

Reply to Vandijck et al

To the Editor—We appreciate the insightful comments by Vandijck et al¹ regarding our article on the cost of methicillin-resistant *Staphylococcus aureus* (MRSA) bloodstream infections.² We included variables in the propensity score that are clinically important even if they were not statistically significant, as recommended in statistics textbooks.³

We decided to use only hospital data because prehospitalization data may be less reliable. However, data on residence in a nursing home is an exception, and we agree with Vandijck et al that it should have been included.

When we repeated the calculations with the inclusion of nursing home residence as a covariate in the propensity score regression, the separation between patients with methicillin-susceptible *S. aureus* (MSSA) BSI and patients with MRSA BSI increased. According to the original calculations, there were 41 patients with a propensity score greater than 0.8; 2 of these patients developed a MSSA BSI, and 39 developed a MRSA BSI. When we applied the new regression, there were 47 patients with a propensity score greater than 0.8; 2 of these patients developed a MSSA BSI, and 45 developed a MRSA BSI. The effect of MRSA BSI on length of stay, cost after infection, and mortality became even less significant for the group of patients who had a propensity score greater than 0.1 and less than 0.8, while the effect of MRSA BSI on intensive care unit patients remained significant over the entire range of propensity scores. Previous antimicrobial therapy may also have an effect on clinical outcome and on hospital cost; however, these data were not available.

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Translating Evidence Into Practice: The Importance of Continuing Local Bacterial Surveillance Even When National Data Are Available

To the Editor—Antimicrobial resistance is frequently observed in the bacterial flora of critically ill patients.¹ Inadequate empirical antibiotic therapy is associated with poor outcomes for patients with sepsis,^{2–4} and nosocomial infections increase morbidity and mortality. Therefore, when choosing empirical antibiotic therapy for critically ill patients, one must take into account the local bacterial population and its antibiotic resistance patterns. The Canadian National Intensive Care Unit (CAN-ICU) study listed the most commonly observed bacteria and the most commonly observed antibiotic resistance patterns in 19 ICUs in Canada.⁵ These data are very useful for identifying emergent pathogens at the national level,⁶ and they provide an important benchmark for the rest of the country. However, the CAN-ICU study may not necessarily represent the antibiotic patterns of bacterial flora in other nonsurveyed ICUs. Even if national studies provide guidance for selecting appropriate empirical antibiotic treatment, data on local bacterial flora would be even more important for individual patients.⁶ In the Province of Québec, only 2 ICUs in the Montreal region were included in the CAN-ICU study.⁵ It is unknown whether the hospitals included in the CAN-ICU study represent the local realities in other ICUs of the Province of Québec as well. We wanted to compare the antibiotic resistance patterns of the bacterial flora in our ICU for this reason. This motive is similar to that of the large CAN-ICU study, which compared the antibiotic resistance patterns it found with those of an American study. In the knowledge-to-action process, knowledge produced by research needs to be adapted to local context.⁷ Hence, before putting the conclusions of the CAN-ICU study into practice, we wanted to know about our own local bacterial flora, to tailor a specific intervention strategy. Therefore, we conducted a retrospective study to assess the bacterial population responsible for the

colonization or infection of patients hospitalized in the ICU at the Hôtel-Dieu de Lévis, Québec, Canada.

The microbiology laboratory's computerized database was used to identify all the bacterial isolates recovered from blood, wound (incomplete data for 2004), urine, and respiratory specimens obtained from patients in our medical-surgical ICUs during the period from January 1, 2004, through December 31, 2007. Specimens of anaerobic bacteria, yeasts, and fungi were excluded. Surveillance swab specimens were also excluded. A total of 4,996 patients were admitted to the ICU during this 4-year period. From these patients, a total of 2,509 specimens were obtained, and a total of 728 isolates recovered from blood, wound, urine, and respiratory specimens were identified. Of the 728 isolates, 242 (33.2%) were recovered from wound specimens, 208 (28.6%) from respiratory specimens, 168 (23.1%) from urinary specimens, and 110 (15.1%) from blood specimens. These proportions differ from those of the CAN-ICU study, in which more than 50% of all isolates were recovered from respiratory specimens.

The most common bacteria are presented in the Table. With the exception of *Haemophilus influenzae* and *Streptococcus pneumoniae*, the 10 most prevalent bacteria identified in the ICUs of the CAN-ICU study⁵ were the same as those identified in our ICU. The percentage of *Staphylococcus aureus* isolates identified in our ICU was also comparable to the percentage identified in the ICUs of the CAN-ICU study (137 [18.8%] of 728 isolates vs 884 [21.1%] of 4,180 isolates). However, there were more methicillin-resistant *S. aureus* (MRSA) isolates in our ICU than there were in the ICUs of the CAN-ICU study (67 [9.2%] of 728 isolates vs 197 [4.7%] of 4,180 isolates). Almost half of all *S. aureus* isolates (67 [48.9%] of 137) identified in our ICU were MRSA, whereas 197 (22.3%) of 884 *S. aureus* isolates identified in the ICUs of the CAN-ICU study were MRSA. MRSA was also identified in 33

(15.9%) of the 208 isolates recovered from our respiratory specimens, whereas MRSA was identified in 118 (5.1%) of the 2,292 isolates recovered from respiratory specimens from the CAN-ICU study. From 2005 to 2007, the percentage of MRSA among all *S. isolates* in our ICU was constant, with a prevalence of 46.2%, 47.5%, and 46.3% in 2005, 2006, and 2007, respectively.

In general, the results observed in our retrospective study are similar to those presented in the prospective CAN-ICU study.⁵ However, our ICU had more MRSA isolates than did the Canadian ICUs that were a part of the CAN-ICU study. Active surveillance and strategies were implemented in our hospital during the past few years to reduce the prevalence of MRSA. From 2004 through 2008, we observed a decrease in the number of patients who acquired MRSA colonization during hospitalization. However, we need to analyze the causes of increased MRSA prevalence in our ICU so that other interventions can be implemented to reduce the prevalence of MRSA^{1,8} to levels reported in the CAN-ICU study. There are several inherent limitations to our local retrospective study. First, because the isolates were recovered from a computerized database, we do not know whether they were associated with a clinically significant infection. Second, previous antibiotic use by the patient before admission to the ICU is not known, and this could have decreased the prevalence of culture-positive infections. The percentage of patients with nosocomial infections acquired in the ICU is also not known, and it was not possible to identify whether *S. aureus* infection or colonization was acquired in the community or in the hospital. Finally, the small sample of isolates identified in our study could result in our overestimating the differences between our study and a large national study.

In conclusion, the bacterial population and its antibiotic resistance patterns in the ICU at the Hôtel-Dieu de Lévis are

TABLE. The Most Common Bacteria in the Intensive Care Unit (ICU) at the Hôtel-Dieu de Lévis, Québec (January 2004–December 2007), Compared with Some of the Most Common Bacteria in Other Canadian ICUs

Bacteria	Our ICU* (n = 728 isolates)	CAN-ICU study (n = 4,180 isolates)
<i>Escherichia coli</i>	104 (14.3)	536 (12.8)
Coagulase-negative staphylococci and/or <i>Staphylococcus epidermidis</i>	87 (12.0)	273 (6.5)
<i>Enterococcus</i> species	85 (11.7)	255 (6.1)
Methicillin-sensitive <i>Staphylococcus aureus</i>	70 (9.6)	687 (16.4)
Methicillin-resistant <i>S. aureus</i>	67 (9.2)	197 (4.7)
<i>Pseudomonas aeruginosa</i>	45 (6.2)	419 (10.0)
<i>Klebsiella pneumoniae</i>	36 (4.9)	224 (5.4)
<i>Enterobacter cloacae</i>	26 (3.6)	164 (3.9)
<i>Stenotrophomonas maltophilia</i>	22 (3.0)	108 (2.6)
<i>Klebsiella oxytoca</i>	20 (2.7)	77 (1.8)
Others	166 (22.8)	1,241 (29.7)

NOTE. Data are no. (%) of isolates. CAN-ICU study, Canadian National Intensive Care Unit study.⁵

* Including respiratory, blood, urinary, and wound specimens.

similar in some respects to those observed in the CAN-ICU study.⁵ However, some differences are important to note, such as a higher prevalence of MRSA among *S. aureus* isolates. These observations emphasize the importance of continuing local surveillance even when national data are available.⁶ We encourage surveillance of common bacteria and their antimicrobial resistance patterns in all ICUs. The choice of empirical antibiotic therapy in our ICU should be based on local microbiologic findings rather than on the data provided by the CAN-ICU study.

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Comparison of Methods of Measuring Pharmacy Sales of Antibiotics without Prescriptions in Pratumthani, Thailand

To the Editor—It is well recognized that the sale of antibiotics without prescription at pharmacies, together with the use of antibiotics in animal husbandry, has contributed to antimicrobial resistance in developing countries.^{1–3} Several studies have revealed high incidence of inappropriate dispensing of antibiotics at pharmacies without prescription by means of either mock-patient presentations^{4–8} or structured interviews of pharmacy personnel.^{9–10} To compare the methods of evaluating sales of antibiotics at pharmacies without prescription, we compared mock-patient presentations with structured interviews at the same pharmacies in Pratumthani, Thailand.

Pratumthani is situated in central Thailand, occupying an area of 1,525 km² divided into 7 administrative health districts. As of July 2006, there were 315 first-class, pharmacy-based drugstores. First-class drugstores are permitted to dispense antibiotics and have registered pharmacists or physicians on duty who can dispense drugs without prescription. Pharmacists on duty advise patients presenting with illnesses and may recommend further evaluation by a physician.

From July 1 through December 31, 2006, we trained 6 internists as mock patients who pretended to have a friend with 1 of 5 common syndromic illnesses: (1) acute low-grade fever, cough, and sore throat (mimicking acute viral pharyngitis; antibiotic treatment inappropriate); (2) acute fever, myalgia, rhinorrhea, and cough (mimicking influenza; antibiotic treatment inappropriate); (3) acute fever, tender maxillary sinus with nonpurulent discharge (mimicking acute viral sinusitis; antibiotic treatment inappropriate); (4) acute watery diarrhea without fever, mucus, bloody stool, or abdominal pain (mimicking acute viral gastroenteritis; antibiotic treatment inappropriate); and (5) skin abrasion without exudates (mimicking noninfected skin abrasion; antibiotic treatment inappropriate).⁵ Each internist or pair of internists was responsible for only 1 of the 5 syndromic presentations, visited all 315 pharmacies, and completed a standardized data collection form after each pharmacy encounter. Soon after the internist left the index pharmacy, another internist visited the pharmacy and used a structured data collection tool to interview the pharmacist who prescribed the antibiotic to the index internist. Data on antibiotics prescribed and on duration of treatment prescribed were compared between the 2 methods.