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Resource Burden Associated with Contact Precautions for Methicillin-Resistant *Staphylococcus aureus* and Vancomycin-Resistant Enterococcus: The Patient Access Managers' Perspective

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Abstract

We surveyed Patient Access Managers on the impact of Contact Precautions (CP) for methicillin-resistant *Staphylococcus aureus* (MRSA) and vancomycin-resistant enterococcus (VRE) on time-to-bed-assignment, and investigated the factors influencing infection control policies allowing for discontinuation of CP. The majority of respondents reported an increase in time-to-bed-assignment for MRSA/VRE patients.

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BACKGROUND

Methicillin-resistant *Staphylococcus aureus* (MRSA) and vancomycin-resistant enterococcus (VRE) are endemic in U.S. hospital settings. As part of implementation of Contact Precautions (CP), the Centers for Disease Control and Prevention (CDC) recommends placement of patients with a history of MRSA/VRE in single rooms; cohorting in the same room (i.e., MRSA and MRSA, VRE and VRE) is acceptable.[1]

Patient Access Managers (PAMs) have the primary administrative responsibility for bed assignment. Decisions are based on admitting service, gender, and severity of illness, in addition to the need for CP. Few data address the impact of CP on the resource utilization associated with hospital bed allocation. Our objective was to describe the perceived effect of CP on PAMs. We hypothesized that PAM experience, institution size and location, cohorting policy and bed organization would be associated with additional time-to-bed-assignment and with the existence CP discontinuation policies for patients with MRSA/VRE.

METHODS

A descriptive study design was used to survey members of the National Association of Healthcare Access Management (NAHAM), the professional organization for PAMs in the United States.[2] Membership in NAHAM is voluntary; membership requires that the applicant have responsibility for managing, training, or consulting in some fashion in patient access or be a healthcare professional interested in patient access. Close to 50% of the NAHAM membership has a bachelor's level degree or higher.

An electronic survey was developed by the authors (ESS, DCH, RPW), piloted internally, and approved by the Partners Human Research Committee.[3] Study data were collected and managed using the Research Electronic Data Capture (REDCap).[4]

Questions covered respondent hospital characteristics (including infection control policies) and the perceived impact of CP status on time-to-bed-assignment. Infection control policy questions included details on cohorting and CP discontinuation. Queries of hospital characteristics were adapted from the American Hospital Association (AHA) Annual Survey.[6]

Inquiries regarding time-to-bed-assignment offered increments of minutes required to allocate a bed for a non-CP patient of 0–10, 10–30, 30–60, 60–120, and greater than 120 minutes (maximum 120). Subsequent questions asked if it required more or less time to assign a bed to a patient with CP for MRSA or VRE. For the few respondents reporting that it takes "less time" to assign a patient to a bed with MRSA/VRE precautions, the additional time-to bed-assignment was assumed to be 0. Based on these responses, the time-to-bed-assignment for patients was set as the mean for each possible selection.

The Chi-square test was used to compare proportions between categorical variables. Multivariate linear and logistic regression models were used to evaluate factors influencing time-to-bed-assignment and the existence of CP discontinuation policies for MRSA/VRE. In the analyses of time-to-bed assignment, the dependent variable was defined as the mean additional time reported for bed assignment. This model was used to estimate the incremental time-to-bed-assignment independently associated with these factors. In the analysis of CP discontinuation policies, the dependent variable was defined as the existence of a policy related to discontinuation of CP. Given the missing responses for reported MRSA/VRE prevalence, these variables were excluded in the models. All statistical analyses were performed using SAS 9.2 (SAS Institute, Cary, NC).

RESULTS

As the survey was anonymous, baseline characteristics of the entire sample and of non-respondents were unavailable.

Reported characteristics of respondents

Of the 1,074 individuals surveyed between March 5-May 11, 2011, 233 (21.7%) responded. To assess generalizability, we compared the self-reported characteristics of the respondents' institutions to similar information in the AHA annual survey; respondents to our survey over-represented smaller institutions with fewer licensed beds in urban settings ($p < 0.05$, data not shown).

The majority of PAMs reported working in urban settings, in institutions with <400 beds and with mixed-occupancy accommodations (Table 1). Sixty of 233 (25.8%) reported that their facilities allowed cohorting of CP. Fewer than half provided information on institutional policies for discontinuation of CP.

Reported estimates of MRSA and VRE prevalence

Among 233 respondents, 154 (66.1%) either provided no response or reported they did not know MRSA prevalence. Responses for VRE were similar (Table 1).

Time-to-bed-assignment

Among 233 respondents, 168 (72.1%) and 164 (70.4%) reported additional time-to-bed-assignment for MRSA and VRE patients, respectively (Table 1). The reported mean time-to-bed-assignment for non-CP patients was 26 minutes (95% CI 23–29; SD 25). Additional time-to-bed-assignment was 29 minutes (95% CI 25–33; SD 33) and 28 minutes (95% CI 24–32; SD 32) for MRSA and VRE patients, respectively.

Factors associated with time-to-bed-assignment

In multivariate logistic regression modeling, cohorting policy was found to be statistically significantly associated with increased time-to-bed-assignment ($p < 0.05$); on average, PAMs from institutions allowing for cohorting reported an additional 12.6 minutes for MRSA-patient placement compared to non-cohorting institutions (Table 2). For VRE, there was a non-statistically significant positive association between larger institution size and cohorting ($p = 0.08$). The experience level of PAMs did not appear to play a significant role in time-to-bed-assignment ($p = 0.22$ for MRSA, $p = 0.45$ for VRE).

Factors influencing existence of policies for discontinuation of Contact Precautions as reported by PAMs

Cohorting institutions were more likely (OR=2.8, 95% CI 1.3–6.0) to have a policy for discontinuation of CP for MRSA patients. While cohorting policies were positively associated with policies for discontinuation of CP for VRE patients, this trend did not attain statistical significance (p=0.11). Larger institutions were, however, more likely (OR=2.4, 95% CI 1.2–4.9) to have a policy for discontinuation of CP for VRE patients.

DISCUSSION

This survey is the first to document the impact of CP status on bed assignment from the perspective of PAMs. We found that nearly 95% of responding PAMs reported spending substantially more time assigning inpatient beds to patients who require CP accommodations for MRSA/VRE, with estimates of a doubling of the time required for standard patients.

This difference represents a “hidden” cost of CP, which to our knowledge, has not been previously reported.

The additional time may result in lengthier emergency department stays; studies have found significant and positive associations between delays to admission for emergency department patients and patient mortality.[7,8] Moreover, patient satisfaction is adversely affected by increased waiting times.[5,9]

Reported policies for CP discontinuation for MRSA appear to correlate with cohorting policies. It may be that capacity constraints are driving institutions both to allow cohorting and to develop internal policies for discontinuation of CP. This linkage may relate to limitations in bed availability from cohorting. For example, in circumstances in which a CP patient occupies a semi-private room, the second bed may go unfilled because there is no gender-identical patient requiring similar CP.

There are limitations to our findings. Although we had a 21.7% response rate which over-represented small, urban institutions, it was a cohort larger than has ever been questioned and/or reported on such issues. This response bias could reflect the perceived burden of MRSA/VRE by PAMs at institutions with these characteristics. Alternatively, PAMs at larger institutions may have reduced participation given the time constraints. Given inconsistencies in membership records, it is impossible to identify the responding institution; thus, more than one PAM from a single institution may have responded. The survey – which has not yet been validated − demonstrated gaps in infection control knowledge, perhaps due to lack of collaboration with Infection Control Departments. Despite these limitations our results highlight the need for further research to define the impact of CP on PAMs, hospital operations and management.

Policies that do not permit removal of CP are likely unsustainable, especially considering that MRSA colonization is transient in a substantial proportion of patients.[10] Studies to define optimal policies for CP discontinuation are needed.

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Table 1

Institution Characteristics Reported by Patient Access Managers (PAMs).

Characteristic	Category	No. (%) Respondents (N=233)
Institution Characteristics		
Location	Rural/ small town (pop. <20,000)	55 (23.6)
	Town (pop. 20,000–49,999)	34 (14.6)
	Urban (pop. >50,000)	144 (61.8)
	No response	0 (0)
Licensed beds	<400 bed	142 (60.9)
	≥400 beds	88 (37.8)
	No response	3 (1.3)
Bed organization	All single occupancy	73 (31.3)
	All double occupancy	2 (0.9)
	Mix of single and double occupancy	156 (67.0)
	No response	2 (0.9)
Infection Control Policies		
Cohorting of patients allowed	No	155 (66.5)
	Yes	60 (25.8)
	No response	18 (7.7)
CP discontinuation policy for MRSA	No (“MRSA for life”)	42 (18.0)
	Yes	72 (30.9)
	I don’t know or no response	119 (51.1)
CP discontinuation policy for VRE	No (“VRE for life”)	36 (15.5)
	Yes	64 (27.5)
	I don’t know or no response	133 (57.1)
Reported MRSA and VRE Prevalence		
Reported MRSA prevalence	<1%	16 (6.9)
	1–5%	27 (11.6)
	5–10%	22 (9.4)
	>10%	14 (6.0)
	I don’t know or no response	154 (66.1)
Reported VRE prevalence	<1%	36 (15.5)
	1–5%	22 (9.4)
	5–10%	7 (3.0)
	>10%	4 (1.7)
	I don’t know or no response	164 (70.4)
Reported Time-to-Bed-Assignment*		
Reported time-to-bed-assignment for non-CP patients	0–10 minutes	66 (28.3)
	10–30 minutes	68 (29.2)
	30–60 minutes	39 (16.7)

Characteristic	Category	No. (%) Respondents (N=233)
	60–120 minutes	13 (5.6)
	>120 minutes	2 (0.9)
	No response	45 (19.3)
Additional time-to-bed-assignment for MRSA patients	0–10 minutes	59 (25.3)
	10–30 minutes	53 (22.7)
	30–60 minutes	32 (13.7)
	60–120 minutes	14 (6.0)
	>120 minutes	10 (4.3)
	It takes less time	13 (5.6)
	No response	52 (22.3)
Additional time-to-bed-assignment for VRE patients	0–10 minutes	62 (26.6)
	10–30 minutes	49 (21.0)
	30–60 minutes	30 (12.9)
	60–120 minutes	14 (6.0)
	>120 minutes	9 (3.9)
	It takes less time	15 (6.4)
	No response	54 (23.2)

Note: Data are number and percent (%) of respondents. Totals may exceed 100% due to rounding.

*Weighted minimum and maximum time values are: 15 minutes-38 minutes (standard patient), 21minutes- 49 minutes (MRSA patient), and 20 minutes-47 minutes (VRE patient).

Table 2

Factors Associated with Additional Reported Time-to-bed-assignment and Polices for Discontinuation of Contact Precautions for Patients with a History of MRSA and VRE.

MRSA	**Time-to-bed-assignment**	**Discontinuation Policy**
Factor (N)[a]	Minutes Adjusted[b]	Adjusted OR (95%CI)[c]
PAM with >5 years of experience (N=149/231)	6.1	--
Large institution (N=88/230)	7.5	1.8 (0.8–3.7)
Urban setting (N=144/233)	4.0	0.7 (0.3–1.4)
Cohorting patients permitted (N=60/215)	12.6 *	2.8 (1.3–6.0) **
Mixed or double occupancy (N=158/231)	8.2	1.0 (0.5–2.0)
VRE	**Time-to-bed-assignment**	**Discontinuation Policy**
	Minutes Adjusted[d]	Adjusted OR (95%CI)[e]
PAM with >5 years of experience (N=149/231)	3.7	--
Large institution (N=88/230)	10.3	2.4 (1.2–4.9) *
Urban setting (N=144/233)	3.9	0.6 (0.3–1.2)
Cohorting patients permitted (N=60/215)	9.6	1.8 (0.9–3.6)
Mixed or double occupancy (N=158/231)	9.3	1.3 (0.7–2.6)

Note. Parameter estimates provided in minutes. MRSA, methicillin-resistant *Staphylococcus aureus*. VRE, vancomycin-resistant enterococcus. Large institution: >400 beds. Urban setting: >50,000 population.

* $P<0.05$

** $P<0.01$

[a] N=x/y where x is the number of PAMs who reported the characteristic and y is the total number of PAMs who responded to the question.

[b] Sample size for MRSA adjusted model was 176, with 57 responses deleted due to missing values.

[c] Sample size for MRSA adjusted model was 189, with 44 responses deleted due to missing values.

[d] Sample size for VRE adjusted model was 174, with 59 responses deleted due to missing values.

[e] Sample size for VRE adjusted model was 191, with 42 responses deleted due to missing values.