

Today's pediatric heart transplantations involve sicker children, but have better outcomes: Study

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Researchers who studied more than 300 pediatric patients receiving heart transplants over the past 36 years at the University of Florida have

documented how advances in technology, technique, and patient management have improved outcomes for younger patients with more serious heart disease, according to a study published this month in the *Journal of the American College of Surgeons*.

In what may be one of the largest series to date of pediatric heart transplants at a single institution, the research team led by Mark S. Bleiweis, MD, FACS, and Jeffrey P. Jacobs, MD, FACS, separated the 36-year study period into two distinct eras—from 1986 to 2010, in which 149 pediatric patients had heart transplants, and from 2011 to 2022, in which 162 patients had heart transplants (some children had multiple transplants).

They also presented their findings at the Southern Surgical Association's 134th annual meeting in Palm Beach, Florida, in December 2022.

"We examined 311 children who had [cardiac transplantation](#) over 36 years, and we found that over the course of time, the patients are getting much more complicated for a variety of reasons. But despite this increased complexity, they continue to do better and better," Dr. Jacobs said. "This finding tells us that, after careful consideration and multidisciplinary input, we can offer [heart transplantation](#) to some of the highest-risk children and have the expectation of reasonably good outcomes."

Dr. Bleiweis and Dr. Jacobs are pediatric cardiac surgeons at the Congenital Heart Center, Departments of Surgery and Pediatrics, at the University of Florida in Gainesville.

Key findings

The study found that in the more recent 2011-to-2022 period, patients were younger (6.6 versus 8.7 years, on average) and more than twice as

many were infants (37.9% versus 17.5%).

Significantly higher percentages of patients in the latter era had serious congenital heart disease (53.8% versus 39%) or were on a ventricular assist device at the time of transplant (33.7% versus 9.1%), increasing the complexity of successful transplantation. A ventricular assist device, or VAD, is a [mechanical device](#) that assists in pumping blood from the ventricles in the lower part of the heart to the rest of the body or, less commonly, to the lungs.

Despite seeing patients in recent years with more serious congenital heart disease, survival was better at all points in time in the most recent era, with statistically significant better survival at both 1 and 5 years. For example, 1-year survival rates were 82.4% and 90.3% in the first and second eras, respectively. Five-year survival rates were 70.7% and 83%, respectively.

Though only at a single site and retrospective—which may limit whether these results are generalizable across other institutions—the study highlights numerous advances in heart transplantation, particularly in children, in recent years.

These advances include improved immunosuppression therapies to prevent rejection of transplant tissue, advances in techniques and approaches to offer transplants to patients who have developed sensitization to donor transplant tissue, better approaches to manage patients with one ventricle, and improvements in preserving donor hearts.

However, the improvements in survival in children who have had heart transplants go beyond techniques and technology, Dr. Bleiweis explained.

"We assembled a multidisciplinary team of experts involved in decision-making before the transplant," he said. "We also have a team of focused individuals who perform the [transplant](#). Furthermore, in the domain of postoperative care, we have learned a lot about how to take care of smaller babies and children across the entire spectrum of pediatric and congenital heart disease, and we extrapolate these lessons to caring for complex children after cardiac transplantation in the ICU."

Added Dr. Jacobs, "It's not possible to identify one single reason why outcomes are better now than they were 10 and 20 years ago, because there are multiple reasons driving these improved outcomes. However, we can really divide the advances into three areas: advances in preoperative management, intraoperative management, and postoperative management."

"The cumulative sum of these advances has made it so that the patients do better and that we can care for higher-risk patients who, 20 years ago, probably would not have been offered transplantation. All of these advances and improved outcomes are secondary to the knowledge and skills of the many members of our multidisciplinary team."

This research is unique among studies of pediatric heart transplantation because of the large number of [pediatric patients](#) undergoing cardiac transplantation at a single institution and the long duration of follow-up, according to Dr. Jacobs.

The subset of "highly challenging patients" in the study population adds to its uniqueness, he added. "At the University of Florida, a subset of children is now being offered cardiac transplantation who were not really offered transplantation in the past and is not currently being offered transplantation at many other hospitals that do pediatric transplants," he said.

"These are some of the smallest babies with some of the most complex diseases, babies that are born with one functional ventricle instead of two, or babies who are incapable of staying alive without a mechanical [ventricular assist device](#) prior to finding a donor heart."

"I think many of us now recognize that we can evaluate some of these extremely complicated types of patients and determine that they are indeed transplantable," Dr. Bleiweis added. "In certain cases, we can extend transplantation beyond the standard situation, and in the majority of patients, the risk of cardiac transplantation is not prohibitive."

More information: Mark S Bleiweis et al, Heart Transplantation in Patients Less Than 18 Years of Age: Comparison of 2 Eras Over 36 Years and 323 Transplants at a Single Institution, *Journal of the American College of Surgeons* (2023). [DOI: 10.1097/XCS.0000000000000604](#)

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