Abstract

Molecular Detection of Selected Genetic Determinants of Carbapenem Resistance among Invasive Isolates of *Acinetobacter baumannii* Recovered from Selected Tertiary Care Units in Colombo District, Sri Lanka

Introduction:

Carbapenem resistant *Acinetobacter baumannii* (CRAB) is a major healthcare concern. A predominant mechanism of resistance is OXA carbapenemase mediated drug hydrolysis, encoded by *bla*$_{\text{OXA}}$ genes. Of these, *bla*$_{\text{OXA-51-like}}$ is intrinsic to *Acinetobacter baumannii* (AB), while *bla*$_{\text{OXA-23-like}}$, which encodes for its globally predominant OXA-23 carbapenemase, is acquired. Carbapenemase gene expression is enhanced by insertion sequences such as IS*Aba1*.

Objectives:

To confirm the species of presumptive AB in blood cultures

To describe the antibiotic resistance profiles of isolates

To utilize a phenotypic test to detect carbapenemase production among CRAB

To detect the *bla*$_{\text{OXA-23-like}}$ gene and the upstream presence of IS*Aba1* to *bla*$_{\text{OXA-51-like}}$ among CRAB

To describe the demographic and clinical characteristics of patients with invasive CRAB infections

Methods:

Fifty four blood culture isolates, presumptively identified as AB by BD Phoenix^{TM}, were assessed for the presence of *bla*$_{\text{OXA-51-like}}$ using conventional PCR to confirm speciation. Confirmed AB isolates identified as CRAB by BD Phoenix^{TM} sensitivity profiling were tested for carbapenemase production using the CarbAcineto NP (CANP) test, and PCR to

detect *bla*$_{\text{OXA-23-like}}$ and the presence of IS*Aba1* upstream to *bla*$_{\text{OXA-51-like}}$. Data on clinical and demographic characteristics of patients with invasive infections due to CRAB were obtained.

Results:

Fifty of the 54 presumptive AB isolates were confirmed to be AB by *bla*$_{\text{OXA-51-like}}$ PCR. Forty six were CRAB by MIC profiles, of which 32 were positive for *bla*$_{\text{OXA-23-like}}$. IS*Aba1* was not found upstream to *bla*$_{\text{OXA-51-like}}$ in any CRAB isolate. Of the 32 CRAB isolates positive for *bla*$_{\text{OXA-23-like}}$ only 20 were detected by CANP. However, CANP detected 12 additional carbapenemase producers.

Conclusions:

Confirmatory speciation of presumptive AB can be performed using *bla*$_{\text{OXA-51-like}}$ conventional PCR. The presence of *bla*$_{\text{OXA-23-like}}$ is an important determinant of carbapenem resistance in our setting while IS*Aba1* mediated *bla*$_{\text{OXA-51-like}}$ hyper-expression may not be important. CANP lacks sensitivity when compared to molecular methods to detect *bla*$_{\text{OXA-23-like}}$ mediated carbapenemase production but may detect additional carbapenemases not represented in the PCR panel.