Effect of Cognitive Aid on Sugammadex Use: Comment

To the Editor:

We read with interest the article by Drzymalski *et al.*[1] published in a recent issue of Anesthesiology. The authors assessed the effect of a cognitive aid on reducing the use of sugammadex and its associated costs using an interrupted time series analysis.[1]

We are fortunate to work in a department that provides quantitative neuromuscular blockade monitoring in every anesthesia workstation. In fact, we have been faced with cases of prolonged neuromuscular blockade and reversal with rocuronium and sugammadex that would have been overlooked without monitoring.[2] We prize the use of quantitative monitoring as the body of evidence that demonstrates the importance of train-of-four ratio of 0.9 or greater has long been present.[3] Furthermore, recent evidence is building towards an adequate level of reversal with a train-of-four ratio of 0.95 or greater.[4]

We appreciate the value of these measures in a setting where only qualitative neuromuscular blockade monitoring is available and applaud the authors for accomplishing their main objective. The authors state that new peripheral nerve stimulators were purchased and placed in every anesthetizing locations.[1] We would like to understand why quantitative monitors were not selected for acquisition if you had a budget and operational peripheral nerve stimulators were available in every station before the month of intervention. Our concern is that the reduction in use of sugammadex, derived from the intervention, was aided by better monitoring equipment, not previously available. In fact, the authors found that the decrease in costs was due to a decreased use of sugammadex but also from neuromuscular blocking drugs and reversal agents.[1] Could this finding be due to an increase in monitoring or simply because fewer general anesthetics with neuromuscular blockade were performed? According to the authors' cognitive aid, every patient should receive a reversal agent (from 4 mg/kg sugammadex with 0 to 1 twitches to 20 mcg/kg neostigmine with 4 twitches without fade).[1] The article does not present the number of neostigmine administrations pre- or postcognitive aid, but one should expect an increase in use and costs postintervention. Regarding sugammadex administrations, the article states that the postintervention monthly rate of sugammadex administration was 4 per 1,000 general anesthetics with a nonsignificant *P*.[1] We do not understand the meaning of this statement as that information contradicts the information presented in the figures. Concerning the adverse respiratory events, the authors cautiously state that significant changes were not observed.[1] Although that can be a statistically sound statement, the regression of the interrupted time series analysis seems to be less fitted when evaluating the adverse respiratory events. One can notice that the highest value of adverse respiratory events was, in fact, recorded in the postintervention period.

Despite all of our considerations, we find the published article of very high quality. We congratulate the authors for accomplishing their goals, reducing costs without having a negative impact on patients' outcomes, and urge the use of such measures in places where qualitative measurement of neuromuscular blockade is not available.

Competing Interests

Dr. Esteves has received lecture and consultant fees from Merck Sharp & Dohme Portugal (Lisboa, Portugal). The other authors declare no competing interests.

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References

1. Drzymalski DM, Schumann R, Massaro FJ, Trzcinka A, Azocar RJ: Effect of a cognitive aid on reducing sugammadex use and associated costs: A time series analysis. Anesthesiology 2019; 131:1036–45
2. Soares M, Esteves S: Significantly prolonged neuromuscular blockade after a single dose of rocuronium: The importance of monitoring. Eur J Anaesthesiol 2016; 33:693–4
3. Viby-Mogensen J: Postoperative residual curarization and evidence-based anaesthesia. Br J Anaesth 2000; 84:301–3
4. Blobner M, Hunter JM, Meistelman C, Hoeft A, Hollmann MW, Kirmeier E, Lewald H, Ulm K: Use of a train-of-four ratio of 0.95 versus 0.9 for tracheal extubation: An exploratory analysis of POPULAR data. Br J Anaesth 2020; 124:63–72

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Effects of Cognitive Aid on Sugammadex Use: Reply

In Reply:

We would like to thank Pereira *et al.*[1] for their interest and comments related to our article.[2] In their letter, the authors state that the reduction in sugammadex use could have been the result of better monitoring equipment and/or a reduction in general anesthetics with neuromuscular blockade. While data on use of monitoring equipment was not collected, the number of general anesthetics and administrations of neuromuscular blocking drugs was presented in table 1 of the original article. The statistical analyses in Supplemental Digital Content 2 (http://links.lww.com/ALN/C45), supplemental tables 1 and 2, showed that the slope and level changes were not statistically significant, suggesting that general anesthetics with neuromuscular blockade were relatively unchanged after implementation of the cognitive aid.

The authors also ask why quantitative monitors were not selected for acquisition. In fact, our anesthesiologists did request the purchase of quantitative monitors, but this request was not approved. A recent article notes that the new product acquisition process is typically governed by a value analysis committee, which Engelman *et al.*[3] state compares short-term costs rather than long-term value. The final choice of qualitative monitors may have been the result of such an approach, where institutional purchasing decisions are beyond the control of the providers.

The authors also note that the number of neostigmine administrations was not presented and that increased use of neostigmine might increase costs postintervention. In fact, the costs associated with neostigmine were part of the secondary outcome, total acquisition costs of neuromuscular blocking drugs and reversal agents, which decreased postintervention.

The authors go on to suggest that the finding of the postintervention monthly rate of sugammadex administrations (4 per 1,000 general anesthetics with a nonsignificant *P* value) contradicts the figures. In figure 2 in the original article, upper left panel showing sugammadex, the solid trend line to the right of the vertical gray area (intervention period) appears flat. A nonsignificant *P* value for the postintervention slope indicates that the slope is in fact flat, or not different from zero. Only a nonzero value for this postintervention slope would indicate that sugammadex use was increasing after the intervention. Our figure demonstrates that after implementation of the cognitive aid, the immediate decrease in sugammadex use was sustained in the postintervention period.

Finally, the authors note that the regression of the interrupted time series analysis seems to be less fitted when evaluating adverse respiratory events. While this is true, we did not find the parameter coefficients to be statistically significant.

In summary, because time series analyses are not used very commonly in the scientific literature, it may be challenging for many clinicians to interpret the results. Ultimately, the purpose of this statistical analysis is to demonstrate whether the slope and level of an outcome have changed over time. A more detailed explanation of the interrupted time series analysis can be found in a recent article by Mascha and Sessler.[4]

Competing Interests

Dr. Schumann reports an ongoing financial relationship with Wolters Kluwer Publishers (Philadelphia, Pennsylvania). The other authors declare no competing interests.

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References

1. Pereira R, Salgado-Seixas F, Esteves S: Effects of cognitive aid on sugammadex use: Comment. Anesthesiology 2020; 132:1614
2. Drzymalski DM, Schumann R, Massaro FJ, Trzcinka A, Azocar RJ: Effect of a cognitive aid on reducing sugammadex use and associated costs: A time series analysis. Anesthesiology 2019; 131:1036–45
3. Engelman DT, Boyle EM Jr, Benjamin EM: Addressing the imperative to evolve the hospital new product value analysis process. J Thorac Cardiovasc Surg 2018; 155:682–5
4. Mascha EJ, Sessler DI: Segmented regression and difference-in-difference methods: Assessing the impact of systemic changes in health care. Anesth Analg 2019; 129:618–33

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