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Adam P. Yagodinski
Jamie Gaul PharmD, BCPS
Dana Lorber PharmD, BCPS
Alissa Keillor PharmD

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Adam P. Yagodinski, PharmD Candidate¹; Jamie Gaul, PharmD, BCPS²; Dana L. Lorber, PharmD, BCPS²; Alissa Keillor, PharmD, BCPS²
1. Ohio Northern University Raabe College of Pharmacy, Ada, Ohio 2. Parkview Regional Medical Center, Fort Wayne, Indiana

OBJECTIVE

To evaluate and characterize the utilization of piperacillin/tazobactam in patients with a suspected urinary tract infection (UTI) at a community hospital in Fort Wayne, Indiana.

BACKGROUND

Antimicrobial stewardship is an effort that focuses on appropriate utilization of antibiotics, especially those with a broad spectrum. Piperacillin/tazobactam is a commonly utilized broad spectrum agent that has coverage of many gram negatives (including Pseudomonas aeruginosa), gram positives, and anaerobic organisms. It is used empirically for a wide range of infections from skin and soft tissue infections to nosocomial pneumonia. Many times, it is utilized inappropriately due to wrong indication, dose, and/or duration. The following table briefly highlights some published evaluations that have been performed in the past on piperacillin/tazobactam utilization.

<table>
<thead>
<tr>
<th>Authors</th>
<th>Year</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mehdad et al.²</td>
<td>2020</td>
<td>Appropriate use in 55% of cases</td>
</tr>
<tr>
<td>Shah et al.³</td>
<td>2013</td>
<td>Appropriate use in 71.5% of cases and 89% of inappropriate use was due to wrong empirical indication</td>
</tr>
<tr>
<td>Rawal et al.⁴</td>
<td>2006</td>
<td>Appropriate use in ~90% of cases</td>
</tr>
<tr>
<td>Antoine et al.⁵</td>
<td>2006</td>
<td>Appropriate use in 71% of cases</td>
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These studies contained a wide range of locations, patients, and specific focuses, but they all included an evaluation of how piperacillin/tazobactam was utilized. Use of this agent in UTIs was a small part of these analyses. The present medication use evaluation (MUE) of piperacillin/tazobactam was specifically aimed at evaluating the empiric use for UTIs.

METHODS

- Institutional review board exempt, single center, retrospective MUE
- Electronic collection: piperacillin/tazobactam was specifically aimed at evaluating the empiric use for UTIs
- Exclusion: received piperacillin/tazobactam for diagnosis other than UTI
- Inclusion: Total of 55% of patients had either no significant growth, E. coli, Klebsiella species, Proteus species, or other gram negatives. An additional 13.3% grew multiple organisms.
- Relevant pharmacy consults also yielded a shorter duration of therapy compared to those who did not receive such consults (2.5 ± 3.2 days)

RESULTS

• There were 10,528 patients in the initial electronic collection of patients who received piperacillin/tazobactam. A total of 8,965 patients were excluded based on exclusion criteria.
  - A total of 1,563 patients remained. A subset of 305 patients were randomly selected from this group.
  - During manual data collection, 36 patients were found to have received ≥2 independent courses of piperacillin/tazobactam during their admission. These patients were then excluded leaving a final study population of 264 patients.
  - Sixty one patients or 23.1% were labeled, “no culture,” but could have had a culture prior to receiving piperacillin/tazobactam, but it was not collected during the study encounter
  - Gives false impression that no culture was collected to guide therapy

- During the study encounter, 53% of patients grew gram negatives, 29.2% grew gram positives, 19.7% grew anaerobic organisms, and 1.6% grew yeast.
- Twenty-six patients or 10% grew gram negatives and yeast
- Nineteen patients or 7% grew gram positives and yeast
- Nine patients or 3.3% grew anaerobic organisms and yeast

- In conclusion, caution should be taken for patients with a suspected UTI who present from a SNF with a history of resistance.

DISCUSSION & CONCLUSIONS

- Patients with antibiotics in the last 90 days or chronic catheter were more likely to grow multiple cultures. Pseudomonas or E. coli were compared to their counterparts.
- Patients from SNF grew multiple organisms more often and those with a history of resistance grew more E. coli and multiple organisms than their counterparts.
- Excluding the “no culture” group, 55% grew organisms which would have been susceptible to a narrower agent
- Including patients who grew multiple organisms, the percentage increases to 68% of cases where a narrower agent, like ceftriaxone, could have been used empirically.
- Pharmacists were shown to shorten the duration of piperacillin/tazobactam by 0.7 days or 2 full doses
- This MUE is difficult to compare to other MUEs as it does not have matching parameters and it only focuses on its use in UTIs. Other MUEs reported a wide range from 55% to 90% of cases where piperacillin/tazobactam was appropriately used.
- An ID consult appeared to have little effect on duration of therapy compared to no ID consult (2.8 ± 2.9 days)

- Sixty one patients or 23.1% were labeled, “no culture,” but could have had a culture prior to receiving piperacillin/tazobactam, but it was not collected during the study encounter
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- Multiple organism cultures were not further analyzed to discern what organisms grew
- This occurred in 25 patients or 13.3% of the study population
- In conclusion, caution should be taken for patients with a suspected UTI who present from a SNF, but it was not collected during the study encounter
- Only 55-68% of these cases represented situations where either no treatment was merited, or ceftriaxone would have been an effective empiric agent.
- This MUE also reinforced the important role pharmacists play in antimicrobial stewardship.

REFERENCES