Use administrative databases with caution

There were 2 striking results in the article by Sandra Dial and colleagues: a sharp increase in the number of cases of community-acquired *Clostridium difficile*-associated diarrhea in 2003 and 2004 in Quebec and a low rate of antibiotic exposure in the weeks preceding the infection.[1] The authors used the provincial hospital discharge summary (MED-ECHO) database to identify the cases on the basis of the first hospital admission for which *C. difficile* infection was listed as the primary diagnosis. This was considered to be a clinically relevant case definition of community-acquired *C. difficile* infection.

However, MED-ECHO coding rules state that the primary diagnosis is "the most important condition encountered by the patient during his hospitalization. In most cases, it is closely related to the reason for admission. In a patient with multiple conditions, the physician should assign the primary diagnosis to the condition requiring the greatest use of medical resources during the hospital stay."[2] Consequently, in patients with severe *C. difficile*-associated diarrhea acquired during a hospital stay and requiring intensive care or a prolonged hospital stay, this condition is more likely to be recorded as the primary diagnosis than is the reason for admission.

This potential for misclassification has 2 major implications for the study by Dial and colleagues.[1] First, one cannot exclude the possibility that the increase in the number of so called community-acquired *C. difficile*-associated diarrhea in 2003 and 2004 reflects an increase in the number of nosocomial cases, given that the spread of the NAP1 strain in Quebec was associated with more severe disease.[3,4] Second, as the index date of the potentially misclassified cases was defined as the admission date, antibiotics given during hospital stay were not included in the study. This would lead to an underestimation of the antibiotic exposure in these cases. The use of administrative databases requires a good understanding of the coding rules, which are not always suitable for epidemiologic analyses.

Bruno Hubert MD
Institut de veille sanitaire, Nantes, France
Rodica Gilca MD
Institut national de santé publique du Québec, Québec City, Que.

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[Two of the authors respond:]

We were aware that the primary discharge diagnosis of *Clostridium difficile* infection may not have been the admitting diagnosis, but we estimated the magnitude of such miscoding in our study to be low (< 5%) for the following reasons.[1] We agree with Hubert and Gilca that severe disease is most likely to be miscoded, but our study mostly covered a period before the severity of *C. difficile* infection in Quebec was at its highest. The highest rate of severe disease reported during the Quebec epidemic was 6.5%.[2] Also, our findings of a significantly lower rate of prior antibiotic exposure and an increasing incidence of community-acquired *C. difficile* infection are consistent with other reports.[3,4]

We also performed 2 screening procedures to estimate the magnitude of the diagnostic miscoding. There were 16 041 cases of *C. difficile* infection in the study database. As *C. difficile* infection is primarily nosocomial, we hypothesized that most of the cases in the database were probably nosocomial. *C. difficile* infection was identified as a secondary diagnosis in 10 370 cases (65%) and as a primary diagnosis in 3956 cases (25%) of patients readmitted within 90 days of an admission to hospital. We believed that these were probably cases of nosocomial *C. difficile* infection. The remaining 1717 cases, with no recent hospital admissions for which *C. difficile* infection was the primary diagnosis, accounted for only 10% of the cases in the database. This distribution, suggesting that only 1 in 10 of the infections was acquired in the community, was consistent with other reports.[4,5] When we took into account our other exclusion criteria, particularly no prior *C. difficile* diagnosis (either primary or secondary), we believed that our study excluded most of the nosocomial cases.

We also examined MED-ECHO data obtained for another study on nosocomial *C. difficile* infection.[6] These data included the primary diagnosis submitted from 4 Montréal hospitals in 2003 (over 30 000 admissions). We conducted a chart review of all patients who tested positive for *C. difficile* toxin among those admissions to determine the number of cases of nosocomial infection. In total, 705 cases with a positive toxin result met the definition of nosocomial *C. difficile* infection; of these, only 5 cases (0.7%) were miscoded as having *C. difficile* infection as the primary diagnosis. Similarly, there were 150 cases with a primary diagnosis of *C. difficile* infection; 145 of these patients presented with di-

arrhea and only 5 of the cases (3.3%) were miscoded. Therefore, we believe the rate of misclassification is low and our results are valid.

Sandra Dial MD MSc
Samy Suissa PhD
Department of Medicine, Sir Mortimer B. Davis–Jewish General Hospital, Montréal, Que.

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Corrections

An article[1] in the November 18 issue contained 2 errors. First, in Table 3, the average annual percentage change in mortality for liver cancer should have been listed as a 2.2% increase.

Second, text was omitted from the first and second paragraphs under "Prevalence, incidence, mortality and survival." This section should have read "Despite the higher number of cases and deaths among men, there is a higher incidence of cancer among women aged 20–59 years. The mortality rates among women in their 30s and 40s are higher than among men of a comparable age.

The prevalence of cancer is also increasing because of the increasing number of new cases each year as well as improved survival. Thus, it is imperative that we better understand the issues faced by cancer survivors. In 2004, there were 850 000 living Canadians who had received a diagnosis of cancer at some time in the previous 15-year period (2.5% of men, 2.8% of women)."

These errors have been corrected in the online version.

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1. Marrett LD, De P, Airia P, et al. Cancer in Canada in 2008. *CMAJ* 2008;179:1163-70.

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In a research article[1] in the December 2 issue, the second-last sentence in the results section of the abstract should have read "They were also more effective for patients with severe pneumonia (OR 1.84, 95% CI 1.02–3.29), those who required admission to hospital (OR 1.30, 95% CI 1.04–1.61) and those who required intravenous therapy (OR 1.44, 95% CI 1.13–1.85).

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DOI:10.1503/cmaj.08-1980

In a research article[1] in the December 2 issue, Brian Hutton should have been acknowledged for his assistance in propensity score matching.

REFERENCE

1. Wen SW, Zhou J, Yang Q, et al. Maternal exposure to folic acid antagonists and placenta-mediated adverse pregnancy outcomes. *CMAJ* 2008;179:1263-8.

DOI:10.1503/cmaj.08-1981

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