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BJAN-D-22-00095_Letter to the Editor

Factors associated with medical errors in perioperative anesthetic practice: cross-sectional study

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Dear Editor,

Errors in anesthesia, mainly during drug administration, are significant and common, and have been repeatedly reported in the literature. However, even with improvement in the anesthetic technique and safety protocols, such errors still occur worldwide, and represent a serious health issue.

Anesthesiologists routinely choose, prepare, and administer potent medications in a brief spam of time, and often the decision on which drug to use is made by just one

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anesthesiologist. Thus, the likelihood of an unintentional error is easily understandable, despite the high potential risk of irreparable harm to the patient.

Thus, analysis of errors in intraoperative drug administration is of major relevance for patient well-being and safety. In view of the scenario, this study focused on understanding the factors related to anesthetic error in the state of Pará, aiming to help establish processes and measures for patient protection and higher anesthetic safety.

This cross-sectional study is based on the analysis of a validated electronic questionnaire. The sample consisted of 90 anesthesiologists, members of the Society of Anesthesiology of the State of Pará (SAEPA) in 2020. All anesthesiologists who were members of SAEPA were included in the study, although physicians who had not paid their annual membership fee and/or who did not complete data fully and adequately were excluded.

Data were collected from the questionnaire based on Erdman et al., 2016[1] (Table 1), which explores demographic data and the anesthetic practice profile of the respondent.

Of the 90 respondents, 85.6% stated they had made a medication administration error. Among those who had made errors, most had occurred between one and five times (94.8%). The most common error was drug exchange (51.9%) followed by omission (23.4%). Fatigue was the most frequently reported error contributing factor (53.5%), followed by incorrect reading of the label/ampoule (23.9%). Among the 77 professionals who reported medication errors, 60 administered drugs erroneously in the neuraxis.

Most anesthesiologists answered that there had been no harm to patients (61.0%). The morning shift revealed a higher incidence of severe errors (37.7%). The most severe errors occurred during anesthesia maintenance (54.5%). Concerning the time elapsed for error detection, 83.1% of the anesthesiologists reported that the error was immediately detected. Late error detection was reported in 12 cases (15.6%).

Thus, the study showed that most of the participant anesthesiologists had already made some type of error, although most of the reported errors resulted in minimal concerns and low morbidity for the patients. Two patient deaths (2.6%) were related to medication errors.

Our findings agree with a study assessing Canadian anesthesiologists that revealed that 85.0% of them had already made some kind of error. Additionally, that

study reported four deaths directly related to medication errors.[2] Another study carried out in India aimed to study medication errors, reporting the events and preventive measures taken by anesthesiologists. This last study revealed that more than two thirds of respondents (75.6%, n = 740) experienced medication errors, and 7.7% (57) reported occurrence of severe morbidity and complications.[3]

The high workload of health professionals causes fatigue, making them more prone to cognitive process failure, leading to error and, consequently, a tendency to deal with errors individually. However, a more comprehensive analysis reveals hidden organizational and administrative conditions contributing to error which must be considered. Consequently, in handling with error one must also include process since the practitioner is the end of a chain and is only a part of systematic failure. Thus, the greater effort of practitioners to avoid errors by themselves is not likely to succeed, as implementing more secure processes and systems are also required.

Thus, prevention is the best method for treating medication errors,[4] complying with the following measures: reading the medication label of vials or syringes carefully before preparing or injecting medication; improving vials and syringe labels regarding font, size, color and information included; labeling syringes; avoiding, whenever possible, similar packaging and presentation of medications, which contribute to drug exchange error; dispensing medication in pre-filled syringes, instead of ampoules (for emergency or general use drugs), which should be prepared and labeled by the anesthesiologist responsible for drug administration, avoiding drug repetition, omission or incorrect dosage.[5] Accordingly, medications error related to practitioner fatigue will be minimized.

Despite its relevance, the study has limitations, as data compilation was strongly dependent on participants' memory and truthfulness. We therefore suggest that new studies focusing on the subject should be performed, examining medical and hospital documents to minimize the likelihood of biases.

Authors' contributions

João Marcos de Oliveira Junior: Conception; study design and data collection.

Lauro Ferreira dos Santos Neto: Study design and data collection; manuscript writing and editing according to journal instructions to the authors.

Tiago Braga Duarte: Study design and data collection; manuscript writing and editing according to journal instructions to the authors.

Bruno Mendes Carmona: Study design and data collection; manuscript writing and editing according to journal instructions to the authors.
Luís Vinícius Pires da Costa: Study design and data collection; manuscript writing and editing according to journal instructions to the authors.
Daniela Ferreira Tramontin: Data entry and statistical analysis, tables and figures; manuscript writing and editing according to journal instructions to the authors.
Deivid Ramos dos Santos: Data entry and statistical analysis, tables and figures; manuscript review and addition of significant content.
Lauriana Marques Corrêa: Manuscript review and addition of significant content.

Conflicts of interest

The authors declare no conflicts of interest.

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Table 1 Electronic questionnaire based on Erdman et al., 2016.

1. How old are you? (years)
2. What is your gender? (M/F)
3. How long have you been practicing anesthesia (including residency)? (years)
4. How many hours do you practice weekly?
5. What is your level of specialization?
(A) Medical residency in progress
(B) Anesthesiologist (holds specialist title)
(C) Anesthesiology Title by the Brazilian Society of Anesthesiology
6. Have you ever made a medication error? (Yes / No)
7. How many times did you make a medication error?
8. What kind of errors did you make?
(A) Omission (drug not administered/forgotten)
(B) Drug Repetition
(C) Wrong Drug (administration of a drug other than the one prescribed).
(D) Wrong Time (drug administered at wrong time)
(E) Wrong Dosage (wrong concentration, amount, or rate of infusion)
9. Did any of the factors below contribute to the error?
(A) Distraction or fatigue
(B) Pressure to execute the procedure
(C) Misreading of the label/vial
(D) Lack of knowledge or experience with the drug
(E) Inadequate storage
(F) Wrong programming of the infusion pump
(G) Inadequate communication between anesthesiologists
(H) Others not specified
10. Have you incorrectly administered medication in the neuraxis?
(Yes No)
11. What was the worst outcome for your patient after your medication error?
(A) No harm (error did not result in change in anesthetic plane or increase in recovery time)
(B) Lower morbidity with reversible harm (increased time to tracheal extubation or post-anesthetic recovery)

(C) Increased morbidity with reversible harm (invasive monitoring required for error correction)
(D) Increased morbidity with irreversible harm (myocardial infarction, cardiac arrest, or permanent neurological sequelae)
(E) Death
12. In which shift of the day did your most severe error occur?
(A) Morning
(B) Afternoon
(C) Night
(E) I don't remember
13. At what time of the perioperative period did your most severe error occur?
(A) In the pre-anesthetic period
(B) During induction of anesthesia (or early intraoperative period)
(C) Anesthesia maintenance
(D) During tracheal extubation (or just before tracheal extubation)
(E) In the postoperative period
14. How long did it take to detect your most severe error?
(A) Immediate detection
(B) Late detection
(C) Suspected, unconfirmed error

Source: Authors.