

Reflecting on the Past and Looking Toward the Future: A Brief History of University of Wisconsin Transplant Program

Isabel Breyer, MD; Didier Mandelbrot, MD; Sharon M. Bartosh, MD; Sandesh Parajuli, MD

The history of the University of Wisconsin (UW) solid organ transplant programs began with the first deceased donor kidney transplant in March 1966. Shortly after, pancreas and liver programs were started and began to grow as many influential individuals were recruited to the university.¹ In 2005 and 2006, the kidney program became the largest in the United States in terms of volume, and in November 2022, a program milestone was reached: 12 000 kidney transplants. Today, the University has 19 adult and 15 pediatric transplant programs, which together have performed over 17 216 adult and 574 pediatric transplants. In addition, major innovations to the field of solid organ transplantation, including the development of University of Wisconsin solution by Folkert Belzer, MD, and colleagues, took place at UW and are now used worldwide.¹

This commentary reflects on the history and success of these programs with an eye toward the future.

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Author Affiliations: University of Wisconsin Transplant Center, University of Wisconsin School of Medicine and Public Health (UWSMPH), Madison, Wisconsin (Breyer, Mandelbrot, Parajuli); Department of Pediatrics, UWSMPH, Madison, Wisconsin (Bartosh).

Corresponding Author: Isabel Breyer, MD, email ibreyer@wisc.edu; ORCID ID 0009-0002-9274-6549

Early Days

The history of the UW Health Transplant Center was not without obstacles. Early programs experienced periods of slow growth as they worked to recruit faculty and improve operative techniques. The first two pancreas transplants at the center failed; programs such as the pedi-

atric liver transplant program faced initial challenges in gaining support; and the first pediatric intestinal transplants were complicated by rejection and mortality.¹ These challenges, among others, helped push the center forward as faculty worked to remedy them.

Adult Kidney Transplant Program

For over 800 000 adults living with end-stage kidney disease (ESKD) in the US,² kidney transplantation is life-altering and offers many advantages compared to dialysis: greater long-term (≥ 1 year) survival,³ improved productivity and employment rates,⁴ and better quality of life.⁵ The most common conditions leading to ESKD in order of decreasing prevalence in the US are diabetes, hypertension, glomerulonephritis, and polycystic kidney disease.⁶ Based on Organ Procurement and Transplantation Network (OPTN) data, almost

90 000 patients are currently on the kidney waiting list.⁷ In 1966, surgeons at UW began performing solid organ transplants with the first deceased donor and, later that year, the first living donor kidney transplant. At the end of 2022, 6477 deceased donor and 3875 living donor trans-

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plants had been performed at UW, with 3007 patients actively followed in the kidney transplant clinic (Table 1).

Pediatric Kidney Transplant Program

Among the US pediatric population, ESKD most often occurs secondary to congenital anomalies of the urinary tract, glomerular disease, or secondary glomerulonephritis.⁶ Preemptive kidney transplantation is the preferred mode of renal replacement therapy (RRT), yet hemodialysis remains the most commonly used initial RRT (23% vs 43%, respectively),² likely reflecting the mismatch between the number of patients with ESKD and available organs. Amaral et al compared outcomes among pediatric patients with ESKD who underwent preemptive kidney transplantation versus those exposed to dialysis and

Table 1. Adult Transplant Programs Through December 31, 2022

Transplant Type	1st Year Performed	Total Transplants	Actively Following
Kidney, deceased donor	1966	6477 ^a	3007 ^b
Kidney, living donor	1966	3875	3007 ^b
Heart	1973	893	291
Pancreas-kidney	1982	1454	537
Pancreas	1982	439	164
Liver, deceased donor	1984	2759	1095 ^b
Heart-kidney	1987	34	16
Lung	1988	881	290
Liver-kidney	1989	173	85
Liver-intestine-pancreas	1989	1	2 ^c
Heart-lung	1989	15	3
Heart-pancreas-kidney	1993	1	–
Intestine	1995	3	–
Lung-kidney	1996	3	2
Liver-living donor	1999	47	1095 ^b
Intestine-liver-pancreas-kidney	2000	1	–
Kidney, autotransplant	2002	147	N/F
Liver-pancreas	2006	8	1
Heart-liver	2017	5	5

Abbreviation: N/F, not following.

^aIncludes dual and en-bloc kidneys.

^bIncludes both living and deceased organ recipients.

^cTransplanted as pediatrics.

Table 2. Pediatric Transplant Programs Through December 31, 2022

Transplant Type	1st Year Performed	Total Transplants	Actively Following
Kidney-living donor	1967	88	99 ^a
Kidney-deceased donor	1967	175	99 ^a
Liver-deceased donor	1984	193	87 ^a
Liver-intestine	1988	4	–
Liver-intestine-pancreas	1991	12	3
Intestine	1994	19	–
Heart	1994	3	1
Intestine-liver-pancreas-kidney	1999	1	1
Liver-kidney	2003	17	1
Pancreas-kidney	2005	20	–
Liver-living donor	2008	5	87 ^a
Lung	2008	4	1
Kidney, autotransplant	2016	20	N/F
Pancreas	2017	13	1
Heart-kidney	Soon		

Abbreviation: N/F, not following.

^aIncludes both living and deceased organ recipients.

found dialysis exposure to be associated with a higher risk of both graft failure and death.⁸

In 1967, a year after the center's first adult kidney transplants, the first pediatric living and deceased donor kidney transplants were completed successfully. Since then, over 88 living donor and 175 deceased donor pediatric kidney transplants have been performed at the transplant center, with 99 patients actively followed in the clinic (Table 2).

Adult Simultaneous Pancreas-Kidney Transplants

For patients with ESKD secondary to type 1 diabetes or insulin-dependent type 2 diabetes, simultaneous pancreas-kidney transplant is a life-changing treatment that can significantly improve quality of life by replacing the need for daily insulin and regular dialysis. Currently, 83% of all pancreas transplants performed are simultaneous pancreas-kidney transplants, 12% are performed in patients who have previously received a kidney, and 5% of pancreas transplants alone are performed for patients with brittle type 1 diabetes without concurrent kidney disease.⁹

The first adult simultaneous pancreas-kidney transplant was performed at UW in 1982. This is one of the institution's larger programs, with 1454 transplants performed through 2022 and 537 patients actively followed in the clinic (Table 1).

Adult Liver Transplant Program

Among patients with end-stage liver disease (ESLD) listed for transplant, common primary diagnoses include alcohol-related liver disease, hepatocellular carcinoma, hepatitis C, and non-alcoholic steatohepatitis (NASH).¹⁰ In recent years, NASH has become the most rapidly increasing indication for liver transplantation, reflecting the obesity epidemic in the US, while transplants due to chronic hepatitis C have declined due to the development of highly effective direct-acting antivirals.¹¹ Regardless of etiology, liver transplantation is the gold standard treatment for ESLD and can significantly improve life expectancy.

This is UW's third largest transplant program, surpassed only by the adult kidney programs. The program's first transplant was performed in 1984, and 2759 transplants had

been performed by the end of 2022. At that time, 1095 patients, including some of the 47 living donor liver recipients, were followed in the transplant clinics (Table 1).

In 1999, 15 years after the first deceased donor adult liver transplant at UW, the first living donor adult liver transplant was performed at UW, marking the beginning of an exciting new era. For patients with liver failure, waiting for a deceased donor organ was no longer the only option. Instead, they could receive a partial liver from a living donor, and by the end of 2022, 47 living donor adult liver transplants had been performed at UW (Table 1).

Across the US, living donor liver programs have experienced slow growth due to challenges such as widespread media coverage of donor deaths in the 2000s and graft size issues leading to exclusion of potential living donor-recipient pairs.¹² Growth of these programs is needed to better serve over 10 000 patients currently waitlisted for a liver.⁷ Increasing the donor pool via living donors is an important goal as nearly 20% of waitlisted patients either die or become too ill for transplant each year.¹⁰

Other Solid Organ Transplant Programs

Besides the aforementioned programs, there are various active thoracic and abdominal solid organ transplant programs at UW, including simultaneous multiorgan transplant programs (Tables 1 and 2). Most patients continue to follow up in the transplant clinic.

From 1966 to 2023, UW's solid organ transplant programs have affected thousands of lives, advanced the field of transplantation through research and innovation, and recruited teams of dedicated individuals. The large proportion of transplanted patients actively followed at our transplant clinics is one of the many strengths of these programs, as they ensure high quality care and provide extensive data for research. Some patients return to the clinics for decades of follow-up care, and we can gather invaluable longitudinal data from the successes and setbacks of their clinical courses.^{13,14}

The successes of the UW Health Transplant Center would not be possible without its patients and the gifts of life from organ donors throughout Wisconsin and nationwide. It is only through their donations that the center has and will continue to serve patients for years to come.

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