Trends in resistance mechanisms of carbapenem resistant *Klebsiella pneumoniae* blood isolates during a two year period in a tertiary care Hellenic hospital

Sophia Tsiplakou¹, Vassiliki Papaioannou¹, Elena Kolliari¹, Dimitra Stefani², Moyssis Leleki²

¹ Microbiology Department, ² Internal Medicine Department, "KAT" General Hospital, Athens, Greece

**Introduction - Purpose**

Carbapenem resistant *Klebsiella pneumoniae* is a major health problem worldwide. The aim of our study was to detect the resistance mechanisms of carbapenem resistant (CR) *Klebsiella pneumoniae* clinical isolates from blood cultures.

**Materials and Methods**

During a 2 year period (2015-2016) all bacteremia cases due to *Klebsiella pneumoniae* were studied in our 550 bed hospital. Identification and susceptibility testing were performed with the Vitek II system (Biomerieux, France). The presence of carbapenemases was detected by the modified Hodge test, while the phenotypic detection of metallo-beta-lactamases (MBL) was done using meropenem discs with and without EDTA and this of KPC production using meropenem discs with and without boronic acid addition.

An immunochromatography rapid test (CorisBioConcept, Belgium) was used for the detection of KPC, NDM and OXA-48 mechanism.

**Conclusions**

The hot spot of CR *K. pneumoniae* blood isolates was ICU. Overtime resistance mechanism of these strains has changed, with production of OXA-48 establishing as the predominant mechanism and replacing that of KPC production.

**Results**

A total of 186/231 (80.5%) *Klebsiella pneumoniae* blood isolates were resistant to carbapenems. The vast majority of patients were critically ill, hospitalized in ICUs (86%), 70% were male, with age ranging from 16 to 98 years. Resistance rates to amikacin, gentamicin, colistin, cotrimoxazole and tigecycline were 43%, 72%, 68%, 45% and 42% respectively. Overall, in the study period the mechanisms of carbapenem resistance were OXA-48 in 44.6%, KPC in 33.9%, MBL (other than NDM) in 19.9% and NDM production in 1.6% of cases. A double mechanism was found in 2 isolates (KPC+VIM and NDM+OXA-48). During the study period we noticed the emergence of isolates producing OXA-48 in our hospital. Starting in July 2015, this carbapenemase was subsequently found in 17/72 (23.6%) isolates in 2015. A dramatic rise was then recorded in 2016, with 66/114 (57.9%) isolates producing OXA-48, replacing the predominant KPC producing ones. KPCs showed a great decrease from 51.4% in 2015 to 23.7% in 2016, while the production of MBL carbapenemase had a slight but no significant change (25% in 2015 and 18.4% in 2016).