Mupirocin ointment with and without chlorhexidine baths in the eradication of Staphylococcus aureus nasal carriage in nursing home residents

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Background: Mupirocin ointment has been shown to be effective in eradicating Staphylococcus aureus nasal carriage in residents of a long-term care facility. Antiseptic soaps have been used as adjunct to this therapy. We compared the efficacy of short-term intranasal mupirocin ointment with and without chlorhexidine baths in the eradication of S. aureus nasal carriage with follow-up for 12 weeks.

Methods: Residents in four nursing homes known to have endemic methicillin-resistant S. aureus were screened for nasal carriage of S. aureus. Residents who had anterior nares cultures positive for S. aureus on two separate occasions were divided into two groups. Both groups received intranasal mupirocin ointment twice daily for 5 days and one group also received chlorhexidine baths for the first 3 days. Cultures of anterior nares, axilla, and groins were performed before treatment and 1 day and 1, 4, 8, and 12 weeks after treatment.

Results: After treatment, S. aureus nasal carriage was eradicated in all residents. Recolonization with S. aureus had occurred at 12 weeks in 24% of residents receiving mupirocin ointment alone (6/25) and in 15% of residents receiving mupirocin ointment plus chlorhexidine baths (4/27).

Conclusions: A short course of mupirocin ointment was effective in eradicating nasal carriage of S. aureus in nursing home residents. There were no statistical differences in efficacy between the two regimens with respect to the eradication of nasal carriage and prevention of recolonization with S. aureus. (AJIC AM J INFECT CONTROL 1995;23:306-9)
and topical antimicrobial agents, with varying degrees of success. Mupirocin ointment has been used with success to treat nursing home residents for nasal carriage, but recolonization occurs. To eradicate S. aureus carriage on other parts of the body, which may be the source of recolonization, we applied intranasal mupirocin ointment and gave chlorhexidine baths to patients undergoing long-term hemodialysis who were S. aureus nasal carriers, with good success. The purpose of this investigation was to compare the efficacy of intranasal mupirocin ointment alone with that of the combination of intranasal mupirocin ointment and chlorhexidine baths in the eradication of S. aureus nasal carriage in residents of nursing homes.

METHODS

Patient population

Nursing homes in the greater Youngstown area with MRSA colonization known to be endemic among their residents were contacted. The rationale for doing the study was explained to the administrators or directors of nursing to seek their approval for participation in this study. The nursing homes incurred no cost for the study. We provided the medications and performed all the cultures. One of us (C. A.) gave in-service programs and provided written instructions to the nursing home staff regarding proper application of mupirocin ointment to the anterior nares and proper bathing of the whole body with chlorhexidine from the neck down, with special attention to the axillary and groin areas. Permission was obtained from attending physicians to talk to residents under their care regarding this study. Written informed consent was obtained from all residents who volunteered for the study. The research protocol was approved by the medical research committee and the institutional review board of St. Elizabeth Hospital Medical Center.

Screening of residents

Written informed consent was obtained from all residents who were older than 18 years, were not pregnant, and had no history of allergy to mupirocin or chlorhexidine. Swabs from both anterior nares were obtained for culture. On day 3, residents whose anterior nares cultures had grown S. aureus underwent culture again from both anterior nares and also from axillary and groin regions. A third culture of the anterior nares was done on day 5 if the second nares culture failed to grow S. aureus. Residents with two nares cultures growing S. aureus were enrolled in the study.

Study protocol

Enrolled residents were examined for open wounds and decubitus ulcers; these were cultured if present. Demographic data, including the residents' functional status, were recorded. Residents were divided into two groups. Alternate residents were enrolled in each group. Residents in the first group were given mupirocin 2% ointment in polyethylene glycol base, applied to the anterior nares and proper bathing of the whole body with chlorhexidine from the neck down, with special attention to the axillary and groin areas. Permission was obtained from attending physicians to talk to residents under their care regarding this study. Written informed consent was obtained from all residents who volunteered for the study. The research protocol was approved by the medical research committee and the institutional review board of St. Elizabeth Hospital Medical Center.
given to the responsible personnel to use for that resident. Posttreatment cultures of the anterior nares; axilla, groin and any open wounds were taken at 1 day, 1 week, 4 weeks, 8 weeks, and 12 weeks after completion of treatment.

**Microbiology**

Swabs were streaked on mannitol salt agar and incubated at 37°C for 48 hours. Mannitol-positive colonies were tested for coagulase. Coagulase-positive colonies were designated as *S. aureus*. All *S. aureus* isolates were tested for susceptibility to methicillin by the standard disk-diffusion test.10

**RESULTS**

Four nursing homes participated in this study. The *S. aureus* nasal carriage rates among residents were 10.7%, 23.4%, 26.5%, and 34.1% in these four nursing homes. The average was 28.2% (59/209 residents).

Twenty-nine residents were assigned to the first group and 30 were assigned to the second group. One resident in the first group died before treatment and one was discharged during treatment. One resident in the second group was discharged before treatment. Data from 27 residents and 29 residents, respectively, were therefore available for analysis. There were no side effects from mupirocin ointment or chlorhexidine baths.

Table 1 shows characteristics of both groups, including sex distribution, age, number with diabetes mellitus, number with wound cultures positive for *S. aureus*, functional status, room assignment, and susceptibility of *S. aureus* isolates. These were comparable between groups. Table 2 shows the results of cultures for *S. aureus*. Few residents were colonized at the axilla and extremely few residents were colonized in the groins. Both regimens were effective in eradicating nasal carriage of *S. aureus*, but recolonization occurred in both groups. At 12 weeks after treatment, 24% (6/25) versus 15% (4/27) in the mupirocin and mupirocin plus chlorhexidine groups, respectively, were recolonized. In the first group, three isolates were MRSA and three were MSSA; in the second group, three were MRSA and one was MSSA.

**DISCUSSION**

Antimicrobial soaps containing various antiseptics have been used in conjunction with topical or systemic antimicrobial regimens in attempts to eradicate *S. aureus* nasal carriage, without clearly demonstrated efficacy.6 In our study of comparable groups of residents, the *S. aureus* nasal recolonization rate at 12 weeks was 24% in the mupirocin alone group versus 15% in the mupirocin plus chlorhexidine group. This finding was not statistically different for our small-sample size. We had hoped to study a much larger population; however, we were unable to recruit more nursing homes to participate in our study. To show statistical significance with a difference of this proportion, we would have needed to enroll almost 400 residents in each group.

The efficacy of short-term application of mupirocin ointment in the eradication of *S. aureus* nasal carriage was again demonstrated in our study. The *S. aureus* nasal recolonization rate at 12 weeks was quite low in both mupirocin-treated groups. Although the long-term use of mupirocin ointment has been associated with the development of mupirocin-resistant strains of MRSA,8 short-term use is much less likely to do so. A complete infection control program incorporating...
many components is clearly needed for the control of MRSA in long-term care facilities as well as acute care hospitals.\textsuperscript{11,12}

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\textbf{References}


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