E. Tissot
C. Cornette
G. Capellier
E. Schmitt

Assessment of medication errors: methodological details

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Sir: We have been very honoured with Dean's editorial regarding our study about medication errors at the administration stage in an intensive care unit [1, 2]. Dean rightly highlights methodological problems met in this field and particularly those concerning obseration-based error rates. Her comments enable us to keep on interpreting our results with the author of a recent French bibliographic review [3]. As a complement to our previous study, we give here a few details about the assessment of medication errors.

According to Barker et al., medication error rates are usually expressed as a percentage of the "total opportunities for error" (TOE). The TOE is the sum of all ordered doses plus all unordered doses given [4]. The definition of this denominator prevents the error rate from exceeding 100 % [5]. As Dean noticed, we followed a different but more realistic way to present our results [1]. This alternative approach calculates separate error rates for each stage of the preparation and administration process. A major disadvantage is that comparisons with our results are not possible because previous studies only use the TOE and do not detail the drug use process. In order to enable such a comparison and avoid all misunderstandings, we provide here our results as a percentage of the TOE. Since we have not observed the administration of unauthorised drugs, the TOE corresponds to the number of observed doses (i. e. $n = 568$, Table 1, p. 355) [2]. Then, the overall rate of medication administration errors expressed as a percentage of the TOE is 132/568 (23.2 %). Excluding wrong-time errors (i. e. $n = 9$, Table 2, p. 355), the rate of medication administration errors turns into (132–9)/568 (21.7 %) [2]. So it becomes possible to compare our results with other studies quoted in Dean's editorial, based on the detection of medication administration errors by direct observation in intensive care units (Table 1) [6, 7].

Actually, the calculation of medication error rates as a percentage of the TOE seems useful for comparing different studies and hospital drug distribution systems [3]. Nevertheless, this study has convinced us that it is neither the most convenient nor the most representative indicator of medication errors. Another solution suggested by Dean may be to link data to the clinical activity, for example to calculate error rates by patient-day. However, the error rate by patient-day is very difficult to get from the results obtained from medication error studies based on direct observation techniques. The only published value is an unconfirmed estimation of Barker and McConnell [8]. The prerequisites for such a calculation are very important: in particular, the observation period must be as long as a 24-h period, which is very hard to put into practice.

Medication error assessment, particularly the calculation of medication error rates, raises many methodological problems. This debate has perhaps become out-of-date since the studies have reached their objective: to prove that the organization of the hospital drug use process is closely linked to the frequency of medication errors.

Table 1 Administration medication error rates observed in intensive care units

Studies	Type of intensive care	Total opportunities for error	Observed errors with wrong-time errors (%)	Range of the wrong-time error	Observed errors without wrong-time errors (%)
Tisdale (1986) [6]	Nursery	389[a]	66 (17.0)	> ± 30 min	27 (6.9)
Tisdale (1986) [6]	Pediatric	231[a]	81 (35.1)	> ± 30 min	25 (10.8)
Schneider et al. (1998) [7]	Pediatric	275	74 (26.9)	> ± 60 min	50 (18.2)
Tissot et al. (1999) [2]	Adult	568	132 (23.2)	> ± 60 min	123 (21.7)

[a] As corrected by Allan and Barker [5]: the number of omission errors was not included in the total of opportunities for errors

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E. Tissot · C. Cornette (✉)
Department of Pharmacy,
University Hospital of Besançon,
F-25030 Besançon Cedex, France
e-mail: christian.cornette@ufc-chu.univ-fcomte.fr
Tel.: + 33(3 81)66 83 03
Fax: + 33(3 81)66 84 89

G. Capellier
Department of Anesthesiology – Medical Intensive Care Unit, University Hospital of Besançon, Boulevard Fleming, F-25030 Besançon Cedex, France

E. Schmitt
Pharmacy Hospital, F-13637 Arles Cedex, France

Mailing address: Pharmacie Centrale, Centre Hospitalier Universitaire Jean Minjoz, Boulevard Fleming, F-25030 Besançon Cedex, France