

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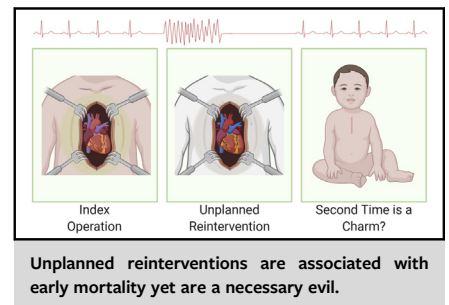
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Commentary: Unplanned reinterventions in pediatric cardiac surgery: Second time’s a charm?

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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 reinterventions may be an inefficient use of health care resources that

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burdens payors with unnecessary costs. For these reasons, unplanned reinterventions merit careful attention.

Unplanned reinterventions in congenital cardiac surgery were first linked to increased mortality by Mazwi and colleagues¹ in 2013. A follow-up study of the Society of Thoracic Surgeons Congenital Heart Surgery Database of 84,404 patients at 117 centers showed that unplanned cardiac reinterventions were performed in 5.4% of patients and had an odds ratio of 5.3 for mortality.² The current study by Dorobantu and colleagues³ expands on these earlier findings with a more detailed analysis of 2861 patients at 5 centers in the United Kingdom. Importantly, their analysis contributes to our understanding of the relationship between unplanned reinterventions and early mortality. A total 146 unplanned reinterventions (4.7%) were identified. Approximately one half of those could be matched with patients who did not have an unplanned reintervention based on patient and procedure characteristics ($n = 74$ pairs). After matching, the mortality at 6 months remained significantly greater in patients with unplanned reinterventions compared with patients without unplanned reinterventions (12.2% vs 1.4%, $P = .02$). Moreover, certain patient factors (neonates, $P = .002$), diagnoses (single-ventricle defects, $P < .001$), and procedures (arterial shunts, $P < .001$) were found to carry a significantly elevated risk for unplanned reintervention.

From the described association between unplanned reinterventions and early mortality, one might conclude that reinterventions are always undesirable. However, unplanned

reinterventions may serve as a surrogate for stochastic complications. This is important because we believe that reinterventions are often necessary evils in an effort to rescue patients from major complications. In fact, it is likely that the mortality in the study population would have been greater rather than lower if the unplanned reintervention had not been performed. This is highlighted by a landmark analysis published in the *New England Journal of Medicine*, which found that hospitals with very high and very low postoperative mortality actually had similar rates of major complications (18.2% and 16.2%, respectively). However, the mortality of patients with major complications was almost twice as high in hospitals with very high mortality than in hospitals with very low mortality (21.4% vs 12.5%, $P < .001$).⁴ Thus, hospitals with very low mortality rates were able to rescue patients with major complications, presumably using means that include unplanned reinterventions. In these situations, the second time can be a charm indeed.

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