In conclusion, we showed the feasibility of home screening by visiting nurses. This approach could be useful in the case of an outbreak of a virulent pathogen that requires strict infection control measures in contact patients. On the basis of our experience and the literature,[10] we now recommend in our hospital isolation and screening of VRE contact patients if readmitted within 3 months after discharge, and screening without isolation beyond that time.

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Determinants of Successful Methicillin-Resistant *Staphylococcus aureus* Decolonization

Carriers of methicillin-resistant *Staphylococcus aureus* (MRSA) serve as reservoirs and vectors for cross-transmission.[1] Nevertheless, topical decolonization to eradicate MRSA carriage is used infrequently in settings with endemic MRSA because of logistical challenges, low chances of success, and the risk of resistance.[2] Few studies have described determinants of successful MRSA decolonization among patients receiving topical decolonization therapy.[3–7]

We recently reported the results of a double-blind, placebo-controlled randomized trial that demonstrated the failure of polyhexanide to eliminate MRSA carriage.[8] On average, the decolonization efficacy was 31.5% for the entire population, with a marginally higher success rate (33.8%) in the polyhexanide group. Using data from this randomized controlled trial (RCT), we assessed possible determinants of successful MRSA decolonization.

A full description of the RCT has been reported elsewhere.[8] In brief, we tested the efficacy of polyhexanide versus placebo solution, applied for 10 days in the nose and on the skin of MRSA carriers. Control swabs were taken from nares and the inguinal/perineal region, according to our local practices and other evidence.[9] Patients with positive tracheal or chronic wound swabs were excluded from the RCT. Data were recorded prospectively with patients' consent.[8] Using data from this RCT, we conducted a retrospective, unmatched case-control study to assess determinants associated with successful MRSA decolonization among participants. Cases were defined as patients with a negative MRSA screening result at the end of the study. The control group consisted of patients who were still MRSA-positive at end of the follow-up period.

TABLE 1. Patients and Treatment Characteristics, Univariate and Multivariate Logistic Regression to Predict Successful MRSA Decolonization

Variables	MRSA-Negative Cases (N = 46)	MRSA-Positive Controls (N = 89)	*P* Value	Univariate Logistic Regression			Multivariate Logistic Regression		
				OR	95% CI	*P* Value	aOR	95% CI	*P* Value
Patient characteristics									
Gender, No. (%)			.824						
Male	27 (58.7)	54 (60.7)							
Female	19 (41.3)	35 (39.3)							
Age, mean (± SD) y (ULR per 1-year increment)	61.9 (±16.07)	66.8 (±14.86)	.078	0.98	0.96–1.00	.079			
BMI (kg/m^2), No. (%)			.883						
<18.5	1 (2.2)	3 (3.4)							
18.5–30	29 (63.0)	57 (64.8)							
>30	16 (34.8)	28 (31.8)							
Presence of at least 1 comorbidity, No. (%)	34 (73.9)	68 (76.4)	.750						
Absence of comorbidities, No. (%)									
Cardiovascular disease	23 (50.0)	41 (46.1)	.664						
COPD	41 (89.1)	70 (78.7)	.131	2.23	0.77–6.41	.119			
Chronic renal failure	38 (82.6)	72 (80.9)	.808						
Chronic liver disease	40 (87.0)	81 (91.0)	.464						
Malignancy	42 (91.3)	71 (79.8)	.086	2.66	0.84–8.40	.073			
Diabetes mellitus	38 (82.6)	77 (86.5)	.545						
Immunodeficiency	34 (73.9)	64 (71.9)	.805						
Degree of dependence, No. (%)			.006			.005			
Dependent or semi-dependent	11 (23.9)	43 (48.3)		1.00	…		1.00	…	
Independent	35 (76.1)	46 (51.7)		2.97	1.34–6.59		2.83	1.26–6.34	.011
McCabe score, No. (%)			.329						
Non-fatal	44 (95.7)	81 (91.0)							
Ultimately fatal	2 (4.3)	8 (9.0)							
Rapidly fatal	0 (0)	0 (0)							
Presence of wound or skin damage, No. (%)	17 (37.0)	33 (37.1)	.989						
Presence of invasive device, No. (%)[a]	5 (10.9)	21 (23.6)	.076	0.39	0.14–1.13	.065			
Antibiotic treatment during the study, No. (%)	9 (19.6)	20 (22.5)	.697						
Fluoroquinolone, No. (%)	2 (4.3)	5 (5.6)	1.000						
Cephalosporin, No. (%)	3 (6.5)	5 (5.6)	1.000						
Anti-MRSA agent, No. (%)[b]	2 (4.3)	3 (3.4)	1.000						
Length of stay since the start of treatment, No. (%)			.046			.040			
>3 weeks	8 (17.4)	30 (33.7)		1.00	…				
≤3 weeks	38 (82.6)	59 (66.3)		2.42	1.00–5.82				
Colonization characteristics									
MLST sequence type, No. (%)	n = 35	n = 80	.878						
ST228[c]	24 (68.6)	56 (70.0)							
ST5 – ST8 – ST22 – ST105 - ST225[d]	11 (31.4)	24 (30.0)							

TABLE 1. *Continued*

Variables	MRSA-Negative Cases (N = 46)	MRSA-Positive Controls (N = 89)	*P* Value	Univariate Logistic Regression			Multivariate Logistic Regression		
				OR	95% CI	*P* Value	aOR	95% CI	*P* Value
Colonized body site, No. (%)									
Nose	34 (73.9)	75 (84.3)	.148	1.89	0.79–4.52	.155			
Groin	31 (67.4)	69 (77.5)	.203	1.67	0.76–3.69	.208			
Colonized sites, No. (%)			.023			.023			
2 (nose and groin)	19 (41.3)	55 (61.2)		1.00	…		1.00	…	
1 (nose or groin)	27 (58.7)	34 (38.2)		2.30	1.11–4.75		2.16	1.03–4.56	.042
MRSA quantity at baseline, No. (%)			.380						
Low level of carriage	18 (39.1)	25 (28.1)							
Medium level of carriage	16 (34.8)	33 (37.1)							
High level of carriage	12 (26.1)	31 (34.8)							
MRSA status, No. (%)			.697						
Newly identified MRSA carriage	30 (65.2)	55 (61.2)							
Known MRSA carriage	16 (34.8)	34 (38.2)							
Treatment characteristics									
Treatment, No. (%)			.425						
Polyhexanide	24 (52.2)	40 (44.9)							
Placebo	22 (47.8)	49 (55.1)							
Place of treatment, No. (%)			.366						
Hospital	20 (43.5)	46 (51.7)							
Home	26 (56.5)	43 (48.3)							

NOTE. BMI, body mass index; COPD, chronic obstructive pulmonary disease; MLST, multilocus sequence typing; MRSA, methicillin-resistant *Staphylococcus aureus;* OR, odds ratio; aOR, adjusted odds ratio; SD, standard deviation; ULR, univariate logistic regression.

[a]Invasive devices: central venous catheter, peripheral venous catheter, implantable venous access device, or urinary catheter.

[b]Anti-MRSA therapy: vancomycin, linezolid, trimethoprim-sulfamethoxazole, or rifampicin.

[c]Endemic MRSA clone at the study site (mupirocin- and chlorhexidine-resistant).

[d]Other non-endemic clones (mupirocin-susceptible).

We included in the case-control study all patients from the RCT with a MRSA-positive swab at inclusion and follow-up screening at day 28. Possible determinants of successful MRSA decolonization included various patient and treatment characteristics. Dependence of patients was defined as a partial or total inability of a person to perform the activities of daily life without help.

We used the Student *t* test and the two-sample Wilcoxon rank-sum test for continuous variables, and Pearson's χ^2 test and Fisher's exact test for categorical variables when appropriate. All variables associated with an increased likelihood of MRSA decolonization with a value of $P \leq .25$ in the univariate analysis were included in a multivariate logistic regression model using a forward stepwise procedure. Log linearity was checked for continuous variables and, if not fulfilled, the variables were converted into categorical variables. The validity of the resulting model was verified using the Hosmer-Lemeshow test. Analyses were performed using Stata 12 software.

Among the 150 patients included in the RCT, 135 met the inclusion criteria for the case-control study. There were 46 MRSA-negative cases (34.1%) and 89 MRSA-positive controls (65.9%) at end of follow-up. Table 1 describes important patient and treatment features. According to our univariate analysis, cases were more likely to live without assistance, having only the nose or groin colonized (and not both), and a shorter length of hospital stay after treatment was initiated. The MRSA-negative patients also tended to be younger, to be without invasive equipment, and without a malignancy or obstructive pulmonary disease. No association was found between MRSA decolonization success and the following variables: gender, body-mass index, other comorbidities, McCabe score, skin damage, antibiotic treatment, MRSA strain type, MRSA quantity at baseline, newly identified MRSA status, polyhexanide treatment, and location of treatment administration.

According to our multivariate analysis (Table 1), 2 independent factors were associated with successful MRSA decolonization: independent status (adjusted odds ratio [aOR], 2.83; 95% CI, 1.26–6.34; $P = .011$) and only 1 MRSA-colonized body site at baseline (aOR, 2.16; 95% CI, 1.03–4.56; $P = .042$). The Hosmer-Lemeshow test indicated adequate model fit ($\chi^2 = 0.58$; $P = .748$).

This case-control study based on a clinical trial population highlights 2 determinants of successful MRSA decolonization: independent status of patients and single-body-site MRSA carriage at baseline (ie, nose or groin). The results are consistent with previous studies in which a higher number of colonized sites were associated with decolonization failure.[3] Concerning the status of independence in daily activities, it has not been associated with a higher likelihood of MRSA decolonization thus far. Only the dependent status of a patient was associated with poor compliance to MRSA decolonization treatment and consequently decolonization failure.[4] Other risk factors have been associated with lower chances of MRSA decolonization in previous studies such as an older age; recent antibiotic use (particularly fluoroquinolones); immunosuppressive treatment; and presence of a central venous catheter, skin wound, or pulmonary diseases.[2,4–6] Although these variables have been included in this analysis, their absence was not associated with successful MRSA decolonization; this might be explained by the low frequency of certain exposures.

A limitation of this study was the reduced number of eligible patients for the RCT, excluding the sickest patients and those receiving systemic antibiotic treatment for MRSA infection. Thus, this study population may not be representative of all MRSA patients. However, the prospective design and data collection remains a strength of this study. Furthermore, a few determinants known to be associated with MRSA decolonization failure could not be evaluated, including colonization at other body sites (eg, throat, axilla) and carriage among household contacts.[2,4,5,7,10]

Based on these data, we can now better target potential patients for topical MRSA decolonization therapy. By choosing independent patients with only 1 MRSA colonization site, we may increase the effectiveness of decolonization treatment and limit the emergence of resistance to topical decolonization agents.[2]

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Blood Culture Contamination Definitions Can Obscure the Extent of Blood Culture Contamination: A New Standard for Satisfactory Institution Performance Is Needed

Blood culture is a critical high-volume laboratory test which, due to contamination, is increasingly associated with issues of cost, patient safety, and antibiotic stewardship on a national scale.

Because there is no standard definition for contamination, we hypothesized that institution contamination rates would differ significantly for 2 different contamination definitions, a clinical episode definition[1] and a single-blood-draw definition.[2] Moreover, there is a need for both a national standard definition of contamination and a new standard for institution contamination rate performance.

METHODS

The blood cultures assessed in this retrospective study were obtained from adults (18 years or older) suspected of having sepsis who were hospitalized, evaluated in the emergency department, or seen as outpatients in a not-for-profit university-affiliated hospital in the Seattle, Washington, area. A blood culture consisted of a 20-mL specimen divided into equal parts that were inoculated into aerobic and anaerobic media. Incubation was conducted using an automated computer-monitored system (bioMérieux SA, Durham, NC) and was continued for 5 days if there was no growth.

The institution contamination rate (R) was calculated using 2 different definitions. First, for the clinical episode definition , a false positive (contamination) was defined as ≥1 skin-residing organism (SRO) isolated in 1 culture in a 48-hour clinical episode. SROs include coagulase-negative *Staphylococcus* spp., *Proprionbacterium acnes, Micrococcus* spp., "viridans" group streptococci, *Corynebacterium* spp., and *Bacillus* spp. Culture results were considered as a unit. If either the aerobic or anaerobic media or both showed an SRO, the culture was counted as a contamination. If antibiotic sensitivity testing was ordered for an otherwise false positive, the culture was reclassified as a true positive.[1]

Second, for the single-blood-draw definition, each culture was considered separately, and contamination was the growth of an SRO in either the aerobic or anaerobic media, but not both. Clinical episodes were not considered in association with the single-blood-draw definition; this definition regards laboratory data only and is not intended for clinical interpretation.[2]

RESULTS

Using retrospective data for a 57-month period (January 1, 2007 through September 30, 2011), we determined our institution's rate of contamination for both clinical episode and single-blood-draw definitions of contamination. Among 39,361 total cultures, we identified 1,295 contaminations using the clinical episode definition and 885 contaminations using the single-blood-draw definition. Thus, the clinical episode definition identified 46.3% more incidents of contamination ($P = .0469$, significance <0.05, χ^2 test with Yates correction), which validates our hypothesis. Using the single-blood-draw definition in the year 2010, the contamination rate of our peer group, ie, the "non-neonatal contamination rate" for 106 institutions, was 2.33% according to a College of American Pathologists (CAP) quality management program.[3] A calibrated 50th percentile contamination rate (using the clinical episode definition) by frequency distribution was 3.43% for our institution (Figure 1).

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