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Prevalence of methicillin-resistant *Staphylococcus aureus* and *Acinetobacter baumannii* in a long-term acute care facility

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Background: Patients in long-term acute care (LTAC) facilities often have many known risk factors for acquisition of antibiotic-resistant bacteria. However, the prevalence of resistance in these facilities has not been well described.
Methods: We performed a single-day, point-prevalence study of a 180-bed, university-affiliated LTAC facility in Baltimore to assess the prevalence of methicillin-resistant *Staphylococcus aureus* (MRSA) and *Acinetobacter baumannii* in the anterior nares, perirectal area, sputum, and wounds.
Results: Among the 147 patients evaluated, we found a high prevalence of colonization by both MRSA (28%) and *A baumannii* (30%). Of the *A baumannii* isolates, 90% were susceptible to imipenem and 92% were susceptible to ampicillin-sulbactam. No isolates were resistant to both imipenem and ampicillin-sulbactam.
Conclusion: The high prevalence of resistance found in this study supports the need for increased surveillance of patients in the LTAC environment. The fact that these patients are often frequently transferred to tertiary care facilities also supports the need for coordination and collaboration among facilities within the same health care system and the broader geographic area. (Am J Infect Control 2008;36:468-71.)

Long-term acute care (LTAC) facilities are an increasingly popular health care segment in the United States.[1] These facilities are characterized by patient populations with high acuity levels, preexisiting comorbid illnesses, long lengths of stay, and frequent readmissions to acute care tertiary facilities. Therefore, these patients have many known risk factors for the acquisition and development of antibiotic-resistant infections; however, there have been but a few reports on antibiotic resistance in LTAC facilities.[2,3] The present study estimated the prevalence of the important nosocomial pathogens methicillin-resistant *Staphylococcus aureus* (MRSA) and *Acinetobacter baumannii* among patients in a university-affiliated LTAC facility.

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METHODS

Study population and data collection

This study was approved by the University of Maryland Baltimore's Institutional Review Board. On December 20, 2005, we completed a point prevalence study of a 180-bed, university-affiliated LTAC facility in Baltimore as part of an ongoing quality improvement and infection control initiative within the University of Maryland Medical System. During the study period, the facility did not use active surveillance for any organism. Patients with positive clinical cultures for MRSA, vancomycin-resistant enterococci, or multiresistant gram-negative bacteria, as well as patients known to be positive from previous admissions, were placed on contact isolation precaution, with gloves and gowns required for all health care worker contacts.

Study personnel collected anterior nares and perirectal cultures from all patients in the facility. Anterior nares cultures were collected by dipping a culturette swab (Bactiswab; Remel Co, Lenexa, KS) into the gel base of the holder to premoisten it, then inserting the swab in each nostril and rolling it approximately 5 times against the nares. Perirectal swabs also were premoistened from the base of the holder before collection and rolled approximately 5 times around the rectal area. Sputum cultures were obtained from patients on mechanical ventilation by attaching a sputum trap to the suction tubing before collection. Wounds were cultured from all patients requiring dressing changes on the study date by rolling a similarly premoistened swab approximately 5 times across the wound. Descriptive data were collected from patients residing in the facility on the study date using an electronic database containing administrative, laboratory, and pharmaceutical data. This database has been used for numerous epidemiologic studies, and previous validation has suggested that the positive and negative predictive values of these data exceed 99%.[2-4] Comorbid conditions were defined based on the *International Classification of Diseases, Ninth Revision*.[5]

Microbiological methods

Perirectal, wound, and sputum cultures were assayed for the presence of MRSA and *A baumannii*. Anterior nares cultures were assayed only for MRSA. Analysis for MRSA was done as reported previously.[2,3] In brief, swabs were plated on tryptic soy agar with 5% sheep's blood. Colonies morphologically consistent with *S aureus* were confirmed by positive catalase and Murex Staphaurex (Remel Co) reactions. MRSA was identified by growth on Mueller-Hinton agar with 4% NaCl and 6 μg/mL of oxacillin. To assess for *A baumannii*, culture swabs were plated on MacConkey agar. Oxidase-negative colonies, which are morphologically consistent with *A baumannii*, were then confirmed using an API 20NE kit (bioMérieux, Hazelwood, MO). *A baumannii* antibiotic susceptibility was evaluated by disk diffusion.

Statistical analyses

Data were assembled in a Microsoft Access database (Microsoft Co, Redmond, WA) and analyzed using SAS statistical software, version 9.1.3 (SAS Institute, Cary, NC). The prevalence of colonization was calculated as the proportion of patients colonized at any site with each organism. The sensitivity of culturing each individual site in detecting colonization also was assessed. These analyses used the presence of colonization at any site as the gold standard.

Table 1. Characteristics of the study population

Characteristic	n (%)
Age, years, mean (SD)	52 (18)
Male sex	90 (61)
Length of stay, days, median (IQR)	
Total	91 (47 to164)
Before study date	33 (11 to 91)
Admissions to affiliated tertiary facility*	
Year before admission to the index facility	
0	67 (46)
1	44 (30)
≥ 2	36 (25)
Year after admission to the index facility	
0	86 (59)
1	38 (26)
≥ 2	23 (16)
In-hospital mortality	11 (8)
Comorbidities	
Myocardial infarction	4 (3)
Heart failure	29 (20)
Cerebrovascular disease	13 (9)
Malignancy	10 (7)
HIV/AIDS	2 (1)
Diabetes mellitus	36 (25)
Liver disease	2 (1)
Renal disease	28 (19)

IQR, interquartile range; *SD*, standard deviation.
*Percentages do not sum to 100 because of rounding.

RESULTS

There were 147 patients in the facility on the study date. Characteristics of the study population are given in Table 1. The mean age was 52 years, and 61% of the population was male. The median length of stay was 91 days, and the median duration from the date of admission to the study date was 33 days. Diabetes mellitus, heart failure, and renal disease were the most prevalent comorbid conditions, at 25%, 20%, and 19%, respectively. Some 55% of the patients had been admitted to the affiliated tertiary care facility in the year preceding the index admission to the study facility, and 42% had been admitted during the year after the index admission date.

Both anterior nares and perirectal cultures were obtained in all 147 patients. In addition, sputum cultures were collected from 39 patients (27%), wound cultures were collected from 31 patients (21%), and both sputum and wound cultures were collected from 35 patients (24%).

The prevalence of MRSA at any site was 30%, and that of *A baumannii* was 28% (Table 2); 2 patients were colonized with both organisms. Among the culture sites, anterior nares cultures were the most sensitive in identifying colonization with MRSA (86%); 9 patients were colonized at multiple sites. Although sputum cultures were collected only from