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Rapid susceptibility testing: reliable, fast, ultrafast

Rapid detection of polymyxin resistance in Enterobacteriaceae

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Background: Enterobacterial strains resistant to polymyxins are increasingly reported worldwide. Currently available polymyxins susceptibility methods are fastidious, time-consuming (24 h) and some methods are not reliable. They are poorly adapted to the clinical need and to the prevention of the dissemination of those multidrug resistant isolates. Therefore, we have developed the Rapid Polymyxin NP test that is rapid, reliable and cost-effective detect polymyxin resistant *Enterobacteriaceae.*

Material/methods: The Rapid Polymyxin NP test is based on the detection of bacterial growth in presence of a defined concentration of colistin (or polymyxin B) meaning colistin resistance in a well-defined medium. Growth is evidenced by acid formation related to glucose metabolism (aerobic and anaerobic) observed through a color change (orange to yellow) of a pH indicator (red phenol).

A total of 196 enterobacterial strains from varied species were used to evaluate the performance of the Rapid Polymyxin NP test. Five strains were intrinsically resistant to colistin, 152 strains had an acquired mechanism of resistance to colistin, and 39 strains were susceptible to colistin. For 93 *Klebsiella* spp. isolates, resistance to colistin was associated to chromosomic alterations in genes modifying lipopolysaccharide (*pmrAB*, *mgrB* genes). For 10 *E. coli* isolates, resistance to colistin was mediated by the plasmid-borne *mcr-1* gene. The mechanism of colistin resistance was unknown for the remaining enterobacterial isolates.

MICs of polymyxins were determined using the reference broth microdilution technique according to the Clinical Laboratory Standard Institute (CLSI) guidelines and results were interpreted according to the breakpoints of the European Committee on Antimicrobial Susceptibility Testing (EUCAST).

Results: The sensitivity and the specificity of the Polymyxin NP test were excellent, being 99.3 and 92.3 %, respectively, as compared to the broth microdilution taken as the gold standard. It was rapid (less than 2h) and reproducible.

Conclusions: The Rapid Polymyxin NP test combines multiple advantages. It is easy to perform, rapid, reliable, cost-effective, sensitive, specific and implementable worldwide. It detects polymyxin-resistant enterobacterial strains from any species regardless the molecular mechanism of resistance to polymyxins (intrinsic, chromosomic and/or plasmid-mediated).

It is a very useful tool for preventing spread with colistin-resistant strains and will change the overall management of those infected / colonized patients.