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Abstract (poster session)

A new real-time polymerase chain reaction (RT-PCR) for rapid detection of VIM, OXA-48, New Delhi metallo beta-lactamase (NDM) and Klebsiella pneumoniae carbapenemase (KPC) carbapenemases in Enterobacteriaceae directly from a rectal swab

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Objectives: The emergence and spread of drug resistance by beta-lactamases amongst Enterobacteriaceae is a serious problem, in the hospital environment as well as in the community. Carbapenems have long been considered a solid last option for treating infections, caused by beta-lactam resistant Enterobacteriaceae. However, since carbapenem resistance is emerging worldwide, due to the presence of various carbapenemase genes, treating infections with these multi-resistant strains has almost become impossible. In order to prevent the spread of these carbapenemases a fast and accurate carbapenemase detection in patient samples is extremely important. Moreover, since higher mortality rate is found in patients infected by carbapenemase-producing Enterobacteriaceae, rapid detection is even more essential. We describe the prototype of a novel multiplex real time PCR for rapid detection of the most common carbapenemases in Enterobacteriaceae (VIM, OXA-48, NDM and KPC) directly from rectal swabs, as a rapid screening approach. Methods: A total of 53 Gram-negative bacterial isolates (originating from various countries worldwide) with proven carbapenemase activity, along with 21 non-carbapenemase producers were used to evaluate this novel carbapenemase real time PCR. Furthermore, one carbapenemase producing Escherichia coli and three different carbapenemase producing Klebsiella pneumoniae isolates were used for spiking experiments in order to detect the analytical sensitivity of the assay, in comparison with culture using the ChromID CARBA agar. Results: The carbapenemase real time PCR demonstrated an excellent performance of 100% (53/53) of the tested isolates with proven carbapenemase activity. All 21 non-carbapenemase producers were correctly identified as carbapenemase negative. The limit of detection in rectal swabs was 0-0.5 CFU/PCR for VIM and OXA-48, 0.5 – 5 CFU/PCR for NDM and 5-50 CFU/PCR for KPC. All results were available within 3 hours (1 hour DNA extraction, 2 hours real time PCR). Conclusion: This novel multiplex real time PCR is the first assay able to detect both VIM, OXA-48, NDM and KPC directly from rectal swabs. With excellent performance, this assay appeared to be an extremely accurate and sensitive method to detect carbapenemase genes VIM, OXA-48, NDM and KPC directly from a rectal screening swab within 3 hours.