Experience with ESBL-Producing Enterobacteriaceae Treated with Carbapenems Compared to Other ß-Lactams: Outcomes Report from the SENTRY Antimicrobial Surveillance Program

RN JONES, SM BHAVNANI, PG AMBROSE, AH MUTNICK, HS SADER, TR FRITSCHE

The JONES Group/JMI Laboratories, North Liberty, IA; Cognigen, Buffalo, NY

ABSTRACT

Objectives: Confirmed ESBL organisms isolated in routine clinical specimens and bacteremia caused by a member of the family Enterobacteriaceae depends on several factors such as the will have a greater likelihood of a favorable outcome than patients infected with isolates that produce multiple ß-

MATERIALS AND METHODS (Continued)

Table 1. Observations available for analysis among evaluable cases (n=82).

<table>
<thead>
<tr>
<th>Treatment Group</th>
<th>Clinical Failures</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cephalosporin</td>
<td>9/39</td>
<td>1/39</td>
</tr>
<tr>
<td>Carbapenem</td>
<td>15/39</td>
<td>4/39</td>
</tr>
<tr>
<td>Other agents</td>
<td>1/54</td>
<td>1/54</td>
</tr>
</tbody>
</table>

RESULTS

• Patients were aged 19-82 years and died on follow up (range 0-464 days).

• Length of hospital stay was prolonged (average 20 days) and the hospitalization for patients in the carbapenem group was 40% longer than patients in the other treatment groups.

• The clinical failure rate (16%) of all treatments was less than the mortality rate (31%); the attributable mortality to the ESBL infection was only 9%, (9/109).

• The overall success rate was 81% in non-ß-lactam treatment groups (11/14) versus 74% in β-lactam treatment groups (42/57).

• The risk factors (independent variables) recorded most often for patients with ESBL infections were: 1) Hospital stay of > 10 days (81/82), 2) prior extended care facility stay (74/82), and 3) prior antimicrobials (81/82). All other risk factors recorded in < 5% of patients

• Most risk factors (independent variables) were not associated with clinical failure or patient mortality rates. "Only transplantations" were not significantly correlated with death. A trend toward a correlation was observed for "prior antimicrobials" for clinical failures (p = 0.01) and mortality (p = 0.04).

• Only 6% (61/82) ESBL infections escherichia coli were treated with carbapenem therapy.

• The most noted antibiotic class failure in treatment was the cephalosporin (piperacillin/tazobactam and meropenem) which was used in 30 (40%) cases in combination with a fluoroquinolone or ß-lactam/β-lactamase inhibitor (30/109; Table 2).

• Clinical failures rates varied from 0% for non-ß-lactam or ß-lactamase inhibitor combination treatments to 46% in patients treated with carbapenem therapy, which was significantly different from the other treatments (p = 0.001, Table 3).

• "Coliform" data comparable in all carbapenem treatments versus all other ß-lactam therapy showed nearly identical clinical and microbiologic mortality results (Table 4).

• Risk factors effecting outcomes (Table 5) when comparing "collapsed" carbapenem treatment group (11/54) and other ß-lactam treatment groups (30/57) showed a significant difference in mortality (p = 0.04) and infection control failures (p = 0.03), favoring the "collapsed" group therapy (especially for cephalosporins), and ventilator assistance was a near significant factor among carbapenem treated patients (p = 0.08).

CONCLUSIONS

- ESBL-producing isolates in the Enterobacteriaceae (E. coli, Klebsiella spp. and P. mirabilis) continue to produce significant morbidity and mortality (19%) among patients associated with long hospitalizations and receiving prior antimicrobial therapy.

- Carbapenem treatment, alone or in various combinations, has become the dominant regimen (62%) for ESBL infections in Europe and the Americas.

- Successful treatment was achieved for 94% of all cases, 80% for carbapenem-containing regimens, and 75% for cephalosporin regimens. Highest success rates were noted for non-ß-lactam or β-lactamase inhibitor combination treatments.

- Continued of this protocol to approximately 150 evaluable cases (with suitable case control) should ultimately assist in the understanding of (1) appropriate pharmacodynamic concentrations for the β-lactams and (2) outcomes related to pharmacodynamic targets in human subjects.

SELECTED REFERENCES

- Jones RN, JMI Laboratories, North Liberty, IA; Cognigen, Buffalo, NY


