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SHORT REPORT

Control of an outbreak of multi-drug-resistant *Acinetobacter baumannii* in an intensive care unit and a surgical ward

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Summary We describe an outbreak of multi-drug-resistant *Acinetobacter baumannii* (MRAB) that occurred in an intensive care unit (ICU) and a surgical ward from December 2003 to March 2004. Mapping patient movements on a timeline indicated that the outbreak was confined to these two areas. Investigation by the hospital's infection prevention service found that a possible source of spread was improper cleaning methods used on respiratory equipment. Pulsed-field gel electrophoresis analysis of available isolates indicated the presence of two distinct strains. One strain was seen in patients from the ICU and the other strain was seen in the surgical ward patients. Cleaning and environmental decontamination as well as staff education were implemented to halt further immediate spread. The deficiencies identified during the investigation were also resolved. The final outcome was the successful termination of this outbreak.
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Introduction

Acinetobacter baumannii is increasingly recognized as an important cause of nosocomial infection and outbreaks.[1–4] This organism can be found on human skin[5] and can survive for long periods of time on dry surfaces in the hospital environment.[6] Multi-drug-resistant *A. baumannii* (MRAB) has been reported as an emerging problem in large urban hospitals,[3,4,7] and may be spread to other centres by interhospital transfers.[3]

Geelong Hospital is a 345-bed acute care facility that serves a population of approximately 300 000

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in southern Australia. It is located approximately 75 km from a large metropolitan centre, and transfer of patients occurs frequently between this hospital and other tertiary care facilities. In late 2003, we noted a sudden increase in the incidence of MRAB, which had previously been uncommon in our hospital. Moreover, we noted that most of these isolates displayed a unique antibiogram that had not been seen in our hospital previously. We describe this outbreak of MRAB and the steps that were taken to halt further spread.

Patients and methods

We defined a case as identification of MRAB from a clinical or screening isolate. The identification and antimicrobial sensitivities of these organisms were determined using the MicroScan Walkaway NBPC11 panel (Dade Berhring, West Sacramento, CA, USA). Five available isolates were referred for pulsed-field gel electrophoresis (PFGE) and analysed according to the criteria set out by Tenover *et al.*[8]

Investigation of the outbreak was co-ordinated by the hospital's infection prevention service. The initial investigation took place in the 15-bed general intensive care unit (ICU) and later in a 30-bed surgical ward. A thorough review of cleaning and infection control procedures in the affected wards was undertaken. A timeline was constructed to establish the incidence of new cases in relation to patient movements and location.

As the outbreak continued, we conducted prevalence screening (skin, groin and rectal swabs as well as urine collection) on the wards where new isolates had appeared. The swabs were inoculated on to horse blood agar (HBA) plates and incubated aerobically at 35 °C for up to 48 h. Urine was processed according to our normal laboratory protocols and was cultured aerobically on HBA, MacConkey and direct sensitivity (Sensitest agar, Oxoid, UK) plates at 35 °C for up to 48 h. Isolates with growth that was not inhibited by a 10-μg gentamicin disc were then identified using the MicroScan Walkaway.

Results

Outbreak description

From December 2003 to March 2004, a total of 29 MRAB isolates were obtained from 10 patients (Table I). Six patients had been admitted to the ICU. Isolates were most frequently recovered from sputum ($N=17$) and were also recovered from urine ($N=5$), blood ($N=1$), skin swabs ($N=2$), a sacral pressure ulcer, a perirectal fistula, a tracheostomy wound and a central venous catheter tip. The mean age of the patients was 65.6 years (range 39–82). The average time from admission until the recovery of the first isolate was 24.9 days (range 4–54). The mean number of isolates obtained from each patient was 2.9 (range 1–10) from an average of 1.5 (range 1–4) different sites in each patient. One case ended in fatality secondary to intra-abdominal sepsis.

Isolates from nine of the 10 patients had identical susceptibility patterns with resistance to all the antimicrobials in the MicroScan panel except meropenem, tobramycin and amikacin. Before December 2003, this antibiogram had not been seen in Geelong Hospital. One isolate differed from the others by more than four antimicrobials. Most notably, this isolate displayed resistance to meropenem and tobramycin. This was the first carbapenem-resistant strain isolated in our hospital.

Investigation

The timeline demonstrated that the outbreak consisted of two waves and occurred in two

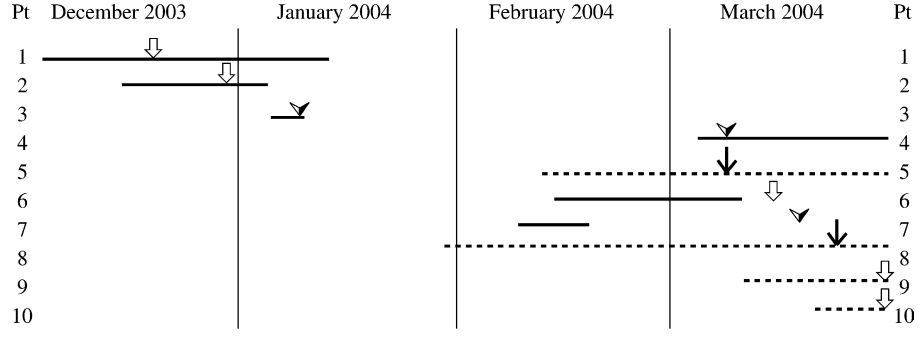

Figure 1 Timeline of isolation of multi-drug-resistant *Acinetobacter baumannii* and common case locations. Solid lines, stay in ICU; dotted line, stay in surgical ward. Isolation of MRAB: ⇘, Strain A; ↓, Strain B; ⇩, not typed.

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