Supplementary Online Content

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This supplementary material has been provided by the authors to give readers additional information about their work

eMethods

Patient recruitment and eligibility

Patients with culture-confirmed community-associated methicillin-resistant *Staphylococcus aureus* (CA-MRSA) skin and soft tissue infection (SSTI) were recruited for the "HOME: Household Observation of MRSA in the Environment study" in the St. Louis metropolitan area. Recruitment took place from 2012-2015 at St. Louis Children's Hospital (SLCH), Cardinal Glennon Children's Hospital, and Washington University Pediatric and Adolescent Ambulatory Research Consortium (WUPAARC)-affiliated community pediatric practices.

To be eligible, index patients were 18 years of age or younger, presented with a culture-confirmed MRSA SSTI, were able to complete their baseline home visit within 3 months of their SSTI, and resided less than 80 miles from the Washington University in St. Louis medical campus. Patients presenting with probable healthcare-associated MRSA infection (as determined by evidence of recent hospitalization, invasive medical device, or residence in a long-term care facility) were excluded.[1]

Additional definitions

Household cleanliness score: scores of 1 (above average), 2 (average), 3 (below average), and 4 (very dirty) were assigned by the research team, considering odor, clutter, and grime, to ensure a bias-free assessment of household cleanliness. Modified from the Environmental Cleanliness and Clutter Scale.[2]

Frequent handwashing score: individual reports washing hands "always" after using bathroom, "always" before preparing food, at least "frequently" before eating, and at least "frequently" after changing a diaper (when applicable).

Detailed laboratory procedures

For all swabs: 100 μL of Eswab (Becton Dickinson [BD], Franklin Lakes, NJ) eluate inoculated into tryptic soy broth with 6.5% sodium chloride (BBL; BD) and incubated overnight at 35°C. 100 μL of broth then plated to trypticase soy agar with 5% sheep blood (blood agar plate [BBL; BD]) and incubated overnight at 35°C. Additionally, for environmental swabs: 100 μL of Eswab eluate directly inoculated to a blood agar plate and incubated overnight at 35°C. Contact plates (Baird Parker agar; Hardy, Santa Maria, CA) incubated overnight at 35°C. Growth indicative of *S aureus* subcultured to a blood agar plate and incubated overnight at 35°C.

Isolates confirmed as *S aureus* based on colony morphology, catalase activity, rapid latex agglutination test (Staphaurex; Remel), and Gram stain. Resistance to cefoxitin disk diffusion test on Mueller-Hinton agar (BBL; BD) classified *S aureus* as MRSA, in accordance with Clinical and Laboratory Standards Institute procedures.[3]

All recovered *S aureus* isolates were analyzed by repetitive-sequence PCR (repPCR) to determine strain concordance among household members, pets, and environmental surfaces over time.[4,5] Isolates with <95% similar repPCR patterns were considered unique. Distinct strain types (composite of unique repPCR designation and methicillin resistance profile for each recovered *S aureus* isolate) were defined at the household level.

Isolates with unusual repPCR patterns and all isolates recovered from pets were confirmed as *S aureus* by matrix-assisted laser desorption ionization time-of-flight mass spectrometry (VITEK MS v2.0).[6]

Statistical analyses

Multivariable logistic models

Longitudinal, multivariable generalized mixed-effects logistic regression models were employed to estimate how individual and household attributes influenced *individual persistence*, *interval SSTI*, *household persistence*, and *infecting-strain persistence*. The following general model formulation was employed:

$$y = link(X\beta + R)$$

where y is an $n \times 1$ vector representing persistence or SSTI, X the $n \times m$ design matrix of fixed effects, β the $m \times 1$ coefficients for these fixed effects, *link* the link function, and R the random intercept terms to account for repeated sampling. In the case of *the individual persistence* and *interval SSTI* models, R consisted of household-level and individual-level terms. In the *household persistence* model, R consisted of household-level and strain-level terms. The *infecting-strain persistence* model consisted solely of a household-level random intercept term due to low

sample size. All models were fitted using the R library "MCMCglmm."[7] As all models were logistic, the 'threshold' family was used with a chi-square prior for random intercepts and a normal prior for fixed effects. For model selection, runtime parameters of 10^4 iterations with a burn-in of 10^2 and a thinning interval of 100 were used to ensure chain convergence as verified by the halfwidth test, stationarity test, and visual inspection of chain convergence.[8-10] Presented models used a more rigorous runtime of $5x10^5$ iterations with a burn-in of 10^3 to ensure stabilization of significance and reproducibility.

With the exception of the *infecting-strain persistence* model, covariate selection occurred via a heuristic, two-stage model selection approach to alleviate the high quantity of covariates relative to modest sample size of the dataset, as described previously.[11,12] In the first stage, 11 covariates were selected based on *a priori* hypotheses and statistically significant variables in univariate analysis for each outcome. All possible combinations were fitted and the optimal model selected based on the lowest deviance information criterion (DIC). In the second stage, each model was re-estimated with the individual addition of other covariates of interest, which were maintained in the final, presented models when model DIC was reduced and the covariate exhibited a pMCMC <0.05. See **eTables 2-5** for primary and secondary covariates included in each model.

Markov model of household strain persistence

A first-order Markov model was fitted using R library "msm."[13] The input to this model included all pairs of time points with a sampled environment across every strain with the following five states to describe colonization by a given strain within a household: at least one child (<18 years) colonized, at least one adult (≥18 years) colonized, both a child and an adult colonized, colonization exclusively in the environment, and no colonization present. This model was run with stochastically generated initial parameters (gen.inits=TRUE) and fitted using the BOBYQA optimization algorithm with 1M maximal iterations to ensure convergence. To consolidate the state space, "child" and "child/adult" were combined to present a simplified model consisting of the following four states: "child," "adult," "environment," and "not present in household." In this model, the "transition probability" represents the estimated probability of observing a strain type transitioning from one state to another between sampling intervals, while "self-transition probability" represents the estimated probability of a strain type remaining in the same state between sampling intervals.

eAcknowledgments

Artwork used in **Figure 2, Figure 3,** and **eFigure 3** created by various artists from the Noun Project - https://thenounproject.com. Icons – Artists described below.

Anterior nares – Xinh Studio; axillae – Gregory Montigny; inguinal folds – Bohdan Burmich; dog (nose & dorsal fur) – Oksana Latysheva; television remote contol – Priyanka; main telephone – Thays Malcher; computer keyboard & mouse – Patrick Morrison; videogame controller – Andrea Severgnini; index patient bed linens – parkjisun; hand towel – AomAm; sink faucet handle – Ben Davis; toilet (seat & handle) – Ralf Schmitzer; light switch – Sara Jeffries; sink – Halil Ibrahim Nuroglu; bathtub – Cecile Parker; countertop – Llisole; soap bar and dish in bath or shower – Bakunetsu Kaito; door handle – Gabriele Fumero; index patient bath towel – icon 54; sponge or cloth – Oleksandr Panasovskyi; refrigerator door handle – dajeong lee; table – Alexander Mravcak; house – Prettycons; and cityscape - Becris.

eReferences

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eTable 1. Longitudinal *S aureus* Contamination Pressure and Normalized Persistence Events on Environmental Surfaces

Environmental surface	Sampling method[a]	Longitudinal *S aureus* contamination pressure[b]		Normalized persistence events[d]	
		N[c]	mean %, SD	N[e]	mean %, SD
Electronics					
Videogame controller	Eswab	49	17.8, 28.8	3	7.0, 38.7
Television remote control	Eswab	61	17.6, 28.6	7	10.3, 47.2
Computer keyboard and mouse	Eswab	46	14.1, 25.3	5	9.9, 49.3
Main telephone or index patient cell phone	Eswab	53	14.0, 24.1	7	8.3, 36.3
Kitchen					
Refrigerator door handle	Contact plate	70	19.2, 26.1	13	16.7, 51.8
Table	Contact plate	55	14.9, 23.8	5	5.7, 26.9
Hand towel	Eswab	31	11.6, 26.6	2	5.1, 31.4
Sponge cloth	Eswab	40	10.0, 21.2	0	0.0, 0.0
Sink faucet handle	Eswab	41	8.4, 16.8	4	3.7, 18.9
Bathroom					
Sink	Contact plate	68	17.6, 25.2	10	12.0, 40.2
Counter top	Contact plate	65	16.5, 24.4	6	6.5, 28.3
Bathtub	Contact plate	67	15.9, 22.9	8	7.4, 26.2
Toilet seat	Contact plate	59	14.1, 21.5	10	12.0, 42.4
Soap dish and bar in bath or shower	Contact plate	19	9.7, 24.3	4	9.6, 35.4
Index patient bath towel	Eswab	43	14.6, 25.4	3	4.0, 19.5
Sink faucet handle	Eswab	58	14.4, 22.9	3	3.7, 23.3
Light switch	Eswab	50	12.9, 23.9	3	3.7, 23.3
Hand towel	Eswab	33	12.1, 25.7	1	1.3, 11.3
Toilet handle	Eswab	48	10.4, 20.3	4	8.3, 49.3
Door handle	Eswab	44	9.4, 19.7	5	7.4, 42.4
Bedroom					
Index patient bed sheets and pillowcases	Eswab	81	26.4, 32.5	14	20.4, 60.5

[a] Eswab (Becton Dickinson [BD], Franklin Lakes, NJ) and Baird Parker Agar contact plate (Hardy, Santa Maria, CA)
[b] The number of contaminated environmental surfaces divided by the number of times each surface was sampled over the 12 month study (max 5 per household) x100.
[c] N = the number of households with *S aureus* contamination at least once longitudinally at each environmental surface.
[d] The number of persistence events divided by the number of potential persistence events (max 4 per household) x100; events are not necessarily consecutive.
[e] N = the number of households with persistent *S aureus* contamination (i.e., an identical *S aureus* strain was recovered for at least two consecutive samplings) at each environmental surface.

eTable 2. Individual Persistence Model, Primary and Secondary Covariates		
Covariate name	**Description**	**Type of variable[a]**
Primary covariates		
Personal strain colonization pressure	The number of anatomic sites (three per person: axillae, nares, and groin; excluding the modeled individual) colonized with the persistent strain divided by the number of anatomic sites sampled in the household at prior sampling	1, 3
Environmental strain contamination pressure	The number of environmental sites contaminated with the persistent strain divided by the number of environmental sites sampled in the household at prior sampling	1, 3
Interval SSTI	Individual reports experiencing a skin or soft tissue infection (e.g., abscess, cellulitis, impetigo, spider bite) since prior sampling	2, 3
Interval systemic antibiotic usage	Individual reports being prescribed systemic (oral or intravenous) antibiotics since prior sampling	2, 3
Interval application of decolonization measures (any)	Individual reports applying mupirocin to the anterior nares, taking bleach baths, or using chlorhexidine body wash since prior sampling	2, 3
Frequent handwashing score	Individual reports washing hands “always” after using bathroom, “always” before preparing food, at least “frequently” before eating, and at least “frequently” after changing a diaper (when applicable)	2, 4
Bathes, ≥1x/day	Individual reports bathing/showering at least daily	2, 4
Shares bedroom with strain-colonized individual	Individual reports ever sharing a bedroom with an individual colonized with the persistent strain at prior sampling	2, 3
Shares towel (any) or hygiene item (any) with strain-colonized individual	Individual reports ever sharing a towel (hand, face, or bath) or hygiene item (e.g., brush/comb, deodorant, toothbrush, cosmetics, or razor/clippers) with an individual colonized with the persistent strain at prior sampling	2, 3
Home ownership	Whether the family owns (vs. rents) their home	2, 4
Household cleanliness score	Whether the research team rated the overall dwelling clean (above average/average) vs. dirty (below average/very dirty), considering odor, clutter, and grime per standardized protocol	2, 4
Secondary covariates		
Sex	Sex of the individual (male vs. female)	2, 4
Age, years, categorical	Age as a 6-level factor, encoded as ≤3,4-10, 11-17, 18-34, 35-64, ≥65 years old	2, 4
Child	Individual <18 years old at time of enrollment	2, 4
Race	Individual reports being Caucasian (vs. any other race, e.g., African American, multiracial, American Indian)	2, 4
Ethnicity	Individual reports being of Hispanic/Latino ethnicity	2, 4
Health insurance	Individual reports having private or military (vs. Medicaid, Medicare, or no) health insurance	2, 4

Personal colonization pressure of other household strains	The number of anatomic sites (three per person: axillae, nares, and groin excluding the modeled individual) colonized with all other strains in the household (other than the persistent strain) divided by the number of anatomic sites sampled in the household at prior sampling	1, 3
Environmental contamination pressure of other household strains	The number of environmental sites contaminated with all other strains in the household (other than the persistent strain) divided by the number of environmental sites sampled in the household at prior sampling	1, 3
SSTI, past year	Individual reports experiencing at least one skin or soft tissue infection in the year prior to enrollment, excluding the index patient enrollment SSTI	2, 4
SSTI in any household member, past year	At least one household member (including the index patient) reports a skin or soft tissue infection in the year prior to enrollment, excluding the index patient enrollment SSTI	2, 4
Interval application of intranasal mupirocin	Individual reports applying mupirocin to the anterior nares since prior sampling	2, 3
Interval ED visit, hospitalization, or surgery	Individual reports visiting emergency department, being hospitalized, or having surgery since prior sampling	2, 3
Interval ED Visit	Individual reports visiting the emergency department since prior sampling	2, 3
Interval hospitalization	Individual reports being hospitalized since prior sampling	2, 3
Interval surgery	Individual reports having surgery since prior sampling	2, 3
Antibacterial soap for handwashing/bathing	Individual reports use of antibacterial soaps for handwashing and/or bathing	2, 4
Showers primarily	Individual reports primarily showering when bathing (vs. taking a bath)	2, 4
Frequent tooth brushing, ≥2x/day	Individual reports brushing teeth at least twice daily	2, 4
Towel washed after each use	Individual reports washing towels after each use	2, 4
Bedding washed, ≥2x/month	Individual reports washing bed linens two or more times per month	2, 4
Shares bedroom	Individual reports ever sharing a bedroom with another household member	2, 4
Shares bed	Individual reports ever sharing a bed with another household member	2, 4
Shares towel (hand, face, or bath)	Individual reports ever sharing a towel (hand, face, or bath) with another household member	2, 4
Shares hand towel	Individual reports ever sharing a hand towel with another household member	2, 4
Shares face towel	Individual reports ever sharing a face towel or cloth with another household member	2, 4

Shares bath towel	Individual reports ever sharing a bath towel with another household member	2, 4
Shares hygiene item (any)	Individual reports ever sharing a hygiene item (e.g., brush/comb, deodorant, toothbrush, cosmetics, or razor/clippers) with another household member	2, 4
Shares brush or comb	Individual reports ever sharing a brush or comb with another household member	2, 4
Shares deodorant	Individual reports ever sharing roll-on deodorant with another household member	2, 4
Shares toothbrush	Individual reports ever sharing a toothbrush with another household member	2, 4
Shares cosmetics	Individual reports ever sharing cosmetics with another household member	2, 4
Shares razor or clippers	Individual reports ever sharing a razor or clippers with another household member	2, 4
Shares bed with strain-colonized individual	Individual reports ever sharing a bed with an individual colonized with the persistent strain at prior sampling	2, 3
Shares hygiene item (any) with strain-colonized individual	Individual reports ever sharing a hygiene item (e.g., brush/comb, deodorant, toothbrush, cosmetics, or razor/clippers) with an individual colonized with the persistent strain at prior sampling	2, 3
Undershirts washed after each wear	Individual reports washing undershirts after each wear	2, 4
Outer shirts washed after each wear	Individual reports washing outer shirts after each wear	2, 4
Pants washed after each wear	Individual reports washing pants after each wear	2, 4
Underwear washed after each wear	Individual reports washing underwear after each wear	2, 4
Socks washed after each wear	Individual reports washing socks after each wear	2, 4
Daycare attendance	Individual reports attending daycare	2, 4
Gym, locker room, or public shower use, ≥1x/month	Individual reports attending a gym, using a locker room, or using a public shower at least monthly	2, 4
Gym attendance, ≥1x/month	Individual reports attending a gym at least monthly	2, 4
Locker room use, ≥1x/month	Individual reports using a locker room at least monthly	2, 4
Public shower use, ≥1x/month	Individual reports using a public shower at least monthly	2, 4
Public pool attendance, ≥1x/month	Individual reports visiting a public pool at least monthly	2, 4

Visits hair salon, ≥1x/month	Individual reports visiting a hair salon at least monthly	2, 4
Prison exposure	Individual reports visiting a prison or being in contact with an individual that has been incarcerated in the past year	2, 4
Sports participation	Individual reports participation in any sport in prior year	2, 4
Skin disorder	Individual reports being diagnosed with skin disorder, including eczema, acne, psoriasis, hidradenitis suppurativa, folliculitis, autoimmune hives, keratosis pilaris, rosacea, molluscum contagiosum, seborrheic dermatitis, shingles, or tinea versicolor	2, 4
Chronic health condition	Individual reports being diagnosed with at least one chronic health condition, including heart disease, diabetes, cancer, kidney disease, liver disease, autoimmune disease, inflammatory bowel disease, or immunodeficiency	2, 4
Depression or bipolar disorder	Individual reports being diagnosed with depression and/or bipolar disorder	2, 4
Asthma	Individual reports being diagnosed with asthma	2, 4
Eczema	Individual reports being diagnosed with eczema	2, 4
Average monthly low temperature (◦F)	Average monthly low temperature (◦Fahrenheit) for Saint Louis, Missouri at the time of sampling	1, 3
Nights per week spent in household	Average number of nights individual reports sleeping in household each week	1, 4
Hours per week spent with index patient	Average number of hours individual reports spending with the index patient each week	1, 4
Home type	Whether the participants live in a house (vs. apartment, condominium, or trailer)	2, 4
Household crowding	More than two household members per bedroom	2, 4
Pet in household	At least one dog or cat in household	2, 4
People per square foot	Number of individuals in household divided by the square footage of home	1, 4
People per bathroom	Number of individuals in household divided by the number of bathrooms	1, 4
Urban dwelling	Dwelling is in an urban or suburban (vs. rural) area[14,15]	2, 4
Mother high school-educated	Mother of index patient reports completing at least a high school education	2, 4
Mother college-educated	Mother of index patient reports completing at least a college education	2, 4
Exercise equipment	Exercise equipment (e.g., stationary bike or treadmill) present in household	2, 4
Clothes washer in home	Clothes washer present in household	2, 4

Cleans refrigerator door handles, ≥1x/week	Household reports cleaning kitchen refrigerator door handles at least weekly	2, 4
Uses bleach in household cleaning, ≥1x/week	Household reports cleaning household with bleach-based products at least weekly	2, 4
[a]Type of variable: 1=continuous, 2=categorical; 3=temporal, 4=independent of time		

eTable 3. Interval SSTI Model, Primary and Secondary Covariates[a]		
Covariate name	**Description**	**Type of variable[b]**
Primary covariates		
Personal MRSA colonization pressure	The number of anatomic sites (three per person: axillae, nares, and groin; excluding the modeled individual) colonized with methicillin-resistant *S aureus* divided by the number of anatomic sites sampled in the household at prior sampling	1, 3
Environmental MRSA contamination pressure	The number of environmental sites contaminated with methicillin-resistant *S aureus* divided by the number of environmental sites sampled in the household at prior sampling	1, 3
Individual MRSA strain persistence	Colonization of individual by an identical MRSA strain for two consecutive samplings in any of at least one anatomic site	2, 3
Interval SSTI, at least one household contact	At least one household contact (not including individual currently modeled) reported a skin or soft tissue infection since prior sampling	2, 3
Frequent handwashing score	Individual reports washing hands “always” after using bathroom, “always” before preparing food, at least “frequently” before eating, and at least “frequently” after changing a diaper (when applicable)	2, 4
Bathes, ≥1x/day	Individual reports bathing/showering at least daily	2, 4
Shares bedroom with MRSA-colonized individual	Individual reports ever sharing a bedroom with an individual colonized with methicillin-resistant *S aureus* at prior sampling	2, 3
Shares towel (any) or hygiene item (any) with MRSA-colonized individual	Individual reports ever sharing a towel (hand, face, or bath) or hygiene item (e.g., brush/comb, deodorant, toothbrush, cosmetics, or razor/clippers) with an individual colonized with methicillin-resistant *S aureus* at prior sampling	2, 3
Average monthly low temperature (◦F)	Average monthly low temperature (◦Fahrenheit) for Saint Louis, Missouri at the time of sampling	1, 3
Home ownership	Whether the family owns (vs. rents) their home	2, 4
Household cleanliness score	Whether the research team rated the overall dwelling clean (above average/average) vs. dirty (below average/very dirty), considering odor, clutter, and grime per standardized protocol	2, 4
Secondary covariates		
Sex	Sex of the individual (male vs. female)	2, 4
Age, years, categorical	Age as a 6-level factor, encoded as ≤3,4-10, 11-17, 18-34, 35-64, ≥65 years old	2, 4
Child	Individual <18 years old at time of enrollment	2, 4
Race	Individual reports being Caucasian (vs. any other race, e.g., African American, multiracial, American Indian)	2, 4
Ethnicity	Individual reports being of Hispanic/Latino ethnicity	2, 4
MRSA colonized	Individual colonized with methicillin-resistant *S aureus* at the prior sampling	2, 3
MSSA colonized	Individual colonized with methicillin-susceptible *S aureus* at the prior sampling	2, 3

S aureus colonized	Individual colonized with *S aureus* at the prior sampling	2, 3
Number of MRSA-colonized anatomic sites	Number of anatomic sites (of three) in which the individual is colonized with MRSA at prior sampling	1, 3
Environmental *S aureus* contamination pressure	The number of environmental sites contaminated with *S aureus* divided by the number of environmental sites sampled in the household at prior sampling	1, 3
Individual MSSA strain persistence	Colonization of individual by an identical MSSA strain for two consecutive samplings in any of at least one anatomic site	2, 3
Index patient	Individual is the index patient who experienced enrollment SSTI (vs. a household contact)	2, 4
SSTI, past year	Individual reports experiencing at least one skin or soft tissue infection in the year prior to enrollment, excluding the index patient enrollment SSTI	2, 4
SSTI in any household contact, past year	At least one household contact (excluding the index patient) reports experiencing a skin or soft tissue infection in the year prior to enrollment	2, 4
SSTI in any household member, past year	At least one household member (including the index patient) reports experiencing a skin or soft tissue infection in the year prior to enrollment, excluding the index patient enrollment SSTI	2, 4
Hospitalization, past year	Individual reports being hospitalized in the year prior to enrollment	2, 4
Interval ED Visit	Individual reports visiting the emergency department since prior sampling	2, 3
Interval hospitalization	Individual reports being hospitalized since prior sampling	2, 3
Interval surgery	Individual reports having surgery since prior sampling	2, 3
Antibacterial soap for handwashing/bathing	Individual reports use of antibacterial soaps for handwashing and/or bathing	2, 4
Washes hands after using bathroom, always	Individual reports always washing hands after using the bathroom	2, 4
Washes hands after preparing food, ≥sometimes	Individual reports washing hands after preparing food at least sometimes	2, 4
Washes hands after handling pet, ≥frequently	Individual reports washing hands after handling a pet at least frequently	2, 4
Showers primarily	Individual reports primarily showering when bathing (vs. taking a bath)	2, 4
Frequent tooth brushing, ≥2x/day	Individual reports brushing teeth at least twice daily	2, 4
Towel washed after each use	Individual reports washing towels after each use	2, 4

Bedding washed, ≥2x/month	Individual reports washing bed linens two or more times per month	2, 4
Shares bedroom	Individual reports ever sharing a bedroom with another household member	2, 4
Shares bed	Individual reports ever sharing a bed with another household member	2, 4
Shares towel (hand, face, or bath)	Individual reports ever sharing a towel (hand, face, or bath) with another household member	2, 4
Shares hand towel	Individual reports ever sharing a hand towel with another household member	2, 4
Shares face towel	Individual reports ever sharing a face towel or cloth with another household member	2, 4
Shares bath towel	Individual reports ever sharing a bath towel with another household member	2, 4
Shares hygiene item (any)	Individual reports ever sharing a hygiene item (e.g., brush/comb, deodorant, toothbrush, cosmetics, or razor/clippers) with another household member	2, 4
Shares brush or comb	Individual reports ever sharing a brush or comb with another household member	2, 4
Shares deodorant	Individual reports ever sharing roll-on deodorant with another household member	2, 4
Shares toothbrush	Individual reports ever sharing a toothbrush with another household member	2, 4
Shares cosmetics	Individual reports ever sharing cosmetics with another household member	2, 4
Shares razor or clippers	Individual reports ever sharing a razor or clippers with another household member	2, 4
Shares bed with MRSA-colonized household member	Individual reports ever sharing a bed with an individual colonized with methicillin-resistant *S aureus* at prior sampling	2, 3
Shares towel (hand, face, or bath) with MRSA-colonized household member	Individual reports ever sharing a towel (hand, face, or bath) with an individual colonized with methicillin-resistant *S aureus* at prior sampling	2, 3
Shares hygiene item (any) with MRSA-colonized individual	Individual reports ever sharing a hygiene item (e.g., brush/comb, deodorant, toothbrush, cosmetics, or razor/clippers) with an individual colonized with methicillin-resistant *S aureus* at prior sampling	2, 3
Undershirts washed after each wear	Individual reports washing undershirts after each wear	2, 4
Outer shirts washed after each wear	Individual reports washing outer shirts after each wear	2, 4
Pants washed after each wear	Individual reports washing pants after each wear	2, 4

Underwear washed after each wear	Individual reports washing underwear after each wear	2, 4
Socks washed after each wear	Individual reports washing socks after each wear	2, 4
Daycare attendance	Individual reports attending daycare	2, 4
Gym, locker room, or public shower use, ≥1x/month	Individual reports attending a gym, using a locker room, or using a public shower at least monthly	2, 4
Gym attendance, ≥1x/month	Individual reports attending a gym at least monthly	2, 4
Locker room use, ≥1x/month	Individual reports using a locker room at least monthly	2, 4
Public shower use, ≥1x/month	Individual reports using a public shower at least monthly	2, 4
Public pool attendance, ≥1x/month	Individual reports visiting a public pool at least monthly	2, 4
Visits hair salon, ≥1x/month	Individual reports visiting a hair salon at least monthly	2, 4
Prison exposure	Individual reports visiting a prison or being in contact with an individual that has been incarcerated in the past year	2, 4
Sports participation	Individual reports participation in any sport in prior year	2, 4
Works in healthcare with patient contact	Individual works in healthcare setting and has contacts with patients.	2, 4
Skin disorder	Individual reports being diagnosed with skin disorder, including eczema, acne, psoriasis, hidradenitis suppurativa, folliculitis, autoimmune hives, keratosis pilaris, rosacea, molluscum contagiosum, seborrheic dermatitis, shingles, or tinea versicolor	2, 4
Chronic health condition	Individual reports being diagnosed with at least one chronic health condition, including heart disease, diabetes, cancer, kidney disease, liver disease, autoimmune disease, inflammatory bowel disease, or immunodeficiency	2, 4
Depression or bipolar disorder	Individual reports being diagnosed with depression and/or bipolar disorder	2, 4
Asthma	Individual reports being diagnosed with asthma	2, 4
Eczema	Individual reports being diagnosed with eczema	2, 4
Home type	Whether the participants live in a house (vs. apartment, condominium, or trailer)	2, 4
Household crowding	More than two household members per bedroom	2, 4
Pet in household	At least one dog or cat in household	2, 4
People per square foot	Number of individuals in household divided by the square footage of home	1, 4

People per bathroom	Number of individuals in household divided by the number of bathrooms	1, 4
Urban dwelling	Dwelling is in an urban or suburban (vs. rural) area[14,15]	2, 4
Mother high school-educated	Mother of index patient reports completing at least a high school education	2, 4
Mother college-educated	Mother of index patient reports completing at least a college education	2, 4
Clothes washer in home	Clothes washer present in household	2, 4
Cleans kitchen refrigerator door handles, ≥1x/week	Household reports cleaning kitchen refrigerator door handles at least weekly	2, 4
Uses bleach in household cleaning, ≥1x/week	Household reports cleaning household with bleach-based products at least weekly	2, 4

[a]Variables regarding interval application of decolonization measures and interval systemic antibiotic usage were not included in model as potential covariates associated with Interval SSTI as we were unable to discern temporality between their prescription and the incidence of the interval SSTI.
[b]Type of variable: 1=continuous, 2=categorical; 3=temporal, 4=independent of time

eTable 4. Household Persistence Model, Primary and Secondary Covariates

Covariate name	Description	Type of variable[a]
Primary covariates		
Environmental strain contamination pressure	The number of environmental sites contaminated with the persistent strain divided by the number of environmental sites sampled in the household at prior sampling	1, 3
Proportion of strain-colonized household members	Proportion of household members colonized in at least one anatomic site with the persistent strain at prior sampling	1, 3
MRSA strain type	Whether the persistent strain is methicillin-resistant *S aureus* (vs. methicillin-susceptible *S aureus*)	2, 4
Interval SSTI, proportion of household members	Proportion of household members reporting a skin or soft tissue infection since prior sampling	1, 3
Interval systemic antibiotic usage, proportion of household members	Proportion of household members reporting being prescribed oral or intravenous antibiotics since prior sampling	1, 3
Interval application of intranasal mupirocin, proportion of household members	Proportion of household members reporting applying mupirocin to the anterior nares since prior sampling	1, 3
Shares bed, bedroom, or towel, proportion of household members	Proportion of household members reporting ever sharing a bed, bedroom, or towel with other household members	1, 4
Average monthly low temperature (◦F)	Average monthly low temperature (◦Fahrenheit) for Saint Louis, Missouri at the time of sampling	1, 3
People per square foot	Number of individuals in household divided by the square footage of home	1, 4
Home ownership	Whether the family owns (vs. rents) their home	2, 4
Household cleanliness score	Whether the research team rated the overall dwelling clean (above average/average) vs. dirty (below average/very dirty), considering odor, clutter, and grime per standardized protocol	2, 4
Secondary covariates		
Index race	Index patient in household reports being Caucasian (vs. any other race, e.g., African American, multiracial, American Indian)	2, 4
Index ethnicity	Index patient in household reports being of Hispanic/Latino ethnicity	2, 4
Personal strain colonization pressure	The number of anatomic sites (three per person: axillae, nares, and groin) colonized with the persistent strain divided by the number of anatomic sites sampled in the household at prior sampling	1, 3

Personal colonization pressure of other household strains	The number of anatomic sites (three per person: axillae, nares, and groin) colonized with all other strains in the household (other than the persistent strain) divided by the number of anatomic sites sampled in the household at prior sampling	1, 3
Environmental contamination pressure of other household strains	The number of environmental sites contaminated with all other strains in the household (other than the persistent strain) divided by the number of environmental sites sampled in the household at prior sampling	1, 3
Number of strain types	Number of distinct strain types recovered in household from household members, environmental surfaces, and pets at prior sampling	1, 3
Shares bed or bedroom, proportion of household members	Proportion of household members reporting ever sharing a bed or bedroom with other household members	1, 4
Interval bleach baths, proportion of household members	Proportion of household members reporting taking bleach baths since prior sampling	1, 3
Interval chlorhexidine body washes, proportion of household members	Proportion of household members reporting using chlorhexidine body wash since prior sampling	1, 3
Frequent handwashing score, proportion of household members	Proportion of household members reporting washing hands “always” after using bathroom, “always” before preparing food, at least “frequently” before eating, and at least “frequently” after changing a diaper (when applicable)	1, 4
Towel washed after each use	Individual reports washing towels after each use	2, 4
Cleans telephone, ≥1x/3months	Household reports cleaning main telephone or index cell phone at least once every 3 months	2, 4
Cleans TV remote, ≥1x/3months	Household reports cleaning television remote control at least once every 3 months	2, 4
Cleans microwave, ≥1x/week	Household reports cleaning microwave at least weekly	2, 4
Cleans kitchen counter, ≥1x/week	Household reports cleaning kitchen countertop at least weekly	2, 4
Cleans kitchen sink faucet handle, ≥1x/week	Household reports cleaning kitchen sink faucet handle at least weekly	2, 4
Replaces kitchen hand towel, ≥1x/week	Household reports replacing kitchen hand towel at least weekly	2, 4
Cleans refrigerator door handles, ≥1x/week	Household reports cleaning refrigerator door handles at least weekly	2, 4
Cleans bathroom counter, ≥1x/week	Household reports cleaning bathroom countertop at least weekly	2, 4

Cleans bathroom sink, ≥1x/week	Household reports cleaning bathroom sink at least weekly	2, 4
Cleans bathroom door handle, ≥1x/week	Household reports cleaning bathroom door handle at least weekly	2, 4
Frequent bathroom cleaning score	Household reports cleaning bathroom countertop, sink, and toilet handle and seat “at least weekly” and door handle “at least monthly”	2, 4
Home type	Whether the participants live in a house (vs. apartment, condominium, or trailer)	2, 4
Interval home move	Household members report moving to a new dwelling since prior sampling	2, 3
Household crowding	More than two household members per bedroom	2, 4
Pet in household	At least one dog or cat in household	2, 4
Number of pets	Number of dogs and cats in household	1, 4
People per bedroom	Number of individuals in household divided by the number of bedrooms	1, 4
People per bathroom	Number of individuals in household divided by the number of bathrooms	1, 4
Urban dwelling	Dwelling is in an urban or suburban (vs. rural) area[14,15]	2, 4
Mother high school-educated	Mother of index patient reports completing at least a high school education	2, 4
Mother college-educated	Mother of index patient reports completing at least a college education	2, 4
Exercise equipment	Exercise equipment (e.g., stationary bike or treadmill) present in household	2, 4

[a]Type of variable: 1=continuous, 2=categorical; 3=temporal, 4=independent of time

eTable 5. Infecting-strain Persistence Model, Covariates

Covariate name	Description	Type of variable[a]
Home ownership	Whether the family owns (vs. rents) their home	2, 4
People per bedroom	Number of individuals in household divided by the number of bedrooms	1, 4
Interval application of intranasal mupirocin, proportion of household members	Proportion of household members reporting applying mupirocin to the anterior nares since prior sampling	1, 3
Interval bleach baths, proportion of household members	Proportion of household members reporting taking bleach baths since prior sampling	1, 3
Interval chlorhexidine body washes, proportion of household members	Proportion of household members reporting using chlorhexidine body wash since prior sampling	1, 3
Interval SSTI, proportion of household members	Proportion of household members reporting experiencing a skin or soft tissue infection since prior sampling	1, 3

[a]Type of variable: 1=continuous, 2=categorical; 3=temporal, 4=independent of time

eTable 6. Study Population and Sampling Statistics: Participants, the Environment, and Their Pets

People	**All individuals, N=692 (%)**	**Index patients, N=150 (%)**	**Household contacts, N=542 (%)**
Demographics			
Age, years, median, range	14, 0.08-82.3	3, 0.08-18.6	25, 0.08-82.3
Race[a]			
Caucasian	479 (69.2)	102 (68.0)	377 (69.6)
African-American	185 (26.7)	37 (24.7)	148 (27.3)
Multiracial[b]	28 (4.0)	11 (7.3)	17 (3.1)
Hispanic[a]	32 (4.6)	9 (6.0)	23 (4.2)
Male	326 (47.1)	70 (46.7)	256 (47.2)
History of SSTI, past year[c]	227 (33.8)	88 (58.7)	139 (26.6)
Application of decolonization measures (any), past year[d]	209 (31.1)	73 (48.7)	136 (26.1)
Samplings and Colonization			
Fully sampled (all 5 visits)	540 (78.0)	128 (85.3)	412 (76.0)
Sampled 2 or more times, contiguously	650 (93.9)	144 (96.0)	506 (93.4)
Number of samplings, median, IQR	5, 5-5	5, 5-5	5, 5-5
Colonized with any *S aureus*, at least once	513 (74.1)	116 (77.3)	397 (73.2)
Number of samplings *S aureus* colonized, median, IQR	1, 0-3	2, 1-3	1, 0-3
Colonized with MRSA, at least once	319 (46.1)	88 (58.7)	231 (42.6)
Number of samplings MRSA colonized, median, IQR	0, 0-1	1, 0-2	0, 0-1
Environmental surfaces	**Households, N=150 (%)**		
Fully sampled (all 5 visits)	98 (65.3)		
Sampled 2 or more times, contiguously	108 (72.0)		
Contaminated with any *S aureus*, at least once	136 (90.7)		
Contaminated with MRSA, at least once	104 (69.3)		

Pets	**Pets, N=154 (%)**		
Fully sampled (all 5 visits)	74 (48.1)		
Sampled 2 or more times, contiguously	106 (68.8)		
Carried any *S aureus*, at least once	68 (44.2)		
Carried MRSA, at least once	44 (28.6)		

ABBREVIATIONS: SSTI, skin and soft tissue infection; MRSA, methicillin-resistant *Staphylococcus aureus*
[a] Race and ethnicity were self-reported
[b] Multiracial participants: African-American/Caucasian (N=22), Caucasian/American Indian (N=3), and African-American/Caucasian/American Indian (N=3)
[c] Excluding index patient enrollment SSTI; N=672
[d] Individual reports applying mupirocin to the anterior nares, taking bleach baths, or using chlorhexidine body wash in the year prior to enrollment; N=672

eTable 7. Individual Strain Persistence by Anatomic Site

Site of colonization, T0	State of colonization, T1[a]		Site of persistent colonization, T1[b]						
	Loss	Persistence	Nares only	Groin only	Axillae only	Nares & groin	Nares & axillae	Groin & axillae	Nares & groin & axillae
Nares only	313 (57)	236 (43)	165 (70)	11 (5)	4 (2)	30 (13)	16 (7)	2 (1)	8 (3)
Groin only	165 (68)	76 (32)	20 (26)	32 (42)	3 (4)	11 (14)	2 (3)	3 (4)	5 (7)
Axillae only	90 (82)	20 (18)	8 (40)	2 (10)	4 (20)	1 (5)	2 (10)	1 (5)	2 (10)
Nares & groin	70 (50)	71 (50)	30 (42)	10 (14)	3 (4)	17 (24)	5 (7)	1 (1)	5 (7)
Nares & axillae	25 (48)	27 (52)	15 (56)	2 (7)	2 (7)	5 (19)	2 (7)	0 (0)	1 (4)
Groin & axillae	16 (57)	12 (43)	1 (8)	3 (25)	2 (17)	4 (33)	0 (0)	0 (0)	2 (17)
Nares & groin & axillae	21 (42)	29 (58)	7 (24)	3 (10)	1 (3)	9 (31)	2 (7)	0 (0)	7 (24)

ABBREVIATIONS: T0, any colonization sampling with *S aureus* recovery; T1, subsequent colonization sampling of same individual
NOTE: Each anatomic category listed is exclusive of the other categories.
[a] (Row %) is percentage of loss of colonization or persistent colonization at any site (at T1) given colonization at each site (at T0).
[b] The sum of all "site of persistent colonization, T1" (columns) is equal to the persistence column within each "site of colonization, T0" (row). (Row %) is percentage of persistence at each site (at T1) given colonization at each site (at T0).

eTable 8. Factors Associated with Persistence, Univariate Analysis				
INDIVIDUAL FACTORS				
Demographic binary factors (≥1 persistence event across time)	**Among persistently colonized individuals, N (%)**	**Among individuals without persistent colonization, N (%)**	**OR (95% CI)**	**p[a]**
Caucasian race	147 (62.6)	157 (75.5)	0.54 (0.36-0.82)	0.004
Private health insurance	149 (63.4)	155 (74.5)	0.59 (0.39-0.89)	0.01
Eczema	51 (21.7)	28 (13.5)	1.77 (1.07-2.94)	0.03
Daycare attendance	43 (31.4)	57 (49.6)	0.47 (0.28-0.78)	0.004
Shares bath towel (ever)	94 (40.3)	56 (27.2)	1.81 (1.21-2.71)	0.005
Temporal binary factors (≥1 persistence event per sampling)	**Among persistently colonized individuals, N (%)**	**Among individuals without persistent colonization, N (%)**	**OR (95% CI)**	**p[a]**
Interval application of intranasal mupirocin	22 (4.7)	58 (11.2)	0.39 (0.24-0.65)	<0.001
Interval application of intranasal mupirocin, at least one other household member	32 (6.8)	76 (14.7)	0.43 (0.28-0.66)	<0.001
Colonized with infecting strain at prior sampling	120 (43.8)	102 (34.8)	1.46 (1.04-2.05)	0.03
Temporal continuous factors (≥1 persistence event per sampling)	**Among persistently colonized individuals, median, IQR**	**Among individuals without persistent colonization, median, IQR**	**Kruskal-Wallis statistic**	**p[b]**
Number of *S aureus*-colonized anatomic sites at prior sampling	1.0, 1.0-2.0	1.0, 1.0-2.0	1.15	<0.001
Number of MRSA-colonized anatomic sites at prior sampling	1.0, 0.0-1.0	0.0, 0.0-1.0	1.29	0.004
Number of infecting-strain-colonized anatomic sites at prior sampling	1.0, 1.0-2.0	1.0, 1.0-2.0	1.20	<0.001
Number of distinct strains colonized with at prior sampling	1.0, 1.0-2.0	1.0, 1.0-2.0	1.15	<0.001

HOUSEHOLD FACTORS				
Demographic binary factors (total observed persistence events)	**Persistence events per time point, per sampling (when factor present), median, IQR**	**Persistence events per time point, per sampling (when factor absent), median, IQR**	**Kruskal-Wallis statistic**	**p[b]**
Home ownership	0.50, 0.2-1.0	1.02, 0.5-1.7	0.55	<0.001
Mother at least high school-educated	0.67, 0.2-1.2	1.85, 1.3-2.1	0.44	0.005
Household cleanliness score (clean)[c]	0.62, 0.2-1.2	0.85, 0.5-1.5	0.74	0.03
Clothes washer in home	0.67, 0.2-1.2	1.33, 0.6-1.7	0.64	0.03
Demographic continuous factors (total observed persistence events)	**N**		**Spearman ρ**	**p[d]**
People per square foot	143		0.24	0.004
People per bathroom	143		0.17	0.045
Temporal continuous factors (persistence events per sampling)	**N**		**Spearman ρ**	**p[d]**
Average monthly low temperature (°F) at time of sampling	455		0.11	0.02
Personal *S aureus* colonization pressure at prior sampling[e]	455		0.43	<0.001
Personal MRSA colonization pressure at prior sampling[e]	455		0.25	<0.001
Personal MSSA colonization pressure at prior sampling[e]	455		0.13	0.005
Personal infecting-strain colonization pressure at prior sampling[e]	266		0.24	<0.001
Environmental *S aureus* contamination pressure at prior sampling	387		0.27	<0.001
Environmental MRSA contamination pressure at prior sampling	387		0.25	<0.001

Environmental infecting-strain contamination pressure at prior sampling	222		0.23	<0.001
Total unique strain types at prior sampling	455		0.09	0.046
Person strain types at prior sampling	455		0.15	0.002
Environment and pet strain types at prior sampling	387		0.11	0.03

ABBREVIATIONS: OR, odds ratio; CI, confidence interval; MRSA, methicillin-resistant *Staphylococcus aureus;* MSSA, methicillin-susceptible *S aureus*
[a] Fisher's exact test
[b] Kruskal-Wallis test
[c] Whether the research team rated the overall dwelling clean (above average/average) vs. dirty (below average/very dirty), considering odor, clutter, and grime per standardized protocol
[d] Spearman's correlation test
[e] Excluding the modeled individual

eTable 9. Factors Associated with Strain Persistence in Pets[a]			
Dichotomous covariates	**Among persistently colonized pets, N=9 (%)**	**Among pets without persistent colonization, N=97 (%)**	**OR (95% CI)**
Dog (vs. cat)	9 (100.0)	74 (76.3)	NA (0.3-106.9)
Pet health[b]	9 (100.0)	77 (79.4)	NA (0.3-90.0)
Pet shares bed with a household member	4 (44.4)	40 (41.2)	1.14 (0.3-4.5)
Continuous covariates	**Among persistently colonized pets, median (IQR)**	**Among pets without persistent colonization, median (IQR)**	***p*[c]**
Age (years)	5.5, 4.0-8.0	6.0, 3.5-9.0	0.67
Personal *S aureus* colonization pressure at prior sampling	0.3, 0.2-0.6	0.3, 0.1-0.3	0.25
Environmental *S aureus* contamination pressure at prior sampling	0.4, 0.1-0.7	0.2, 0.1-0.4	0.12

ABBREVIATIONS: OR, odds ratio; CI, confidence interval
[a]N=106 pets in 57 households; only pets sampled at two consecutive visits and with known demographic information for all covariates were included in this analysis
[b]Pet was reported as having normal health, energy levels, and SSTI nor surgical site infection in prior year.
[c]Kruskal-Wallis test

eTable 10. Strain Persistence Measures of Strains Present at Enrollment or 3-Month Follow-up Visit

Strain type persistence degree measures[a]	***S aureus*, median, IQR**	**MRSA**[b]**, median, IQR**	**MSSA, median, IQR**	**Infecting-strain MRSA, median, IQR**
Personal strain persistence degree	0, 0-2	0, 0-2	0, 0-1	1, 0-3
Environmental strain persistence degree	0, 0-1	0, 0-1	0, 0-1	1, 0-2
Personal or environmental strain persistence degree	1, 0-2	1, 0-3	0, 0-2	2, 0-4
Households with ≥1 strain with persistence degree ≥2	***S aureus*, N=69 (%)**	**MRSA**[b]**, N=45 (%)**	**MSSA, N=40 (%)**	**Infecting-strain MRSA, N=23 (%)**
Persistently colonized ≥1 household member	22 (32)	9 (20)	15 (38)	4 (17)
Persistently contaminated ≥1 environmental site	67 (97)	44 (98)	38 (95)	23 (100)
Colonized ≥3 household members	35 (51)	26 (58)	15 (38)	12 (52)

NOTE: 98 households fully sampled at all 5 visits and included in this analysis.
[a] Number of strain types present across all 98 eligible households is 268, 119, 149, and 45 for *S aureus*, MRSA, MSSA, and infecting-strain MRSA, respectively.
[b] All MRSA, including infecting-strain MRSA.

eTable 11. Interval Skin and Soft Tissue Infections

Participant level	**All individuals, n=667 (%)**	**Index patients, n=144 (%)**	**Household contacts, n=523 (%)**
Reported interval SSTI, at least once	177 (27)	76 (53)	101 (19)
Number of interval SSTIs, median (IQR)	1 (1-2)	2 (1-2)	1 (1-2)
Reported ≥2 interval SSTIs	82 (12)	45 (31)	37 (7)
Infection level	**All individual SSTIs, n=333 (%)**	**Index patient SSTIs, n=164 (%)**	**Household contact SSTIs, n=169 (%)**
Sought medical care	178 (53)	88 (54)	90 (53)
Incision and drainage procedure[a]	68 (38)	33 (38)	35 (39)
Hospitalized[a]	9 (5)	3 (3)	6 (7)
Prescribed systemic antibiotics[a]	143 (80)	67 (76)	76 (84)
Prescribed topical antibiotics[a]	88 (49)	41 (47)	47 (52)
Physician-confirmed[a,b]	105 (59)	63 (72)	42 (47)
Not cultured[c]	61 (58)	35 (56)	26 (62)
Negative[c]	1 (1)	0 (0)	1 (2)
Staphylococcus aureus[c]	43 (41)	28 (44)	15 (36)
MRSA[d]	37 (86)	23 (82)	14 (93)
MSSA[d]	6 (14)	5 (18)	1 (7)
Did not seek medical care	155 (47)	76 (46)	79 (47)
Took systemic antibiotics[e]	7 (5)	2 (3)	5 (6)
Applied topical antibiotics[e]	78 (50)	45 (59)	33 (42)

ABBREVIATIONS: SSTI, skin and soft tissue infection; IQR, interquartile range; MRSA, methicillin-resistant *Staphylococcus aureus;* MSSA, methicillin-susceptible *S aureus*
NOTE: Eligible individuals for this analysis were those who underwent at least 1 follow-up sampling
[a] Of SSTIs for which medical care was sought
[b] Care for the remainder of SSTIs (i.e., not "physician-confirmed;" n=73, 41%) was sought at facilities from which medical records were unable to be obtained, e.g., urgent care centers
[c] Of SSTIs for which physician confirmation was obtained
[d] Of SSTIs culture-positive for *S aureus*
[e] Of SSTIs for which medical care was not sought

eTable 12. Interval Skin and Soft Tissue Infections, Isolate Available	
Interval SSTI with isolate available for analysis	**N=19 (%)[a]**
MRSA	16 (84.2)
Interval SSTI in index patient	15 (78.9)
Strain recovered in household at prior sampling	14 (73.7)
Individual reporting SSTI colonized with strain at prior sampling	8 (42.1)
Individual reporting SSTI colonized with different strain at prior sampling	2 (10.5)
Individual reporting SSTI colonized with strain at current sampling	5 (26.3)
Individual reporting SSTI colonized with different strain at current sampling	3 (18.8)
Household contact of individual reporting SSTI colonized with strain at prior sampling	7 (36.8)
Household contact of individual reporting SSTI colonized with strain at current sampling	5 (26.3)
Environment contaminated with strain at prior sampling[b]	9 (52.9)
Environment contaminated with strain at current sampling[c]	3 (18.8)
Interval SSTI strain is index patient enrollment infecting strain[d]	11 (78.6)
Index patient persistently colonized with enrollment infecting strain (≥2x)[e]	7 (63.4)
Interval SSTI reported by non-index patient[e]	1 (9.1)

ABBREVIATIONS: SSTI, skin and soft tissue infection; MRSA, methicillin-resistant *Staphylococcus aureus*
[a] In 17 distinct households
[b] Household environment not sampled at prior sampling in 2 households, N=17
[c] Household environment not sampled at current sampling in 3 households, N=16
[d] Infecting strain not available for analysis in 5 households, N=14
[e] Of interval SSTI strain concordant with index patient enrollment infecting strain, N=11

eTable 13. Factors Associated with Interval Skin and Soft Tissue Infection, Univariate Analysis

INDIVIDUAL FACTORS				
Demographic binary factors (≥1 SSTI across time)	**Among individuals reporting SSTI, N (%)**	**Among individuals not reporting SSTI, N (%)**	**OR (95% CI)**	**p[a]**
Index patient	75 (43.1)	90 (17.9)	3.48 (2.38-5.07)	<0.001
Child	107 (61.5)	241 (50.0)	1.60 (1.12-2.27)	0.01
SSTI, past year	126 (72.8)	150 (31.6)	5.79 (3.93-8.53)	<0.001
Systemic antibiotic use, past year	136 (78.6)	251 (53.0)	3.27 (2.18-4.90)	<0.001
Hospitalization, past year	49 (28.3)	92 (19.4)	1.64 (1.10-2.45)	0.02
Showers primarily	115 (66.1)	371 (77.0)	0.58 (0.40-0.85)	0.006
Frequent handwashing score[b]	54 (31.0)	191 (39.6)	0.69 (0.47-0.99)	0.045
Washes hands after using bathroom, always	86 (49.4)	283 (58.7)	0.69 (0.49-0.97)	0.04
Washes hands after preparing food, at least sometimes	83 (90.2)	295 (96.4)	0.34 (0.14-0.86)	0.03
Washes hands after handling pet, at least frequently	13 (11.9)	68 (25.5)	0.40 (0.21-0.75)	0.004
Frequent tooth brushing, ≥2x/day	130 (79.8)	389 (87.0)	0.59 (0.37-0.94)	0.03
Bedding washed in hot water	104 (60.1)	236 (49.8)	1.52 (1.07-2.16)	0.02
Demographic continuous factors (≥1 SSTI across time)	**Among individuals reporting SSTI, median, IQR**	**Among individuals not reporting SSTI, median, IQR**	**Kruskal-Wallis statistic**	**p[c]**
Age, years	11.9, 2.4-31.5	16.5, 5.5-35.0	0.82	0.002
Number of times reporting use of systemic antibiotics in past year	2.0, 1.0-3.0	1.0, 0.0-1.0	2.07	<0.001

Temporal binary factors (≥1 SSTI per sampling)	**Among individuals reporting SSTI, N (%)**	**Among individuals not reporting SSTI, N (%)**	**OR (95% CI)**	**p[a]**
S aureus colonized at prior sampling	134 (52.1)	875 (38.6)	1.74 (1.34-2.25)	<0.001
MRSA colonized at prior sampling	102 (39.7)	418 (18.4)	2.91 (2.22-3.82)	<0.001
MSSA colonized at prior sampling	40 (15.6)	507 (22.3)	0.64 (0.45-0.91)	0.01
Colonized with infecting strain at prior sampling	50 (36.5)	180 (13.9)	3.55 (2.42-5.20)	<0.001
Interval SSTI, ≥1 household contact	103 (40.1)	675 (29.7)	1.58 (1.21-2.06)	0.001
Shares towel (any) with MRSA-colonized individual (ever)	113 (44.0)	777 (34.7)	1.48 (1.14-1.92)	0.004
Shares bedroom with MSSA-colonized individual (ever)	36 (14.0)	465 (20.7)	0.62 (0.43-0.90)	0.01
Temporal continuous factors (≥1 SSTI per sampling)	**Among individuals reporting SSTI, median, IQR**	**Among individuals not reporting SSTI, median, IQR**	**Kruskal-Wallis statistic**	**p[c]**
Number of *S aureus*-colonized anatomic sites at prior sampling	1.0, 0.0-1.0	0.0, 0.0-1.0	1.46	<0.001
Number of MRSA-colonized anatomic sites at prior sampling	0.0, 0.0-1.0	0.0, 0.0-0.0	2.33	<0.001
Number of MSSA-colonized anatomic sites at prior sampling	0.0, 0.0-0.0	0.0, 0.0-0.0	0.76	0.02
Number of infecting-strain-colonized anatomic sites at prior sampling	1.0, 0.0-1.0	0.0, 0.0-1.0	1.46	<0.001
Number of distinct strains colonized with at prior sampling	1.0, 0.0-1.0	0.0, 0.0-1.0	1.47	<0.0001
Personal MRSA colonization pressure at prior sampling[d]	0.07, 0.0-0.2	0.0, 0.0-0.1	1.32	0.003
Personal MSSA colonization pressure at prior sampling[d]	0.0, 0.0-0.1	0.07, 0.0-0.2	0.80	<0.001
HOUSEHOLD FACTORS				

Demographic binary factors (total reported SSTIs)	**Number of SSTIs per time point, per sampling (factor present), median, IQR**	**Number of SSTIs per time point, per sampling (factor absent), median, IQR**	**Kruskal-Wallis statistic**	**p[c]**
SSTI, any household member, past year (excluding index patient enrollment SSTI)	0.10, 0.0-0.2	0.00, 0.0-0.1	N/A[e]	<0.001
SSTI, index patient, past year (excluding enrollment SSTI)	0.12, 0.1-0.2	0.05, 0.0-0.1	1.44	0.004
S aureus infection, any household contact, past year	0.11, 0.0-0.2	0.06, 0.0-0.1	1.67	0.005
Cleans refrigerator door handles, at least weekly	0.05, 0.0-0.1	0.09, 0.0-0.2	0.70	0.03
Demographic continuous factors (total reported SSTIs)	**N**		**Spearman ρ**	**p[f]**
Number of household members	143		-0.17	0.047
Temporal continuous factors (SSTIs reported per sampling)	**N**		**Spearman ρ**	**p[f]**
Personal *S aureus* colonization pressure at prior sampling[d]	455		0.09	0.04
Personal MRSA colonization pressure at prior sampling[d]	455		0.21	<0.001
Personal MSSA colonization pressure at prior sampling[d]	455		-0.15	<0.001
Personal infecting-strain colonization pressure at prior sampling[d]	331		0.24	<0.001
Environmental *S aureus* contamination pressure at prior sampling	387		0.10	0.04
Environmental MRSA contamination pressure at prior sampling	387		0.13	0.006

ABBREVIATIONS: SSTI, skin and soft tissue infection; OR, odds ratio; CI, confidence interval; MRSA, methicillin-resistant *Staphylococcus aureus;* MSSA, methicillin-susceptible *S aureus*

[a] Fisher's exact test

[b] Aggregate variable defined as washing hands "always" after using bathroom, "always" before preparing food, at least "frequently" before eating, and at least "frequently" after changing a diaper (when applicable).

[c] Kruskal-Wallis test

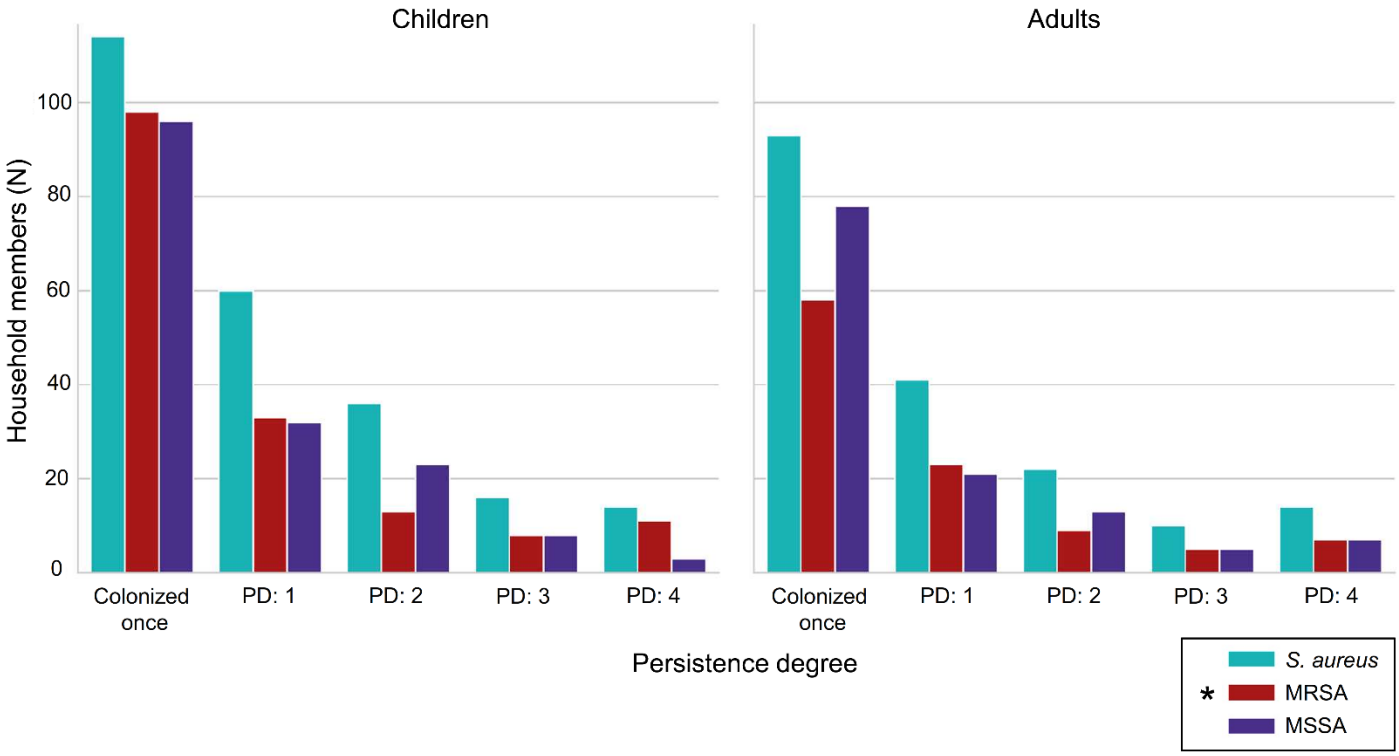
[d] Excluding the modeled individual

[e] Not applicable due to 0 in denominator

[f] Spearman's correlation test

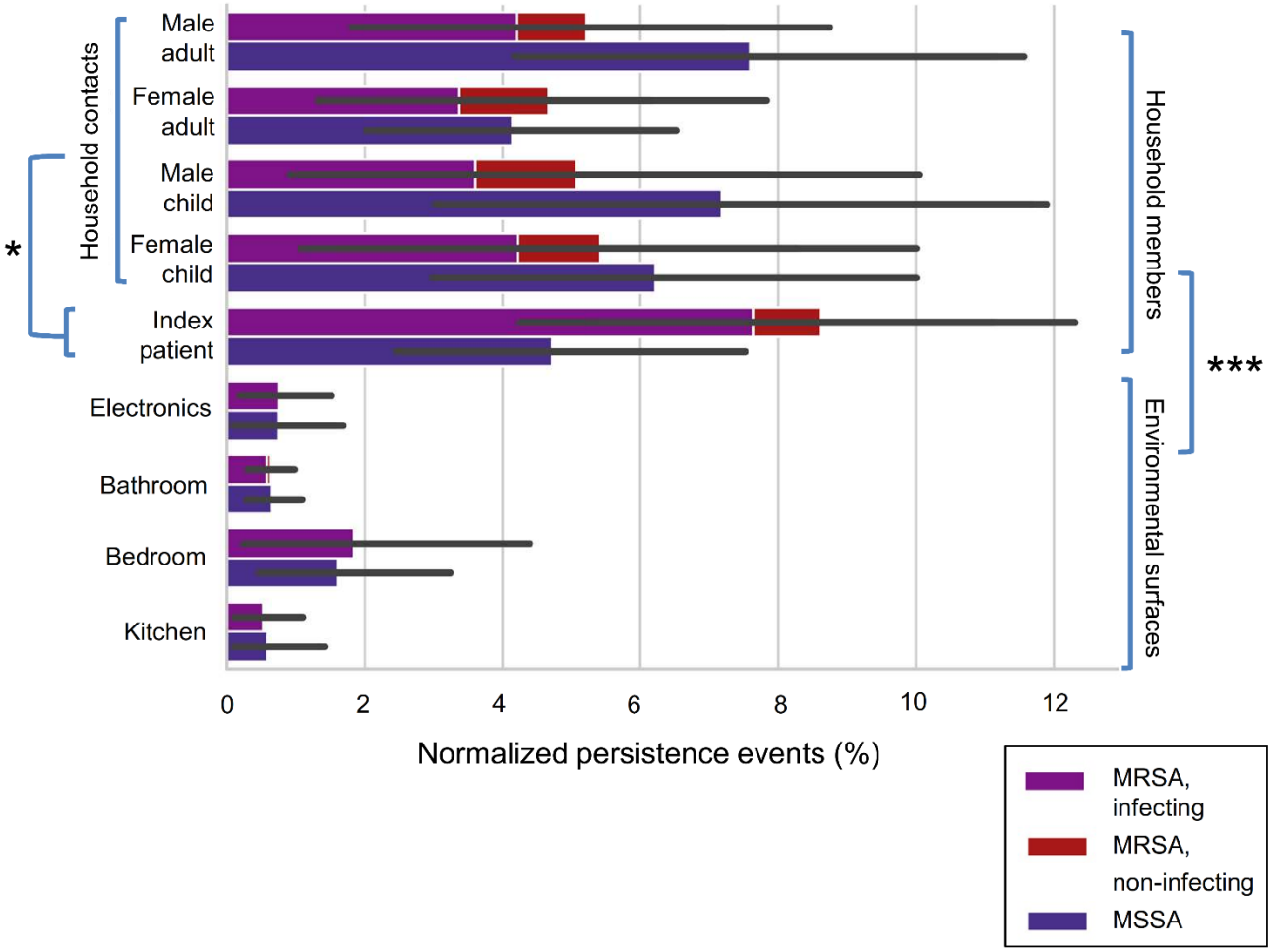
eFigure 1. Degree of Persistent Colonization between Children and Adults

Persistence degree (PD) for children (<18 years old) and adults for any *S aureus*, methicillin-resistant *S aureus* (MRSA), and methicillin-susceptible *S aureus* (MSSA). Persistence degree is the number of consecutive persistence events observed. Eligible individuals for this analysis were those that completed all 5 samplings (N=540). Never colonized individuals are not pictured: 59, 136, and 137 children were never colonized with *S aureus*, MRSA, and MSSA, respectively; 61, 139, and 117 adults were never colonized. Children were more persistently colonized with MRSA than adults (*p=0.01 by Kruskal-Wallis). Persistence degree was similar for MRSA and MSSA.



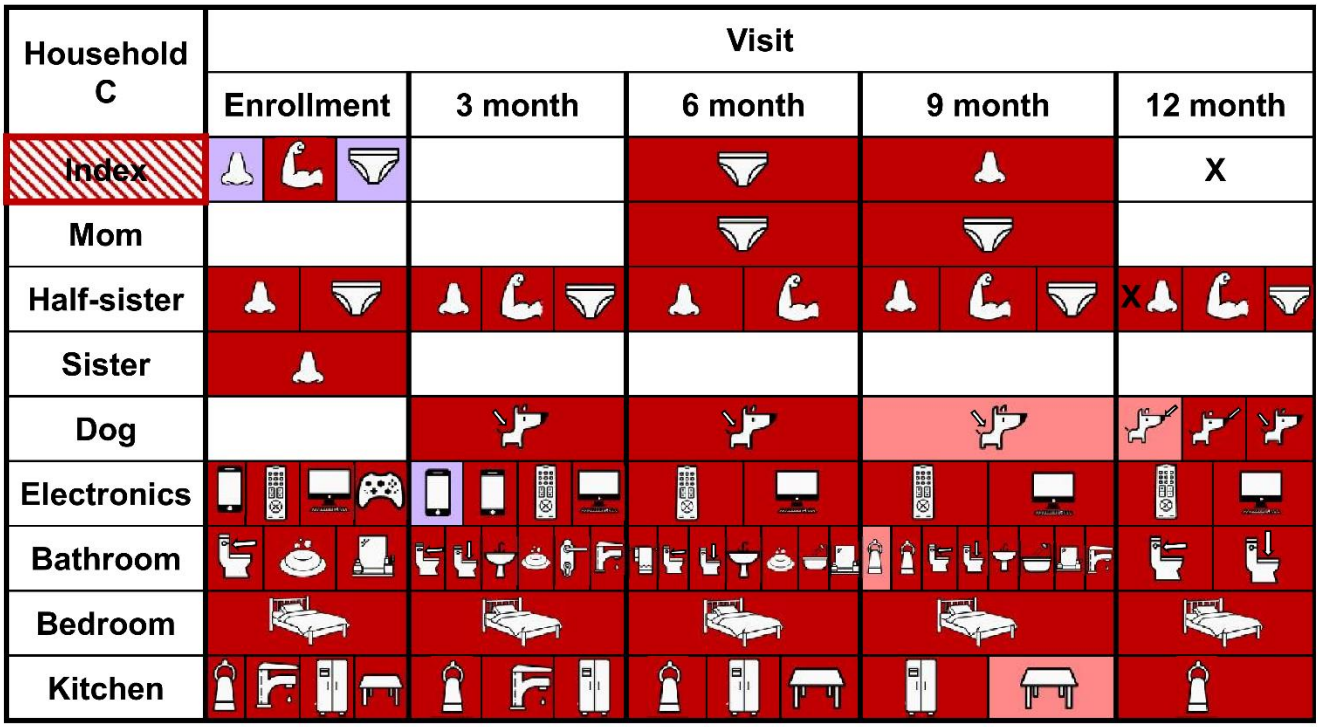
eFigure 2. *S aureus* Strain Persistence by Sex, Age, and Environmental Site

Normalized persistence events across sex, age, and environmental surface categories for infecting-strain MRSA, non-infecting-strain MRSA, and MSSA. Normalized persistence events are the number of persistence events divided by the number of potential persistence events (max 4) x100. Events are not necessarily consecutive (in contrast to persistence degree). Eligible households for this analysis were those with known enrollment infecting strain (N=91 households). Child columns are exclusive of index patient (included in separate column). Environmental surface columns display persistence at any site within each category (not specific to individual sites). Line represents 95% confidence interval (CI) estimate of bootstrapped mean. Index patients were more persistently colonized with infecting-strain MRSA compared to household contacts (*p=0.02 by Kruskal-Wallis). MSSA and non-infecting MRSA strain persistence did not differ between index patients and household contacts. Environmental surfaces infrequently exhibited persistence events compared to household members (***p<0.001 by Kruskal-Wallis).



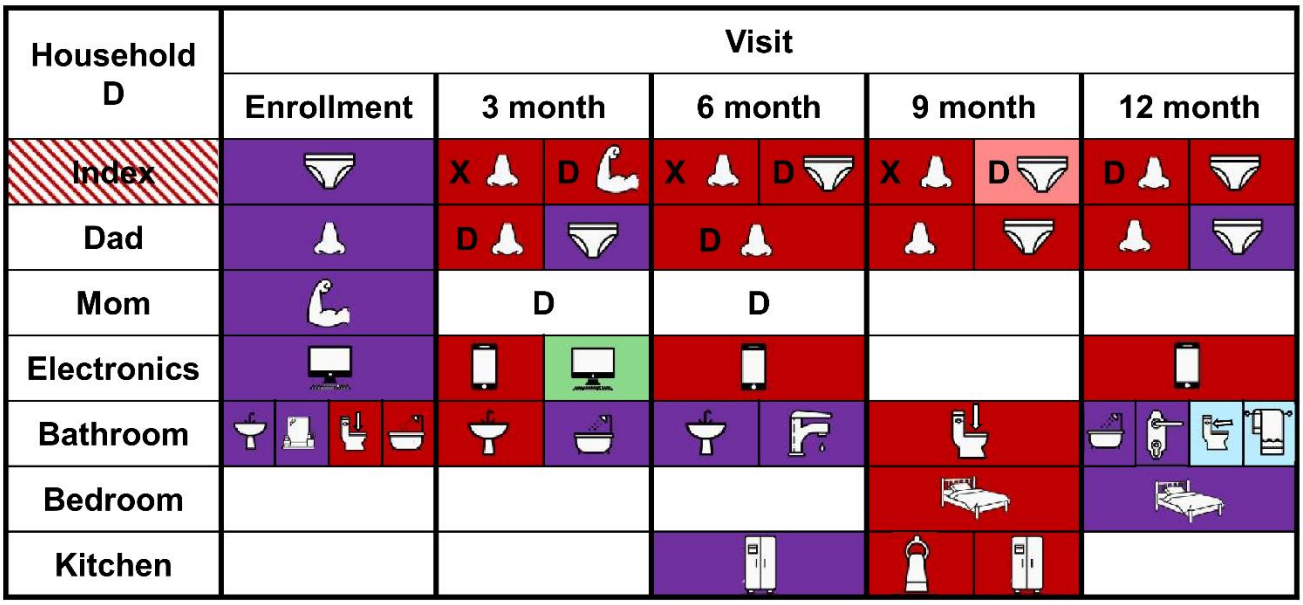
eFigure 3. Longitudinal Strain Persistence and Interval SSTI in Exemplar Households (C, D, E, and F)

"X" denotes a reported interval SSTI, "A" denotes interval oral or IV antibiotics, and "D" denotes interval application of decolonization measures (nasal mupirocin, bleach baths, or chlorhexidine body washes). The red hash marks in the Index box indicate the index patient's enrollment infecting strain (MRSA_1) was available for strain typing; a red box around this cell signifies an infection (with MRSA_1) prior to the infection prompting enrollment.
Artwork used in figure from the Noun Project (https://thenounproject.com); see **eAcknowledgements** for individual artists



Household C strain key
MRSA_1
MSSA_1
MSSA_2

Household C. The Index patient experienced an SSTI 1 week prior to the infection that prompted enrollment, caused by MRSA_1 (the enrollment infecting strain). Between the 9-month follow-up visit and the 12-month visit, the Index patient experienced another SSTI, after persistent colonization with MRSA_1 at the 6-month visit and 9-month visit. The enrollment infecting strain persisted in the household across all five samplings, with high personal colonization pressure (Index patient, Mom, and Half-sister) and environmental contamination pressure (Electronics, Bathroom, Bedroom, and Kitchen). Half-sister was Dog's primary caretaker and slept in the same bed as Dog; they were both persistently colonized with the same strain (MRSA_1). MSSA strains (MSSA_1 and 2) were recovered periodically in this household but did not exhibit persistence or high longitudinal strain colonization or contamination pressure.



Icon key			
	Anterior nares		Toilet seat
	Axillae		Door handle
	Inguinal folds		Bathtub
	Main telephone		Toilet handle
	Computer keyboard & mouse		Index patient bath towel
	Sink faucet handle		Refrigerator door handle
	Hand towel		Index patient bed linens
	Strain from index patient enrollment SSTI	X	SSTI reported; strain unknown
		D	Decolonization performed

Household D strain key
MRSA_1
MSSA_1
MRSA_2
MSSA_3
MSSA_4

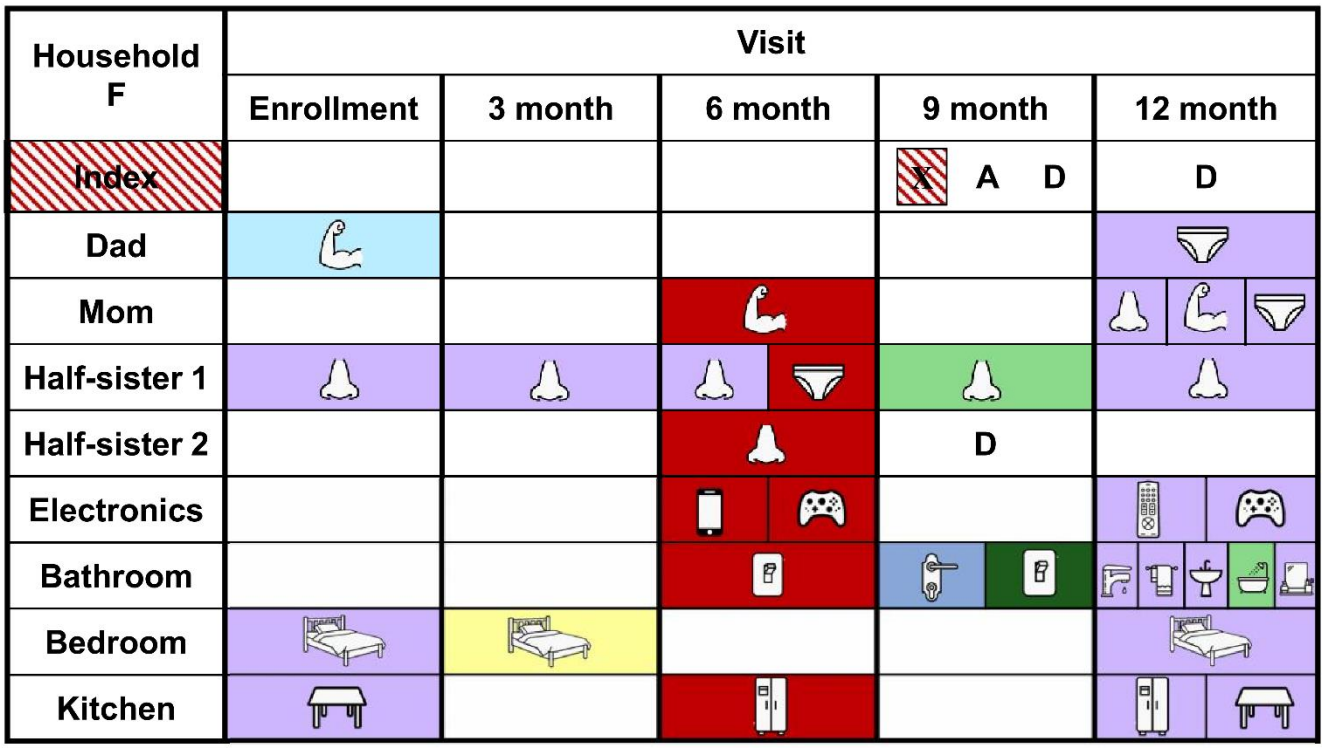
Household D. The Index patient experienced an interval SSTI between the enrollment and 3-month follow-up visit, the 3-month visit and 6-month visit, and the 6-month visit and 9-month visit. After each of these three infections, the Index patient performed decolonization measures. Despite decolonization efforts, both the Index patient and Dad (who did not report interval SSTI) were persistently colonized at all four samplings from the 3-month visit to 12-month visit with MRSA_1 (the enrollment infecting strain). At least one environmental surface was colonized with the enrollment infecting strain at all five samplings over the year. Three MSSA strains (MSSA_1, 3, and 4) were recovered in this household, each at one sampling, and did not exhibit persistence.

Household E	Visit				
	Enrollment	3 month	6 month	9 month	12 month
Index		X X X	X A	X A D	
Dad				D	
Mom				D	
Sister 1				D	
Sister 2					
Dog 1					
Dog 2					
Electronics					
Bathroom					
Bedroom					
Kitchen					

Icon key			
	Anterior nares		Sink
	Axillae		Bathtub
	Inguinal folds		Index patient bed linens
	Dog dorsal fur		Toilet seat
	Television remote control		Refrigerator door handle
	Main telephone		Countertop
	Moved between prior and current samplings		Sponge or cloth
		A	Antibiotics taken
	Strain from index patient enrollment SSTI	D	Decolonization performed
		X	SSTI reported; strain unknown

Household E strain key
MRSA_1
MSSA_1
MSSA_2
MSSA_3
MSSA_4
MSSA_5
MSSA_6
Not swabbed

Household E. The Index patient experienced three interval SSTIs between the enrollment and 3-month follow-up visit and one each between the 3-month and 6-month visits and the 6-month and 9-month visits. Before the 6-month and 9-month visits, the Index patient and three household contacts (Mom, Dad, Sister) performed decolonization measures; subsequently, no *S. aureus* was recovered from household members, pets, or the environment at the 9-month visit. At the enrollment and 3-month visits, MRSA_1 (the enrollment infecting strain) persistently contaminated multiple environmental surfaces, along with six MSSA strains (MSSA_1, 2, 3, 4, 5, and 6), each recovered at just one time point. The household members moved to a new home between the 3-month and the 6-month visit. Fewer household members remained colonized and no environmental surfaces were contaminated with *S. aureus* at the 6-month visit or 9-month visit in the new home. However, non-infecting MSSA strain (MSSA_4) did persist on Dad and Dog 2. Before the 12-month visit, the household members again moved to a new home; a strain not recovered since the enrollment visit (MSSA_2) was recovered at the new home from the Index patient, Sister 1, and the Index patient bedlinens.



Icon key			
	Anterior nares		Sink faucet handle
	Axillae		Index patient bath towel
	Inguinal folds		Light switch
	Television remote control		Index patient bed linens
	Main telephone		Bathtub
	Videogame controller		Refrigerator door handle
	Sink		Countertop
	Door handle		Table
	Strain from index patient enrollment SSTI	A	Antibiotics taken
		D	Decolonization performed
		X	SSTI reported; strain known

Household F strain key
MRSA_1
MSSA_2
MSSA_3
MRSA_4
MSSA_4
MSSA_5
MSSA_6

Household F. The Index patient experienced an interval SSTI caused by MRSA_1 (the enrollment infecting strain) between the 6-month follow-up visit and 9-month visit. While the Index patient was never colonized with the enrollment infecting strain, MRSA_1 was recovered from three household members (Mom and both Half-sisters) as well as multiple environmental surfaces at the 6-month visit, just prior to the Index patient interval SSTI. MSSA_2 persisted in this household on household contacts and environmental surfaces; no household members experienced interval SSTI until MSSA_2 largely disappeared at the 6-month visit, coinciding with the reemergence of MRSA_1. Non-infecting MRSA strain (MRSA_4) and four additional MSSA strains (MSSA_3, 4, 5, and 6) were recovered periodically in this household but did not exhibit persistence or high longitudinal strain colonization or contamination pressure.

eFigure 4. Degree of Persistent Colonization and Risk of Interval SSTI

Persistence degree (PD) of an individual (MRSA, red; MSSA, blue) plotted against the number of SSTIs reported by that individual (left) and the number of SSTIs reported by all household contacts (right), normalized by number of household members. Eligible individuals for this analysis were those that completed all 5 samplings (N=540). Both the number of SSTIs experienced by the modeled individual, and the number of SSTIs experienced by all other household contacts, are significantly correlated with increasing MRSA persistence degree (ρ=0.32, p<0.001 for self and ρ=0.30, p<0.001for others) and decreasing MSSA persistence degree (ρ=-0.22, p=0.009 for self and ρ=-0.16, p=0.07 for others).