

*Research Article*

## Prevalence of hospital acquired *Acinetobacter baumannii* infections in Al Azhar University Hospitals

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### Abstract

**Background:** *Acinetobacter baumannii* is an emerging multidrug-resistant global opportunistic pathogen and is acquiring increasing importance as a nosocomial pathogen, **Aim:** This study aimed to determine the prevalence of nosocomial *Acinetobacter baumannii* infections in the intensive care units of Al Azhar University Hospitals. **Patients, materials and methods:** This study included 784 patients who developed hospitals acquired infections. They were admitted to different intensive care units (ICUs) from February 2017 to February 2018. Appropriate clinical samples were collected from the patients after informed consent and were cultured for isolation and further biochemical identification.

**Results:** A total of 51 strains of *Acinetobacter baumannii* were isolated from 784 patients (6.5%). Most of clinical isolates were collected from respiratory tract infection samples (endotracheal tube, nasal and sputum samples (61.08%), followed by urine samples (13.73%) and wound swabs (3.92%). The general ICU showed the highest percentage of infection (68.63%). **Conclusions:** We conclude that nosocomial *A.baumannii* infections are significant in Al-Azhar University Hospitals. The highest prevalence of *A.baumannii* isolation were detected in the respiratory tract infections.

**Keywords:** *Acinetobacter baumannii*, nosocomial pathogen, intensive care units

### Introduction

*Acinetobacter baumannii* is a gram negative strictly aerobic, catalase positive, and oxidase negative coccobacilli. (Towner et al., 2013). *A. baumannii* has the ability to survive for prolonged periods under a wide range of environmental conditions and on surfaces making it a frequent cause of nosocomial infections and outbreaks (Fournier et al., 2006)

Nosocomial *Acinetobacter* is commonly acquired through cross-transmission because of its ability to survive in the hospitals environment and persistent fomites (Lowings et al., 2015). Interpreting the significance of isolates from clinical specimens is often difficult, because of the wide distribution of *Acinetobacter* spp. in the nature and its ability to colonize healthy or damaged tissue (Lahiri et al., 2004). *A.baumannii* is an important opportunistic pathogen. The organism is usually targets the most susceptible and immune-compromised patients and is responsible for a variety of nosocomial infections, such as bacteremia, urinary tract infections, meningitis, skin and soft tissue infection, diabetic ulcers and pneumonia, especially in mechanically ventilated patients and intravenous devices

infections. This leads to increase mortality rates due to high prevalence of multidrug resistance in *A. baumannii*, which limits therapeutic choices (Eveillard et al., 2010).

This study aimed to determine the prevalence of nosocomial *A. baumannii* in ICUs at Al Azhar University Hospitals.

### Materials and methods

#### Study population

This cross sectional study was carried in the laboratory of Microbiology at Al Azhar University Hospitals from February 2017 to February 2018. The subjects were patients who developed clinical evidence of infection at least 48 hours after ICU admission. A total of 784 patients were included in the study. Appropriate clinical specimen (endotracheal, sputum, wound swabs and urine) were collected according to the site of infection and were subjected to complete microbiologically identification.

#### Bacteriological testing

Media used in this study were: Herellea agar (Himedia, India), Simmons citrate agar (Difco laboratories, USA) other media were brain heart infusion broth, Muller Hinton agar, MacConcky

agar, MIO agar and nutrient Agar were supplied from (Oxoid, UK).

Further identification of the isolates by Gram stain, biochemical tests as oxidase test, citrate utilization test and catalase test was performed.

### Results

A total of 51 strains of *Acinetobacter baumannii* from 784 patients were isolated. *A. baumannii*

isolates are Gram negative, non-lactose fermenter, diplo-coco bacilli, oxidase negative and catalase, citrate utilization test positive.

Table (1) represents the distribution of *A. baumannii* nosocomial infections in different ICUs; the highest percentage of infection was recorded in the general ICU followed by chest ICU, the lowest percentage was in the neurology and mild ICUs as in table (1).

**Table (1): *A. baumannii* nosocomial infections in different wards**

| Wards         | N  | %     |
|---------------|----|-------|
| ICU           | 35 | 68.63 |
| ICU, chest    | 5  | 9.8   |
| IP            | 4  | 7.84  |
| CCU           | 3  | 5.88  |
| ICU, Accident | 2  | 3.93  |
| ICU, Mild     | 1  | 1.96  |
| ICU, Neuro    | 1  | 1.96  |

The detailed distribution of *A. baumannii* isolates in different clinical samples is shown in table (2).

**Table (2): Distribution of *A. baumannii* species in different clinical samples**

| Samples                 | N  | %     |
|-------------------------|----|-------|
| Endotracheal tube (ETT) | 15 | 29.42 |
| Nasal                   | 10 | 19.6  |
| Sputum                  | 8  | 15.69 |
| Urine                   | 7  | 13.73 |
| Blood                   | 6  | 11.76 |
| Skin                    | 2  | 3.92  |
| Wounds                  | 2  | 3.92  |
| Central venous catheter | 1  | 1.96  |

## Discussion

*A. baumannii* has emerged as an important opportunistic pathogen worldwide. It has been identified as one of the six important and highly drug resistant hospital pathogens by the “Infectious Disease Society of America” (Gant et al., 2007). They exist in nature and have the ability to survive for prolonged periods in dry environmental conditions (Pedro et al., 2001).

During the study period from February 2017 to February 2018, we reported *A. baumannii* nosocomial infections to be 6.5% (51/784). This percentage is close to that obtained by Daef et al., (2012) who showed that nosocomial infection rate of *A. baumannii* in Assiut University hospitals was 5.6%. Different results were obtained in North Egypt at Cairo governorate where nosocomial infection rates ranged from 10% to 36.1% (El-Kholy et al., 2012; Fouad et al., 2013). On the other hand, the rate of nosocomial infection was only 1.53% in Alexandria governorate (Mohamed and Raafat, 2011). The low *A. baumannii* infection rates in Upper Egypt may indicate that it is not endogenous in this area and it has been recently introduced by the domestic labour travelling to the capital or to other foreign countries where *A. baumannii* is prevalent. Also, *A. baumannii* prevalence differs worldwide where it was recorded in Europe to be ranging from 2% to 10% of all gram negative bacterial infections (Joshi et al., 2006) while the United States had the lowest percentage (2.5%) of infection (Jones et al., 2005). Higher percentages were recorded in China (16.25 % to 19.5%) (Tan et al., 2013; Sun et al., 2016) and the highest *A. baumannii* prevalence (71.2%) was recorded in India (Islahi et al., 2014). Differences in rates of infections could be an indication of the strict application of the hygiene protocols in different countries.

In the present study, we reported that *A. baumannii* isolates was most common in respiratory tract infections, isolation from urine, blood, skin, wounds and central venous catheters came next. These results are in agreement with (Senok et al., 2015) who reported that respiratory tract infections are the most common source of *A. baumannii*. These results are also similar to that obtained in other studies (Hanaa et al., 2010; Daef et al., 2012; Fattouh and El-din, 2014; Senok et al., 2015).

From these results we concluded that respiratory tract infection isolates (endotracheal tubes, sputum and nasal swabs), urine and blood isolates were the main important reservoirs of *A. baumannii* infections and are involved in *A. baumannii* transmission.

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