

# Critically ill children can still undergo liver transplantation and survive

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Advancements in critical care make it possible for even the sickest children to successfully undergo liver transplantation. According to a new study published online as an "article in press" in the *Journal of the American College of Surgeons* (JACS), children who are sick enough to require mechanical ventilation or dialysis before transplantation achieve the same survival benefit as children who are stable prior to the surgical procedure. The study will appear in a print edition of the *Journal* this spring.

Since pediatric critical care was recognized as a specialty area of medicine in the 1980s-1990s, survival and disease recovery rates for acutely ill children have improved significantly. Pediatric intensive care units have reduced mortality rates for children with such life-threatening conditions as sepsis, cardiac arrest, and traumatic brain injury. Postoperative critical care systems have improved outcomes after many types of organ transplantation. These advances have increased survival of children with [acute liver failure](#) without transplantation and stabilized children with [chronic liver failure](#) who are on the wait list for transplantation.

In the present study, surgeons from Texas Children's Hospital and Baylor College of Medicine, Houston, found that pediatric critical care also has led to steady improvements in survival after [liver transplantation](#) regardless of the severity of illness of a child.

"Our study suggests that successful outcomes are now possible in the

most critically ill patients with [liver failure](#). Every effort should be made to transplant more children and sicker children," said John A. Goss, MD, FACS, professor of surgery, Michael E. DeBakey Department of Surgery and chief of the division of abdominal transplantation at Baylor.

The study is a nationwide evaluation of all children under the age of 18 years who had liver transplantation between 1987 and 2015. Although transplantations were performed in the 1960s, the study began gathering data from 1987 when the United Network for Organ Sharing (UNOS) first established measures for evaluating transplantation outcomes. The study divided data into two segments to compare outcomes of patients treated before and after 2002, when the Pediatric End-Stage Liver Disease system (PELD) was instituted. PELD is a method of scoring severity of [liver disease](#) on the basis of age, failure to grow, serum indicators of liver function, and an international normalized ratio. A similar set of data was gathered to reflect outcomes for children treated at Texas Children's Hospital.

Over the course of the study period, 13,723 children underwent liver transplantation across the country and were followed for an average of 6.6 years. A total of 4,248 of these children were in the ICU at the time of transplantation; these patients were followed for an average of 5.7 years. Between 2002 and 2015, 6,746 children had liver transplantation, 1,816 of whom were in the ICU at the time of the surgery.

Survival improved steadily for all patients over time. One-year survival was 66 percent in 1987 and 92 percent in 2015. Survival likewise improved for the sickest patients, as defined by the need for dialysis or mechanical ventilation. The one-year survival rate for patients on dialysis was 50 percent in 1995 and 95 percent in 2013; survival for patients on a ventilator was 49 percent in 1994 and 94 percent in 2013. The same [survival benefit](#) was seen in infants; the one-year survival rate increased from 45 percent in 1988 to 88 percent in 2013.

At Texas Children's Hospital, 65 of the 354 patients who had liver transplantation between 2002 and 2015 were ill enough to require admission to the ICU at the time of the operation. Survival at one year was 92 percent for the entire group and 87 percent for ICU [patients](#).

An analysis of clinical and institutional risk factors that may affect survival showed that medical centers performing fewer than five transplants per year had poorer outcomes than high-volume centers.

"As [critical care](#) has improved and medical centers can keep seriously ill children alive longer, the question has evolved from can we perform a transplantation to should we do a transplant operation. The answer is yes, we can go ahead and transplant an organ into a critically ill child and expect the same outcome we would see in a stable child. The one caveat is if a medical center does not have the resources to perform a high volume of transplantations, then it should transfer critically ill [children](#) to a center that does," Dr. Goss said.

**More information:** Abbas Rana et al, No Child Left Behind: Liver Transplantation in Critically Ill Children, *Journal of the American College of Surgeons* (2017). [DOI: 10.1016/j.jamcollsurg.2016.12.025](https://doi.org/10.1016/j.jamcollsurg.2016.12.025)

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