

# Investigating Transmission Dynamics Between Pets and Caretakers in Households of Children with Methicillin-resistant *Staphylococcus aureus* Skin and Soft Tissue Infections

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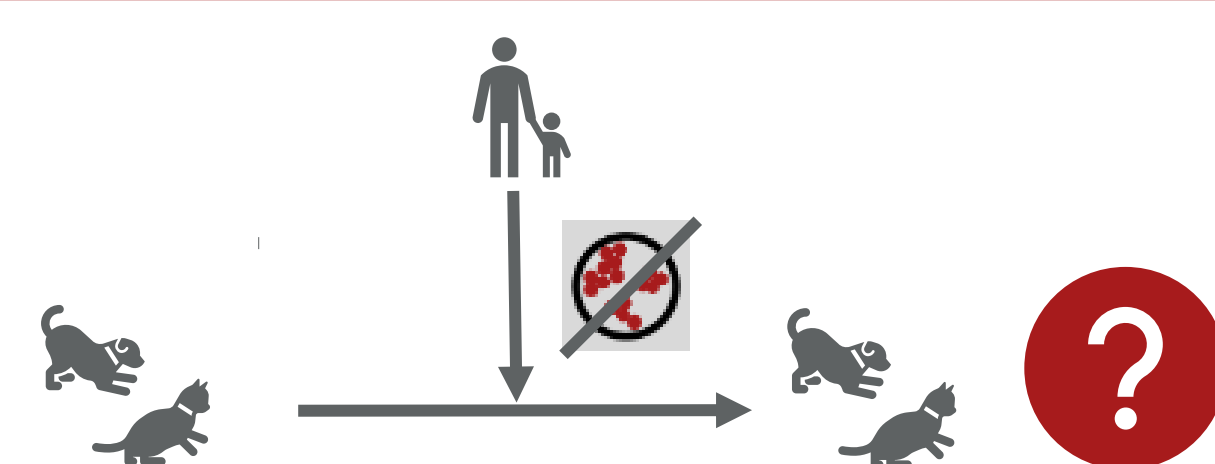
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## Background

- Staphylococcus aureus* is the most common cause of skin and soft tissue infections (SSTI) in children.
- An estimated 20-80% of people are colonized with *S. aureus*, which is a risk factor for subsequent SSTI.<sup>1</sup>
- More than half of people with an SSTI will have a recurrent infection.<sup>2</sup>
  - Decolonization measures are often prescribed to prevent recurrent SSTI.
- Pets participate in household *S. aureus* transmission dynamics.<sup>3</sup>
  - Humans more commonly transmit *S. aureus* to pets.
  - Once colonized, pets may serve as reservoirs for transmission or reacquisition.
- In a multi-household study, 26 of 130 pets carried *S. aureus*.<sup>4</sup>
  - 61% of pets carrying *S. aureus* were colonized with strains concordant with strains recovered from their owners.

## Research Question

Does decolonization of human household members or the environment impact pet *S. aureus* carriage?



## Methods

### Participants

- The SHINE Trial (NCT02572791) enrolled 196 households of children with community-associated *S. aureus* SSTI.
  - We enrolled 161 pets from 95 households.
- Dyads included a pet and their human caretaker(s) (the individual(s) responsible for pet feeding, exercising, and waste cleanup).

### Study design

- Study visits were conducted in participants' homes.
- Households were randomized to a 3-month intervention.
  - Environmental Cleaning Only: Weekly household surface cleaning and linen laundering
  - Human Decolonization: Twice weekly chlorhexidine body washes and application of intranasal mupirocin application for 5 consecutive days each month performed by all human household members
- Culture swab samples (Eswab) were collected up to 5 times over 9 months.
  - Enrollment (prior to performing the intervention)
  - Months 1 and 3 (during the intervention)
  - Months 6 and 9 (following the intervention)

### Sampling sites to detect *S. aureus* colonization

- Indoor dogs and cats: mouth and dorsal fur
- Human caretakers: nares, axillae, and inguinal folds

### Statistical methods

- Management and analyses conducted in R version 4.1.1.
- Data were analyzed in three phases: (1) univariate analyses, (2) bivariate analyses (Chi-square and T-test), and (3) logistic regression.

## Results

Table 1. Pet and Human Characteristics by Randomization Group

Characteristics at Enrollment	Human Decolonization Group N=46 (%)	Environmental Cleaning Only Group N=115 (%)
Type of pet		
Dog	40 (87%)	81 (70%)
Cat	6 (13%)	34 (30%)
Pet colonized with <i>S. aureus</i>	10 (22%)	17 (15%)
MRSA	5 (11%)	8 (7%)
MSSA	5 (11%)	9 (8%)
Pet colonization site		
Both mouth and dorsal fur	3 (7%)	7 (6%)
Mouth only	9 (20%)	10 (9%)
Dorsal fur only	4 (9%)	14 (12%)
≥1 caregiver colonized with <i>S. aureus</i>	25 (54%)	54 (47%)
MRSA	10 (22%)	22 (19%)
MSSA	15 (33%)	37 (32%)
Pet sleeps with a household member	21 (46%)	49 (43%)
Pet has a skin condition	10 (22%)	6 (5%)
Pet boarded in the prior 2 weeks	2 (4%)	1 (1%)
Number of household members, median (range)	4 (3-7)	4 (3-7)

Figure 1: Pet and Caretaker Colonization Over Study Period

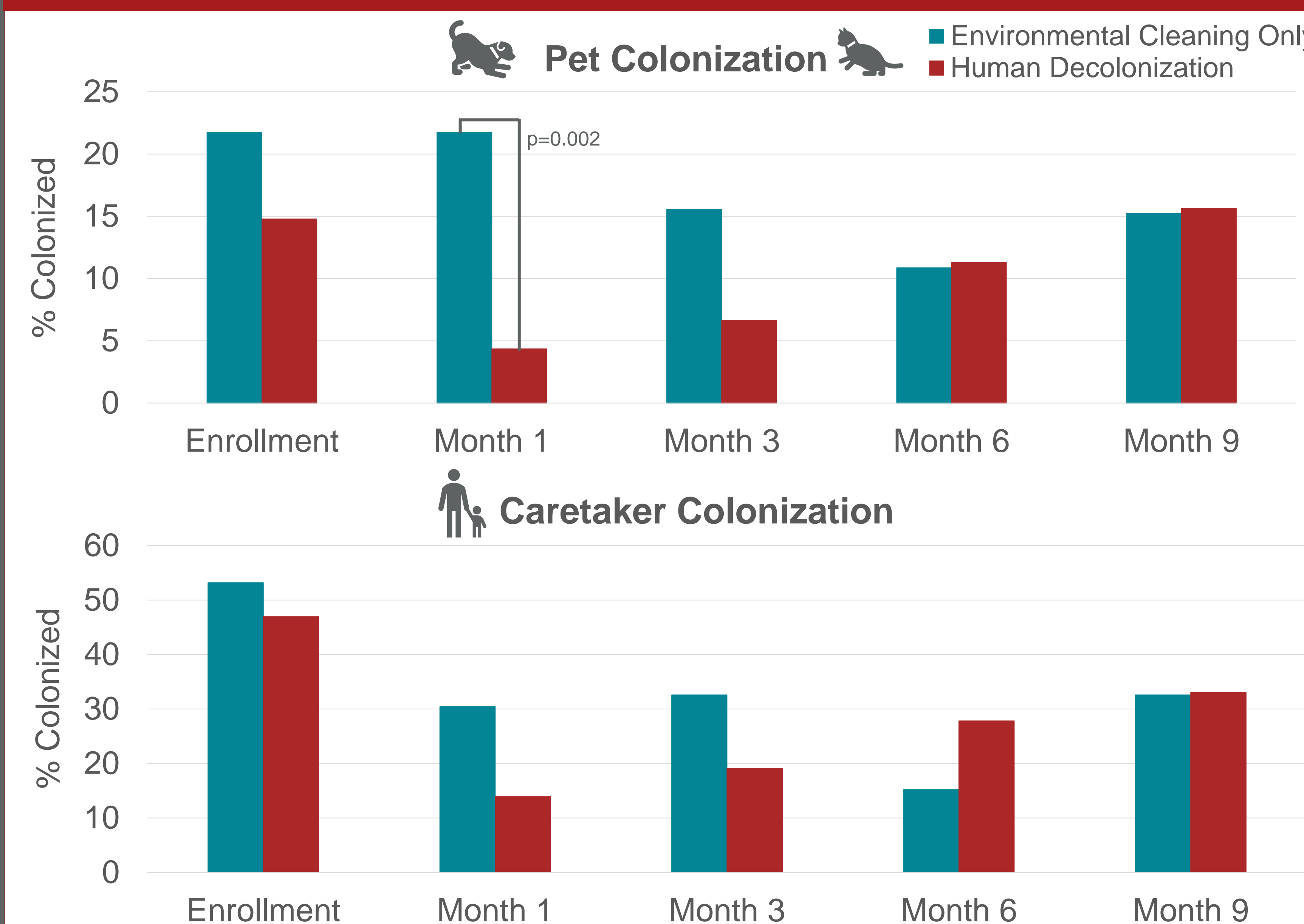


Figure 2: Dyad Colonization Over Study Period

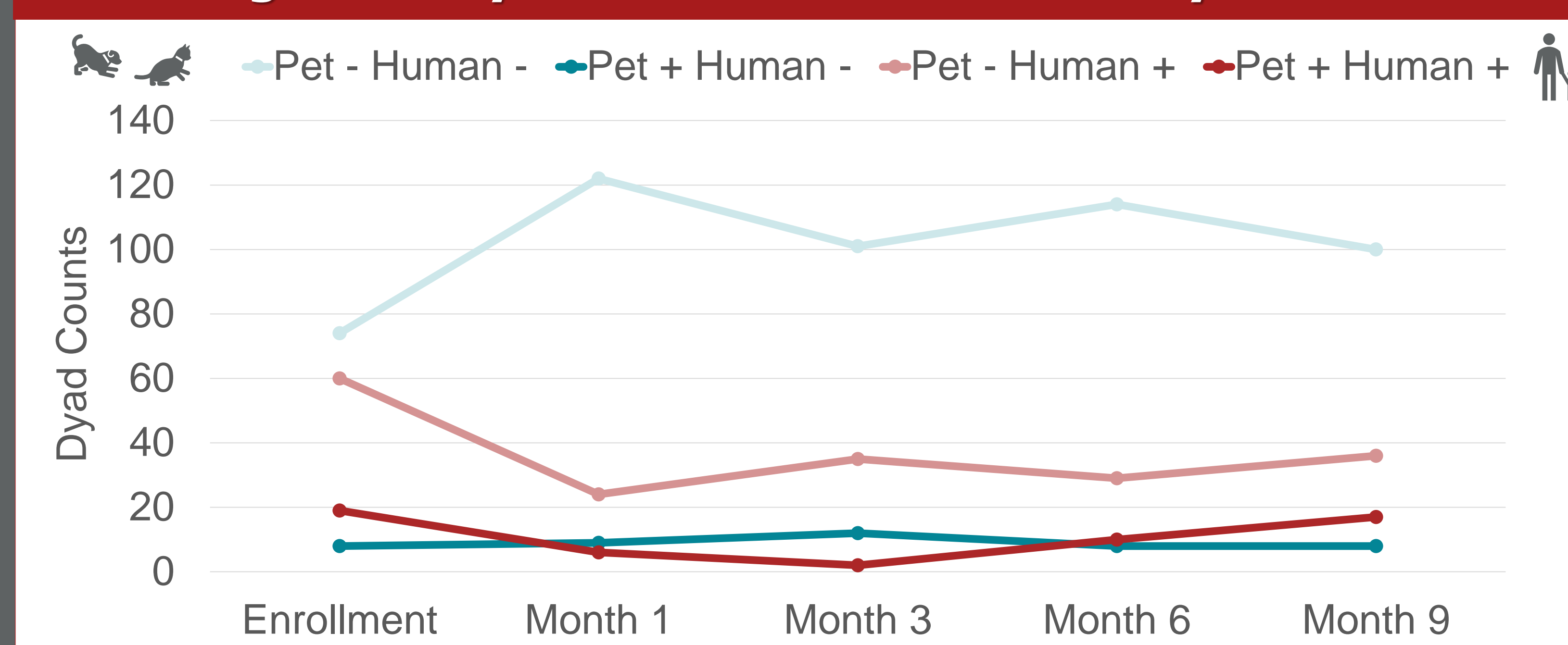


Table 2. Factors Associated with Pet Colonization at 3-Month Sampling, Multivariable Model

Characteristic	aOR	95% CI
Caretaker colonized with <i>S. aureus</i> at enrollment	1.8	0.5 – 6.8
Pet colonized with <i>S. aureus</i> at enrollment	<b>7.4</b>	<b>2.2 – 26.0</b>
Pet is a cat (ref. dog)	0.8	0.2 – 3.5
Pet sleeps with the caretaker	2.0	0.6 – 7.1
Number of household members	1.0	0.5 – 1.9
Randomization to Human Decolonization (ref. Environmental Cleaning Only)	0.5	0.1 – 1.7

## Conclusions

- After controlling for other variables, pet carriage at enrollment was associated with pet carriage at the 3-month sampling.
- Pet colonization followed a similar pattern over time as caretaker colonization, indicating that decreased caretaker colonization coincided with lower pet colonization.
  - Lower pet and caretaker colonization was demonstrated during the intervention but was not sustained following completion of the intervention.
- Future studies could include decolonization of pets along with human household members and longer follow-up periods.

## References

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