ABSTRACT

Background: Resistance of Pseudomonas aeruginosa (PA) isolates to imipenem and meropenem (Group 2 carbapenems) has been well documented in acute care hospitals. Literature review suggests a decrease in susceptibility of PA to imipenem and meropenem in these acute care hospitals is associated with an indiscriminate use of group 2 carbapenems as formulary antibiotics. However, there is limited research on the development of resistance to carbapenem antibiotics in PA isolates in long term acute care hospitals (LTACHs). The aim of this study is to analyze the change in susceptibility pattern of Pseudomonas aeruginosa to various antibiotics in a long term acute care hospital in Metropolitan Detroit from 2007 to 2013.

Methods: Minimum Inhibitory Concentrations (MICs) of various antimicrobials including imipenem, cefepime, tobramycin and gentamycin to PA was retrieved from the microbiology database from 2007 to 2013 at an LTACH in Detroit. The only carbapenems used as formulary antibiotics at this LTACH over all these years were group 2 carbapenems (imipenem and meropenem). Unique blood and urine isolates were included for analysis. Linear graphs were plotted to indicate the trend. Chi square test was used to calculate the p value.

Results: A decrease in susceptibility to imipenem was observed in PA isolates during the study period. The susceptibility of PA to imipenem decreased from 71% in 2008 (n= 140) to 56% in 2013 (p=0.06, O.R= 1.975, 95% C.I 1.208, 3.230). However, there was not a significant change in susceptibility pattern for other antibiotics in the study (Graph).

Conclusion: Development of resistance to group 2 carbapenems in LTACHs is a cause of concern as these are recommended for severe nosocomial infection caused by Pseudomonas aeruginosa. This may exert selection pressure that can lead to collateral damage i.e. resistance to prescribed antibiotics as well as other antimicrobial agents. Also, as a result of resistance to group 2 carbapenems, LTACHs may have to use toxic agents like amikacin and colistin as an empiric choice for PA infection. Therefore, there is an urgent need to make group 1 carbapenems (Ertapenem) available in these LTACHs and include them as formulary antibiotics along with group 2 carbapenems. Also, de-escalation to ertapenem is recommended when clinically appropriate.

BACKGROUND

• A study in a tertiary care hospital found the use of group 2 carbapenems to be significantly associated with the incidence of imipenem resistant PA while ertapenem use had no association with Imipenem resistance in PA isolates.
• A study in a LTACH found a significant association between imipenem use and prevalence of resistance to imipenem in PA isolates. However, limited research has been done to study the development of resistance to carbapenems in LTACHs.
• The aim of this study is to analyze the change in susceptibility pattern of Pseudomonas Aeruginosa to various antibiotics in a long term acute care hospital in Metropolitan Detroit from 2007 to 2013.

METHODS

• MICs of various antibiotics to PA was retrieved from the microbiology database of an LTACH from 2007 to 2013.
• Unique blood and urine isolates were included for analysis.
• Group 2 Carbanepems were used as formulary antibiotics at this LTACH.
• Linear graphs were used to indicate the trend.
• Chi-square test was used to calculate the p-value.

RESULTS

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>%age susceptibility</th>
<th>p-value</th>
<th>Odds ratio (95%C.I)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Imipenem</td>
<td>71%(2008) n=140</td>
<td>56%(2013) n=145</td>
<td>.006</td>
</tr>
<tr>
<td>Cefepime</td>
<td>61%(2008) n=140</td>
<td>76%(2013) n=145</td>
<td>-</td>
</tr>
<tr>
<td>Tobramycin</td>
<td>81%(2007) n=69</td>
<td>76%(2013) n=145</td>
<td>-</td>
</tr>
</tbody>
</table>

CONCLUSIONS

• Development of resistance to group 2 carbapenems in LTACHs poses serious threat since these are recommended for severe nosocomial infection caused by PA.
• LTACHs should include group 1 carbapenems as formulary antibiotics along with group 2 carbapenems.
• De-escalation to ertapenem is recommended when clinically appropriate.
• Antibiograms should be readily available to infection control personnel.

REFERENCES