An antimicrobial prescription optimization system improves the adequacy of antimicrobial dosage in obese inpatients

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BACKGROUND

Obesity affects the pharmacokinetics of antibacterials (Abx). As a consequence, Abx are frequently underdosed in obese patients which may increase the risk of unfavorable outcomes. Antimicrobial stewardship programs can improve the use of Abx in obese inpatients. The aim of this study was to analyze the impact of an antimicrobial stewardship intervention on Abx optimal dosing in obese inpatients.

METHODS

This study included all hospitalized adults receiving selected Abx in a 677-bed hospital in Quebec, Canada between 08/2008 and 08/2013. Data were retrospectively collected from Antimicrobial Prescription Surveillance System (APSS), a computerized decision support system. We evaluated the number of inappropriate days of Abx treatment per 1000 hospitalized-patients days and the proportion of inappropriate days of Abx treatment per total days of Abx treatment. Pre-intervention rates (2008-10) were compared to post-intervention rates (2010-13) in non-obese (BMI<30), obese (30<BMI<39.9), and morbidly obese (MO) (BMI≥40) patients.

RESULTS

A total of 40,605 hospitalizations with Abx were included in the study: 78% (31,614) concerned non-obese patients, 16% (6,481) obese patients, and 6% (2,510) MO patients.

The most frequently prescribed Abx for MO patients were piperacillin-tazobactam, cefazolin, vancomycin, and ciprofloxacin.

Regardless of the weight of patients, APSS had a positive impact on dosing optimization on several classes of Abx. In morbidly obese patients, the effect was the most important on penicillins with or without β-lactamase inhibitor and fluoroquinolones. Improving Abx prescriptions in morbidly obese patients is important since suboptimal dosing could be associated with unfavorable outcomes.

Table 1. Mean percentage of days of inappropriate treatment (dose and frequency) according to BMI and Abx classes (iv), before and after the implementation of APSS

<table>
<thead>
<tr>
<th>BMI &lt; 30 kg/m²</th>
<th>BMI 30-39.9 kg/m²</th>
<th>BMI ≥ 40 kg/m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-</td>
<td>Post-</td>
<td>Difference</td>
</tr>
<tr>
<td>Mean (%)</td>
<td>Mean (%)</td>
<td>(%)</td>
</tr>
<tr>
<td>Aminoglycosides</td>
<td>57.9</td>
<td>54.0</td>
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<tr>
<td>Penicillins</td>
<td>14.5</td>
<td>13.8</td>
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<td>Carbapenems</td>
<td>35.5</td>
<td>43.0</td>
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<tr>
<td>Cephalosporins</td>
<td>8.5</td>
<td>5.6</td>
</tr>
<tr>
<td>Fluoroquinolones</td>
<td>9.6</td>
<td>8.1</td>
</tr>
</tbody>
</table>

*Significant difference in mean percentage (Student t-test) (p<0.05) **p<0.001

Including β-lactamase inhibitors

ACKNOWLEDGEMENTS

Stéphanie Sirard has co-founded Lumed Inc. (www.lumed.ca), the company that commercializes APSS in Canada. He is also a shareholder and medical advisor to Lumed Inc.

Vincent Nault has co-founded Lumed Inc. He is also a shareholder and CEO to Lumed Inc.

REFERENCES