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Commentary: Complication monitoring comes of age

Camille L. Hancock Friesen, MD

In their article in this issue of the *Journal*, Dorobantu and colleagues¹ report a large contemporary series evaluating the incidence of post–pediatric cardiac surgery unplanned reinterventions (uREs), the risk factors for uRE occurrence, and the impact of uRE occurrence on mortality.¹ Their findings will come as no surprise to anyone who has been following the emergence of complication monitoring and reporting in pediatric cardiac surgery. Five centers (representing approximately 50% of pediatric cardiac surgery cases performed in the United Kingdom) collaborated to capture uREs, defined as the occurrence of any of the following: cardiac reoperation, interventional catheterization, pacemaker implantation, or diaphragm plication. The authors prospectively collected complication data from 3090 index procedures (defined in this study as “30d surgical episodes”) performed in 2861 patients and reported on 153 uREs occurring in 146 patients (uRE rate, 4.7%). The incidence of the individual uREs was low and laudable; 2.9% for cardiac reoperation, 0.8% for interventional catheterization, 0.8% for permanent pacemaker, and 0.4% for diaphragm plication. Despite different definitions of “index procedure” and uRE, the rates in this report are comparable to reports from the Society of Thoracic Surgeons Congenital Heart Surgery Database.^{2–4} Higher-risk operations are associated with more complications, and more complications are associated with higher mortality, as has been reported previously.^{5,6} In this report, the authors used a stringent matching algorithm to generate 74 pairs of patients with uREs (cases) and patients with no uREs (controls) and report the novel finding of an ongoing subacute (at 6 months postoperation) hazard for mortality

From the Division of Pediatric Cardiothoracic Surgery, Children’s Health Dallas and University of Texas Southwestern, Dallas, Tex.

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Address for reprints: Camille L. Hancock Friesen, MD, Children’s Health Dallas, 1935 Medical District Drive, Dallas, TX 75235 (E-mail: Camille.HancockFriesen@UTSouthwestern.edu).

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Camille L. Hancock Friesen, MD

CENTRAL MESSAGE

Unplanned reinterventions (uREs) carry an independent ongoing subacute hazard for mortality in pediatric cardiac surgery patients. uREs can be used as part of a quality metric and as a target for improving outcomes.

attributable in patients with uRE (12.2% in cases vs 1.4% in controls; $P = .02$), independent of other risk factors.

Although the authors make it look easy, the analysis and presentation of complication data are anything but. Concise definitions of complications are mandatory. The degree of surveillance (ie, how hard one looks for a complication) impacts the incidence, and here the prospective nature of the study is a clear strength of the report. In an exemplary model of coordination and collaboration, the multidisciplinary multisite team assembled and articulated a priori definitions and ultimately developed a system for prospectively capturing complications.

One inherent assumption of this type of analysis is that complication occurrence is linear; that is, complications occur independent of one another. Dorobantu and colleagues do a heroic job attempting to identify which patient and procedure factors affect survival after uREs and use novel mapping graphics to illustrate the complexity of complication clustering and frequency of occurrence. As big data, artificial intelligence, and machine learning become part of our ecosystem, we can expect further explanation of the complexities of complication occurrence.⁷

As a discipline, we can now name and count complications, and indeed we have had explicit definitions of complications for more than a decade.⁸ We know that regardless of the volume of a program, nearly one-half of heart surgery

patients will experience at least 1 complication.^{5,9} We also know that a key contributor to reduced mortality is timely recognition and management of complications, sometimes termed “rescuing.”⁹ With this and other recent reports, we are embracing complication analysis as part of the assessment of quality of care.^{10,11} Moving upstream of complications to prevent their occurrence will be the next worthy challenge in this dynamic and evolving field. The description of the magnitude and consequences of any problem is the essential foundation to the fundamental goal of reducing (or eliminating) that problem, and Dorobantu and colleagues have provided such a foundation with this work.

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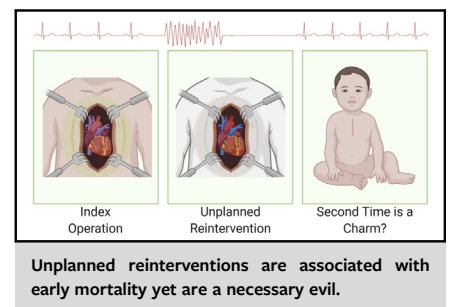
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Commentary: Unplanned reinterventions in pediatric cardiac surgery: Second time's a charm?

T. Konrad Rajab, MD, and
Minoo N. Kavarana, MD, FACS

Unplanned reinterventions are important for a number of reasons. First and foremost, they may result from deficiencies in the quality of clinical care that may be improved.



CENTRAL MESSAGE

Unplanned reinterventions are associated with significantly increased early mortality. However, on occasion, they are a necessary evil to rescue patients from complications.

Second, unplanned reinterventions are adverse outcomes for patients since each procedure carries additional risks for morbidity and mortality. Further, unplanned

From the Section of Pediatric Cardiothoracic Surgery, Medical University of South Carolina, Charleston, SC.
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Address for reprints: Minoo N. Kavarana, MD, FACS, Section of Pediatric Cardiothoracic Surgery, 10 McClellan Banks Dr, Charleston, SC 29425 (E-mail: kavarana@musc.edu).
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