Rationale and methodology of a collaborative learning project in congenital cardiac care

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Background Collaborative learning is a technique through which individuals or teams learn together by capitalizing on one another's knowledge, skills, resources, experience, and ideas. Clinicians providing congenital cardiac care may benefit from collaborative learning given the complexity of the patient population and team approach to patient care.

Rationale and development Industrial system engineers first performed broad-based time-motion and process analyses of congenital cardiac care programs at 5 Pediatric Heart Network core centers. Rotating multidisciplinary team site visits to each center were completed to facilitate deep learning and information exchange. Through monthly conference calls and an in-person meeting, we determined that duration of mechanical ventilation following infant cardiac surgery was one key variation that could impact a number of clinical outcomes. This was underscored by one participating center's practice of early extubation in the majority of its patients. A consensus clinical practice guideline using collaborative learning was developed and implemented by multidisciplinary teams from the same 5 centers. The 1-year prospective initiative was completed in May 2015, and data analysis is under way.

Conclusion Collaborative learning that uses multidisciplinary team site visits and information sharing allows for rapid structured fact-finding and dissemination of expertise among institutions. System modeling and machine learning approaches objectively identify and prioritize focused areas for guideline development. The collaborative learning framework can potentially be applied to other components of congenital cardiac care and provide a complement to randomized clinical trials as a method to rapidly inform and improve the care of children with congenital heart disease. (Am Heart J 2016;174:129-37.)

Background

Collaborative learning is the process by which 2 or more people attempt to learn something together. As opposed to individual learning, collaborative learning promotes sharing experience, resources, skills, and techniques to enhance performance.[1,2] Collaborative learning is based on a model whereby knowledge can be created within a group where members interact and share experiences about a specific process.[3] Its application in medicine is more closely aligned with benchmarking, a method of comparing services or outcomes at an individual center with other leading centers.[4–7] Experience from adult cardiac care, such as the New England Cardiovascular Disease Study Group and the Michigan Society of Thoracic and Cardiovascular Surgeons Quality Collaborative, suggests that many "best" institutional practices can be disseminated and adopted across multiple participating centers through a collaborative learning model, leading to improvement in quality of care.[8,9] Within pediatric cardiology, the National Pediatric Cardiology Quality Improvement Collaborative has created a national network using both providers and parents to promote collaborative learning to improve outcomes.[10–15]

Success in collaborative learning requires careful coordination and stewardship commitment among the different stakeholders. It remains underused in pediatrics,

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Funding sources: The study was supported by U01 grants from the National Heart, Lung, and Blood Institute (HL068269, HL068270, HL068279, HL068281, HL068285, HL068292, HL068290, HL068288, HL085057, HL109781, HL109737) and the National Science Foundation (IIP-0832390, IIP-1361532). The contents of this work are solely the responsibility of the authors and do not necessarily represent the official views of the National Heart, Lung, and Blood Institute or the National Science Foundation.

Submitted March 12, 2015; accepted January 2, 2016.

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0002-8703

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http://dx.doi.org/10.1016/j.ahj.2016.01.013

Figure 1

Collaborative learning process.

but congenital cardiac care in particular stands to benefit from collaborative learning because of the small number of patients, the complexity and heterogeneity of disease processes, and geographically dispersed sites of care. All these factors create challenges for more traditional research efforts. In addition, collaboration is a natural aspect of the multidisciplinary nature of the clinical teams that care for these patients, which include anesthesiologists, cardiologists, intensivists, surgeons, nurses, and others. Collaborative learning involves evaluating and disseminating beneficial practices quickly. This is especially true for complex processes that require the input of many disciplines.

The Pediatric Heart Network (PHN), sponsored by the National Heart, Lung, and Blood Institute, was formed expressly to conduct clinical research. The Single Ventricle Reconstruction Trial, which examined the outcomes of infants with hypoplastic left heart syndrome palliated with 2 different operative techniques, required sharing of some institutional experience among investigators to develop a study protocol that could be carried out across the network.[16] However, such institutional sharing was incidental to the development of the protocol and not the primary focus. Several recent investigations, including post hoc analysis of data from the Single Ventricle Reconstruction Trial, highlighted dramatic variation in clinical practice and outcomes among participating centers.[17–20]

Interest in reducing this variation as a potential means of improving outcomes provided the impetus for exploring the collaborative learning model within the PHN. Although collaborative learning and site visits have been applied on a local geographic level in other surgical fields,[8,9] this process has not yet been applied to pediatric cardiac care at a national level. Furthermore, engaging system engineers to objectively observe and prioritize potential areas for focused collaborative learning had not yet been used. Therefore, we designed this study to test the feasibility of collaborative learning with the ultimate goal of developing a clinical practice guideline (CPG) that minimized variation and improved clinical outcomes at participating sites. This process included data sharing and meta analytics, benchmarking, machine learning to prioritize potential areas, site visits, and practice dissemination at 5 large academic congenital heart centers in order to change practice, test hypotheses, and improve outcomes (Figure 1).

Table I. Pediatric Heart Network core sites participating in CPG

1. Children's Hospital of Philadelphia
2. Emory University
3. Texas Children's Hospital
4. University of Michigan
5. University of Utah–Primary Children's Hospital

CPG, Clinical practice guideline.

Study development

Rationale

The Collaborative Learning Study endeavored to identify outcome variation among centers related to differences in perioperative care that could be modifiable through a collaborative learning intervention and would minimize variation and improve quality of care. The initiative targeted infants undergoing heart surgery because this population accounts for a large proportion of morbidity, mortality, and resource utilization in pediatric cardiac centers. The entire care process was observed and evaluated including diagnosis, surgical planning, intraoperative technique, postoperative care, and the transition to outpatient care. All clinical processes that were interdependent and logically associated with patient outcomes were included in the initial evaluation. In choosing metrics for outcome measurement, factors such as center-specific surgical volume, acuity, mortality, and postoperative length of stay were taken into account.

Initial site visits

Five core PHN sites were enrolled as Collaborative Learning Study sites (Table I). Each site appointed a multidisciplinary team consisting of a cardiac intensivist and/or cardiac anesthesiologist, a cardiothoracic surgeon, a respiratory therapist, an intensive care unit (ICU) nurse, and a quality improvement specialist. These 5 clinical sites, along with a team of industrial systems engineers

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