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Comparison of Rectal Swabs and Stool Cultures for the Detection of Gastrointestinal Carriage of *Staphylococcus aureus*

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In a survey of gastrointestinal staphylococcal colonization conducted in hospitalized burned patients, rectal swab cultures yielded *Staphylococcus aureus* significantly more often (34/65, 52%) than simultaneously collected stool cultures (24/65, 37%; $P < 0.01$).

Asymptomatic carriers of *Staphylococcus aureus* represent a major reservoir of staphylococci within the hospital (7). Although nasal carriage of this organism is most thoroughly studied, *S. aureus* may be carried in a number of other anatomic sites (7, 9). Rectal and perineal carriage are well documented and are potential sources of both endogenous and exogenous staphylococcal infection (9).

For the past 5 years, there has been a continuing outbreak of infections caused by methicillin- and aminoglycoside-resistant strains of *S. aureus* in the burn unit of this hospital (3). During this time, we have conducted surveys of rectal, cutaneous, and nasal colonization with *S. aureus* in patients admitted to this ward.

Because rectal swabs are simpler to collect and process than stool specimens, we compared recovery of *S. aureus* from rectal swabs and from specimens of stool in patients admitted to the burn unit between November 1978 and August 1979.

Nurses on the burn unit were asked to collect rectal swabs and stool specimens from burned patients who had been hospitalized more than 7 days. Rectal swabs were done by inserting Culturette swabs (Cepti-Seal, Scientific Products, McGaw Park, Il.) 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. Patients were enrolled in the study only when a stool specimen could be collected within 4 h of the time of taking the rectal swab. Swabs were transported to the laboratory in modified Stuart transport media. Stool specimens were collected and transported in clean cardboard boxes.

The rectal swabs were rolled over an edge of the surface of mannitol salt agar (BBL Microbiology Systems, Cockeysville, Md.) in a petri dish. From the area of the plate inoculated with the swab, the remaining three equal quadrants were streaked with a sterile platinum loop. Growth of *S. aureus* was graded as follows: 1+, <10 colonies in the first streaked section; 2+, >10 colonies in the first streaked section (but no growth in the second or third section); 3+, growth in the second streaked section; and 4+, growth in all quadrants.

A sample of stool weighing approximately 1 g was taken from the specimen and weighed with an analytic balance. The stool sample was placed in 9 ml of Trypticase soy broth (BBL Microbiology Systems, Cockeysville, Md.) and vigorously agitated (Vortex Genie, Scientific Industries, Bohemia, N.Y.) until the stool was uniformly dispersed in the broth. Dilutions of the stool suspension (1:10, 1:100, 1:1,000) were made in Trypticase soy broth. Plates of mannitol salt were inoculated with a sterile loop calibrated to hold 0.001 ml. This process yielded approximate final dilutions of 10^{-4}, 10^{-5}, and 10^{-6}. A correction for the weight of the stool sample was made; this allowed determination of the exact final dilution.

Both swab and stool cultures were incubated at 35°C for 24 h. All colonies morphologically resembling *S. aureus* (whether or not mannitol was fermented) were identified on the basis of Gram stain morphology, a tube coagulase test, and antimicrobial susceptibility.

Paired rectal swabs and stool specimens were collected on 65 occasions from 32 patients. When the same patient was included more than once, there was an interval of at least a week between repeated sampling.

Stool specimens yielded *S. aureus* in 24 of 65 (37%) samples. Rectal swabs were positive in 34 of the 65 (52%). These two proportions are statistically significantly different ($Z = 3.44$, $P < 0.01$).

In only two of the comparisons were stool specimens positive and the rectal swab negative (Table 1). In both of these cases, 10^4 organisms

TABLE 1. *Comparison of recovery of S. aureus from rectal swabs and simultaneously collected stool cultures*

Determination	Swab cultures yielding *S. aureus*	Swab cultures negative for *S. aureus*
Stool cultures yielding *S. aureus*	22	2
Stool cultures negative for *S. aureus*	12	29

per g of stool were present. In contrast, there were 12 comparisons in which the rectal swab was positive, but the specimen of stool did not yield *S. aureus*. Of these 12 specimens, 10 yielded 2 to 3+ growth on swab culture. In the majority of stool-swab comparisons in which both specimens yielded *S. aureus*, the stools yielded 10^4 to 10^6 organisms per g. In most cases, the rectal swab yielded growth which was scored as 2+.

Available studies of intestinal carriage of *S. aureus* have utilized either stool specimens (6, 8) or rectal swabs (2, 5). The relative efficacy of these two techniques is not discussed in these papers, nor are we aware of attempts to directly compare the rectal swab and the stool culture for detection of rectal carriage of *S. aureus*.

In previous studies, it has been documented that rectal swabs are superior to stool cultures for the detection of *Shigella* species and *Vibrio cholerae* (1, 4). It seems likely that these organisms—and *S. aureus*—are concentrated on the colonic mucosa rather than within the feces. Although conjectural, this would explain the increased frequency of recovery of these organisms from a rectal swab culture.

Because of the increased yield we observed in this study and because swabs are easier to collect, handle, and process, a rectal swab should replace the stool culture as the technique of choice for the detection of intestinal carriage of *S. aureus*.

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