



A multidrug-resistant *Acinetobacter baumannii* outbreak in intensive care unit: Antimicrobial and organizational strategies

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Abstract

Purpose: Multidrug-resistant *Acinetobacter baumannii* (MRAB) is an emerging cause of intensive care unit (ICU) outbreaks. Patients are the main reservoirs, inducing cross transmission. We describe an MRAB outbreak that occurred in the Prato Hospital ICU in June to August 2009.

Materials and Methods: The ICU consists of 2 separated 4-bed rooms (rooms A and B). The MRAB-positive patients were included in our study. During the outbreak, infection control measures were enhanced; patients and environmental screenings were performed. A 6-month follow-up was carried out.

Results: Four of 26 patients admitted during the outbreak were MRAB positive. All patients were located in room A; no case was detected in room B either in the hospital or during the follow-up. Management included closure to new admissions, reinforcement of infection control measures, patient and environmental screenings, discharge of room B MRAB-negative patients for at least 5 days after the first case identification. All isolates were carbapenems resistant and tigecycline and colistin susceptible. All patients received tigecycline: 2 were successfully treated, 1 died because of preexisting illness, and 1 developed resistance and recovered after colistin therapy.

Conclusions: Enhanced infection control measures and adequate antibiotic strategy limited the outbreak. Tigecycline allowed rapid recovery. Nevertheless, resistance ensued; so colistin remained the only therapeutic option. However, pan-drug resistance has been reported.

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1. Introduction

Acinetobacter baumannii, a nonfermentative, Gram and oxidase-negative bacillus, has been recognized as a world-

wide emerging cause of nosocomial outbreaks, particularly in intensive care units (ICUs) [1,2]. It is ubiquitous in the hospital environment, and it can survive for long periods on dry inanimate surfaces. Patients are one of the main reservoirs of *A. baumannii*; they may contaminate staff's hands, resulting in cross-transmission cases [3,4]. Identified risk factors for *A. baumannii* colonization and infection are prolonged hospital stay, broad-spectrum antibiotics

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administration, invasive procedures and devices, and underlying severity of illness [5,6].

In recent years, an increasing emergence of multidrug-resistant *A baumannii* (MRAB), defined as an isolate resistant to carbapenems or resistant to 3 or more classes of antimicrobials with the exception of colistin, has been reported [7]. This pattern of resistance is especially common in environments of high antibiotic pressure, such as ICUs [4,5,8].

In this article, we describe an outbreak of MRAB in the 8-bed multidisciplinary tertiary care ICU of Prato Hospital occurring from June 6 until August 10, 2009. We analyze the sequence of infection control measures instituted, the clinical impact of MRAB outbreak, and the long-term outcome of the successful infection control intervention over 6 months.

2. Methods

2.1. Setting

Our study was carried out at Misericordia e Dolce Hospital, a 528-bed tertiary care hospital in Prato, Italy. It services medical and surgical patients, with an average of 25,000 admissions per year.

Its multidisciplinary ICU presents approximately 400 annual admissions and consists of 2 completely separated rooms (rooms A and B); each room has 4 beds and is run by its own independent staff. An extra 1-bed room (room C), not routinely used and completely isolated from both rooms A and B, is available.

In Fig. 1, the map of the Prato Hospital ICU is shown.

2.2. Study design

Outbreak period was defined as the time elapsed from the presentation of the first case (defined as *case index*) until the last isolation of MRAB strains, whereas *surveillance period* was defined as the 6-month infection control follow-up performed after the discharge of the last infected patient. *Study period* was defined as the time elapsed from the case index identification until the end of surveillance period.

All patients who presented an MRAB isolate recovered from a surveillance or a clinical sample obtained at least 48 hours after ICU admission during the outbreak period were defined as *case patients* and were included in our study.

For each MRAB-affected patient, the following data were recorded: demographics (age and sex), cause of ICU admission, length of hospital and ICU stay before acquisition of MRAB, previous administration of antibiotics during the period from ICU admission to the recovery of MRAB, history of surgery or other invasive procedures (such as mechanical ventilation, placement of a central venous catheter, arterial line, and urinary catheter), and presence of devices (such as drainage tubes).

2.3. Interventions

The MRAB outbreak management was divided into 5 phases:

- Phase 1: identification of the case index and reinforcement of infection control measures including patient and environmental screenings.

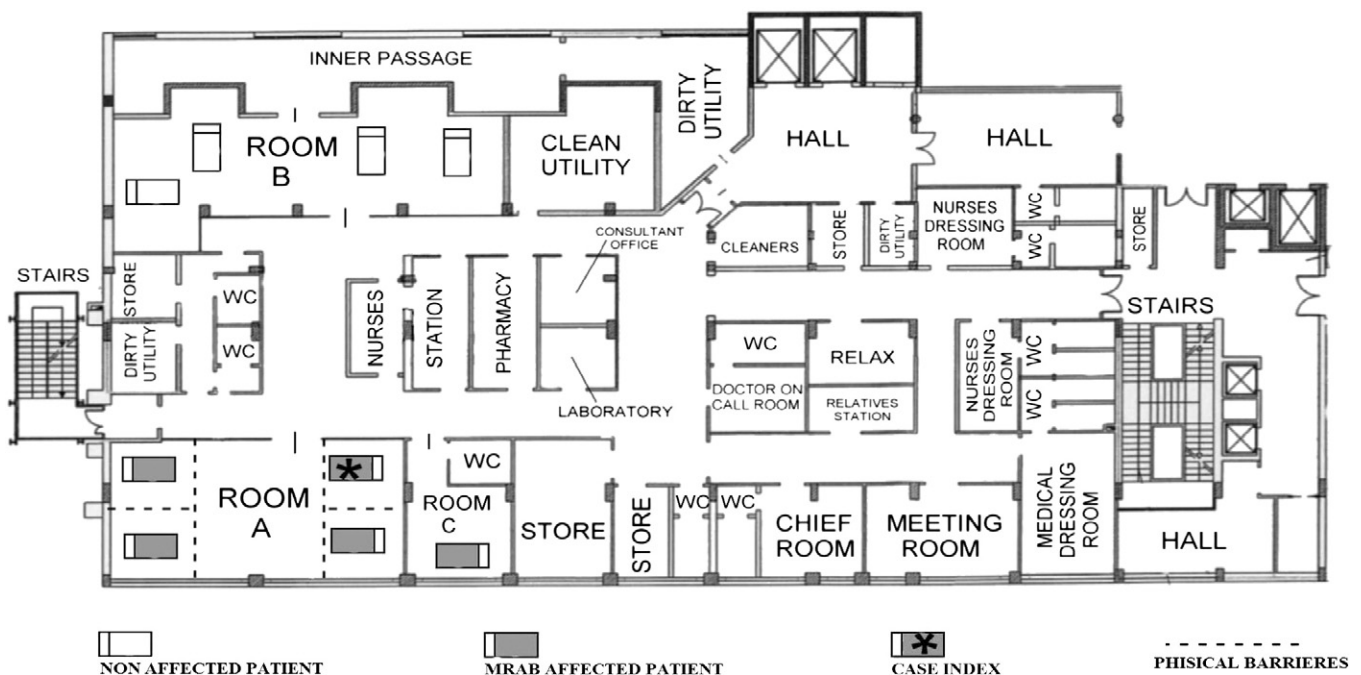


Fig. 1 Map of the multidisciplinary tertiary ICU of Prato Hospital.

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