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Low Prevalence of *Acinetobacter baumannii* colonization upon Hospital Admission

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Abstract

We conducted a prospective cohort study of non-critically-ill patients admitted to a tertiary-care center from December 2003 to September 2004 and obtained peri-rectal samples at hospital admission to determine the prevalence of *Acinetobacter baumannii*. *A. baumannii* was isolated from 1 (0.18%) of 555 cultures (no multidrug-resistant *A. baumannii* was identified). Interventions aimed at early identification of *A. baumannii* colonized patients may not benefit by widely targeting non-critically-ill patients upon hospital admission.

Acinetobacter baumannii is an emerging nosocomial pathogen with important clinical consequences¹. Colonization with *A. baumannii* may precede clinical infection^{2–4} and may contribute nosocomial spread. Therefore, knowledge about the epidemiology of *A. baumannii* colonization is important to identify persons at potential risk of infection and to target infection control interventions aimed at decreasing transmission. Most studies investigating colonization with *A. baumannii* have focused on critically-ill populations and thus, the prevalence of colonization in non-critically-ill patients is largely unknown.. In this study, we aimed to determine the prevalence of peri-rectal colonization with *A. baumannii* among non-critically-ill patients upon hospital admission.

METHODS

Patient data and isolates were collected from a previous prospective cohort of patients admitted to general medical and surgical units of the University of Maryland Medical Center (UMMC) to identify risk factors for presence of methicillin-resistant *Staphylococcus aureus* (MRSA) and vancomycin-resistant enterococci (VRE) upon hospital admission (methods described elsewhere)⁵. Briefly, a sample of patients admitted between December 16th, 2003 and September 9th, 2004 were invited to participate. Patients with known history of MRSA or VRE colonization/infection were excluded. Peri-rectal culture was obtained within 48 hours of hospital admission. Patient data were collected from a questionnaire and from the UMMC central data repository, a relational database containing patient administrative and

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laboratory data. This study was approved by the University of Maryland Institutional Review Board.

After collection, peri-rectal cultures were stored frozen in Trypticase Soy Broth (TSB) with 30% glycerol (BBL/Becton Dickinson; Sparks, MD). Cultures were later thawed and plated onto MacConkey agar (Remel Inc.; Lenexa, KS) and MacConkey agar supplemented with imipenem (US Pharmacopia; Rockville, MD) and were incubated at 37°C for 24–48 hours. Recovery of organisms from archived frozen specimens using this technique has been shown to be 98%⁶. Organisms were identified as *A. baumannii* using standard laboratory methods.

RESULTS

During the study period 4710 eligible patients were admitted to the general medical and surgical wards at UMMC. Of these, 2819 (59.9%) were randomly selected and underwent screening for study participation and 555 (11.8%) were enrolled and underwent peri-rectal surveillance culturing. Differences between participants and non-participants have been previously described⁵.

The mean (SD) age of the study sample was 53 (16) years and 50% of the study patients were men. 68% (379/555) of patients reported receiving an antibiotic within the previous year and 66% (368/555) reported a prior admission to any healthcare facility within the previous year. During the index admission 60% (332/555) of patients received an antibiotic, the mean (SD) Charlson Co-morbidity Index was 2.1 (2.5), 5% (28/555) of patients were admitted to an intensive care unit, and 0.4% (2/555) of patients died.

A. baumannii was isolated from 1 (0.18%) of the 555 peri-rectal cultures and no isolates of multidrug-resistant *A. baumannii* (MDR-AB) were identified. One (0.18%) of the 555 patients enrolled had a clinical culture positive for *A. baumannii* from a thigh wound at the time of hospital admission (i.e. near the time of study enrollment); however, the peri-rectal culture for this patient was negative for growth of *A. baumannii*. Among the 2819 patients screened, 16 (0.57%) were found to have a clinical culture positive for growth of *A. baumannii* from multiple sources; in 7 patients cultures were positive within the first 48 hours of admission.

DISCUSSION

Among non-critically-ill patients in this study, less than 1% was colonized in the gastrointestinal tract with *A. baumannii* and no patients were colonized with MDR-AB. In addition, only one patient among those who underwent peri-rectal culturing was identified as having a clinical culture positive for growth of *A. baumannii* (and this patient did not have growth of *A. baumannii* from the peri-rectal culture).

The incidence of hospital-acquired *A. baumannii* infections, particularly MDR-AB is on the rise¹. Colonization with *A. baumannii* has been shown to precede infection; previous studies showing that 17–26% of patients colonized with *A. baumannii* at one or multiple sites (e.g. skin, oropharynx, rectum) may go on to develop clinical infection^{2–4}. Prior knowledge of colonization status has been linked to higher rates of appropriate empiric therapy for gram-negative bacteremia⁷ which may result in improved patient outcomes^{8,9}. Furthermore, recognition of colonization before infection allows for the implementation of infection control strategies, such as Contact Precautions, aimed at reducing hospital transmission. Identification of colonization prior to infection, however, relies on costly and time consuming active surveillance strategies. The results of this study suggest a very low prevalence of *A. baumannii* in the non-critically-ill medical-surgical patient population upon

hospital admission, suggesting that active surveillance in this population may not be cost effective. A similar study performed in the intensive care setting, which assumes the largest burden of *A. baumannii* infections, showed prevalence at admission of 0.82% (10 of 1223 admissions).¹⁰

This study had several limitations. The original study cohort excluded patients with known MRSA and/or VRE, which could have resulted in underestimating the prevalence of *A. baumannii* since risk factors, including previous healthcare exposures, may be similar to those for *A. baumannii*. However, the prevalence of MRSA and VRE on admission was 7% and 5%, respectively, suggesting a high prevalence despite those exclusions. However, only the peri-rectal site was evaluated in this study and thus we may still have underestimated the prevalence of *A. baumannii* colonization at other sites such as the skin, wounds, and the respiratory tract may also be colonized^{4, 11}. Finally, since this study was performed from 2003 to 2004 and *A. baumannii* is continuing to emerge in certain populations, these results may not be consistent with the current epidemiology. A review of UMMC clinical culture data from 2002 to 2008 suggested that the prevalence of *A. baumannii* did not change substantially in the years before, during or after the study period (Data not shown).

The data presented suggest that the prevalence of gastrointestinal colonization as detected by peri-rectal culture with *A. baumannii* upon hospital admission in a non-critically-ill population was low. Infection control interventions aimed at early identification of patients colonized with *A. baumannii* may not benefit by widely targeting non-critically-ill patients upon hospital admission.

References

1. Gaynes R, Edwards JR. Overview of nosocomial infections caused by gram-negative bacilli. Clin Infect Dis 2005;41(6):848–854. [PubMed: 16107985]
2. Corbella X, Pujol M, Ayats J, et al. Relevance of digestive tract colonization in the epidemiology of nosocomial infections due to multiresistant *Acinetobacter baumannii*. Clin Infect Dis 1996;23(2): 329–334. [PubMed: 8842272]
3. Lortholary O, Fagon JY, Buu Hoi A, Mahieu G, Gutmann L. Colonization by *Acinetobacter baumannii* in intensive-care-unit patients. Infect Control Hosp Epidemiol 1998;19(3):188–190. [PubMed: 9552188]
4. Ayats J, Corbella X, Ardanuy C, et al. Epidemiological significance of cutaneous, pharyngeal, and digestive tract colonization by multiresistant *Acinetobacter baumannii* in ICU patients. J Hosp Infect 1997;37(4):287–295. [PubMed: 9457606]
5. Furuno JP, McGregor JC, Harris AD, et al. Identifying groups at high risk for carriage of antibiotic-resistant bacteria. Arch Intern Med 2006;166(5)
6. Green HP, Johnson JA, Furuno JP, et al. Impact of freezing on the future utility of archived surveillance culture specimens. Infect Control Hosp Epidemiol 2007;28(7):886–888. [PubMed: 17564997]
7. Blot S, Depuydt P, Vogelaers D, et al. Colonization status and appropriate antibiotic therapy for nosocomial bacteremia caused by antibiotic-resistant gram-negative bacteria in an intensive care unit. Infect Control Hosp Epidemiol 2005;26(6):575–579. [PubMed: 16018434]
8. Kang CI, Kim SH, Park WB, et al. Bloodstream infections caused by antibiotic-resistant gram-negative bacilli: risk factors for mortality and impact of inappropriate initial antimicrobial therapy on outcome. Antimicrob Agents Chemother 2005;49(2):760–766. [PubMed: 15673761]
9. MacArthur RD, Miller M, Albertson T, et al. Adequacy of early empiric antibiotic treatment and survival in severe sepsis: experience from the MONARCS trial. Clin Infect Dis 2004;38(2):284–288. [PubMed: 14699463]
10. Maragakis LL, Tucker MG, Miller RG, Carroll KC, Perl TM. Incidence and prevalence of multidrug-resistant *acinetobacter* using targeted active surveillance cultures. Jama 2008;299(21): 2513–2514. [PubMed: 18523219]

11. Marchaim D, Navon-Venezia S, Schwartz D, et al. Surveillance cultures and duration of carriage of multidrug-resistant *Acinetobacter baumannii*. J Clin Microbiol 2007;45(5):1551–1555. [PubMed: 17314222]