

of the stakeholders in actually implementing what they create.

This early roll-out of an Enhanced Recovery After Surgery program for congenital heart surgery is really a proof of concept with a glimpse at the challenges of compliance. The patient population in the study was relatively low complexity and excluded neonates, yet only 54% were extubated within 8 hours. Even more interesting, the implementation of a multimodal pain regimen only occurred in 57% of patients in the operating room, where in theory it is a very limited anesthesia group that should have had “buy in” to the recommended regimen. Yet, there was 100% compliance in the postoperative setting with a far greater number of providers.

The key going forward will be the monthly multidisciplinary reviews to keep the process alive and encourage stakeholders to participate while also identifying barriers to compliance. These reviews along with the implementation of automated electronic medical record alerts for participation and compliance will be essential to truly impacting clinically relevant outcomes.

As it turns out, it can be just as difficult to paint by numbers.

Reference

1. Roy N, Parr F, Brown ML, Sleeper LA, Nathan M, Sefton BA, et al. Initial experience introducing an enhanced recovery program in congenital heart surgery. *J Thorac Cardiovasc Surg.* 2020;160:1313-21.e5.

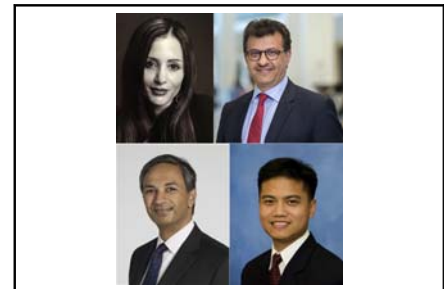
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Commentary: False start— Offense: Premature data may cost more than five yards

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In this issue of the *Journal*, Roy and colleagues¹ describe their institutional experience with an Enhanced Recovery after Cardiac Surgery Program (ERAS) over an abbreviated 5-month period. The authors studied a group of 155 non-neonatal pediatric patients undergoing the less-complex spectrum of congenital cardiac surgical procedures and compared outcomes with a propensity-matched group before institution of this ERAS pathway.



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CENTRAL MESSAGE

Although ERAS Pathways in pediatric cardiac surgery may have benefit, the current paper may not provide a complete picture, given the formative stage of the program.

We would like to congratulate the authors on their implementation of an important concept that has potential to improve short-term convalescence for this patient population. However, as the data presented currently stand, the utility of the program to achieve clinically relevant improvements is questionable. In fact, the minimal reduction in absolute ventilation hours or intensive care unit (ICU) length of stay without concomitant decreases in complications, reinterventions, or hospital length of stay, coupled with poor adherence to many components, limit our

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assessment of the efficacy of the described ERAS program. We would argue that the authors' concluding statement, "...monthly sharing of quality metrics allows multidisciplinary collaboration, provider engagement, and opportunities for research and process improvement,"¹ rather than supporting the need for the ERAS pathway, advocates for alternative mechanisms to optimize value-based care. Multiple such processes already exist within the congenital cardiac surgery field (and within the wider sphere of cardiothoracic surgery) by virtue of center and provider participation in national quality-collaboratives.²⁻⁴

The concept and structural framework for ERAS programs in other surgical disciplines, including cardiac surgery, have been described previously.⁵⁻⁹ Typical components include preoperative optimization of nutritional and functional status (smoking and excessive alcohol cessation), use of alternative analgesics (acetaminophen, gabapentin) to reduce opioid use, aggressive use of antiemetics, early feeding, pulmonary recruitment, and early mobilization.⁵⁻⁹ Roy and colleagues¹ employed nearly identical components in their program, including preoperative components (education and fasting limitation), intraoperative components (blood conservation, multimodality pain and sedation regimens, antiemetics, goal-directed fluid therapy, normothermia), and postoperative components (early extubation, pulmonary function optimization, and mobilization). Although the authors report follow-up metrics that would have been instructive to assess the subjective impact of the ERAS program on patients and their families (satisfaction surveys and patient reported outcomes), these metrics were not reported in the present paper. Interestingly, the authors' institution had already deployed an early extubation protocol for similar patients, and it was unclear whether the early extubation component of the ERAS pathway supplanted, inhibited, or complemented this effort. Additional information about the impact of a newly developed perioperative care pathway on other clinically useful programs would be important to disseminate to assuage concerns about possible adverse consequences. Other issues that also could have been covered in more detail include methods to improve adherence and extend the pool of eligible patients, and how implementation of the ERAS pathway impacted cost or requirements for additional personnel/resources allocated to development or operationalization.

The evidence provided that the program has meaningful clinical utility is limited, although admittedly the program is in the formative stages. The authors showed, using a myriad of statistical tests, that use of the ERAS pathway decreased ventilation time by 0.6 hours (from 8.2 hours to 7.6 hours) and ICU length of stay by 0.16 days (from 1.28 days to 1.12 days)—with the addition of 0.1 hours (for ventilation time) obligated by the use of the certain

transformations of scale. Log transformations were reported for both of these metrics without accompanying graphics, which impedes a clear understanding of the relationship of these metrics to outcome. There was also no effect of the ERAS pathway on other relevant or related clinical outcomes, including The Society of Thoracic Surgeons-Congenital Heart Surgery Database-defined complications, the number of complications (as an ordinal variable), readmission within 30 days, or 30-day mortality. Surprisingly, total hospital length of stay was also equivalent among patients in the ERAS pathway compared with propensity-matched controls. Furthermore, many pediatric cardiac intensive care units now submit their percent of surgical cases extubated in the operating room, mean hours to extubation, and ICU length of stay to large databases, such as PC,⁴ which allows benchmarking to their peers.^{3,10} It would have been useful to know where the authors' institution ranks according to these metrics to allow the reader a more reasoned perspective of the data in context to other practices.

It is possible that, given the excellent results achieved at the authors' institution, the overall adverse event rate was insufficient to demonstrate meaningful differences between these groups. A larger multi-institutional study may shed additional light on the potential for an ERAS pathway to impact a wider scope of meaningful outcomes, although implementation of such prescriptive pathways at multiple centers may be challenging and further compromise adherence. Sustainability of such an initiative may also be problematic in the long term.

We were surprised by the short duration of the present study, especially given that some of the limitations acknowledged by authors could have been mitigated by a longer period of ERAS implementation. For example, the nutritional component, which is a critical issue that often prolongs convalescence among infants, was still under development at the conclusion of this report. Further, adherence to many of the components was suboptimal, despite what appears to be a thorough eligibility screening process. Early extubation was achieved in only 84 patients (54%), fasting limitation was achieved in only 18 patients (17%), and multimodality anesthesia and postoperative nausea and vomiting prevention in only 57% and 33%, respectively.

Our perspective on the paper by Roy and colleagues¹ is somewhat guarded—a proverbial false start that, in this case, may cost more than just 5 yards on a football field. The concept is a good one, and there is a solid rationale for the deployment of such perioperative care pathways to improve value-based care. Unfortunately, publication of this study, we feel, is premature, as implementation of the ERAS program had limited clinical impact, some components were still under development, and adherence was

attenuated. While the authors have excused these as consequences of study prematurity (hence the use of the phrase “initial experience introducing...” in the title), others may conclude, based on the data presented, that an ERAS pathway for the population of congenital cardiac surgery patients is superfluous, potentially squelching further examination.

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