ljm Libyan Journal of Medicine

COACTION PUBLISHING

LETTER TO THE EDITOR

A 6-year surveillance of antimicrobial resistance patterns of *Acinetobacter baumannii* bacteremia isolates from a tertiary care hospital in Saudi Arabia during 2005–2010

Multidrug resistance (MDR) of *Acinetobacter baumannii* increasingly jeopardizes the health care setting leading to substantial mortality and morbidity globally. During the past decade, entirely resistant *A. baumannii* strains presented a real challenge to clinicians and posed difficulties in therapy (1, 2). MDR of *A. baumannii*–associated infections, with adverse clinical outcomes involving the respiratory tract, blood, soft tissues, urinary tract, and central nervous system, significantly increases the outlay of the infirmary. Being Gram-negative coccobacilli and an obligate aerobe, *A. baumannii* causes both community- and hospital-acquired infection outbreaks in intensive care units especially in countries with tropical climates (3, 4). Of particular concern, we sought to reveal the status of antimicrobial resistance in *A. baumannii* bacteremia isolates, the trends and relative frequency of multidrug resistance pattern and also the underlying clinical condition among patients with *A. baumannii* bacteremia at Riyadh Military hospital, Saudi Arabia, from January 2005 to December 2010.

Our retrospective study was conducted at Riyadh military Hospital, Riyadh, Saudi Arabia, which is a tertiary health care center with a capacity of 1,200 beds. Identification of the microorganism was done using the microbiology laboratory protocol, and those non-repetitive clinical cultures that showed positive for *A. baumannii* during a 5-year period from January 2005 to December 2010 were included in the study. Blood cultures were performed using the BACTEC 9,240 system (Becton–Dickinson Sparks, MD, USA). A total of 380 *A. baumannii* blood isolates were identified in blood cultures between January 2005 and December 2010 and confirmed by API 20 NE (bioMerieux Inc., France). Isolation and identification was followed by antibiotic typing of these 380 blood isolates by MicroScan WalkAway (Dade Behring Inc., West Sacramento, CA, USA) according to manufacturer specifications. Antibiotic patterns were determined in accordance with CLSI guidelines. The antimicrobial agents used in this study were amikacin (AK), ampicillin–sulbactam (AM–S), cetazidime (CFZ), ceftriaxone (CFN), ciprofloxacin (CIP), gentamicin (GEN), meropenem (MERO), netilmicin (NET), piperacillin/tazobactam (PT), trimethoprim/sulfamethoxazole (TM-SXT), and tetracycline (TET). Intermediately, susceptible strains were considered to be resistant. All laboratory testing was performed according to manufacturer specifications for that instrument in accordance with practices recommended by CLSI.

Multidrug resistant *A. baumannii* (MDR-AB) is classically recognized and defined if it is resistant to three or more classes of antibiotics. Statistical analysis was done using a *t*-test, and $P < 0.05$ was considered significant.

Table 1 depicts the resistance profiles of all the cases and consequently the fluctuations in the susceptibility patterns during the study years. Table 2 describes the frequency of *A. baumannii* isolation from blood during the year 2005–2010 and also the preponderance of MDR-AB during these retrospective years. Resistance to most potent drugs for *A. baumannii*–associated infections, namely AK, CFN, and MERO firmly increased to 50, 71, and 55% during the year 2009 from 21, 42, and 12%, respectively during year the 2005. Resistance to AM-S fluctuated in these years maximizing in the year 2009 to 60%, and similarly the resistance rates to CIP (60%) and GEN (55%) attained peak values during the year 2009. It was noted that there has been a steady increase in the resistance rates of *A. baumannii* isolates, thereby increasing the relative frequency of MDR-AB strains. The number of *A. baumannii* isolated from blood culture increased considerably from 49 to 110 in the period 2005–2010. Moreover, MDR-AB-associated infections endangered the hospital settings by their significant predominance in ICU as 76 and 75% in 2006 and 2008, respectively. A substantial increase in MDR-AB strains is horrendous since MDR-AB were significantly isolated from ICU patients (5). Apart from being MDR, the steady increase in resistance rates of these bacteriemic isolates to MERO is certainly noteworthy as it reflects the probability of a nosocomial outbreak of carbapenam-resistant clones of *A. baumannii*. The number of cases of MDR-AB isolated from non-ICU patients in the years 2005 and 2009 were 12 [63%] and 9 [75%], respectively, which was higher than that isolated from ICU patients in the same years (7 [37%]) and 3 [25%], respectively). Moreover, the MDR rate was 63% in 2005 whereas 72% in 2009, thus prevailing antimicrobial resistance pattern

Citation: Libyan J Med 2014, **9**: 24039 - http://dx.doi.org/10.3402/ljm.v9.24039

Table 1. Prevalence and resistance trends of *Acinetobacter baumannii* bacteremia isolates at Riyadh military hospital, 2005–2010

		Resistance prevalence (%)									
Year	Isolates	AK	AM-S	CFZ	CFN	CIP	GEN	MERO	NET	AUG	TM-SXT
2005	49	29	35	41	51	29	31	12	15	39	29
2006	48	35	30	48	52	35	44	35	22	62	37
2007	85	37	22	46	57	42	44	35	21	51	42
2008	106	50	51	53	59	49	53	47	36	61	46
2009	99	50	60	58	71	60	55	55	42	78	47
2010	110	44	42	54	60	47	42	51	32	70	44

Table 2. Characteristic of patients infected with MDR *Acinetobacter baumannii* bacteremia

Characteristic	2005	2006	2007	2008	2009	2010
Mean age (years)	37	44	49	51	52	50
Male	28	28	44	62	46	58
Female	21	20	42	46	53	52
ICU patients	16	24	25	37	41	23
Non-ICU patients	33	24	61	71	58	87
No. of isolated MDR	11	13	29	48	53	52
MDR in ICU (%)	7 (63)	10 (76)	19 (66)	36 (75)	38 (72)	18 (35)

among the ICU patients is alarming in the hospital care settings.

Our retrospective study suggests that there was a substantial increase in antimicrobial resistance and a relative increase in frequency of the MDR predominating in the blood culture isolates of *A. baumannii*. An optimal treatment for *A. baumannii* infections has not been established, especially for MDR-AB. Decisions on treatment should be made on a case-by-case basis by a health care provider. Extensively resistant *A. baumannii* strains remain generally susceptible to polymyxins (colistin and polymyxin B). Therefore, valid infection control practices and judicious antibiotic strategies are necessary to contain the outbreaks of MDR-AB in nosocomial settings, and clinical alternatives for therapy is mandatory for improved management of infections due to MDR-AB.

Acknowledgements

The authors extend their appreciation to the Research Center at the College of Applied Medical Sciences and the Deanship of Scientific Research at King Saud University for funding this work.

Conflict of interest and funding

The authors certify that there is no conflict of interest with any financial organization regarding the material discussed in the manuscript.

*Krishnappa Lakshmana Gowda**
Department of Clinical Laboratory Sciences
College of Applied Medical Sciences
King Saud University
Riyadh, Kingdom of Saudi Arabia

*Mohammed A. M. Marie**
Department of Clinical Laboratory Sciences
College of Applied Medical Sciences
King Saud University
Riyadh, Kingdom of Saudi Arabia
Email: dr.mmarieali@gmail.com

Yazeed A Al-Sheikh
Department of Clinical Laboratory Sciences
College of Applied Medical Sciences
King Saud University
Riyadh, Kingdom of Saudi Arabia

James John
Department of Clinical Microbiology
Christian Medical College and Hospital
Vellore, India

Sangeetha Gopalkrishnan
Department of Microbiology
Central Leprosy Training and Research Institute
Chennai, India

*Contributed equally.

Citation: Libyan J Med 2014, **9**: 24039 - http://dx.doi.org/10.3402/ljm.v9.24039

Pradeep Chikkabidare Shashidhar
Department of Clinical Laboratory Sciences
College of Applied Medical Sciences
King Saud University
Riyadh, Kingdom of Saudi Arabia

Khaled Homoud M. Dabwan
Department of Clinical Laboratory Sciences
College of Applied Medical Sciences
King Saud University
Riyadh, Kingdom of Saudi Arabia

References

1. Koeleman JG, Parlevliet GA, Dijkshoorn L, Savelkoul PH, Vandenbroucke-Grauls CM. Nosocomial outbreak of multi-resistant *Acinetobacter baumannii* on a surgical ward: epidemiology and risk factors for acquisition. J Hosp Infect. 1997; 37: 113–23.
2. Sengstock DM, Thyagarajan R, Apalara J, Mira A, Chopra T, Kaye KS. Multidrug-resistant *Acinetobacter baumannii*: an emerging pathogen among older adults in community hospitals and nursing homes. Clin Infect Dis. 2010; 50: 1611–16.
3. Montefour K, Frieden J, Hurst S, Helmich C, Headley D, Martin M, et al. *Acinetobacter baumannii*: an emerging multidrug-resistant pathogen in critical care. Crit Care Nurse. 2008; 28: 15–25.
4. Richet H, Fournier PE. Nosocomial infections caused by *Acinetobacter baumannii*: a major threat worldwide. Infect Control Hosp Epidemiol. 2006; 27: 645–6.
5. Fournier PE, Richet H. The epidemiology and control of *Acinetobacter baumannii* in health care facilities. Clin Infect Dis. 2006; 42: 692–9.