

An Increasing Threat in Libyan Hospitals: Emergence of Extensively-Resistant *Acinetobacter Baumannii*

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Abstract

Introduction: The prevalence of extensively drug resistance (XDR) *Acinetobacter baumannii* (AB) is rapidly progressing. The aim of this study was to determine the prevalence of XDR *A. baumannii* in Tripoli, Libya.

Methods: AB isolates were identified and antibiotic susceptibility testing was performed using an automated system to determine the multidrug resistant organisms. XDR-AB was considered when they were non-susceptible to one or more of the agents in all but two or less categories.

Results: A total of 250 AB strains isolated from two teaching hospitals were characterized during 2013-2014. Extremely high level of isolates (240/250; 96%) was defined as multidrug resistant organisms. Whereas, extensively drug resistant was evident in 153/250; 61.2% of detected organisms, it was predominantly associated with burn patients (116/153; 75.8%), aged ≤ 30 years old (76.1%) and hospitalized in intensive care unit (ICU) (76.7%). All isolates were susceptible to colistin and tigecycline. This study indicated that pan-drug resistant *A. baumannii* has not been detected in Libya.

Conclusion: XDR-AB infections are endemic in burn patients with a great potential for spread in ICUs, indicating that there is a long-standing infection control problem in these patients.

Keywords: *Acinetobacter baumannii*; Extensively Drug Resistance; Libya

Introduction

Acinetobacter baumannii (AB) has been recognized as one of the important causes of nosocomial infections in hospitalized patients, particularly in burn patients in recent years [1-3]. Its propensity to acquire fast antibiotic resistance elements allows AB to survive under selective antibiotic pressure [4,5]. Carbapenems are considered first-line agents for the treatment of AB infections, and therefore the rise of infections due to carbapenem-resistant strains is of particular concern [6]. Recently, it has shown resistance to the most available antibiotics followed by the emergence of multiple (MDR) and extensively drug resistance (XDR) strains [2,4-7]. The incidence of XDR-AB infections is continually rising. Colistin and tigecycline are often the only treatment options for XDR-AB infections but resistance to both agents has recently been described, with colistin resistance scattered worldwide [8-10]. For severe XDR-AB infections, colistin is frequently used and is considered by most to be the drugs of choice [11]. Today, colistin-resistant/carbapenem-resistant pan-resistant *A. baumannii* spread and cause nosocomial outbreaks [12-14]. There is little information on the prevalence of XDR-AB in the countries of North Africa (including Libya) and the Middle East. Therefore, the aim of the present investigation was to determine the prevalence of XDR-AB in Tripoli, Libya.

Material and Methods

Non-duplicate, nonconsecutive isolates of AB were collected during 2013 - 2014 from two teaching hospitals in Tripoli: Tripoli Medical Centre (TMC) and Burn Plastic Surgery Centre (BPSC). All isolates recovered from various clinical specimens obtained from different ana-

tomical sites including respiratory tract, urine, blood, wound, cerebral spinal fluid (CSF) and tips (endotracheal tube [ETT], central line, Foley's catheter and gastrostomy tube), these specimens were collected from different departments: intensive care units (ICUs) in (burn; surgical; internal medicine; emergency; neonates and pediatrics) and other wards. Isolated organisms were identified to the species level and tested for their susceptibility to a variety of antimicrobial agents by the BD Phoenix Automated Microbiology System (USA) according to the manufacturer's instructions. *A. baumannii* isolates that showed resistance to at least one agent in three or more antimicrobial categories was defined as MDR. Species were considered XDR when they were non-susceptible to one or more of the agents in all but two or less categories in accordance with the definitions provided by Magiorakos and colleagues [15].

Results

A total of 250 AB isolates were characterized, the majority were isolated from patients hospitalized in BPSC (180/250; 72%) compared with TMC (70/250; 28%). A 97.4% of strains were isolated from in-patients specimens primarily from burn wounds (40.5%) and less frequently from blood (10.3%); sputum (7.7%); ETT (6.9%), urine (5.1%); and others (29.5%). The main source of isolates 76.7% were obtained from patients hospitalized in ICUs (burn, neonatal, surgical, etc.) and the remaining from patients housed in other hospital sectors. The ages of the patients were between 6 days to 85 years, 95 (38%) females and 155 (62%) males. Extremely high level of isolates (240/250; 96%) was defined as MDR. Whereas, 153/250; 61.2% of the isolated were found extensively drug resistant, mainly associated with burn patients (116/153; 75.8%), aged \leq 30 years old (76.1%) and hospitalized in ICU (76.7%). All isolates were susceptible to colistin and tigecycline.

Discussion

AB is known as one of the most common Gram-negative bacteria that can cause nosocomial infection in health care centers especially in burned hospitalized patients [2-4]. Treatment of infection due to XDR-AB is extremely difficult and causes more morbidity and mortality in hospitalized burn patients [16,17]. Although, the overall prevalence of XDR isolates in our patients was extremely high 61.2%, but lower than the previous study in Egypt and Iran (86.6% and 96%, respectively) [18,19]. A lower prevalence of XDR and PDR *A. baumannii* isolates (37.1% and 8.1%, respectively) were recorded from the patient with burning in Iran [20]. Recently, Moghnieh and colleagues showed that the rate of acquisition of XDR-AB was 15.6%, and identified the risk factors that might be used to develop a score to determine which patients need isolation to limit the spread of XDR-AB [21]. However, Qin Y described a decrease in XDR isolates in China; this decrease was explained by the adherence to the principles of antibiotic use and effective monitoring and preventive measures [22]. The main finding of this study was the high prevalence of XDR among *A. baumannii* (75.8%) isolated from burn patients aged less than 30 years old admitted to ICU. The emergence of XDR-AB makes significant therapeutic problem, especially in burned patients. According to our results and another study [23], colistin remains a more effective antibiotic for the treatment of infection caused by XDR-AB. Despite the fact this study revealed that the prevalence of XDR-AB was extremely high, the results indicated that PDR *A. baumannii* has not been detected in Libya. The spread of these highly resistant pathogens in burned patients is alarming for health care systems. This baseline data should engender further research to investigate the encoding genes associated with the resistant in these isolates in Libya.

Conclusion

XDR-AB infections are endemic in burn patients with a great potential for spread in ICUs. This is an alarming health care issue in Libya which emphasizes the need to rigorously implement infection control practices.

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