

Carriage prevalence and genomic epidemiology of *Staphylococcus aureus* among Native American children and adults in the southwestern USA

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Supplemental Table 1. Sensitivity of sampling different body sites for identifying *Staphylococcus aureus* carriage

Specimen type(s)	All participants		Children (0-4 years)		Adults (≥18 years)	
	Number with SA isolated from any specimen type	Sensitivity ^a (%)	Number with SA isolated from any specimen type	Sensitivity ^a (%)	Number with SA isolated from any specimen type	Sensitivity ^a (%)
AN	54	80.6	17	68.0	37	56.9
NP	46	68.7	19	76.0	27	41.5
OP	-	-	-	-	34	52.3
AN and NP	67	100.0	25	100.0	42	64.6
AN and OP	-	-	-	-	60	92.3
NP and OP	-	-	-	-	53	81.5
AN, NP and OP	-	-	-	-	65	100.0

AN: anterior nares; NP: nasopharynx; OP: oropharynx; SA: *Staphylococcus aureus*

^a Sensitivity of each body site compared to all body sites combined: for all participants and children, body sites included AN and NP; for adults, body sites included AN, NP, and OP.

Supplemental Table 2. Household risk factors for colonization with *Staphylococcus aureus* among Native American children in the Southwest United States.

		Total population (N=121) n (%)	Positive at any site (n=25) n (%)	Crude prevalence ratio (95% CI)	p-value^a	
Number of people in the household, n (%)	1-2	5 (4.1)	0	Ref		
	3-4	37 (30.6)	7 (18.9)			
	5-6	53 (43.8)	12 (22.6)	1.36 (0.59, 3.15)	0.47	
	7+	26 (21.5)	6 (23.1)	1.38 (0.52, 3.67)	0.51	
Other children in the household	No	63 (52.1)	15 (23.8)	Ref		
	Yes	58 (47.9)	10 (17.2)	0.72 (0.35, 1.48)	0.38	
Smoker in the household, n (%)	No	117 (97.5)	25 (21.4)	Ref		
	Yes	3 (2.6)	0	-	1.00	
Number of rooms in the house, n (%)	1-2	22 (18.3)	6 (27.3)	Ref		
	3-4	24 (20.0)	5 (20.8)	0.76 (0.27, 2.15)	0.61	
	5-6	35 (29.2)	9 (25.7)	0.94 (0.39, 2.28)	0.90	
	7+	39 (32.5)	5 (12.8)	0.47 (0.16, 1.36)	0.17	
Number of rooms for sleeping in the house	1-2	55 (45.8)	12 (21.8)	Ref		
	3+	65 (54.2)	13 (20.0)	0.92 (0.46, 1.84)	0.81	
People per bedroom, n (%)	≤ 2	67 (55.8)	11 (16.4)	Ref		
	>2	53 (44.2)	14 (26.4)	1.61 (0.80, 3.25)	0.18	
Presence of indoor piped water	No	22 (18.3)	2 (9.1)	Ref		
	Yes	98 (81.7)	23 (23.5)	2.58 (0.66, 10.15)	0.17	
Use of a wood-burning stove	No	116 (95.9)	25 (21.6)	Ref		
	Yes	5 (4.1)	0	-	0.58	
Presence of pet in the house	No	87 (71.9)	16 (18.4)	Ref		
	Yes	34 (28.1)	9 (26.5)	1.44 (0.70, 2.94)	0.32	
Presence of livestock	No	99 (81.8)	19 (19.2)	Ref		
	Yes	21 (17.4)	5 (23.8)	1.66 (0.79, 3.50)	0.18	
Self-reported history of skin infections or complications among household members (e.g. boils, spider bites, eczema)	No	102 (84.3)	19 (18.6)	Ref		
	Yes	19 (15.7)	6 (31.6)	1.70 (0.78, 3.68)	0.18	
Self-reported history of <i>S. aureus</i> infection among household members	No	112 (93.3)	23 (20.5)	Ref		
	Yes	8 (6.7)	2 (25.0)	1.22 (0.35, 4.27)	0.76	
Household member with chronic illness requiring frequent healthcare	No	109 (90.8)	22 (20.2)	Ref		
	Yes	11 (9.2)	3 (27.3)	1.35 (0.48, 3.80)	0.57	
Behaviors of household members in the past 6 months						
	Hospitalization	No	101 (83.5)	20 (19.8)	Ref	

	Yes	20 (16.5)	5 (25.0)	1.27 (0.54, 2.97)	0.59
Surgery	No	109 (90.1)	24 (22.0)	Ref	
	Yes	12 (9.9)	1 (8.3)	0.38 (0.06, 2.55)	0.32
Long-term care residence	No	121 (100.0)	25 (20.7)	Ref	
	Yes	0	0	-	-
Shared a towel	No	92 (76.0)	19 (20.7)	Ref	
	Yes	29 (24.0)	6 (20.7)	1.00 (0.44, 2.27)	1.00
Shared a bed	No	68 (56.2)	13 (19.1)	Ref	
	Yes	53 (43.8)	12 (22.6)	1.18 (0.59, 2.38)	0.63
Worn clothes more than once without washing	No	102 (84.3)	20 (19.6)	Ref	
	Yes	19 (15.7)	5 (26.3)	1.34 (0.57, 3.14)	0.50
Shared clothes	No	119 (98.4)	24 (20.2)	Ref	
	Yes	2 (1.7)	1 (50.0)	2.48 (0.59, 10.37)	0.21
Used a gym	No	113 (93.4)	24 (21.2)	Ref	
	Yes	8 (6.6)	1 (12.5)	0.59 (0.09, 3.81)	0.58
Used a locker room	No	115 (95.0)	25 (21.7)	Ref	
	Yes	6 (5.0)	0	-	0.34
Went to a sweat lodge	No	114 (94.2)	24 (21.1)	Ref	
	Yes	7 (5.8)	1 (14.3)	0.68 (0.11, 4.31)	0.68
Child in household attended daycare	No	121 (100.0)	25 (20.7)	Ref	
	Yes	0	0	-	-

CI: confidence interval; Ref: reference value;

^a P-values represent the difference in prevalence of colonization between those with and without the characteristic of interest. P-values are reported from log-binomial regression or from Fisher's Exact Test where regression was not possible. P-values <0.05 are presented in bold.

Supplemental Table 3. Individual risk factors for colonization with *Staphylococcus aureus* among Native American adults in the Southwest United States.

		Total population (N=167) n (%)	Positive at any site (n=66) n (%)	Crude prevalence ratio (95% CI)	p-value ^a	Age-adjusted prevalence ratio (95% CI)	p-value ^a
Sex	Male	37 (22.2)	14 (37.8)	0.95 (0.60, 1.50)	0.81	0.97 (0.62, 1.51)	0.89
	Female	130 (77.8)	52 (40.0)	Ref		Ref	
Type of living facility	Residence	164 (98.2)	66 (40.2)	Ref		Ref	
	Currently homeless	3 (1.8)	0	-	0.28	-	-
Times likely to bathe or shower in a typical week	1-2	29 (17.8)	12 (41.4)	Ref		Ref	
	3-4	46 (28.2)	18 (38.1)	0.95 (0.54, 1.66)	0.85	1.04 (0.61, 1.77)	0.88
	5-6	23 (14.1)	7 (30.4)	0.74 (0.35, 1.56)	0.42	0.62 (0.30, 1.31)	0.21
	7+	65 (39.9)	28 (43.1)	1.04 (0.62, 1.74)	0.88	0.94 (0.57, 1.54)	0.80
Current tobacco smoker	No	148 (88.6)	54 (36.5)	Ref		Ref	
	Yes	19 (11.4)	12 (63.2)	1.73 (1.16, 2.59)	0.008	1.43 (0.94, 2.16)	0.09
Current chewing tobacco user	No	154 (92.2)	61 (39.6)	Ref		Ref	
	Yes	13 (7.8)	5 (38.5)	0.97 (0.48, 1.98)	0.94	0.83 (0.41, 1.70)	0.62
Self-reported history of skin infections or complications (e.g. boils, spider bites, eczema)	No	136 (81.4)	52 (38.2)	Ref		Ref	
	Yes	31 (18.6)	14 (45.2)	1.18 (0.76, 1.84)	0.46	1.14 (0.73, 1.79)	0.56
Documented SA infection in the past 5 years	No	162 (97.0)	64 (39.5)	Ref		Ref	
	Yes	5 (3.0)	2 (40.0)	1.01 (0.34, 3.01)	0.98	0.96 (0.33, 2.76)	0.94
Antibiotic use in the past 14 days	No	144 (89.4)	61 (42.4)	Ref		Ref	
	Yes	17 (10.6)	2 (11.8)	0.28 (0.07, 1.04)	0.06	0.31 (0.08, 1.17)	0.08
Any underlying health condition	No	61 (36.5)	24 (39.3)	Ref		Ref	
	Yes	106 (63.5)	42 (39.6)	1.01 (0.68, 1.49)	0.97	1.12 (0.76, 1.64)	0.57
Diabetes	No	114 (68.3)	47 (41.2)	Ref		Ref	
	Yes	53 (31.7)	19 (35.9)	0.87 (0.57, 1.33)	0.52	1.32 (0.84, 2.07)	0.22
Obesity	No	93 (55.7)	33 (35.5)	Ref		Ref	
	Yes	74 (44.3)	33 (44.6)	1.26 (0.86, 1.83)	0.23	1.20 (0.77, 1.62)	0.55
Behaviors in the past 6 months							
Hospitalization	No	145 (86.8)	56 (38.6)	Ref		Ref	
	Yes	22 (13.2)	10 (45.5)	1.18 (0.71, 1.94)	0.52	1.35 (0.84, 2.17)	0.21
Surgery	No	148 (88.6)	55 (37.2)	Ref		Ref	
	Yes	19 (11.4)	11 (57.9)	1.56 (1.01, 2.41)	0.05	1.91 (1.23, 2.97)	0.004
Long-term care residence	No	163 (97.6)	65 (39.9)	Ref		Ref	
	Yes	4 (2.4)	1 (25.0)	0.63 (0.11, 3.46)	0.59	0.58 (0.11, 3.16)	0.53
Shared a towel	No	142 (85.0)	52 (36.6)	Ref		Ref	
	Yes	25 (15.0)	14 (56.0)	1.53 (1.02, 2.30)	0.04	1.32 (0.88, 1.99)	0.18
Shared a bed	No	108 (64.7)	39 (36.1)	Ref		Ref	
	Yes	59 (35.3)	27 (45.8)	1.27 (0.87, 1.84)	0.21	1.13 (0.78, 1.65)	0.51

Worn clothes more than once without washing	No	116 (69.5)	43 (37.1)	Ref		Ref	
	Yes	51 (30.5)	23 (45.1)	1.22 (0.83, 1.79)	0.32	1.17 (0.81, 1.71)	0.40
Shared clothes	No	162 (97.0)	65 (40.1)	Ref		Ref	
	Yes	5 (3.0)	1 (20.0)	0.50 (0.09, 2.89)	0.44	0.44 (0.08, 2.56)	0.36
Gym use	No	147 (88.0)	56 (38.1)	Ref		Ref	
	Yes	20 (12.0)	10 (50.0)	1.31 (0.81, 2.13)	0.27	1.14 (0.68, 1.89)	0.62
Used a locker room	No	159 (95.2)	61 (38.4)	Ref		Ref	
	Yes	8 (4.8)	5 (62.5)	1.63 (0.92, 2.89)	0.09	1.33 (0.75, 2.39)	0.33
Went to a sweat lodge	No	164 (98.2)	65 (39.6)	Ref		Ref	
	Yes	3 (1.8)	1 (33.3)	0.84 (0.17, 4.21)	0.83	0.85 (0.18, 4.09)	0.84
Participated in organized team sports or activities	No	153 (92.7)	60 (39.2)	Ref		Ref	
	Yes	12 (7.3)	5 (41.7)	1.06 (0.53, 2.14)	0.86	0.86 (0.42, 1.75)	0.67
Received any artistic (body-art) or cosmetic tattoos	No	156 (94.6)	60 (38.5)	Ref		Ref	
	Yes	9 (5.4)	5 (55.6)	1.44 (0.78, 2.68)	0.24	1.14 (0.59, 2.20)	0.70
Received any body or facial piercings	No	160 (97.0)	62 (38.8)	Ref		Ref	
	Yes	5 (3.0)	3 (60.0)	1.55 (0.74, 3.25)	0.25	1.23 (0.57, 2.66)	0.61
Used drugs for non-medical purposes	No	158 (95.8)	61 (38.6)	Ref		Ref	
	Yes	7 (4.2)	4 (57.1)	1.48 (0.76, 2.90)	0.25	1.24 (0.63, 2.42)	0.54

CI: confidence interval; Ref: reference value;

^a P-values represent the difference in prevalence of colonization between those with and without the characteristic of interest. P-values are reported from log-binomial regression. For the univariable analysis, if log-binomial regression was not possible, p-values from Fisher's Exact Test are reported. P-values <0.05 are presented in bold.

Supplemental Table 4. Household risk factors for colonization with *Staphylococcus aureus* among Native American adults in the Southwest United States.

		Total population (N=167) n (%)	Positive at any site (n=66) n (%)	Crude prevalence ratio (95% CI)	p-value^a	Age-adjusted prevalence ratio (95% CI)	p-value^a
Number of people in the household, n (%)	1-2	71 (42.5)	24 (33.8)	Ref		Ref	
	3-4	52 (31.1)	25 (48.1)	1.42 (0.92, 2.19)	0.11	1.23 (0.80, 1.89)	0.35
	5-6	33 (19.8)	14 (42.4)	1.26 (0.75, 2.10)	0.39	1.11 (0.67, 1.84)	0.68
	7+	11 (6.6)	3 (27.3)	0.81 (0.29, 2.23)	0.68	0.69 (0.25, 1.89)	0.47
Any children in the household	No	124 (74.3)	49 (39.5)	Ref		Ref	
	Yes	43 (25.8)	17 (39.5)	1.00 (0.65, 1.54)	1.00	0.80 (0.51, 1.24)	0.32
Smoker in the household, n (%)	No	156 (95.1)	60 (38.5)	Ref		Ref	
	Yes	8 (4.9)	5 (62.5)	1.63 (0.92, 2.88)	0.10	1.37 (0.77, 2.43)	0.29
Number of rooms in the house, n (%)	1-2	24 (14.4)	9 (37.5)	Ref		Ref	
	3-4	45 (27.0)	20 (44.4)	1.19 (0.64, 2.18)	0.59	1.31 (0.72, 2.39)	0.37
	5-6	58 (34.7)	20 (34.5)	0.92 (0.49, 1.72)	0.79	1.12 (0.60, 2.08)	0.72
	7+	40 (24.0)	17 (42.5)	1.13 (0.60, 2.13)	0.70	1.24 (0.67, 2.32)	0.49
Number of rooms for sleeping in the house	1-2	91 (54.5)	40 (44.0)	Ref		Ref	
	3+	76 (45.5)	26 (34.2)	0.78 (0.53, 1.15)	0.21	0.89 (0.60, 1.32)	0.56
People per bedroom, n (%)	≤ 2	143 (85.6)	58 (40.6)	Ref		Ref	
	>2	24 (14.4)	8 (33.3)	0.82 (0.45, 1.50)	0.52	0.69 (0.38, 1.24)	0.21
Presence of indoor piped water	No	41 (24.6)	17 (41.5)	Ref		Ref	
	Yes	126 (75.5)	49 (38.9)	0.94 (0.61, 1.43)	0.77	1.03 (0.68, 1.56)	0.88
Use of a wood-burning stove	No	145 (86.8)	54 (37.2)	Ref		Ref	
	Yes	22 (13.2)	12 (54.6)	1.46 (0.95, 2.27)	0.09	1.40 (0.89, 2.18)	0.14
Presence of pet in the house	No	113 (68.9)	44 (38.9)	Ref		Ref	
	Yes	51 (31.1)	22 (43.1)	1.11 (0.75, 1.64)	0.61	1.05 (0.71, 1.57)	0.80
Presence of livestock	No	124 (75.6)	50 (40.3)	Ref		Ref	
	Yes	38 (23.2)	14 (36.8)	1.09 (0.72, 1.65)	0.68	1.27 (0.86, 1.89)	0.24
Self-reported history of skin infections or complications among household members (e.g. boils, spider bites, eczema)	No	151 (90.4)	59 (39.1)	Ref		Ref	
	Yes	16 (9.6)	7 (43.8)	1.12 (0.62, 2.02)	0.71	1.25 (0.71, 2.23)	0.44
Self-reported history of <i>S. aureus</i> infection among household members	No	155 (96.9)	58 (37.4)	Ref		Ref	
	Yes	5 (3.1)	4 (80.0)	2.14 (1.32, 3.57)	0.002	1.87 (1.08, 3.22)	0.02
Household member with chronic illness requiring frequent healthcare	No	122 (73.5)	47 (38.5)	Ref		Ref	
	Yes	44 (26.5)	19 (43.2)	1.12 (0.75, 1.68)	0.58	1.24 (0.84, 1.83)	0.27
Behaviors of household members in the past 6 months							
Hospitalization	No	156 (93.4)	60 (38.5)	Ref		Ref	
	Yes	11 (6.6)	6 (54.6)	1.42 (0.80, 2.52)	0.23	1.34 (0.77, 2.31)	0.30
Surgery	No	163 (97.6)	65 (39.9)	Ref		Ref	
	Yes	4 (2.4)	1 (25.0)	0.63 (0.11, 3.46)	0.59	0.72 (0.14, 3.83)	0.70

Long-term care residence	No	166 (99.4)	65 (39.2)	Ref		Ref	
	Yes	1 (0.6)	1 (100.0)	-	0.40	-	-
Shared a towel	No	138 (82.6)	52 (37.7)	Ref		Ref	
	Yes	29 (17.4)	14 (48.3)	1.28 (0.83, 1.98)	0.26	1.28 (0.85, 1.93)	0.24
Shared a bed	No	114 (68.3)	39 (34.2)	Ref		Ref	
	Yes	53 (31.7)	27 (50.9)	1.49 (1.03, 2.15)	0.03	1.37 (0.95, 1.98)	0.09
Worn clothes more than once without washing	No	142 (85.0)	57 (40.1)	Ref		Ref	
	Yes	25 (15.0)	9 (36.0)	0.90 (0.51, 1.57)	0.70	0.86 (0.50, 1.48)	0.59
Shared clothes	No	163 (97.6)	64 (39.3)	Ref		Ref	
	Yes	4 (2.4)	2 (50.0)	1.27 (0.47, 3.46)	0.64	1.25 (0.49, 3.23)	0.64
Used a gym	No	157 (94.0)	58 (36.9)	Ref		Ref	
	Yes	10 (6.0)	8 (80.0)	2.17 (1.49, 3.14)	<0.0001	1.80 (1.23, 2.64)	0.003
Used a locker room	No	158 (94.6)	59 (37.3)	Ref		Ref	
	Yes	9 (5.4)	7 (77.8)	2.09 (1.39, 3.12)	0.0004	1.98 (1.29, 3.04)	0.002
Went to a sweat lodge	No	164 (98.2)	65 (39.6)	Ref		Ref	
	Yes	3 (1.8)	1 (33.3)	0.84 (0.17, 4.21)	0.83	0.69 (0.14, 3.47)	0.66
Child in household attended daycare	No	163 (97.6)	66 (40.5)	Ref		Ref	
	Yes	4 (2.4)	0	-	0.15	-	-

CI: confidence interval; Ref: reference value;

^a P-values represent the difference in prevalence of colonization between those with and without the characteristic of interest. P-values are reported from log-binomial regression. For the univariable analysis, if log-binomial regression was not possible, p-values from Fisher's Exact Test are reported. P-values <0.05 are presented in bold.