Development of a Pediatric Cardiac Mechanical Support Program

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Objective: The development of a pediatric cardiac support program is a complex, multidisciplinary project. Despite relatively low volumes, the University of Iowa Congenital Heart Program has had considerable success in its mechanical support program. This study aims to describe the Iowa experience from its inception to the present, in particular examining those specific factors that have led to substantial improvements in the program, additionally identifying where further gains can be made.

Methods: We retrospectively reviewed all pediatric patients who received mechanical cardiac support at the University of Iowa from the inception of program in 1991. In total, 29 patients received mechanical support between December 1991 and December 2015 and are included in the study. Median age at implant was 12.8 ± 6.2 years. Factors examined included: OR time, ICU and hospital length of stay, intubation days, blood product usage, pre and post-operative bilirubin, creatinine and BNP and device implanted. Categorical and continuous variables were compared using Chi-squared and Wilcoxon rank-sum tests, respectively.

Results: Of the 29 patients who received mechanical support, 17 (58.6%) were discharged home, 11 (37.9%) died during their hospitalization and 1 (3.4%) remains hospitalized. Between December 1991 and December 2011, in-hospital mortality was 64.3%. Following this period, significant changes were made to patient management with in-hospital mortality decreasing to 13.3% between December 2011 and December 2015. Comparison between deceased and living patients revealed several significant factors including: median number of PRBCs transfused, 8 vs 4 units (p =0.048), median OR time, 396 vs 299 minutes (p=0.003) and device implanted (Table 1).

Table 1. Comparison of mechanical support devices

Device	Deceased (n=11)	Home (n=17)	
Heartware	0 (0%)	10 (59%)	p=0.008
Thoratec	6 (55%)	3 (17%)	
Berlin	5 (45%)	2 (12%)	
Other	0 (0%)	2 (12%)	

Conclusions: During the early stages of the mechanical support program, higher than expected mortality rates prompted changes in the management of pediatric cardiac patients, specifically, the development of a dedicated management team. These changes significantly improved outcomes and can be used as a model for similar cardiac support programs, especially in smaller volume programs.