

Letter to the Editor

Bed Utilization of Patients With Methicillin-Resistant *Staphylococcus aureus* in a Canadian Tertiary-Care Center

To the Editor:

A continuing increase in the isolation rate of methicillin-resistant *Staphylococcus aureus* (MRSA) has been observed in many Canadian hospitals.^{1,4} This has been associated with an increasing cost of care for patients infected or colonized with MRSA.² We undertook a study of the effect of isolation of patients infected or colonized with MRSA (MRSA positive) on hospital bed utilization to better understand the impact of MRSA.

At the Health Sciences Centre, a 780-bed, university-affiliated, tertiary-care center in Winnipeg, Manitoba, Canada,^{3,5} all patients known to be MRSA positive are placed in a single room. Individuals entering the room are required to don gown, gloves, and mask, and must wash their hands on entering and exiting the room. A copy of the facility's "Infection Control Management of MRSA" guideline is left on the patient's chart, and staff, patient, and family education occurs for all MRSA-positive patients. Patients suspected of having MRSA have had potential exposure to a MRSA carrier. These individuals undergo a screening protocol, includ-

ing culture of the anterior nares, throat, open wounds, and device exit sites, and are isolated only if MRSA is recovered.

A list of all MRSA-positive patients identified from January 1, 1995, to December 31, 1998, was compiled from the Infection Control Unit's records. Retrospective chart review with standardized data collection was undertaken, including patient demographics and hospitalization variables such as duration of admission, duration of isolation, and ward of admission. The number of days other beds were "blocked" (ie, unavailable for roommates) because a MRSA-positive patient required a single room, when only multibed rooms (2 or 4) were available, was also calculated. Instances in which MRSA-positive patients were not appropriately isolated were also identified, and the success rate in isolating identified patients with MRSA was determined.

The number of MRSA-positive patients remained relatively constant during the 4-year period, varying from 24 to 30 (Table). A total of 107 MRSA-positive patients were identified. Overall, there were 5 instances in which patients were not appropriately isolated. Of the 87 patients requiring admission(s), 68 were isolated and 19 were not. Fifty had single admissions and 18 had multiple admissions. Of the 19 not isolated, 17 patients either died, were transferred, or were discharged prior to their

MRSA status being known. For the remaining 2 patients, errors in isolation procedure occurred, one due to a lack of notification from the laboratory to the Infection Control Unit staff and the other because a patient with known MRSA was not correctly identified at admission. For an additional 3 of 68 admissions, delays in recognition of MRSA occurred, so the success rate of isolation was 63 (92.6%) of 68. In the former 2 cases, full ward follow-up surveillance cultures were performed on all patients admitted during the period that the patients were not isolated. In the latter 3 episodes, surveillance swabs were obtained from roommates of the MRSA patients. Nosocomial transmission of MRSA to other patients was not identified in any of these 5 episodes.

All MRSA-positive patients were isolated in a private room. The mean duration of isolation for MRSA-positive patients was 30.6 days (range, 16.4 to 41.5 days). Of 3,000 isolation bed-days required, 950 (31.7%) were medical, 1,116 (37.2%) surgical, 344 (11.4%) pediatric, 186 (6.2%) rehabilitation, and 404 (13.5%) medical-surgical. In addition, 1,908 bed-days (633 medical, 711 surgical, 10 pediatric, 356 rehabilitation, and 198 medical-surgical) were lost due to blocked beds for patients isolated in multibed rooms. The 4,908 total isolation bed-days constitutes 0.35% of the 1,385,167 total available bed-days for the study period; the 3,000 isolation

TABLE
NUMBER OF PATIENTS WHO WERE METHICILLIN-RESISTANT *STAPHYLOCOCCUS AUREUS* POSITIVE*

Year	No. of MRSA-Positive Patients		No. of Admissions for MRSA-Positive Patients	Average Duration of Isolation per Admission (d)	Hospital Bed-Days		
	Total	Admitted and Isolated			Total Bed-Days	Isolation Days	No.
1995	28	22	38	16.4	354,750	624	0.18
1996	30	21	26	45.4	352,580	1,180	0.33
1997	25	14	20	30.7	336,186	615	0.18
1998	24	11	14	41.5	341,651	581	0.17
Total	107	68	98	30.6	1,385,167	3,000	0.22

MRSA = methicillin-resistant *Staphylococcus aureus*.
*MRSA positive: infected or colonized with MRSA.

days constitute 0.22% of the total available bed-days (Table).

Although the total proportion of isolation bed-days of only 0.35% is small, the time and effort involved in isolation protocols for MRSA-positive patients in our facility are significant. The need to isolate MRSA-positive patients means beds are blocked, leading to delays in ward admissions and contributing to emergency department overcrowding. In addition to bed utilization, MRSA-positive patients also have increased costs of care related to increased use of supplies such as gowns, gloves, and masks, have increased laundry expenses, have costs associated with screening, and require additional staff time.^{1,2}

Some authors question the use of aggressive infection control policies and interventions for MRSA. This is generally in institutions in which there is a high frequency of endemic MRSA. The proportion of *S. aureus* isolates that were MRSA in our facility during the study period was low (1995: 2.7%; 1996: 4.5%; 1997: 4.0%; 1998: 2.6%), although several outbreaks have occurred.⁵ With these outbreaks, the same intensive infection control measures and stringent isolation protocols have been instituted. These measures have helped to

control the outbreaks and prevent MRSA from becoming endemic throughout our facility. Thus, the use of intensive infection control measures appears to have been effective in maintaining low rates of MRSA endemicity in our facility.

A 92.6% success rate in isolating patients with MRSA when admitted and when identified during surveillance suggests a highly effective system. The aggressive screening and isolation policies, rapid and effective communication from the microbiology laboratory, and hospital antimicrobial use policies likely all contribute to this success. Therefore, we believe that these aggressive measures are of benefit to maintain low rates of endemicity of MRSA at our facility, despite additional costs and excess hospital bed utilization days.

REFERENCES

1. Papia G, Louie M, Tralla A, et al. Screening high-risk patients for methicillin-resistant *Staphylococcus aureus* on admission to the hospital: is it cost effective? *Infect Control Hosp Epidemiol* 1999;20:473-477.
2. Kim T, Oh PI, Simor AE. The economic impact of methicillin-resistant *Staphylococcus aureus* in Canadian hospitals. *Infect Control Hosp Epidemiol* 2001;22:99-104.
3. Embil J, Almuneff M, Nicoll D, et al. Methicillin-resistant *Staphylococcus aureus*: profiles oceans apart—Canadian and Saudi Arabian experiences. *J Chemother* 2001; 13(suppl 1):28-33.
4. Simor AE, Ofner-Agostini N, Bryce E, et al. The evolution of methicillin-resistant *Staphylococcus aureus* in Canadian hospitals: five years of national surveillance. *Can Med Assoc J* 2001;165:21-26.
5. Embil JM, McLeod JA, Al-Barrak AM, et al. An outbreak of methicillin-resistant *Staphylococcus aureus* on a burn unit: potential role of contaminated hydrotherapy equipment. *Burns* 2001;27:681-688.

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