Commentary: Defining the functional anatomy of a pediatric heart center

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Backer and colleagues1 present a substantial body of work initiated by the Congenital Heart Surgeons’ Society that outlines the recommendations of an expert panel regarding the classification, design, and development of centers performing pediatric heart surgery in the United States. The assembled panel of experts included membership from a wide array of representative centers and specialties and the group’s thoughtful analysis has resulted in a comprehensive document that has been endorsed by the Board of Directors of the American Association for Thoracic Surgery (AATS). Along with the endorsement of the AATS, similar endorsements have been obtained across the spectrum of related professional organizations. Backer and colleagues1 deserve great credit and our thanks for taking on the important task of defining the functional anatomy of a pediatric heart center in the current era and have identified 300 criteria enumerated in 13 tables in the document.

What will this document achieve? The document will undoubtedly focus discussions within institutions that are wrestling with the never-ending mission of improving quality. The expert panel’s determination that an element of organizational structure or a process is an important contributor to optimal care will be enormously helpful in discussions within heart center teams—or between heart centers and their hospital administrations. Too often, such discussions fall on deaf ears and now these arguments will be strengthened by the weight of the expert panel. In this respect, common sense will have a strong ally because, indeed, most of the recommendations fall within the realm of common sense and it is a tremendous service to our specialty that the expert panel worked through the important task of articulating the individual elements of common sense for our benefit—and the benefit of our patients.

The dominant ensuing discussion that will inevitably arise from this document will involve the stratification of heart center types by volume of cases. Essential care centers (ECCs) and comprehensive care centers (CCCs) are now defined with numerical precision based on the strata of 75 to 200 cases per year (ECCs) and >200 cases per year (CCCs). Among the 300 criteria identified in 13 tables within the document, the authors identify 123 criteria that differ between ECCs and CCCs and 177 criteria that do not differ between ECCs and CCCs. The greatest concentration of criteria that differ are in areas where the perception that volume matters is strongest. For example, the pediatric heart transplant, ventricular assist device, and heart failure recommendations (Table 7) are widely perceived to have a close relationship between volume and outcomes and, in support, Table 7 is tightly linked to United Network for Organ Sharing recommendations.

In contrast, criteria describing safety structures, processes, and outcomes (Table 4) are nearly identical for both types of centers. Indeed, the 177 criteria that do not differ between ECCs and CCCs arguably fall within the realm of widely accepted components of appropriate care for centers of any size.

Nevertheless, because of the natural human tendency to focus on the easiest criterion to identify (in this case, volume). Newly designated heart centers in the 75 to 200 cases per year band will have some concern regarding any document-based inference that they are providing suboptimal care in comparison to CCCs. Yes, volume may be important and, in some cases, low-volume programs should take a long, hard look at their risk-adjusted outcomes and...
affirm that they are serving their patients’ best interests. There are other factors that may be more important criteria than surgical volume. At the time of this Commentary, currently available data on the Society of Thoracic Surgeons Congenital Heart Surgery website (https://publicreporting.sts.org/chsd) include center-specific reporting from June 2017 to July 2021. Examination of risk-adjusted observed to expected mortality rates demonstrates that there are 38 centers within the 75 to 200 case per year range. Among the 38 centers that would be labeled ECCs, there are 6 centers with observed to expected mortality rates in the top quartile of all programs (ie, they outperform 75% of all centers, small and large). Clearly, risk-adjusted excellent performance in terms of survival is achievable even in smaller programs.

The next important task for our specialty is to identify the factors associated with excellent performance through statistical analysis rather than expert opinion. A starting point to identify variables to evaluate will include the list of variables identified by Backer and colleagues. How many of the variables enumerated in the 13 tables are critical determinants of performance for a pediatric heart center? The Congenital Heart Surgeons’ Society Quality and Improvement Committee has initiated a study to identify statistically significant correlates of heart center structure and process with outcomes that will include some of the variables enumerated by the expert panel headed by Backer and colleagues.

The greatest contribution of the article by Backer and colleagues may reside in driving the progressive recognition that quality of care in congenital heart centers in the current era is predicated on much more than the technical skill of an individual surgeon. Although technical expertise is essential, it is not sufficient within the broader framework of heart centers where outcomes are influenced by a multitude of factors in highly integrated and complex environments. Thus, defining the functional anatomy of a pediatric heart center is an important achievement of Backer and colleagues. But there are additional factors that could be considered in defining the functional anatomy of a heart center.

The authors evaluated the critical components of functional anatomy through the commonly used lens of structure, process, and outcomes. This paradigm was originally described as the Donabedian Triad, wherein structures of care influence the processes of care and these components in turn influence outcomes in a linear relationship (Figure 1, top). The Donabedian Triad was originally developed to characterize processes of care in the early 1980s. The model may be insufficient to fully characterize the ability of a pediatric heart program to produce optimal outcomes in the current era where performance expectations....

![Defining the Functional Anatomy of a Pediatric Heart Center](image_url)

**FIGURE 1.** The Donabedian Triad (top) and a proposed revision for the current era (bottom).
are extremely high and the current environment is characterized by high levels of complexity and uncertainty. Under these circumstances, optimal outcomes are dependent upon maximizing team interdependence.4,7

Refinement of the Donabedian Triad model should include 2 other contributors to the functional anatomy of a pediatric heart program that are closely linked to optimal team performance: mission alignment and culture (Figure 1, bottom). Mission alignment is important because of the tendency to have silos in complex organizational environments and, under those circumstances, alignment between different groups (and between individuals within a group) can vary with a highly detrimental effect on organizational resilience, agility, and outcomes.7,8 For example, at a very high level, an academic program may have considerable discord between teams regarding prioritization of resources and effort. For example, is the mission to improve patient care, grow market share, create new knowledge, or teach new clinicians? Although each mission is important, divergence between teams regarding the relative prioritization of each mission can have detrimental effects on overall performance. Less noble aspects of mission (eg, self-career advancement, intergroup competition, and financial gain) can also differ among care-givers and, in aggregate, degrade team performance.

Culture is also an important contributor to team performance in pediatric heart centers.5 Even with optimal structure and processes, a culture that degrades psychological safety and inhibits free discussion of perspective in clinical decision making and in the operating room will incur a higher risk of safety events and suboptimal outcomes.10 Even the best structure and processes cannot overcome the destructive influence of a dysfunctional culture. Thus, pediatric heart centers in the current era should consider the importance of mission alignment and culture when contemplating the functional anatomy of a heart center.5,6

The importance of adding mission alignment and culture to the paradigm with which we define the functional anatomy of pediatric heart programs lies in the guidance of future studies. Backer and colleagues1 have given us a tremendous foundation upon which to build further refinement of our understanding of the critical elements of organizational structure and process. Addition of mission alignment and culture to this model will help us to gain a fuller understanding of the ideal functional anatomy of a pediatric heart center. With this knowledge, we can work to improve performance in all centers, large or small, high-performing or underperforming.

The current recommendations by Backer and colleagues1 provide excellent guidance and should be followed with spirited inquiry and statistical analysis to identify the criteria that are most directly related to optimal outcomes. We should also work to identify new criteria in other domains (eg, mission and culture) that influence team performance. Our objective, and the cornerstone of the AATS mission, is to promote scholarship, innovation, and leadership. The recommendation document by Backer and colleagues1 provides ample substrate for all 3 components of the AATS mission.

Conflict of Interest Statement
The author reported no conflicts of interest.

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