Establishing an Institutional Pediatric Cardiac Anesthesia Data Framework

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Introduction: Survival with congenital heart disease (CHD) is crucially dependent on procedures performed under anesthesia, including surgery, diagnostic and interventional catheterizations, and other cardiac imaging. The recent ACGME accreditation of training programs in pediatric cardiac anesthesiology reflects the pivotal role of skilled anesthesiologists. A detailed understanding of exactly how anesthesiologists contribute to good long-term outcomes, however, is obscured by the heterogeneity of lesions and procedures, details of anatomical repair or palliation, and postoperative critical care management.

Several specialty-focused registries in the US and elsewhere, including the Congenital Cardiac Anesthesia Society's database, curate high-quality data concerning CHD patients. Each registry has particular strengths, which are typically related to the specialty group who created it.

Methods: In order to investigate our specialty's contribution to postoperative outcomes in CHD, we are establishing a pediatric cardiac anesthesia data framework at our institution. We integrate data from the Epic (Madison, WI) Electronic Health Record and Anesthesia Information Management System with curated data submissions to established CHD registries.

Our first step was to establish a categorization of surgical cases at a level equivalent to how we would answer a colleague who asks, "What case are you doing today?" For example, the Society of Thoracic Surgeons (STS) Congenital Heart Surgery Database records anatomical aspects and component parts of surgical procedures exhaustively and reliably, but this level of detail is less well suited to the more pathophysiologic interests of anesthesiologists and intensivists. For example, anesthesiologists might be interested in all cases where VSD closure is the primary part of the surgery, and therefore would want to exclude cases where VSD repair forms a minor part, such as when VSD repair accompanies an arterial switch operation. In addition, we have created linkages to other CHD registries such as American College of Cardiology's IMPACT Catheterization database and the Pediatric Cardiac Critical Care Consortium (PC4) to enhance the availability of high quality data.

Results: We have developed an algorithmic approach to translating STS procedural classification to physiologic groupings of surgeries. A group of subject matter experts mapped 1,888 STS codes down to 150 categories. As a first test of the relevance to anesthesia professionals, we have created a secondary mapping down to the 18 categories of case logs required by the new ACGME pediatric cardiac anesthesiology curriculum. In addition to STS procedural codes, this secondary mapping relies also on fields detailing the patient's age, use of cardiopulmonary bypass, and specialty of proceduralist/surgeon, as well as data from IMPACT, in order to accurately complete such categories as "neonatal procedures for correction/palliation/revision of congenital cardiac lesions on bypass" or "patent ductus arteriosus (surgical or catheterization laboratory) procedures off bypass."

Conclusion: We have demonstrated the feasibility of integrating EHR and AIMS data with pre-existing CHD registries in a way that is meaningful to pediatric cardiac anesthesiology practice. Future uses of our data framework will likely include supporting research, quality improvement, education and workforce planning in pediatric cardiac anesthesiology.