www.jmscr.igmpublication.org
Impact Factor 5.84
Index Copernicus Value: 83.27
ISSN (e)-2347-176x ISSN (p) 2455-0450
crossref DOI: https://dx.doi.org/10.18535/jmscr/v5i6.51

IGM Publication
Journal Of Medical Science And Clinical Research
An Official Publication Of IGM Publication

Profile of Multidrug Resistant *Acinetobacter Baumannii* Infections among Hospitalized Patients

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Abstract

Background: *Infections by Acinetobacter baumanniiis posing serious healthcare-associated infections [HAIs] and the incidence is increasing, with many strains now being multidrug resistant [MDR]. MDR Acinetobacter baumannii confer a high risk of morbidity and mortality to hospitalized patients.*

Aim: *This study aimed to describe some of the common risk factors seen among hospitalized patients with Acinetobacter infection. Materials and methods: Acinetobacter baumannii isolates from invasive infection sites, numbering 120 were analysed. Clinical details and risk factors were documented in selected inpatients during the study period.*

Results: *Multidrug resistant [MDR] strains were 87% among all the isolates. Resistant to meropenem and imipenem were 75% and 62% respectively. The major risk factors associated with acquisition of MDR A.baumannii infection among the patients were hospital stay of more than 2 weeks [74.10%], followed by stay in ICU [72.50%], presence of indwelling intravascular device[69.10 %,] and mechanical ventilation [52.50%]. Positive blood culture for A.baumannii was associated with a mortality rate of 85%, with a confidence interval of [CI=82%-88%].*

Conclusion: *Significant risk factors were prolonged hospital stay, intravenous devices and mechanical ventilation. Further development of A.baumannii bacteremia is associated with a high mortality rate. Therefore to constrain the infection rate, both antibiotic policies and infection control policies have to be strictly followed.*

Keywords: *Acinetobacter, multidrug resistance, risk factors.*

Introduction

Acinetobacter is increasingly being recognized as a major pathogen in nosocomial infections, particularly in patients admitted to intensive care units.[1] Antimicrobial resistance among *A. baumannii* seems to be on the upswing internation-ally.[2;3] Multidrug resistant [MDR] Acinetobacter have been reported as major causes of life threatening infections in the intensive care units.[1;4]

In view of the increasing prevalence of *Acinetobacter baumannii* infection and emergence of resistant strains, which confer a high risk of morbidity and mortality to patients this study was undertaken to find the associated risk factors for the acquisition of *Acinetobacter baumannii* infection among the hospitalized patients.

Materials and Methods

The study was carried out between October 2010 to March 2012 in a tertiary care hospital after

obtaining the Institute Ethical Committee clearance. All patients admitted to the hospital during the study period, from whom different cultures yielded *Acinetobacter baumannii* isolates were included in the study. Hundred and twenty patients yielded pure, significant growth of Acinetobacter from various clinical specimen in the Clinical Microbiology Laboratory. They were identified by standard methods, to species level and tested for antibiotics according to CLSI guidelines against a total of 14 antibiotics. [5] Minimum inhibitory concentration testing was done against polymyxin B. Isolates were designated as multidrug resistant if they were resistant to three or more classes of antibiotics.[6] Patient records were analyzed for details of risk factors including length of hospital stay and stay in the intensive care units, introduction and duration of intravenous devices, surgical procedures and any other risk factors.

Results

Multidrug resistant [MDR] strains were 87% among all the isolates. Prolonged hospital stay with a duration of >2weeks [74.1%], followed by ICU admission [72.5%], presence of intravascular devices [69.1%], mechanical ventilation [52.5%], were the major risk factors associated with the isolation of MDR *Acinetobacter baumannii*. [Figure 1]. Majority of isolates were from wound swabs 67 [58.3 percent], followed by ET aspirates 25[20.8 %], blood 13[11.3 %], urine 10[8.7 %] and Broncho alveolar lavage [BAL] 5[4%]. Positive blood culture for *A.baumannii* was associated with a mortality rate of 85 %, with a confidence interval of [CI=82%-88%]. Antibiotic resistance pattern of Acinetobacter isolates is shown in the [Figure 2]. Least effective antibiotic [i.e. yielding the largest number of isolate with in vitro resistance] were cetazidime [90.8%], gentamicin [89.10%] and ciprofloxacin [83.3%]. In contrast the only antibiotic still maintaining high potency against all of the isolates was polymyxin B [100% sensitive].

Figure 1 Antibiotic resistance pattern among the clinically significant *Acinetobacter baumannii* isolated from hospitalized patients.

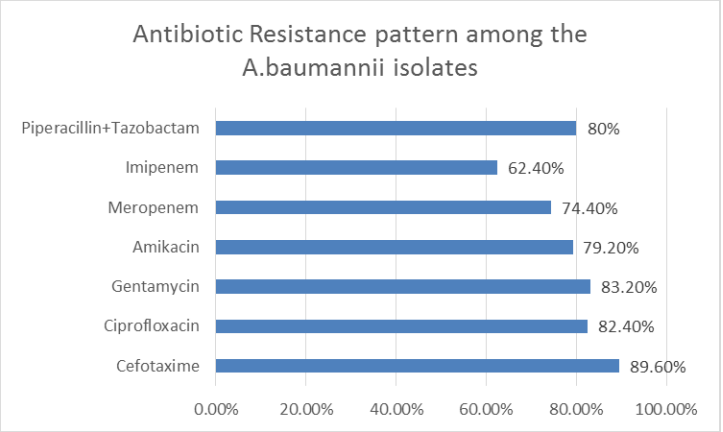
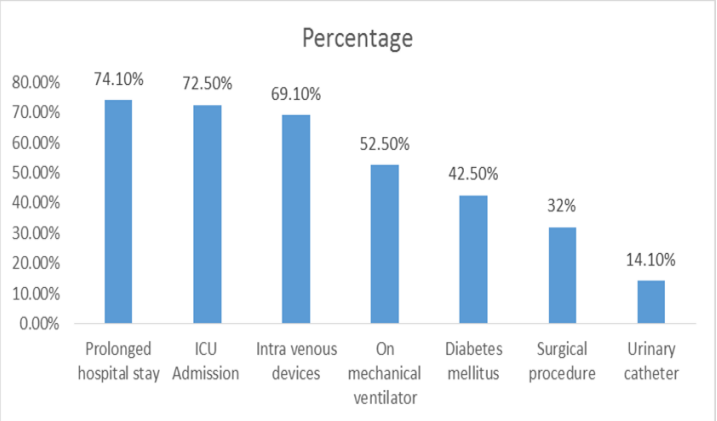


Figure 2. Potential risk factors for acquisition of multi drug resistant *Acinetobacter baumanii infection.*



Discussion

Acinetobacter baumannii is one of the important opportunistic bacterial pathogens, and is primarily associated with hospital-acquired infections.[7] A total 120 *Acinetobacter baumannii* isolates were analyzed. Significant risk factors responsiblefor *Acinetobacter baumannii* infection have been reported as prolonged hospital stay including stay in the ICU, mechanical ventilation, presence of intravascular devices, recent surgery, exposure to antibiotics and severity of the underlying illness.[8;9] Risk factor assessment in our study showed a significant increase in MDR *A.baumannii* infection among patients with a hospital stay of more than 2 weeks 74.10% [n=89], followed by stay in ICU 72.50% [n=87], presence of indwelling intravascular device 69.10

%[n=83] and mechanical ventilation 52.50% [n=63]. This finding was consistent with few other studies.[9-11] Sepsis caused by *A.baumannii* was associated with a mortality rate of 85%.

Carbapenems are the drug of choice for multidrug resistant *Acinetobacter spp*, and are increasingly being used in tertiary care hospitals due to infections by ESBL and Amp C producing Gram negative bacteria, leading to emergence of high level resistant strains. Studies have demonstrated concomitant increase in multidrug resistant strains during the course of treatment with carbapenems. [11;12]. Some studies in recent years have also shown Imipenem and Meropenem resistance among *A. baumannii*.[13;14] Large percentage of isolates from this hospital were resistant to Meropenem and Imipenem, similar to report by Cisneros et al [15;16]. Progressive decline in imipenem susceptibility has been recorded from 2006 -2009 in North America, Europe, Latin America and the Asia/Pacific region.[17;18].

Conclusion

The major risk factors for acquisition of *A. baumannii* infection in our study were prolonged hospital stay, intravenous devices and mechanical ventilation. Multidrug resistant *A. baumannii* have ability to survive for prolonged periods in hospital surroundings which makes these organisms responsible to pose a risk among prolonged hospitalized patients [including stay in the ICU] and patient on mechanical ventilation. MDR *A. baumannii* has become a leading red alert pathogen in many hospitals worldwide[19;20] There are a number of hospital outbreaks, been reported from various geographical regions [21-23] and in some areas it has turn out to be endemic [9]. The drugs most commonly used for treatment of patients with MDR *A.baumanni* infections were carbapenems in 2000 [45%] and colistin in 2010 [50.3%]. Buttreatment options appear to be restricted with large percentage of strains exhibiting reduced susceptibility to carbapenems. Hence in such instances Polymixin B & E become the main stay of treatment. This problem of increasing antimicrobial resistance is even more frightening when considering the very limited number of new antimicrobial agents that are in development. Therefore to constrain the infection rate, both antibiotic policies and infection control policies have to be strictly followed.

Limitations of the study

The cause and effect of association between the risk factors and development of MDR *A.baumannii* could not be established as our study was not a case control study

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