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Pre-operative medication reconciliation by pharmacy technicians or anaesthesiologists

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Editor,

We report on medication reconciliation at the pre-operative screening. Medication reconciliation by pharmacy personnel is a safety intervention aimed at reducing the risk of medication errors at transitions of care.[1,2] The number of medications per patient is a well-established risk factor of these errors.[3] Therefore, stratification of the performer of medication reconciliation (physician during routine activities or pharmacy technician) by the number of medications may be an efficient approach. We therefore set out to determine the safety of this method of stratification.

An observational prospective study was performed in elective surgery patients in the Leiden University Medical Centre, the Netherlands. Approval for this study was provided by the Ethical Committee 'CME' of Leiden University Medical Centre, Leiden, The Netherlands (Chairperson Prof. Dr. A. Dahan) on 11 October 2016 (Ethical Committee No. P16-180). Data of this study were collected to study risk factors of medication errors in all patients, and are currently used to analyse the differences in medication errors between pharmacy technicians and anaesthesiologists.[4] Medication reconciliation was performed at pre-operative screening (POS) by pharmacy technicians when patients used >1 medication, whereas anaesthesiologists performed medication reconciliation in all other patients. Medication reconciliation was performed using a community pharmacy medication overview and consisted of a face-to-face interview with the patient discussing all medication. Medication reconciliation was repeated at admission by a researcher. Patients admitted for at least 24 h who were aged ≥18 years and were able to participate in a medication reconciliation interview were included between October 2016 and August 2017. The primary outcome was the proportion of patients with one or more medication errors at admission (MEA). This was corrected for differences in patient characteristics using multivariate logistic regression using IBM SPSS Statistics version 23 (IBM Corp, Armonk, New York). Results are reported as (adjusted) odds ratios and 95% confidence intervals. Secondarily, the average number of medication errors per patient was compared with an unpaired *t*-test, and the type and severity of the MEA were assessed. Severity of MEA was classified independently by two hospital pharmacists (KG and ME) using the National Coordinating Council for Medication Error Reporting and Prevention medical error index.[5] In case their assessments differed, they met to reach consensus.

Of 1020 patients screened, 367 patients were included in the study. The pharmacy technician performed medication reconciliation in 201 (54.8%) patients and the anaesthesiologist in 166 (45.2%) patients. The percentage of patients with at least one MEA was 44% and 47%, respectively. Results of the univariate logistic regression and multivariate logistic regression are shown in Table 1.

Of 166 patients reconciled by the anaesthesiologist, 68 (41.0%) should have been reconciled by the pharmacy technician, because these patients used two or more medications at the moment of pre-operative screening. In the pharmacy technician group, four patients (2.2%) were not seen according to protocol because these patients used one or no medication. Overall, these results indicate that in daily practice the protocol is not adhered to in almost 20% of patients. The results of the per protocol analysis were not different from the intention to treat analysis (data not shown).

A total of 293 MEA were found. In both groups the most frequent types of errors were omissions, followed by commissions with dose or frequency differences. More omissions occurred in patients seen by anaesthesiologists (60% versus 41%) and more frequency or dose changes in

Table 1 Frequency of medication errors at admission

	Total	Anaesthesiologist ($n = 166$)	Pharmacy technician ($n = 201$)	Statistics
Patients with at least one MEA	167	78 (47%)	89 (44%)	OR 1.12 (95%CI 0.74 to 1.69)[a]
Patients with at least one MEA multivariate analysis	167	78 (47%)	89 (44%)	OR_{adj} 1.66 (0.99 to 2.80)[b]
Number of medication errors at admission per patient (mean ± SD)	0.87 ± 1.3	0.82 ± 1.2	0.93 ± 1.4	$P = 0.45$[c]

[a] Result of univariate logistic regression. [b] Result of a multivariate logistic regression adjusted for number of medications, age, days between POS and admission, cardiovascular disease, hypertension, diabetes and cerebrovascular accident. [c] Result of an unpaired *t*-test. MEA, medication errors at admission. OR, odds ratio; POS, pre-operative screening.

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Table 2 NCC MERP category of medication errors at admission for anaesthesiologists and pharmacy technicians

NCC MERP category	C	D	E	F	Total
Anaesthesiologist *n* (%)	41 (32.8%)	48 (38.4%)	36 (28.8%)	0	125
Pharmacy technician *n* (%)	64 (38.1%)	71 (42.3%)	31 (18.5%)	2 (1.2%)	168
Total *n*, %	105 (35.8%)	119 (40.6%)	67 (22.9%)	2 (0.7%)	293

NCC MERP, National Coordinating Council for Medication Error Reporting and Prevention.

patients who were seen by the pharmacy technicians (27% versus 13%).

In Table 2, the severity of MEA is shown. The potential harm of the MEA did not differ between the anaesthesiologist and pharmacy technician.

When MEA were corrected for patient characteristics a trend to more MEA was present after medication reconciliation by the anaesthesiologist. With a larger study population this could become a significant result, which would accord with findings in literature in which pharmacy professionals reduce medication errors more effectively than physicians and nurses.[1,2]

This may be explained by the fact that medication reconciliation is the sole task of the pharmacy technician during the pre-operative screening visit, whereas it is only one of many tasks for the anaesthesiologist during this visit.

The most common types of MEA in this study were omissions, which was also shown by Tam *et al*.[6] Most of the MEA fell into the medical error severity classes C and D. This means that most medication errors did not cause any harm to patients.[5] A systematic review conducted by Mekonnen *et al*.[7] also showed that most medication errors did not cause any harm to the patient.

After medication reconciliation at the pre-operative screening, medication errors at admission still occur. In this study, no difference in medication errors at admission was found when reconciliation is performed by a pharmacy technician compared with the anaesthesiologist when allocating patients on number of medications in use. Therefore, we conclude that allocating medication reconciliation of patients using one or no medication to an anaesthesiologist instead of a pharmacy technician is safe.

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