

# Recent trends in organ procurement for renal transplantation at The Cleveland Clinic Foundation<sup>1</sup>

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**Organ procurement data for renal transplantation at The Cleveland Clinic Foundation are reviewed for the period from 1978 to 1983. An analysis of the geographic source of organs, causes of donor death, and age/sex distribution of the donors is presented. The need for an expanded cadaver donor base is emphasized.**

**Index terms:** Kidney, transplantation • Tissue donors  
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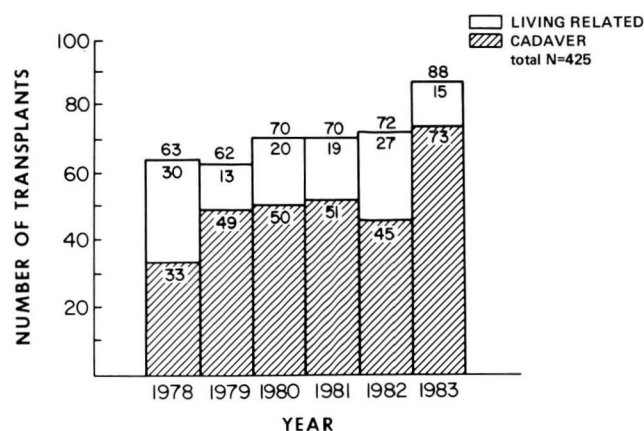
Renal transplantation continues to provide effective replacement therapy for many patients with end-stage renal disease. Yet, the number of patients eligible for transplantation continues to exceed the supply of available donor organs. The implications of this problem are twofold. First, many patients with end-stage renal disease are being denied the opportunity for the improved quality of life afforded by successful transplantation. Second, since transplantation has been shown to offer more cost-effective therapy than dialysis, the cost of the government-supported end-stage renal disease program continues to escalate.

In most programs, including ours, preference is given to suitably matched, living related renal donors who are well motivated and in good health.<sup>1</sup> Nevertheless, acceptable living donors are not always available and their overall contribution to the pool of available organ donors for transplantation remains in the minority. The burden for increasing the supply of donor organs therefore rests with existing local, regional, and national groups whose efforts are being directed at correcting this deficiency. With the

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**Fig. 1.** Number of transplants performed at The Cleveland Clinic Foundation from living related donors and cadavers (1978–1983)

recent advances and sudden interest in other organ transplants, this problem is no longer limited to kidney transplantation, but is now also affecting heart, liver, pancreas, and bone transplantation.

Following his arrival at The Cleveland Clinic Foundation, Bruce H. Stewart, M. D., worked actively in the field of renal transplantation for many years. A large portion of his efforts was expended during an era when the field was in its infancy. Rigorous demands were required of individuals committed to the development of renal transplantation, and the outcome for many patients was less rewarding to the physician than is currently possible. Dr. Stewart's interest in transplantation remained strong throughout his career, and he continued to be actively involved in efforts to improve the supply of available donor organs for potential recipients. In this review, we document the recent progress and current status of renal organ procurement at The Cleveland Clinic Foundation.

### Materials and methods

The Cleveland Clinic Foundation has been an active participant in the Northeastern Ohio Organ Recovery Program since the program's inception in 1969. This organization was founded as a collaborative, area-wide effort among three renal transplant centers (The Cleveland Clinic Foundation, Akron City Hospital, Case Western Reserve University) with the goal of enhancing and coordinating the procurement, preservation, and use of kidneys for transplantation. More recently, the scope of this group has expanded to encompass other organ transplants as well.

The program is comprised of regional histocompatibility matching and organ preservation laboratories (both maintained at The Cleveland Clinic Foundation), as well as a staff of professional transplant coordinators whose full-time efforts are directed toward stimulating and facilitating the recovery of cadaver organs in northeast Ohio. Kidney retrieval operations are performed either by transplant surgeons from one of the participating institutions or by interested community surgeons trained in procurement techniques. Recovered kidneys are distributed to patients within the cooperative group according to designated criteria, such as the level of histocompatibility matching, the degree of patient presensitization, and the duration of time spent by the patient undergoing dialysis while waiting for a graft. In the event that a suitable recipient is not available for kidneys procured within northeast Ohio, these "local" organs are then distributed to waiting recipients in other parts of the United States through a national sharing organization. Conversely, cadaver kidneys obtained by procurement groups in other geographic regions are often made available and "imported" for patients awaiting transplantation in northeast Ohio.

### Results

From January 1, 1978, to December 31, 1983, 425 renal transplantations were performed at The Cleveland Clinic Foundation. The source of the transplanted kidney was from a cadaver donor in 301 patients and from a living related donor in 124 patients. The yearly number of cadaver and living related transplants during this period is detailed (*Fig. 1*). The yearly number of cadaver transplants has increased from 33 (1978) to 73 (1983).

*Figure 2* illustrates the source (local or imported) of cadaver kidneys transplanted at The Cleveland Clinic Foundation. The number of locally recovered cadaver kidneys transplanted in our program has increased annually, while the yearly number of imported organs has not changed substantially. In fact, the ratio of local to imported kidneys has reversed completely from 0.55 (1978 to 1980) to 1.73 (1981 to 1983).

The *Table* shows the cause of death for donors of cadaveric kidneys transplanted at The Cleveland Clinic Foundation. Second to motor vehicle accidents, most donors had died of cerebral trauma. Other central nervous system lesions (for



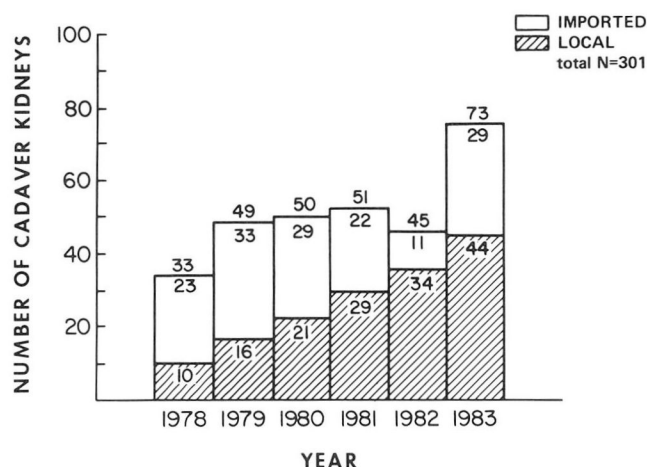


Fig. 2. Number of local and imported cadaver kidneys transplanted at The Cleveland Clinic Foundation (1978-1983)

example, subarachnoid hemorrhage and cerebrovascular accident) were the next frequent reasons for death. No significant difference in these two groups was evident when compared on an annual or cumulative basis. Gunshot wounds represented primarily suicides, usually in young adults (71% male predominance). Other causes of donor death included respiratory failure, acute surgical death, drug overdose, and drowning.

Figure 3 details the age and sex distribution of cadaver donors whose kidneys were transplanted at The Cleveland Clinic Foundation. More than half of the donors were between 11 and 30 years old, reflecting the predominance of motor vehicle accidents and suicide in this age group. Male deaths outnumbered female deaths in each category, except for donors more than 40 years old, reflecting an increase in female deaths due to

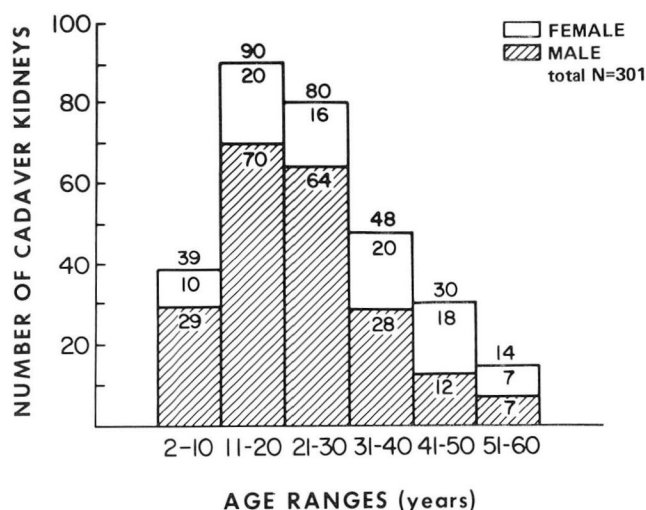


Fig. 3. Age and sex distribution of cadaver kidney donors whose kidneys were transplanted at The Cleveland Clinic Foundation (1978-1983)

cerebrovascular accidents. The pediatric group (2-10 yrs old) is an important source of cadaver kidneys. In particular, the organs of infants and small children are being used increasingly in most transplant programs.

### Discussion

During 1982, 65,765 patients with end-stage renal disease were undergoing chronic dialysis in the United States while only 5,358 renal transplantations (30% from living related donor sources<sup>2</sup>) were performed. These data highlight the large number of patients who are eligible for and currently awaiting cadaver transplantation. At the present time, 165 patients in northeast Ohio are waiting for a cadaver kidney; 111 are patients of The Cleveland Clinic Foundation.

Despite recently renewed public education efforts, brain-death and health care legislation, and improved national organ sharing, cadaver kidney transplantation remains an underused procedure for end-stage renal disease patients due to an inadequate supply of available organs.<sup>3-7</sup> Several studies analyzing this problem have concluded that this is not due to a lack of suitable organ donors, but to a failure of the primary physicians caring for such patients to raise the issue of organ donation after neurologic death has been declared.<sup>5-10</sup> Suggested measures for correcting this deficiency have included surveillance of the number and causes of deaths in hospitals with a potentially high yield of organ donors, the recruitment and training of interested community surgeons for recovery operations, and hospital-ori-

Table. Cause of death for cadaver kidney donors

Cause of Death	Total No. of Kidneys (%)	Breakdown by Year					
		1978	1979	1980	1981	1982	1983
Motor-vehicle accident	103 (34%)	12	12	24	15	11	29
Other central nervous system disorder	98 (33%)	13	23	13	15	15	19
Gunshot wound	62 (21%)	6	3	10	17	13	13
Other	38 (12%)	2	11	3	4	6	12
TOTAL	301	33	49	50	51	45	73

ented educational programs directed at the medical and nursing staff.<sup>4,10</sup> The educational programs should be conducted by transplant coordinators and surgeons, with an emphasis on the existing need for organ donors, acceptable donor criteria, donor preparation and management, and the recovery process itself. An important function of the transplant coordinators has been to facilitate the entire donation process from the time permission is obtained from the next of kin, with the aim of alleviating the burden of the primary physicians and thereby encouraging their more active participation in the identification of acceptable organ donors.

During the last several years, these policies have been implemented more frequently in the Northeastern Ohio Organ Recovery Program. This has led to a substantial increase in the number of cadaver kidneys procured within this region. The beneficiaries of this augmented program have been the patients in northeast Ohio awaiting cadaver transplantation, not only at The Cleveland Clinic Foundation, but also at the other participating centers. Continued intensified efforts in organ procurement are needed so that the benefits of successful transplantation can be extended to as many eligible patients as possible.

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