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MAJOR ARTICLE

Household Versus Individual Approaches to Eradication of Community-Associated *Staphylococcus aureus* in Children: A Randomized Trial

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Background. Community-associated *Staphylococcus aureus* infections often affect multiple members of a household. We compared 2 approaches to *S. aureus* eradication: decolonizing the entire household versus decolonizing the index case alone.

Methods. An open-label, randomized trial enrolled 183 pediatric patients (cases) with community-onset *S. aureus* skin abscesses and colonization of anterior nares, axillae, or inguinal folds from 2008 to 2009 at primary and tertiary centers. Participants were randomized to decolonization of the case alone (index group) or of all household members (household group). The 5-day regimen included hygiene education, twice-daily intranasal mupirocin, and daily chlorhexidine body washes. Colonization of cases and subsequent skin and soft tissue infection (SSTI) in cases and household contacts were ascertained at 1, 3, 6, and 12 months.

Results. Among 147 cases with 1-month colonization data, modified intention-to-treat analysis revealed *S. aureus* eradication in 50% of cases in the index group and 51% in the household group ($P = 1.00$). Among 126 cases completing 12-month follow-up, *S. aureus* was eradicated from 54% of the index group versus 66% of the household group ($P = .28$). Over 12 months, recurrent SSTI was reported in 72% of cases in the index group and 52% in the household group ($P = .02$). SSTI incidence in household contacts was significantly lower in the household versus index group during the first 6 months; this trend continued at 12 months.

Conclusions. Household decolonization was not more effective than individual decolonization in eradicating community-associated *S. aureus* carriage from cases. However, household decolonization reduced the incidence of subsequent SSTI in cases and their household contacts.

Clinical Trials Registration. NCT00731783.

The incidence of staphylococcal skin and soft tissue infection (SSTI) has risen dramatically over the past decade [1, 2]. This epidemic has been driven largely by a community-associated *Staphylococcus aureus* clone designated USA300, which includes methicillin-resistant and methicillin-sensitive strains [3, 4]. Recurrent *S. aureus* SSTIs are especially problematic; recurrence rates >20% over 3 months have been reported [5–7]. Community-associated *S. aureus* infections cluster within households [8–10]. We previously demonstrated that children were at a 7-fold greater risk for developing SSTI if a household member had a recent SSTI [11]. Although community-associated methicillin-resistant *Staphylococcus aureus* (MRSA) transmission dynamics are not well established, it is believed that household contacts may serve as reservoirs for *S. aureus* transmission. Thus, patients treated for *S. aureus* infection may reacquire the organism from colonized household contacts, potentially placing them at risk for recurrence.

Staphylococcus aureus nasal colonization is a risk factor for SSTI development [11–13]. Decolonization

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measures used to prevent healthcare-associated MRSA infections (eg, mupirocin ointment and chlorhexidine antiseptic) [14–18] are often prescribed for patients in community settings in an effort to prevent recurrent SSTI [19]. However, it is unclear whether decolonization should be performed by all household members or only by affected individuals. The primary objective of this study was to compare *S. aureus* eradication from index cases when decolonization measures were performed by the index case alone compared with measures performed by all household members. Secondary objectives included comparing incidence of SSTI in index cases and household contacts between treatment groups and evaluating adherence to decolonization measures. We hypothesized that decolonization of all household members would be twice as effective in eradicating index case *S. aureus* carriage compared with decolonization of the index case alone.

METHODS

Study Design

The *Staphylococcus aureus* Decolonization Study (SuDS) was an open-label, randomized controlled trial. The Washington University Institutional Review Board approved this study.

Definitions

A *case* was defined as a pediatric patient with community-onset *S. aureus* SSTI and *S. aureus* colonization. A *household contact* was defined as an individual spending more than half of each week in the case's household. *Decolonization* was defined as use of antimicrobial agents to eliminate *S. aureus* carriage [20]. *Eradication* was defined as absence of *S. aureus* carriage at 3 sampled body sites.

Participants

Recruitment for this study was a 2-step process. First, patients aged 6 months to 20 years with acute community-onset SSTI requiring drainage were screened at the St Louis Children's Hospital (SLCH) ambulatory wound center and emergency department and from 9 community pediatric practices affiliated with a practice-based research network in metropolitan St Louis (Figure 1). Patients were excluded from screening if they had an indwelling catheter, percutaneous medical device, or postoperative wound infection; were undergoing dialysis; or resided in a long-term care facility. At screening, verbal informed consent and demographic information were obtained. Culture swabs (BBL Liquid Stuart; Becton Dickinson [BD], Sparks, Maryland) were collected from the anterior nares, axillae, and inguinal folds. Wound culture results were obtained from the SLCH microbiology laboratory or the primary provider to confirm *S. aureus* as the infecting organism. Second, patients with both *S. aureus* (MRSA or methicillin-sensitive *S. aureus* [MSSA]) colonization and infection were subsequently invited to return to SLCH for trial enrollment. To assess colonization status of the cases' household contacts, swabs (BBL Liquid Amies; BD) from the anterior nares, axillae, and inguinal folds, accompanied by directions for culture collection, were mailed to the cases' homes (a procedure validated previously by our group and others) [21, 22].

Study Intervention and Randomization

Trial enrollment was conducted in the SLCH Clinical Research Center (CRC) from July 2008 to November 2009, after the case's acute SSTI had healed (median time from screening, 21 days; interquartile range,15–31 days; no difference between treatment groups). At trial enrollment, written informed consent was provided for the case and each household contact. Participant assent was obtained for minors ≥7 years of age. Randomization was conducted with an Internet-based, computer-generated randomization schedule (Randomization.com) using permutation blocks of 6 and 8. The designated intervention for each participant was sealed inside a sequentially numbered security envelope and opened at enrollment by a research coordinator.

All participants received a standardized hygiene curriculum advising them to avoid sharing personal hygiene items (eg, razors, brushes, and towels), to use liquid pump or pour soaps and lotions (rather than bar soaps and jars of lotion), and to launder (in hot water) bed linens at least once weekly and towels and washcloths after each use. The 5-day decolonization regimen included twice-daily application of 2% mupirocin ointment to the anterior nares with a sterile cotton applicator and daily use of Hibiclens (4% chlorhexidine gluconate, Mölnlycke Health Care, Norcross, Georgia) in the bath or shower. Participants were instructed to apply the Hibiclens with the hands or with a clean washcloth and wash all body parts, excluding the face, followed by a thorough rinse with water. Participants were randomized to 1 of 2 study groups: the index group in which only the case was instructed to perform decolonization, and the household group in which the case and all household contacts (>6 months of age and not pregnant) were instructed to perform decolonization. Oral and printed instructions were provided to study participants. Study staff demonstrated application of mupirocin ointment to the anterior nares. Participants were provided with all study materials needed to complete decolonization measures at home.

Data Collection at Baseline and Follow-up

A standardized questionnaire was administered to each case at enrollment to collect demographic information for each case and household contact, details of the household environment, and case characteristics. One week after enrollment, a parent or guardian of each case was telephoned to assess adherence and adverse reactions to the decolonization protocol.

Index cases were followed longitudinally with visits 1, 3, 6, and 12 months after enrollment at the SLCH CRC or the primary provider's office. To assess *S. aureus* colonization status of the case, nasal, axillary, and inguinal swabs were collected at each follow-up visit. A survey was administered to ascertain interval

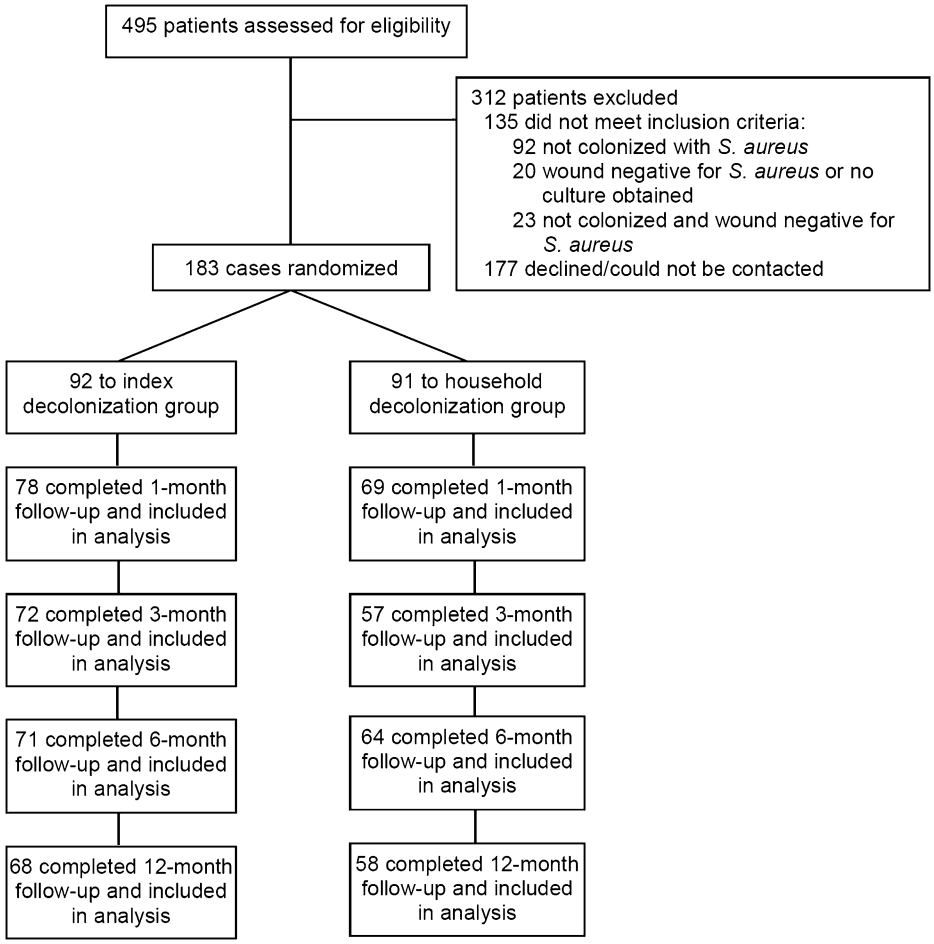


Figure 1. Flow of study participants through the *Staphylococcus aureus* Decolonization Study trial.

development of SSTI in the case or any household contact. Descriptions of SSTI included skin abscess or boil, cellulitis, impetigo, or spider bite (because community-associated MRSA abscesses may be mistaken for spider bites) [4]. All follow-up was completed by November 2010. Participants remained blinded to colonization culture results until completion of their 12-month follow-up. Over the 1-year study, 22 cases completed ≥1 follow-up visit by mail due to the distance of their home from SLCH. For these cases, the follow-up survey was conducted by telephone, and swabs were mailed for home collection as detailed above. For cases unable to be contacted for follow-up, SLCH medical records were examined to identify recurrent SSTI. In addition, medical record review was performed at the primary provider's office for cases reporting recurrent SSTI for which they sought medical care.

Study Outcomes

The primary outcome measure was *S. aureus* eradication of the case 1 month after randomization. Secondary outcomes were *S. aureus* eradication from the case at 3, 6, and 12 months; incidence of SSTI in the case or household contacts over 12 months; and adherence to decolonization measures.

Laboratory Methods

Colonization culture swabs were incubated in tryptic soy broth with 6.5% sodium chloride (BBL; BD) overnight at 35°C. The broth was plated to trypticase soy agar with 5% sheep's blood (BBL; BD) and incubated at 35°C overnight. *Staphylococcus aureus* isolates were identified, and antibiotic susceptibility testing was performed according to Clinical and Laboratory Standards Institute procedures as previously described [23, 24]. Laboratory personnel were blinded to randomization assignments. Swabs collected at home all yielded normal flora for the appropriate body site, suggesting that samples were indeed representative of these sites.

Sample-Size Calculation and Statistical Analysis

We anticipated that 50% of cases would achieve *S. aureus* eradication when measures were performed by the case alone

([25] and Fritz, unpublished data). On this basis, 65 participants were needed in each group to detect 50% relative reduction in *S. aureus* colonization in the case at 1 month ($\alpha = .05$, study power 80% by Pearson's χ^2 test). We anticipated 25% attrition and therefore enrolled 183 households.

Statistical analyses were performed with SPSS for Windows 17.0 (IBM SPSS, Chicago, Illinois). Baseline characteristics between treatment groups were evaluated by the Student *t* test (continuous data) and Pearson's χ^2 test or Fisher's exact test (categorical data). Outcome measures were evaluated by modified intention-to-treat analysis at each time point by Fisher's exact test. Specifically, participants were analyzed in the arm to which they were assigned, and the analysis for each time point included participants with evaluable data at that time point. All tests of significance were 2-tailed. *P* values ≤.05 were considered significant. Odds ratios were considered significant if the 95% confidence interval did not include 1. Relationships between treatment group and outcomes (index case *S. aureus* eradication and recurrent SSTI) were evaluated using multivariable binary logistic regression, adjusting for potential confounding characteristics that differed significantly between treatment groups at baseline; adjusted odds ratios were reported.

RESULTS

Baseline Patient Characteristics

One hundred eighty-three cases and their households were enrolled in the study; 91 were randomized to the household group and 92 to the index group (Figure 1). The mean age (SD) of the cases was 6.0 (5.8) years. Females (58%) and African Americans (58%) were predominant. Characteristics of cases in the treatment groups were similarly distributed at baseline, except that those randomized to the household group were less likely than those in the index group to have Medicaid or no health insurance ($P = .02$) and more likely to be colonized with MRSA ($P = .04$) (Table 1).

Primary and Secondary Outcomes

S. aureus *Eradication at 1 Month*

Among 147 cases with 1-month colonization data, *S. aureus* was eradicated from 51% in the household group and 50% in the index group ($P = 1.00$) (Figure 2).

S. aureus *Eradication at 3, 6, and 12 Months*

At 3 months, cases in the household group had a higher rate of *S. aureus* eradication (72%) than those in the index group (54%; $P = .05$); this difference was not significant when adjusting for baseline differences between treatment groups ($P = .07$). Eradication rates at 6 and 12 months did not differ between groups (Figure 2). When stratified by MRSA and MSSA baseline colonization, eradication rates between treatment groups did not differ significantly (data not shown).

Recurrent SSTI in Cases

At 1 month, recurrent SSTI was self-reported for 15% of case in the household group and 26% in the index group ($P = .12$). Assessment of the cumulative recurrence of self-reported SSTI revealed that cases in the household group were less likely than those in the index group to report recurrent SSTI after 3 months (28% vs 47%; $P = .02$), 6 months (38% vs 61%; $P = .008$), and 12 months (52% vs 72%; $P = .02$) (Figure 3*A*). Recurrent SSTI rates did not differ when stratified by baseline MRSA versus MSSA infection (data not shown).

Of 175 self-reported recurrent SSTIs in 90 cases, medical care was sought for 117 (67%) SSTIs. Of these, 56 (48%) cases reported requiring a drainage procedure, and 93 (79%) reportedly were prescribed antibiotics. Of the 117 SSTIs for which cases reported seeking medical care, 107 (91%) were confirmed upon review of medical records. At 1 month, recurrent SSTI was documented by a physician in 13% of cases in the household group and 19% of cases in the index group ($P = .38$). Cases in the household group were less likely than those in the index group to have a physician-documented recurrent SSTI after 3 months (15% vs 34%; $P = .007$), 6 months (22% vs 43%; $P = .008$), and 12 months (36% vs 55%; $P = .03$) (Figure 3*B*). In multivariable analyses, adjusting for baseline differences between treatment groups (insurance and MRSA colonization status) did not change the effect size of the relationship between treatment group and recurrent SSTI in cases (Figure 3*A* and 3*B*).

SSTI in Household Contacts

Household contacts of cases in the household group were less likely than those in the index group to report SSTI at 1 month (2% vs 7%; $P = .005$), 3 months (4% vs 10%; $P = .01$), and 6 months (9% vs 16%; $P = .04$). At 12 months, a trend remained toward decreased SSTI among household contacts in the household group (16% vs 22%, $P = .10$) (Figure 4).

Protocol Adherence

No serious adverse events were reported. Of 162 (88%) cases providing information, 35 (22%) reported side effects, including dry skin (23 [14%]), rash (9 [6%]), and hives (3 [2%]). Most parents of cases (85%) found the protocol easy to implement. Parents perceived chlorhexidine body washes to be the easiest study component, whereas washing towels after each use was perceived to be the most difficult.

Cases were considered adherent to the decolonization protocol if they used mupirocin twice daily and chlorhexidine daily for ≥5 days and followed ≥3 hygiene recommendations. Duration of use of study medications by cases ranged from 0 to 30 (median, 5) days. The majority (131 of 162 [81%]) of cases were adherent with the protocol (index group, 69 of 84 [82%]; household group, 62 of 78 [80%]; $P = .69$). In the household group, 74% (220 of 299) of the household contacts performed decolonization measures for ≥5 days as prescribed. Parents and

Table 1. Index Case Demographics, Culture Results, and Household Characteristics by Treatment Group

Characteristic	All Participants (%)	Treatment Group		*P* Value
		Index Decolonization (%)	Household Decolonization (%)	
Index cases	183	92	91	…
Age, mean ± SD	6.0 ± 5.8	6.3 ± 5.7	5.7 ± 6.0	.47
BMI, mean ± SD	19.0 ± 5.2	19.1 ± 5.1	18.8 ± 5.3	.68
Female	106 (58)	55 (60)	51 (56)	.66
Race[a]				
Caucasian and other	77 (42)	36 (39)	41 (45)	.46
African American	106 (58)	56 (61)	50 (55)	
Medicaid or no health insurance	107 (58)	62 (67)	45 (49)	.02
No. of persons in household, mean (range)	4.6 (2–12)	4.5 (2–12)	4.7 (2–10)	.55
Proportion of household contacts with *S. aureus* colonization, mean ± SD	0.52 ± 0.35	0.55 ± 0.37	0.49 ± 0.33	.24
Household crowding[b]	28 (15)	15 (16)	13 (14)	.84
Chronic medical condition[c]	93 (51)	48 (52)	45 (50)	.77
Eczema	56 (31)	23 (25)	33 (36)	.11
Any antibiotic use in past year	131 (72)	64 (70)	67 (75)	.41
Hospitalization in past year	16 (9)	9 (10)	7 (8)	.80
Surgery in past year	61 (33)	30 (33)	31 (34)	.88
Emergency department visit in past year	78 (43)	42 (46)	36 (40)	.46
Index case SSTI in past year	79 (44)	41 (45)	38 (43)	.77
Sports participation	44 (24)	26 (28)	18 (20)	.23
Pets in home	92 (50)	48 (52)	44 (48)	.66
Indirect healthcare contact[d]	95 (52)	43 (47)	52 (57)	.18
Prison contact[e]	40 (22)	22 (24)	18 (20)	.59
Piercings	78 (43)	39 (42)	39 (43)	1.00
Daycare or preschool attendance[f]	54 (50)	21 (41)	33 (58)	.12
School attendance[g]	66 (88)	36 (88)	30 (88)	1.00
Screening colonization (at any site)				
MRSA[h]	129 (70)	58 (63)	71 (78)	.04
MSSA	54 (30)	34 (37)	20 (22)	
Screening SSTI				
MRSA	144 (79)	68 (74)	76 (84)	.15
MSSA	39 (21)	24 (26)	15 (16)	
Body site(s) of colonization at screening[i]				
Nares	116 (63)	57 (62)	59 (65)	.76
Axillae	54 (30)	25 (27)	29 (32)	.52
Inguinal folds[j]	120 (66)	57 (62)	63 (70)	.28
Number of colonization sites at screening				
1	102 (56)	54 (59)	48 (53)	.21[k]
2	54 (30)	29 (32)	25 (28)	
3	26 (14)	9 (10)	17 (19)	
Household contacts	661	325	336	…
Age of household contacts, mean ± SD	23.1 ± 16.2	22.9 ± 16.0	23.3 ± 16.5	.74
Household contact female sex	383 (58)	183 (56)	200 (60)	.43
Household contact *S. aureus* colonization[l]	323 (53)	169 (57)	154 (49)	
MRSA	128 (19)	56 (19)	72 (23)	.23[m]
MSSA	195 (32)	113 (38)	82 (26)	
Not colonized	286 (47)	127 (43)	159 (51)	

Table 1 continued.

Characteristic	All Participants (%)	Treatment Group		*P* Value
		Index Decolonization (%)	Household Decolonization (%)	
Household contact relationships				
Parent or stepparent	280 (42)	140 (43)	140 (42)	.59[k]
Sibling or stepsibling	248 (38)	123 (38)	125 (37)	
Grandparent or great-grandparent	48 (7)	19 (6)	29 (9)	
Other	85 (13)	43 (13)	42 (13)	
Household contact SSTI in past year	128 (20)	67 (22)	61 (19)	.43

Abbreviations: BMI, body mass index; MRSA, methicillin-resistant *Staphylococcus aureus*; MSSA, methicillin-sensitive *S. aureus*; SD, standard deviation; SSTI, skin or soft tissue infection.

[a] Race was self-reported. Other race includes 1 Asian case; African American race includes 6 biracial cases.

[b] More than 2 people per bedroom per household.

[c] Chronic medical conditions commonly reported included asthma, allergies, and seizures. One case reported heart disease. No cases reported high blood pressure, diabetes, cancer, sickle cell disease, cystic fibrosis, human immunodeficiency virus, gastroesophageal reflux disease, depression/bipolar disorder, or attention deficit disorder.

[d] Visited a hospital or nursing home in last 6 months or has a healthcare worker living in the household.

[e] Visited a prison, had contact with someone who spent time in prison in last 6 months, or has prison worker living in the household.

[f] Analyzed for cases ≤4 years old (n = 108).

[g] Analyzed for cases >4 years old (n = 75).

[h] Cases colonized with both MRSA and MSSA were classified as colonized with MRSA.

[i] May be colonized at >1 anatomic site with MRSA or MSSA.

[j] An inguinal culture was not obtained for 1 case (n = 182).

[k] Pearson's χ^2 test was used for comparisons of number of colonization sites at screening and household contact relationships. Fisher's exact test was used for all other categorical comparisons.

[l] Colonization information was not provided by 52 household contacts (n = 609).

[m] Comparison between household contacts colonized with MRSA and those not colonized with MRSA.

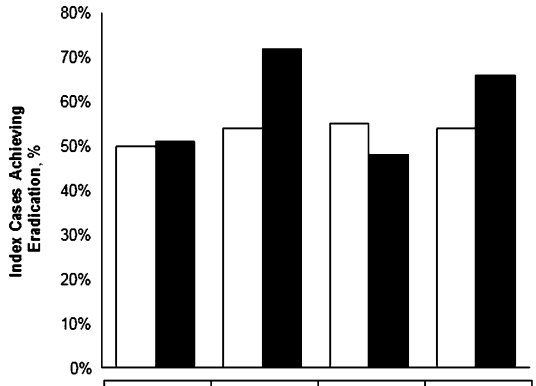
siblings (77%) were more likely to be adherent than other household members (63%; $P = .03$). Twenty-nine (10%) of 295 household contacts in the index group (instructed not to perform decolonization) reported using the study materials.

DISCUSSION

While data are emerging regarding the effectiveness of regimens to eradicate *S. aureus* from patients in community settings, the optimal approach to decolonization remains unclear [20, 25–27]. Community-associated *S. aureus* is a disease affecting households; in the present study, we evaluated an individual versus household approach to *S. aureus* eradication. We found that *S. aureus* eradication from cases did not differ between treatment groups over 12 months. Interestingly, we found that a household decolonization approach resulted in fewer subsequent SSTIs in both cases and their household contacts.

The finding of reduced SSTI despite no difference in eradication rates between treatment groups is surprising given the fact that endogenous *S. aureus* colonization is a predictor of nosocomial infection [28–30]. However, in the community setting, other factors may contribute to *S. aureus* pathogenesis and SSTI development [31]. Some authors propose that skin-to-skin and skin-to-fomite contact may play a greater role in *S. aureus* pathogenesis than does endogenous colonization [31]. This model of transmission is supported by the observation that not all patients with *S. aureus* SSTI are colonized with *S. aureus* [31, 32]. In the present study, 20% of screened patients with confirmed *S. aureus* SSTI were not colonized with *S. aureus* in the nares, axillae, or inguinal folds. Furthermore, while many patients with SSTI are *S. aureus* carriers, an endogenous colonizing strain may not be the strain causing disease. In a study of pediatric patients with *S. aureus* SSTI and nasal colonization, only 59% were colonized with a strain concordant with the strain recovered from the infection site [6]. This suggests that acquisition of a new strain (via person-to-person contact or from environmental surfaces) results in symptomatic infection. A better understanding of the molecular epidemiology of community-associated *S. aureus* colonization and infection is essential to developing interventions that will improve patient outcomes.

The household decolonization data presented here can inform a common clinical practice that had been previously unstudied. In a 2006 survey of infectious diseases consultants inquiring about strategies to prevent recurrent community-associated SSTIs, approximately half the respondents reported prescribing decolonization measures for all family members, while 4% treated only colonized family members [19]. The effectiveness of



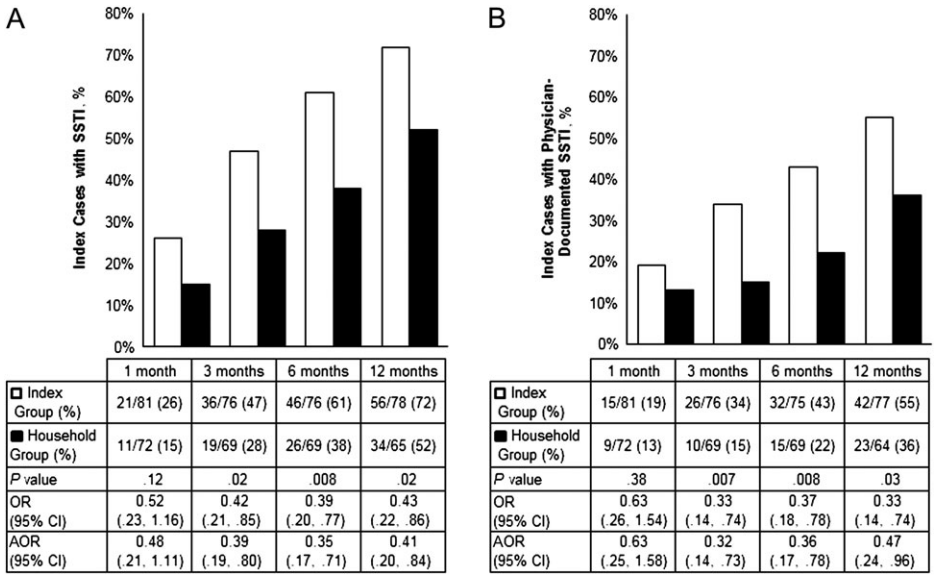
	1 month	3 months	6 months	12 months
Index Group (%)	39/78 (50)	39/72 (54)	39/71 (55)	37/68 (54)
Household Group (%)	35/69 (51)	41/57 (72)	31/64 (48)	38/58 (66)
P value	1.00	.05	.49	.28
OR (95% CI)	1.03 (.54, 1.97)	2.17 (1.03, 4.55)	0.77 (.39, 1.52)	1.59 (.77, 3.28)
AOR (95% CI)	1.03 (.52, 2.02)	2.02 (.95, 4.31)	0.77 (.38, 1.55)	1.38 (.66, 2.91)

Figure 2. Eradication of *Staphylococcus aureus* carriage from index cases following intervention. *P* values were derived by Fisher's exact test. Abbreviations: AOR, adjusted odds ratio, adjusting for insurance status and methicillin-resistant *S. aureus* colonization; CI, confidence interval; OR, odds ratio.

decolonization measures in reducing SSTI might be similar if measures were targeted only at *S. aureus* carriers; such an approach would decrease the burden and cost of performing these measures. However, culturing all household members may not be practical in a community setting. If decolonization measures are prescribed for patients with recurrent SSTI, the findings of this study support an approach directed at all household members.

This study has several limitations. We did not directly observe the performance of decolonization measures by participants, although 81% of cases and 74% of household contacts asked to perform the protocol reported adherence with prescribed measures. Additionally, 10% of household contacts not assigned to the protocol used the index case's materials. Although we recognize the limitations of self-reporting an SSTI, our conclusions are also borne out by the analysis limited to physician-documented SSTIs. The decolonization regimen selected for this trial (intranasal mupirocin and chlorhexidine body washes) was selected based on data from healthcare-based trials [17, 18, 33] and the popularity of this regimen among infectious disease practitioners for patients in the community [19]. Bleach and chlorhexidine-impregnated cloths are alternatives for decolonization [34–36]. Finally, because we hypothesized that the effect size would be greater earlier in the follow-up period (within the first 3 months), we modeled the outcomes individually at each time point; alternative modeling strategies (eg, generalized hierarchical linear modeling) might also have been considered.

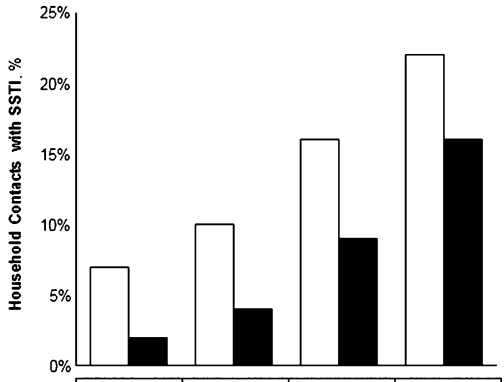
This study has unique strengths. Though nasal screening is frequently the sole means used to detect *S. aureus* colonization [37–40], other sites [38, 41–43] may represent important niches for *S. aureus* colonization. We sampled 3 body sites that yielded important data on the distinct colonization patterns of community-associated *S. aureus* [22, 31]. Indeed, nearly



	1 month	3 months	6 months	12 months
Index Group (%)	21/81 (26)	36/76 (47)	46/76 (61)	56/78 (72)
Household Group (%)	11/72 (15)	19/69 (28)	26/69 (38)	34/65 (52)
P value	.12	.02	.008	.02
OR (95% CI)	0.52 (.23, 1.16)	0.42 (.21, .85)	0.39 (.20, .77)	0.43 (.22, .86)
AOR (95% CI)	0.48 (.21, 1.11)	0.39 (.19, .80)	0.35 (.17, .71)	0.41 (.20, .84)

	1 month	3 months	6 months	12 months
Index Group (%)	15/81 (19)	26/76 (34)	32/75 (43)	42/77 (55)
Household Group (%)	9/72 (13)	10/69 (15)	15/69 (22)	23/64 (36)
P value	.38	.007	.008	.03
OR (95% CI)	0.63 (.26, 1.54)	0.33 (.14, .74)	0.37 (.18, .78)	0.33 (.14, .74)
AOR (95% CI)	0.63 (.25, 1.58)	0.32 (.14, .73)	0.36 (.17, .78)	0.47 (.24, .96)

Figure 3. *A*, Cumulative recurrent skin and soft tissue infection (SSTI) self-reported by index cases following intervention. *B*, Cumulative index case recurrent SSTIs following intervention documented by a physician. *P* values were derived by Fisher's exact test. Abbreviations: OR, odds ratio; CI, confidence interval; AOR, adjusted odds ratio, adjusting for insurance status and methicillin-resistant *Staphylococcus aureus* colonization.



	1 month	3 months	6 months	12 months
Index Group (%)	20/281 (7)	28/271 (10)	40/254 (16)	53/239 (22)
Household Group (%)	6/285 (2)	11/250 (4)	23/245 (9)	36/226 (16)
P value	.005	.01	.04	.10
OR (95% CI)	0.28 (.11, .71)	0.40 (.19, .82)	0.55 (.32, .96)	0.67 (.42, 1.06)

Figure 4. Cumulative skin and soft tissue infection (SSTI) self-reported by household contacts following intervention. *P* values were derived by Fisher's exact test. Abbreviations: OR, odds ratio; CI, confidence interval.

one-third of colonized cases and household contacts would not have been detected had only the nares been sampled. Also, due to the breadth of age, race, household size, and geographic distribution of our participants, these results may be generalizable to other populations affected by community-associated *S. aureus*.

The ongoing community-associated *S. aureus* epidemic is a significant public health burden that affects millions of individuals. This entity is particularly challenging within households, where the reservoir of *S. aureus* may perpetuate ongoing disease. At present, we lack effective validated methods to prevent these infections [20]. This is the first randomized trial of *S. aureus* decolonization strategies in the community setting to demonstrate a reduction in the burden of SSTI [25–27]. However, this study is only a first step in demonstrating that a household approach can decrease the impact of *S. aureus*, as >50% of cases in the household group reported recurrent SSTI over a 1-year period. Further studies elucidating the roles of household colonization pressure and household environmental contamination in community-associated *S. aureus* transmission and disease are needed to guide subsequent trials of optimized strategies for interrupting staphylococcal transmission.

Notes

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