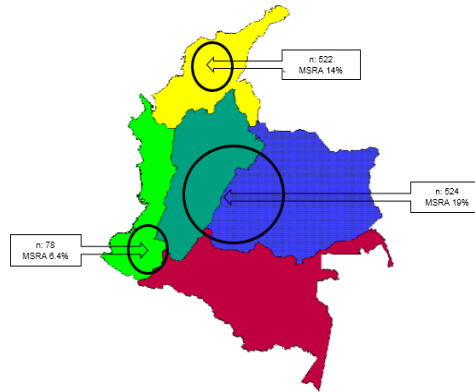


Risk Factors Associated with Complicated Skin and Soft Tissue Infection (CSSTIs) Caused by Methicillin-Resistant *Staphylococcus aureus* (SAMR) in Colombia

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Background: Skin and soft tissue infections (SSTI) caused by *Staphylococcus aureus* represent a growing problem in Colombia due to the massive dissemination of a community-associated (CA) strain SAMR USA300 Latin American Variant. The aim of this study was to evaluate risk factors associated with complicated Infection of Skin and Soft Tissue (CSSTIs) caused by CA-Methicillin-Resistant *Staphylococcus aureus* in Colombia

Methods: We conducted a prospective cohort study with a nested case-control design in 13 hospitals in Colombia between January 2009 and June 2015. We included patients aged ≥ 18 years with CSSTI who required at least 48 hours of inpatient care or patients with hospital-acquired SSTI. Patients with osteoarticular infections, burns or viral infections were excluded. Case patients were defined as having an SAMR SSTI and control as those with SSTI caused by other microorganisms

Results: A total of 1134 patients were included with 177 (15.6%) patients in which *Staphylococcus aureus* was isolated. Multivariate logistic regression identified the following risk factors for SAMR infection: abscesses [odds risk (OR) 2.54, 95 % confidence interval (CI) 1.79 - 3.61], forunculosis [OR 3.79, 95% CI 1.04-13,85], age 18 - 44 years [OR 2.46, 95% CI 1.55-3,93], previous management in outpatient setting [OR 1.76, 95% CI 1.14 - 2.71] and history of bite [OR 1.98, 95% CI 1,08-3.62]. Of note, 57% patients received inappropriate therapy for SAMR.

Table 2. Demographic and epidemiologic factors in patients with SSTIs

VARIABLE	TOTAL SSTIs (n: 1134)		SSTIs with MRSA (n:177)		SSTI without MRSA (n:957)		OR (IC 95%)	p
	n	%	n	%	n	%		
Age								
18- 44 years	424	37.39	96	54.24	328	34.27		
45-65 years	358	31.57	52	29.38	306	31.97	0.58 (0.40-0.84)	0.004
More than 65 years	352	31.04	29	16.38	323	33.75	0.30 (0.19 -0.47)	0.000
Male	576	50.79	95	53.67	481	50.26	0.87(0.63 -1.20)	0.405
Comorbidities								
Diabetes mellitus	250	22.05	24	13.56	226	23.62	0.50 (0.32-0.80)	0.004
Cancer	57	5.03	6	3.39	51	5.33	0.62 (0.26-1.47)	0.282
Malnutrition	20	1.76	1	0.56	19	1.99	0.28 (0.03-2.10)	0.217
Renal disease	72	6.35	8	4.52	64	6.69	0.66 (0.31-1.40)	0.280
HIV	15	1.32	2	1.13	13	1.36	0.82 (0.18-3.70)	0.807
Obesity	79	6.97	6	3.39	73	7.63	0.42 (0.18-0.99)	0.048
Recurrent furunculosis	6	0.53	3	1.69	3	0.31	5.48 (1.09-27.3)	0.038
Immunosuppression	173	15.26	17	9.60	156	16.30	0.54 (0.32-0.92)	0.025
Surgical history	279	24.6	33	18.64	246	25.71	0.66 (0.44-0.99)	0.046
Source of infection							0.57 (0.30-1.06)	0.081
In-hospital	223	19.66	27	15.25	27	20.48		
Community	911	80.34	150	84.75	761	79.52		
Triggers								
Without trigger	604	53.26	101	57.06	503	52.56	1.19 (0.86-1.65)	0.271
Trauma	206	18.17	37	20.90	169	17.66	1.23 (0.82-1.83)	0.304
Bite	68	6	18	10.17	50	5.22	2.05 (1.16-3.61)	0.012
Injection	153	13.49	12	6.78	141	14.73	0.42 (0.22-0.77)	0.006
Surgery	50	4.41	3	1.69	47	4.91	0.33 (0.10-1.08)	0.068
Ulcer	44	3.88	3	1.69	41	4.28	0.38 (0.11-1.25)	0.114
Previous treatment								
Without previous treatment	670	59.08	92	51.98	578	60.40		
Ambulatory	187	16.49	44	24.86	143	14.94	1.93 (1.29-2.89)	0.001
Emergency	195	17.2	30	16.95	165	17.24	1.14 (0.73-1.78)	0.560
In-hospital	82	7.23	11	6.21	71	7.42	0.97 (0.49-1.90)	0.937
Previous antibiotic use								
Penicillins	189	16.67	43	24.29	146	15.26	1.78 (1.21-2.62)	0.003
Cephalosporins	137	12.08	21	11.86	116	12.12	0.97 (0.59-1.60)	0.923
Carbapenems	7	0.62	1	0.56	6	0.63	0.90 (0.10-7.52)	0.923
Quinolones	19	1.68	3	1.69	16	1.67	1.01 (0.29-3.51)	0.983
TMP SMX	8	0.71	1	0.56	7	0.73	0.77 (0.09-6.30)	0.808
Clindamycin	39	3.44	4	2.26	35	3.66	0.60(0.21-1.73)	0.353

Table 3. Clinical characteristics and outcomes of patients with SSTIs

VARIABLE	TOTAL SSTIs		SSTI with MRSA		SSTI without MRSA		OR (IC 95%)	p
	n	%	n	%	n	%		
Type of infection								
Abscess	361	31.83	93	52.54	268	28.00	2.84 (2.05-3.94)	0.000
Cellulitis	554	48.85	51	28.81	461	48.17	0.78 (0.64-1.20)	0.286
Furunculosis	11	0.97	4	2.26	7	0.73	3.13(0.80-10.83)	0.070
Erysipela	59	5.2	0	0.0	59	6.17		
Tenosynovitis	18	1.59	5	2.82	13	1.36	2.11 (0.74-5.99)	0.161
Pyomyositis	3	0.26	0	0.00	3	0.31		
Necrotizing fasciitis	25	2.2	4	2.26	21	2.19	1.03 (0.34-3.03)	0.957
Ulcer	140	12.35	11	6.21	29	3.04	0.42 (0.22-0.80)	0.009
Diabetic foot	50	4.41	4	2.26	46	4.81	0.45 (0.16-1.28)	0.131
Ulcer	53	4.67	3	1.69	50	5.22	0.31 (0.09-1.01)	0.053
Anatomic site								
Head	85	7.5	10	5.65	75	7.84	0.70 (0.35-1.39)	0.312
Thorax	83	7.32	20	11.30	63	6.58	1.80 (1.06-3.07)	0.029
Superior limbs	229	20.19	59	33.33	169	17.66	2.33 (1.63-3.32)	0.000
Inferior limbs	590	52.03	78	44.07	512	53.50	0.68 (0.49-0.94)	0.021
Perineum	80	7.05	7	3.95	73	7.63	0.49 (0.22-1.10)	0.085
Abdomen	72	6.35	5	2.82	67	7.00	0.38 (0.15-0.97)	0.043
Symptoms duration								
Less than 48 h	153	13.49	16	9.47	137	14.94		
48 h to 7 days	542	47.8	92	54.44	450	49.07	1.75 (0.99-3.07)	0.052
More than 7 days	391	34.48	61	36.09	330	35.99	1.58 (0.88-2.84)	0.124
Clinical manifestations								
Fever	331	29.19	50	28.25	281	29.36	0.94 (0.66-1.35)	0.765
Erythema	333	29.37	50	28.25	283	29.57	1.06 (0.74-1.52)	0.723
Edema	879	77.51	142	80.23	737	77.01	1.21 (0.81-1.80)	0.347
Pain	945	83.33	154	87.01	791	82.65	1.40 (0.87-2.24)	0.155
Warmth	700	61.73	115	64.97	585	61.13	1.17 (0.84-1.64)	0.334
Pus	402	35.45	64	36.16	338	35.32	1.03 (0.74-1.44)	0.830
Pain	5	0.44	1	0.56	4	0.42	1.35(0.15-12.18)	0.878
Hypoesthesia	8	0.71	0	0.00	8	0.00		
UCI management	74	6.526	6	3.39	68	7.11	0.45 (0.19-1.07)	0.073
Hospital stay (med/DE) hours	11 (9.4)		11		13		0.98 (0.97-1.00)	0.145
Clinical improvement 72 hours	790	69.66	134	75.71	656	68.55	1.42 (0.98-2.06)	0.058
Treatment adjustment								
Without adjustment	663	58.47	70	39.55	593	62.03		
<72 hours	182	16.05	51	28.81	131	13.70	3.29 (2.19-4.95)	0.000
≥72 hours	288	25.4	56	31.64	232	24.27	2.04 (1.39-2.99)	0.000
Duration of total treatment							0.73 (0.53-1.01)	0.062
<7 days	472	41.62	85	48.02	387	40.48		
>7 days	661	58.29	92	51.98	569	59.52		
Complications								
Without complications	707	62.35	84	47.46	623	65.10	2.06 (1.49-2.85)	0.000
Drainage	367	32.36	85	48.02	282	29.47	2.21 (1.59-3.06)	0.000
Amputation	28	2.47	3	1.69	25	2.61	0.64 (0.19-2.15)	0.473
Death	16	1.41	0	0.00	16	1.67		

Conclusion: CSSTIs caused by SAMR in Colombia mainly affect young patients and is often associated with abscesses. Previous management in outpatient settings is an important risk factor for SAMR acquisition. Although clinicians should consider SAMR when designing the initial empirical treatment for purulent SSTIs, there seems to be low awareness of this fact in Colombia.