,1 Emily Hancock MS2
1New Mexico Emerging Infections Program, 2University of New Mexico, 3High Desert Epidemiology

Introduction

Background: New Mexico initiated surveillance for carbapenem-nonsusceptible Enterobacteriaceae (CRE) and Acinetobacter baumannii in Bernalillo County in 2013 as part of the Emerging Infections Program (EIP) Multi-site Gram Negative Surveillance Initiative (MuGSI).

Methods: Active, laboratory- and population-based surveillance was conducted in Bernalillo County, NM. We defined CRE as Escherichia coli, Enterobacter spp, or Klebsiella spp nonsusceptible to ≥1 carbapenem (excluding ertapenem) and resistant to all 3rd generation cephalosporins tested, and CRAB as A. baumannii nonsusceptible to ≥1 carbapenem (excluding ertapenem) isolated from normally sterile sites or urine. Medical record reviews were conducted on incident cases, and a convenience sample of isolates underwent PCR for common carbapenemases at CDC.

Case Definition

Species | Definition of carbapenem-nonsusceptibility
---|---
Escherichia coli | Intermediate or resistant to imipenem (MIC ≥2), meropenem (MIC ≥2), or doripenem (MIC ≥2)
Enterobacter aerogenes | Intermediate or resistant to imipenem (MIC ≥2), or doripenem (MIC ≥2)
Klebsiella pneumoniae | Intermediate or resistant to (if tested): ceftazidime (MIC ≥4), ceftriaxone (MIC ≥4), and cefotaxime (MIC ≥4)
Acinetobacter baumannii | Intermediate or resistant to (MIC ≥1): imipenem (MIC ≥2), or meropenem (MIC ≥2)

Results

Community Onset, Healthcare-Associated CRE

- 67% were collected in an outpatient setting (ER or outpatient clinic)
- Most had risk factors or relevant healthcare exposures in the prior year

Location of Culture Collection

- LTACH: 6%
- LTCF: 4%
- OP: 54%
- IP: 22%

Demographics

<table>
<thead>
<tr>
<th>Race/Ethnicity</th>
<th>MuGSI Cases</th>
<th>Bernalillo County Population</th>
</tr>
</thead>
</table>
| Hispanic | 5 (25) | 26 (50)
| Non-Hispanic White | 13 (65) | 45 (90)
| American Indian and Alaska Native | 1 (5) | 5 (10)
| Unknown | 1 (5) | 3 (6)

Isolate Characteristics

<table>
<thead>
<tr>
<th>Isolate Characteristics</th>
<th>n (%)</th>
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</thead>
<tbody>
<tr>
<td>Culture source:</td>
<td></td>
</tr>
<tr>
<td>- 62 urine</td>
<td></td>
</tr>
<tr>
<td>- 2 blood</td>
<td></td>
</tr>
<tr>
<td>- 3 blood</td>
<td></td>
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<tr>
<td>Four KPC-producing organisms identified</td>
<td></td>
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</tbody>
</table>

Clinical Characteristics

- 29% of the cases were considered colonized, not infected
- 58% had urinary tract infections
- Six cases were bacteremic
- Peritonitis, pyelonephritis, septic shock also seen
- Outcomes were generally good
- Three deaths

Hospitalized Cases

- 29% hospitalized at the time of, or within 30 days after culture.
- 40% had culture collected 4 or more days after admission
- Duration of hospitalization ranged from 1 – 217 days
- Median duration of hospitalization was 8 days
- 40% were discharged to a LTCF

Underlying Conditions

- No Underlying Conditions
- Urinary Tract Procedural/Infectious
- Diabetes
- Chronic Pulmonary Disease
- Chronic Kidney Disease
- Chronic Liver Disease
- Cancer
- Dehydration/Poor Nutrition
- Nutrition
- Obstructive Jaundice
- COPD
- Sickle Cell Disease
- Sickle Cell Anemia
- Cancer
- Cystic Fibrosis
- Heart Failure
- Neurological Problems
- Hypertension
- Hypothyroidism

Risk Factors

- 67% had at least one risk factor related to healthcare exposures, indwelling devices, or travel
- 12% had MuGSI culture collected >3 calendar days after hospital admission
- 71% had at least one underlying condition of interest

Carbapenemase-producing CRE (CP-CRE)

Four KPC-producing organisms identified, all from urine cultures

Demographics

<table>
<thead>
<tr>
<th>CP-CRE</th>
<th>n (%)</th>
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<tbody>
<tr>
<td>Female</td>
<td>4 (100)</td>
</tr>
<tr>
<td>Age 60-70</td>
<td>4 (100)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>1 (25)</td>
</tr>
<tr>
<td>Non-Hispanic White</td>
<td>2 (50)</td>
</tr>
<tr>
<td>American Indian and Alaskan Native</td>
<td>1 (25)</td>
</tr>
</tbody>
</table>

In year prior to culture date: CRE | CP-CRE | P-value*
<table>
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<tr>
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</thead>
<tbody>
<tr>
<td>Hospitalization</td>
<td>36 (45)</td>
<td>4 (100)</td>
</tr>
<tr>
<td>LTCF Residence</td>
<td>10 (12)</td>
<td>3 (75)</td>
</tr>
<tr>
<td>CRE Diagnosis</td>
<td>2 (3)</td>
<td>2 (50)</td>
</tr>
</tbody>
</table>

*Calculated using Fisher’s exact test

Conclusions

While two-thirds of cultures were collected in an outpatient setting, most cases had substantial prior healthcare exposures. 42% of CRE were found to produce a carbapenemase. CP-CRE may not have been found to be widespread in Bernalillo County, NM. Individuals with CP-CRE were significantly more likely to have been hospitalized, resided in a LTCF, or had a distinct CRE culture in the prior year. Most cases had prior stays in acute- or long-term care facilities. Among inpatients, 40% were discharged to a long-term care facility. Inter-facility communication and coordinated prevention and control efforts are essential to mitigating transmission of these organisms.

Contact Information

Erin Phripps, DVM, MPH
New Mexico Emerging Infections Program
(505) 272-6687
EPhripps@sauld.unm.edu