28th ECCMID EUROPEAN CONGRESS OF CLINICAL MICROBIOLOGY AND INFECTIOUS DISEASES
Madrid, Spain
21 – 24 April 2018

# P1053 Colistin- or tigecycline-resistant carbapenemase-producing Klebsiella pneumoniae bloodstream infections among critically ill patients during a seven year period: molecular epidemiology and risk factors

Matthaios Papadimitriou Olivgeris*[1,4], Christina Bartzavali[2], Nektarios Sioulas[3], Aikaterini Spyropoulou[2], Anastasia Lambropoulou[2], Anastasia Zotou[3], Iris Spiliopoulou[2], Evangelos Anastassiou[2], Fotini Fligou[3], Myrto Christofidou[2], Markos Marangos[1]

*[1]School of Medicine, University of Patras, Department of Infectious Diseases, Partas, Greece*, *[2]School of Medicine, University of Patras, Department of Microbiology, Partas, Greece*, *[3]School of Medicine, University of Patras, Anaesthesiology and Intensive Care Medicine, Partas, Greece*, *[4]University Hospital of Lausanne, CHUV, Department of Infectious Diseases, Lausanne, Switzerland*

**Background:** Over recent years, a significant increase of infections caused by carbapenemase-producing *Klebsiella pneumoniae* (CP-Kp) resistant to either colistin or tigecycline has been observed worldwide. The objective was to determine the epidemiology and associated risk factors for CP-Kp bloodstream infections (BSIs) among Intensive Care Unit (ICU) patients.

**Materials/methods:** During a seven-year period (2010-17), all CP-Kp bloodstream infections among patients hospitalized at ICU of the University General Hospital of Patras, Greece were included. Antimicrobial susceptibility was performed by the agar disk diffusion method. Colistin and tigecycline susceptibility was evaluated by Etest. Results were interpreted according to EUCAST guidelines. The presence of $bla_{KPC}$, $bla_{VIM}$, $bla_{NDM}$, $bla_{OXA-48}$ genes was confirmed by PCR. PFGE of chromosomal *Xba*I DNA digests was performed among 110 representative isolates.

**Results:** Among 224 patients that developed a BSI by CP-Kp, 62 (44.6%) and 104 (46.4%) were resistant to colistin and 66 (29.5%) to tigecycline. The majority of isolates (199; 88.8%) carried the $bla_{KPC}$ gene followed by 12 (5.4%) $bla_{NDM}$ and seven that carried both $bla_{KPC}$ and $bla_{VIM}$. PFGE revealed three types; A (76 isolates; 69.1%), B (24 isolates; 21.8%) and C (10 isolates; 9.1%) (Table). Risk factor for the development of colistin-resitsant CP-Kp bacteraemia as compared to that provoked by coslitin-susceptible was colistin administration (*P* 0.016) and tracheostomy (*P* 0.032). Multivariate analysis between tigecycline-resistant and susceptible CP-Kp bacteraemia revealed that number of comorbidities (*P* 0.045) and prior BSI by Gram-negative pathogen (*P* 0.008) was independently associated with tigecycline resistant CP-Kp bacteremia.

**Conclusions:** A high percentage of colistin or tigecycline resistance among CP-Kp bacteraemia was observed in critically ill patients. Colistin resistance is associated with previous colistin administration, whereas the use of tigecycline did not affect the development of tigecycline resistance among CP-Kp bacteraemic isolates. PFGE type B is associated with colistin resistance (*P* 0.010) as compared to other pulsotypes (A and C).

| PFGE type | Phenotype | Carbapenemase genes |
|---|---|---|
| A(n=76) | Col-R/Tig-R(n=16) | $bla_{KPC}$(n=16) |
| | Col-S/Tig-R(n=8) | $bla_{KPC}$(n=8) |
| | Col-R/Tig-S(n=25) | $bla_{KPC}$(n=24) |
| | | $bla_{VIM}$(n=1) |
| | Col-S/Tig-S(n=27) | $bla_{KPC}$(n=26) |
| | | $bla_{VIM}$(n=1) |
| B(n=24) | Col-R/Tig-R(n=10) | $bla_{KPC}$(n=7) |
| | | $bla_{VIM}$(n=2) |
| | | $bla_{KPC}$, $bla_{VIM}$(n=1) |

| | | |
|---|---|---|
| | Col-S/Tig-R(n=1) | *bla*$_{KPC}$(n=1) |
| | Col-R/Tig-S(n=9) | *bla*$_{KPC}$(n=7) |
| | | *bla*$_{KPC}$, *bla*$_{VIM}$(n=2) |
| | Col-S/Tig-S(n=4) | *bla*$_{KPC}$(n=2) |
| | | *bla*$_{KPC}$, *bla*$_{VIM}$(n=2) |
| C(n=10) | Col-S/Tig-R(n=1) | *bla*$_{NDM}$(n=1) |
| | Col-R/Tig-S(n=1) | *bla*$_{NDM}$(n=1) |
| | Col-R/Tig-R(n=8) | *bla*$_{NDM}$(n=8) |

R: resistant; S: Susceptible; Col: colistin; Tig: tigecycline