



Analysis of perioperative antibiotic administration in electronic medical records: correlations among patients addressed by analyzing control chart data using the batch means method

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Received: 21 July 2017/Revised: 23 July 2017/Accepted: 8 September 2017/Published online: 15 September 2017
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To the Editor,

The recent publication by Hincker *et al.* addresses the implementation of an anesthesia information management system modification to optimize the rate of correct second dosing of intraoperative antibiotics was interesting. Their control chart data in Fig. 5 showed strong evidence that a greater percentage of intraoperative repeat doses of cefazolin were administered correctly.¹

The authors' confidence intervals in Fig. 5 and Table 1 treated the patients as independent random samples (i.e., the authors considered the effective sample sizes to be the numbers of patients). The patients' probabilities of appropriate antibiotic re-dosing, however, may have been correlated among patients with the same procedure, surgical specialty, surgeon, anesthesiologist, and/or nurse anesthetist or resident. The authors neither analyzed their data with stratification, mixed models, nor control chart (i.e., batch means) methods. The authors' sample sizes were (reasonably and typically) too small to rule out such unmeasured correlations among patients. Consequently, confidence intervals would typically be calculated using the summary measure method (i.e., by month as in the authors' Fig. 5, not by patient as in their Table 1).

This topic of appropriate methods of analysis of such data has been summarized previously as part of a checklist,² review article,³ statistical grand rounds,⁴ and

editorial.⁵ Examples of articles showing the need for such analyses by measuring such correlations include those about cancellations,⁶ turnover times,^{7,8} and labour analgesia durations.⁹ The percentages can be transformed before applying Student's *t* distribution, with inverse transformation then applied.^{10,11}

Whether performed without (i.e., simpler) or with (i.e., if the authors prefer) transformation of the authors' percentages using the two-group *t* test, it would be useful to know the authors' confidence interval for the difference in percentages using their Fig. 5's $n = 12$ measurements before intervention *vs* the $n = 8$ after intervention. I am confident that it will not affect the authors' conclusions, but it would affect comparisons and pooling of the authors' effect size relative to similar studies.

Conflicts of interest None declared.

Editorial responsibility This submission was handled by Dr. Hilary P. Grocott, Editor-in-Chief, *Canadian Journal of Anesthesia*.

Funding Departmental.

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This letter is accompanied by a reply. Please see *Can J Anesth* 2018; 65: this issue.

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