for CR *P. aeruginosa*) and 5 who died before day 14. The median age of patients was 51 years (range, 31–69 years), the median duration of carbapenem therapy was 7 days (range, 5–16 days), and no enrolled patients had enteric CR-GNB infection or colonization at admission. Patient characteristics are summarized in Table 1. On day 14, CR *A. baumannii*, CR *P. aeruginosa*, and CR *S. maltophilia* were detected in 4 subjects (20%), 6 subjects (30%), and 1 subject (5%), respectively, in the imipenem group, compared with 4 subjects (20%), 6 subjects (30%), and 1 subject (5%), respectively, in the meropenem group and 3 subjects (15%), 0 subjects (0%), and 1 subject (5%), respectively, in the doripenem group. On day 28, CR *A. baumannii*, CR *P. aeruginosa*, and CR *S. maltophilia* were detected in 4 subjects (20%), 5 subjects (25%), and 1 subject (5%), respectively, in the imipenem group, compared with 4 subjects (20%), 5 subjects (25%), and 1 subject (5%) in the meropenem group and 3 subjects (15%), 0 subjects (0%), and 1 subject (5%) in the doripenem group.

Overall, there were no differences in the gastrointestinal selective capacity of the 3 carbapenems for the emergence and detection of CR *A. baumannii* or CR *S. maltophilia* 14 and 28 days after treatment (Table 1). However, on day 14, selection for CR *P. aeruginosa* was found less frequently in the doripenem group than in the imipenem group (0% vs 30%; $P = .01$) and the meropenem group (0% vs 30%; $P = .01$). On day 28, selection for CR *P. aeruginosa* was found less frequently in the doripenem group than in the imipenem group (0% vs 25%; $P = .04$) and the meropenem group (0% vs 25%; $P = .04$) (Table 1). The MIC_{90} values for carbapenems were >32 mg/L for both CR *A. baumannii* and CR *S. maltophilia* isolates in all 3 groups. They were 16 and 8 mg/L 14 days after treatment and 16 and 8 mg/L 28 days after treatment for CR *P. aeruginosa* in the imipenem and meropenem groups, respectively; MIC data were not available for the doripenem group on days 14 and 28.

Although limited by a small sample size and the selected patient population, our study findings suggest that there are no differences in the emergence of CR *A. baumannii* or CR *S. maltophilia* after exposure to imipenem, meropenem, or doripenem for treatment of healthcare-associated pneumonia. However, the emergence of CR *P. aeruginosa* was less frequent among subjects who received doripenem. Additional studies will be important to promote understanding of the gastrointestinal selective capacity of carbapenems and other anti-infective agents for the emergence of multidrug-resistant gram-negative pathogens and their contributory role in the transmission dynamics of drug resistance.

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Intervention to Reduce the Incidence of Healthcare-Associated Methicillin-Resistant *Staphylococcus aureus* Infection in a Tertiary Care Hospital in Saudi Arabia

To the Editor—The greatest success in controlling methicillin-resistant *Staphylococcus aureus* (MRSA) has been in places that adhere to rigorous transmission-based control policies that include active surveillance culture testing to identify colonized patients and strict application of barrier precautions

for patients who are colonized or infected with MRSA.[1] The observation that MRSA has been successfully controlled with rigorous infection control practices supports the premise that transmission is the major factor that contributes to the increasing prevalence of MRSA colonization and infection.[2] The aim of our study is to show that reduction in the rate of healthcare-associated MRSA (HA-MRSA) infection is an achievable goal, even in developing countries, with the implementation of transmission-based control policies.

We conducted a prospective study at King Fahad Medical City (a tertiary care hospital with an 850-bed capacity) in Riyadh, Saudi Arabia, from January 2007 to December 2009. The study was approved by the institutional review board of King Fahad Medical City. We designed a program called the MRSA Prevention Program that was in the form of a bundle with two components: preemptive screening of patients who are at risk for MRSA colonization and implementation of maximum contact precautions for patients with test results positive for MRSA.

Preemptive screening was performed in emergency departments (for adult and pediatric patients), using polymerase chain reaction (PCR) testing of nasal swab specimens collected from patients who had been transferred from other hospitals, who had a history of prior hospitalization in the last 6 months, or who had a history of infection or colonization with MRSA. Maximum contact precautions were employed in the cases of patients who had positive PCR test results and who had been admitted to a single room or cohorted with other MRSA patients. All people entering the rooms of these patients were required to perform hygiene practices and don personal protective equipment (gloves, gowns, and surgical face masks). A daily review of the clinical data and microbiology reports sent to the Infection Prevention and Control Department of our facility was performed to identify patients who had HA-MRSA infection. Additional data on age, sex, admission and discharge dates, referring hospital, comorbidities, the decolonization process, and outcome were obtained. Topical decolonization was performed for all MRSA patients by applying topical mupirocin to both nares 2 times per day for 5 days and bathing with chlorhexidine once a day for 7 days.

The rates of HA-MRSA infection were calculated in relation to the number of patient-days. The denominator is provided monthly to the Infection Prevention and Control Department by the health information system of our hospital. A total of 4,809 eligible patients were screened during the study period. The MRSA colonization rate was 8%. The HA-MRSA infection rate decreased significantly, from 0.17 cases per 1,000 patient-days in 2007 to 0.03 cases per 1,000 patient-days in 2009 ($P = .01$; Figure 1*A*), and the rate of HA-MRSA bloodstream infections decreased from 0.1 cases per 1,000 patient-days in 2007 to 0 cases per 1,000 patient-days in 2009 (Figure 1*B*).

The effectiveness of active surveillance testing in the prevention of MRSA transmission is currently an area of controversy, and optimal implementation strategies (including timing and target populations) are unresolved.[3] Several published studies of high-risk or high-prevalence populations (including those in outbreak situations) have shown an association between the use of active surveillance testing to identify and isolate MRSA-colonized patients and the effective control of MRSA transmission and/or infection.[4-7] Two recent studies evaluated the impact of performing universal active surveillance testing at the time of hospital admission in combination with the administration of decolonization therapy to MRSA carriers, and they came to conflicting conclusions. One study used an observational cohort design and reported a significant reduction in hospital-associated MRSA disease after the introduction of active surveillance testing of all patients and decolonization of MRSA carriers.[8] The other study used a crossover cohort design and found no significant changes in the incidence of nosocomial MRSA infection among surgical patients.[9] In another recent study, active MRSA surveillance of adults during admission to the hospital appears to be cost effective at a wide range of prevalence and basic reproductive rate values.[10] Our study showed that active MRSA surveillance and the implementation of strict transmission-based control policies results in significant reduction in HA-MRSA infections.

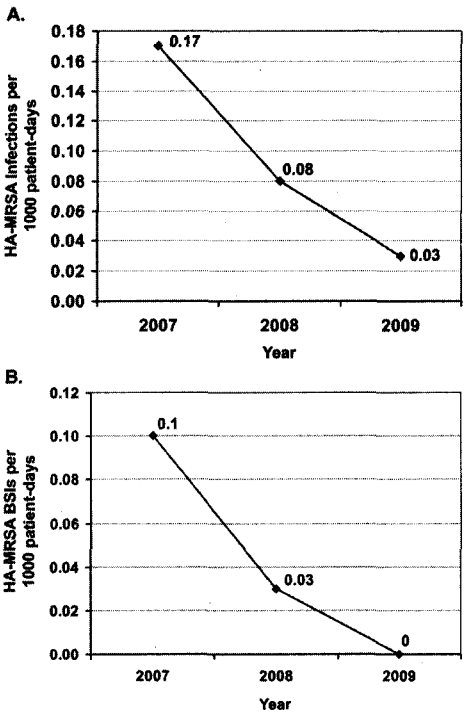

FIGURE 1. *A*, Rate of healthcare-associated methicillin-resistant *Staphylococcus aureus* (HA-MRSA) infections per 1,000 patient-days from 2007 to 2009 at King Fahad Medical City (Riyadh, Saudi Arabia). *B*, Rate of HA-MRSA bloodstream infections (BSIs) per 1,000 patient-days from 2007 to 2009 at King Fahad Medical City.

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