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In Reply:

We thank Dr. Wax for his response to our recent article on perioperative steroid management.[1] Since the publication of our article, we have received several queries regarding the use of dexamethasone as a perioperative stress-dose steroid and appreciate the opportunity to further address this topic. As Dr. Wax aptly notes, dexamethasone has significantly more glucocorticoid potency than hydrocortisone, has no mineralocorticoid effect, and can be clinically effective in the prevention of postoperative nausea and vomiting. Indeed, the recommended antiemetic dose of dexamethasone (4 mg) has at least the same glucocorticoid equivalence as the recommended intraoperative stress dose of hydrocortisone (100 mg) for patients at risk for adrenal insufficiency undergoing major surgery.[1] The available literature on perioperative steroid supplementation provides dosing guidelines based on hydrocortisone, which has a shorter, more predictable half life compared to dexamethasone and is thus more easily tapered to the usual daily dose in patients requiring continued postoperative supplementation based on surgical stress. However, the literature on patients with *secondary* adrenal insufficiency does not make any specific recommendation as to what is the "best" stress-dose steroid to administer. Dexamethasone is not appropriate for patients with *primary* adrenal insufficiency or critically ill patients, both of whom require mineralocorticoid supplementation.[2,3] While we agree that the use of dexamethasone may be a reasonable approach for many patients with *secondary* adrenal insufficiency, with additional benefit in the prevention of postoperative nausea and vomiting, we caution against a "one-size-fits-all algorithm," especially in critically ill patients.

Competing Interests

The authors declare no competing interests.

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Volume Responsiveness Alone Is Not an Indication for Volume Administration!

To the Editor:

It is with intrigue that we read Gómez-Izquierdo *et al.*'s paper demonstrating the lack of effectiveness of goal-directed fluid therapy (GDFT) in reducing ileus after elective laparoscopic colorectal surgery.[1] We congratulate the authors for a well-done study and Anesthesiology for publishing an important negative trial. There are a few points we would like to discuss.

First, these authors join an increasingly large number of research groups whose results call into question the value of GDFT in mitigating complications and reducing hospital length of stay or cost after elective surgery. Specifically, several previous reports, and now that of Gómez-Izquierdo *et al.*, collectively force us to critically examine the *general applicability* of GDFT in today's surgical patients. Although GDFT has been shown to mitigate postsurgical complications in studies spanning three decades,[2] its effectiveness in reducing postsurgical morbidity in patients on enhanced recovery pathways appears limited.[3] Additionally, traditional proponents of GDFT recently have questioned its value within enhanced recovery.[4,5] Even staunch proponents of standardized, best-evidence clinical pathway design and implementation have questioned the acceptance of all enhanced recovery elements without continued individual element evaluation.[6,7] To be sure, the laparoscopic approach, avoidance of dehydrating bowel preparations, and clear liquid consumption until 2 h before surgery all play important roles in reducing the volume shifts that were typical of traditional surgical procedures. To these points, we agree with Gómez-Izquierdo *et al.* that important advancements in perioperative care have diminished the positive impact of GDFT.

Second, the implemented GDFT approach is not in line with the referenced perioperative fluid therapy consensus statement, which details a logical two-step rationale for intraoperative fluid administration. "First, determine if the patient requires hemodynamic support or augmentation of cardiovascular function. Second, if the need is apparent and the patient is fluid responsive, fluid bolus therapy should be considered."[8] As recently penned by Takala, "giving volume

to fluid responders as long as they respond should not become the iatrogenic syndrome of the decade."[9] Bearing this sentiment in mind, and considering these two criteria for fluid administration, it is not surprising that the results of this trial are negative. Gómez-Izquierdo *et al.*'s important work critically underscores the notion that intraoperative fluid administration based solely on fluid responsiveness is neither physiologically sound nor should it be expected to improve surgical outcomes.

Competing Interests

Dr. Bloomstone is on the speaker's bureau of the Edwards Lifesciences's (Irvine, California) Critical Care Division and is on the steering committee of the American Society for Enhanced Recovery (ASER; Milwaukee, Wisconsin). Dr. Kramer has ownership positions in Arcos, Inc. (Missouri City, Texas), and Resuscitation Solutions, Inc. (Galveston, Texas). Dr. Navarro e Lima declares no competing interests.

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Goal-directed Hemodynamic Therapy: Neither for Anyone, Neither the Same for Everyone

To the Editor:

Gómez-Izquierdo *et al.* report the results of a randomized, methodologically flawless clinical trial to analyze the influence of goal-directed hemodynamic therapy in the postoperative ileus within a well-established enhanced recovery protocol.[1] This strategy eliminates all the confounding factors that could alter the results of a single intervention. Taking into account that fluid therapy in the control group was based on traditional principles, the conclusion about the goal-directed hemodynamic therapy obtained from this study should be generalizable. Nevertheless, there are certain aspects to consider:

There is scientific interest in removing the goal-directed hemodynamic therapy from the enhanced recovery protocols and questioning the value of its individual components, especially the value of the stroke volume optimization.[2] However, intraoperative fluid management outside clinical trials is extremely variable,[3] and both an excessively restrictive and an excessively liberal approach lead to an increase in postoperative ileus.[4] Moreover, observational studies performed within enhanced recovery protocols repeatedly showed that inadequate fluid therapy was independently associated with postoperative complications.[5,6] Although it has been suggested that goal-directed hemodynamic therapy, and especially the stroke volume optimization,[2] lead to excessive fluid administration, the systematic review recently published by Michard *et al.* confirmed otherwise.[7] The same outcome has been corroborated by a Gómez-Izquierdo *et al.* study, in which similar amounts of fluids were given on the day of surgery.[1] The administration of vasopressors and inotropics were also similar in both groups. Interestingly, these drugs were administered to both groups without a clinical protocol. Additionally, although the goal-directed hemodynamic therapy group had higher cardiac output, stroke volume, and mean arterial pressure values throughout the surgery, these were not significantly higher compared with the control arm.[1] Consequently, using an equivalent amount of fluids and vasopressors, both groups reached the same hemodynamic goals, which could explain the lack of efficacy of the goal-directed hemodynamic therapy in this trial, even with a significantly higher weight balance gain on the first day in the control group. As in previous trials,[8] it would have been interesting to analyze which (risk) patients and which hemodynamic values were associated with postoperative complications.

Certain subsets of patients rather than all patients undergoing colorectal surgery with enhanced recovery protocols seem to benefit the most from goal-directed hemodynamic therapy. Meta-analysis demonstrated the futility of the goal-directed hemodynamic therapy in low-risk surgical patients.[2,9] Gómez-Izquierdo *et al.* conducted their study in