NOTES

Gastrointestinal Carriage of Methicillin-Resistant

Staphylococcus aureus

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Nasal and rectal cultures were taken from all patients with methicillin-resistant Staphylococcus aureus identified on routine cultures obtained because of clinical indications. Of 117 patients studied over a 3-year period, 70 (60%) had rectal colonization and 62 (53%) had nasal colonization. Rectal colonization, probably reflecting gastrointestinal carriage, may be a source of transmission of methicillin-resistant S. aureus in hospitalized patients and may be difficult to eradicate.

Infections with methicillin-resistant Staphylococcus aureus continue to be a difficult problem in hospitalized patients. Recent studies (5, 18) have attempted to define the epidemiology of these infections, but many unanswered questions remain. A continuing outbreak of methicillin-resistant S. aureus at our hospital allowed us to explore the importance of gastrointestinal carriage of this organism in infected patients.

Since January 1979 the Atlanta Veterans Administration Medical Center has experienced a continuing outbreak of infections caused by methicillin-resistant S. aureus (16). To define possible sources of transmission, we performed prevalence cultures from selected sites in infected patients.

Between January 1982 and December 1984 all patients with methicillin-resistant S. aureus that was cultured from any body site for clinical indications were evaluated by the infection control nurse. Results of our previous studies showed that 60 to 80% of these isolates were associated with clinical infections (16). These patients were placed in contact isolation, and samples from anterior nares and rectum were taken and cultured within 48 h of the original culture. Rectal samples were taken by inserting cotton swabs (Swab Transport-Pack; Difco Laboratories, Detroit, Mich.) 3 to 5 cm into the rectum and rotating the swab against the bowel wall. Care was taken so that the swab did not contact the perineal area (6). Nasal samples were taken by swabbing both anterior nares. Swabs were plated on mannitol salt, blood, and phenylethanol agar (Difco).

All methicillin-resistant S. aureus isolates were identified on the basis of morphology on Gram stain, catalase production, and results of the tube coagulase test. Standard disk diffusion antibiotic susceptibility tests were performed at 35°C, and cultures were incubated for 18 h. The strains were previously confirmed to be methicillin resistant by microdilution MIC and agar dilution (16). During this period all methicillin-resistant S. aureus isolates had a single phage type (47/54/75/77/83A) and one of two antimicrobial susceptibility patterns (P. Kozarsky, D. Rimland, P. Terry, and K. Wachsmuth, submitted for publication). Comparison of culture prevalence between groups was made by chi-square analysis.

A total of 117 patients had nasal and rectal prevalence cultures performed after isolation of methicillin-resistant S. aureus from a clinical site of infection (Table 1). Patients were most likely to have both positive nasal and rectal cultures (48 of 117). Rectal colonization was not significantly different from nasal colonization (70 of 117 versus 62 of 117, respectively; \( P = 0.36 \)).

Evaluation by site of original culture indicated that patients with wound infections were more likely to have an absence of nasal and rectal colonization (22 of 53 [41.5%]) than patients with other clinical infections (11 of 64 [17.2%]; \( P = 0.007 \)).

Systematic follow-up prevalence cultures were not performed on all patients, but 31 patients had cultures taken on subsequent hospitalizations. Nasal colonization persisted for at least 1 to 33 months (mean, 8.5 months), and rectal colonization persisted for at least 2 to 24 months (mean, 8.4 months).

Results of this study suggest that patients infected with methicillin-resistant S. aureus are often colonized with the same organism in the nares and rectum. Colonization in the rectum, suggesting gastrointestinal carriage, was indeed more common than nasal carriage. Crossley and Solliday (6) recently described the greater yield of S. aureus in prevalence cultures from rectal swabs than stool specimens, so we used rectal swabs in our study to define gastrointestinal colonization.

Results of studies of normal persons and hospitalized patients indicate that 15 to 50% are persistent carriers and 70 to 90% are transient or occasional carriers of S. aureus in at least one site (2, 14). The anterior nares have generally been considered the most important site of colonization and dissemination (14, 19), although other sites such as the perineum have been suggested as sources of dissemination in operating rooms (10, 12).

Techniques for defining gastrointestinal carriage of S. aureus differ between studies. Cultures of stool (22), rectum (9), and perineal skin (3) are not always defined and may not represent the same site. Most studies of gastrointestinal colonization have been performed in hospitalized patients on

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admission or after exposure to the hospital environment, including antimicrobics. Routine prevalence cultures in adults have revealed perineal colonization rates of 12 to 13% (3, 15); rectal colonization rates of 8% on admission, increasing to 15% during hospitalization (9); and fecal colonization rates of 17 to 21% on admission, increasing to 38 to 44% after hospitalization or antibiotic administration (11, 22). Prevalence rates of S. aureus in perineal or fecal cultures from neonates and children are consistently higher than those from adults and may reach 50 to 100% (22).

Nasal colonization of S. aureus is associated with a higher rate of postoperative infection than noncolonization (21, 23) and is very common in patients with acute cutaneous infections (8) and recurrent styes (13). The importance of gastrointestinal colonization in predicting staphylococcal infections has not been studied, and only limited data suggest the association of established infection with this type of colonization. Patients with recurrent furunculosis were found to have positive perineal cultures of S. aureus in 56% of the patients from whom samples were taken (20). In a prospective study of colonization and infection in a rehabilitation facility, Aelits et al. (1) found that 22 of 62 patients (35%) with methicillin-resistant S. aureus infections had positive perineal cultures at least once, and 3 of 63 (5%) had persistently positive cultures. The absence of both nasal and rectal colonization in 22 of 53 (41%) of our patients with wound infections suggests that exogenous infection of wounds may occur without prior colonization in the patient. This finding needs to be further evaluated in outbreaks of methicillin-resistant S. aureus infections.

Prolonged gastrointestinal carriage of methicillin-resistant S. aureus, as seen in several of our patients, could be an important factor in the persistence of methicillin-resistant S. aureus outbreaks in hospitals. Feces can certainly be important as a source of environmental contamination (9) and may be a common source of antibiotic-resistant, aerobic, gram-negative bacilli (17). Furthermore, the limited success in eradicating the carriage of methicillin-resistant S. aureus in patients and personnel with the use of topical ointments or washing (4, 7) may be due to the persistence of gastrointestinal carriage.

Prospective studies of gastrointestinal carriage of methicillin-resistant S. aureus as a predictor of clinical infection need to be performed. Future attempts to eradicate carriage may need to consider elimination of this gastrointestinal source.

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**LITERATURE CITED**


