

P1292 Genes of carbapenemases among Enterobacterales isolated from blood culture in haematological patients

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Background: The aim of this study was to determine carbapenemase genes and to evaluate antibiotic susceptibility among carbapenemase-producing Enterobacterales (CPE) obtained from blood culture in hematological patients.

Materials/methods: Prospective study included Enterobacterales isolated from blood cultures in hematological patients (2003-2018). Susceptibility was tested by the broth microdilution method. The interpretation was performed by CLSI 2018 and EUCAST 2018 (tigecycline, colistin) clinical breakpoints. Genes of carbapenemases (*bla*_{OXA-48-like}, *bla*_{KPC}, *bla*_{VIM}, *bla*_{IMP}, *bla*_{NDM}) were detected by real-time PCR.

Results: A total of 84 CPE isolates were evaluated of them 92.9% (n=78) were *Klebsiella pneumoniae*, 4.8% (n=4) *Serratia marcescens*, 1.2% (n=1) *Escherichia coli*, 1.2% (n=1) *Enterobacter cloacae*. First *K. pneumoniae* producing carbapenemase (KPC) was detected in 2007. Distribution of carbapenemases was as follows: OXA-48 (90.5%, n=76), OXA-48+NDM (3.6%, n=3), VIM (3.6%, n=3), KPC (2.4%, n=2). First *K. pneumoniae* harboring two genes of carbapenemases (*bla*_{OXA-48-like}+*bla*_{NDM}) appeared in September of 2017. Genes *bla*_{VIM} were observed only in *S. marcescens* (n=3).

Antimicrobial susceptibility of OXA-48-producing Enterobacterales is presented in Table. Tigecycline was active against 88.2% (67/76) of OXA-48-producers, colistin - against 65.8% (50/76). 53.9% of OXA-48-producers were susceptible to imipenem and 25% – to meropenem. Two of OXA-48-producing isolates had MICs of carbapenems 64 µg/mL and 128 µg/mL.

Conclusions: Carbapenemases genes prevailed in *K. pneumoniae*. The vast majority of carbapenemases belonged to OXA-48-type, combinations of carbapenemase genes have appeared in 2017. Tigecycline was the most active antimicrobial agent against OXA-48-producers; more than 30% of isolates were resistant to colistin.

Table. Antimicrobial susceptibility of OXA-48-producing Enterobacterales (n=76)

| Antibiotics | S, % | I, % | R, % | MIC₅₀, µg/mL | MIC₉₀, µg/mL | Range of MIC |
|-------------------------|-------------|-------------|-------------|--------------------------------|--------------------------------|---------------------|
| Tigecycline | 88.2 | 7.9 | 3.9 | 0.5 | 2 | 0.015 - 4 |
| Colistin | 65.8 | - | 34.2 | 0.25 | 64 | 0.0075 - >128 |
| Imipenem | 53.9 | 22.4 | 23.7 | 1 | 8 | 0.06 - 128 |
| Amikacin | 51.3 | 5.3 | 43.4 | 16 | >128 | 0.5 - >128 |
| Meropenem | 25 | 10.5 | 64.5 | 4 | 16 | 0.06 - 128 |
| Piperacillin/Tazobactam | 14.5 | 22.4 | 63.2 | >128 | >128 | 0.5 - >128 |
| Ceftazidime | 14.5 | 5.3 | 80.3 | 64 | 128 | 0.125 - 128 |
| Cefepime | 14.5 | - | 85,5 | 128 | >128 | 0.125 - >128 |
| Levofloxacin | 6.6 | 13.2 | 80.3 | 16 | 64 | 0.125 - >128 |

S – susceptible, I – intermediate, R - resistant

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