

Abstract

Background

Urosepsis has contributed for nearly 25% of sepsis burden. The key characteristics which had contributed to negative outcome were the, virulence factors and multiple antibiotic resistance features expressed in common uro-pathogens. Expression of different types of beta-lactamases in uro-pathogens is considered the most important resistance mechanism. For antibiotic stewardship, elucidation of these resistance characteristics is mandatory, but not routinely undertaken in most diagnostics laboratories in Sri Lanka.

Objectives: This study aimed to describe the diversity of the beta lactamases in Gram-negative bacteria of urosepsis isolated from teaching hospital Kandy. The research also aimed to utilize the Advanced Expert System (AES) in commercial platform (VITEK® 2) and commercial combined discs (Mast® discs) in predicting the existence of different types of beta lactamases among the target isolates.

Method: The research was conducted as a laboratory based descriptive study over period of 4 months. 47 Gram negative blood culture isolates obtained from eligible patients with clinically and ultrasonically suspected bacteremic uro-sepsis were analyzed. All isolates were identified to the species level with antibiotic sensitivity and MIC using VITEK 2 platform. Resistance mechanisms against beta lactamases were extrapolated using the MIC values and AES data. Then isolates were tested for differential expression of beta lactamases using 4 commercial combination discs according to manufacturer's instructions. For all tests recommended standards and QC parameters were used as described by manufacturers.

Results: The main uropathogens identified during study were: *Escherichia coli* (n=29, 62%), *Klebsiella pneumoniae* (n=11, 24%), *Enterobacter cloacae* (n=3, 6%), *Serratia marcescens* (n=2, 4%), *Proteus mirabilis* (2%) and *Pseudomonas aeruginosa* (2%). According to AES and MIC interpretations, 42.5% of the isolates were ESBL producers. 23.4% of the isolates were probable carbapenemase producers. Altogether there were 6 (12.7%) probable Amp C producers. There were only 2 isolates which demonstrated wild type phenotype. With combined discs, there were 20 ESBL

producers and 2 Amp C producers together with 3 ESBL and Amp C co-producers. There were 3 metallo beta lactamase producers and 19 showed no demonstrable resistance mechanisms with commercial disc method.

Conclusion: This study suggested that Gram -negative bacteria causing urosepsis, produce a wide variety of beta lactamase enzymes which is diverse. Nearly 50% of the Gram -negative isolates causing urosepsis are ESBL producers, MIC distributions predict high rates of Amp C and carbapenemase producers among Gram -negative isolates causing urosepsis and combination discs demonstrated low rates of Amp C and carbapenemase producers.

Key words: Urosepsis, Beta lactamases, AES of Commercially available platforms (VITEK 2®), Commercially available combined discs (MAST ®)