Trends in Medicare reimbursement for end-stage renal disease: 1974-1979

by Paul W. Eggers

This article presents detailed analyses of the trends in Medicare expenditures for persons with end-stage renal disease. Program expenditures increased at an annual rate of 30.5 percent from 1974 to 1981. Three-fourths of this increase was a result of increases in enrollment. Per capita reimbursements for dialysis patients increased at a 5.2-percent annual rate and per capita reimbursements for transplant patients increased at a 10.5-percent annual rate. In 1979, per capita reimbursements for home dialysis patients were $5,000 less than for in-unit dialysis patients. Patient characteristics such as age, sex, race, and cause of renal failure were, for the most part, unrelated to the costs of dialysis and transplantation.

Introduction

End-stage renal disease (ESRD) is the condition in which the kidneys permanently cease to function at a level that will support life. The two basic therapies for treating this condition, dialysis and transplantation, were effectively developed by the early 1960's. However, the high cost of both treatments prevented the widespread expansion of these therapies to all persons who could benefit from them. The fact that thousands of persons were being denied access to these life-saving therapies because of the prohibitively high costs led Congress to extend Medicare benefits to those persons with end-stage renal disease.

Entitlement to Medicare benefits was extended to persons with end-stage renal disease with the enactment of the Social Security Amendments of 1972 (Public Law 92-603, Section 299I). It thus became the only catastrophic illness specifically covered by the Medicare program. Coverage began on July 1, 1973. Since that time expenditures rose from $229 million in 1974 to an estimated $1.8 billion in 1982. The increased expenditures were generally unexpected. Rettig and Marks (1981, p. 8.) have put this problem in perspective: ". . . The figures used in the 1972 Senate debate authorizing the programing were unreasonably low and quite misleading and, in early 1973, the subject of a well-publicized controversy. The shift from unrealistic to realistic estimates contributed to a perception of costs out of control."

Unexpected or not, there can be no question that the ESRD program is expensive. ESRD beneficiaries comprise about one-fourth of 1 percent of all Medicare beneficiaries. In 1983, they accounted for an estimated 3.7 percent of total Medicare expenditures (Parts A and B) and 8.5 percent of Part B expenditures (Health Care Financing Administration, 1984). When an easily identifiable group such as this has extremely high health care costs, it inevitably becomes the focus of considerable attention for cost-savings measures.

Two subsequent legislative actions, the End-Stage Renal Disease Program Amendment of 1978 (Public Law 95-292) and the Omnibus Budget Reconciliation Act (OBRA) of 1981 (Public Law 97-35) contained provisions designed to increase the cost-efficiency of the ESRD program. Reacting to a decrease in the percent of patients dialyzing at home (generally considered to be less expensive than facility dialysis), Congress wrote into the 1978 amendments a number of provisions designed to promote home dialysis. Among these were a waiver of the usual 3-month waiting period for entitlement for persons undergoing a self-dialysis training program, full coverage for home dialysis supplies, 100 percent reimbursement for home dialysis equipment, and authorization for the establishment of target-rate [1] reimbursements to encourage home dialysis. These target rates were paid to facilities that would be responsible for providing the necessary supplies, equipment, and back-up to home patients. The 1978 amendments also contained provisions to encourage transplantation. These included extension of post-transplant Medicare entitlement from 1 to 3 years, clarification of coverage for live related donor costs, and clarification of the reimbursement principles on cadaveric organ procurement.

OBRA contained two provisions related to cost containment in the ESRD program. The first directed the Health Care Financing Administration (HCFA) to develop incentive reimbursement rates per dialysis treatment based on a composite of facility and home dialysis rates. Because the rates would be lower than the facility rates alone, facilities would have an incentive to dialyze patients at home, where costs are lower. The composite rates that went into effect on August 1, 1983, are $131 per dialysis treatment for hospital-based facilities and $127 per dialysis treatment for free-standing facilities. These replaced the $138 screen, applicable to both types of facilities, which had been in effect since the program's inception.[2] A second provision in OBRA makes Medicare the secondary payer to other insurance coverage for care for the first year following renal failure.

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[1] The target rates for home dialysis were implemented in 1979 and stayed in effect until the implementation of the composite rate methodology in 1983. The rates ranged from $90 to $120 depending on region of the country and covered the entire range of home dialysis costs. Only 30 of the 1,200 renal facilities contracted with HCFA to accept the target rate for their home patients.

[2] Prior to the implementation of the composite rates, a number of hospital-based facilities had received exceptions to the $138 limit and were being paid at higher levels.

Two studies of ESRD costs have examined Medicare program costs over time. Rettig and Marks (1981) showed that although average benefit payments rose from $14,895 per person in 1974 to $20,149 per person in 1978, when the figures are adjusted for inflation in medical care, the per capita rates remain virtually unchanged. Another analysis by Lowrie and Hampers (1981) made essentially the same point. Using data for the years 1974 through 1979, they showed that per capita costs for the ESRD program rose by 30.8 percent. During the same time, national per capita health expenditures rose by 74.9 percent and the cost per patient day in community hospitals rose by 91.4 percent.

Thus, it would seem that within the context of rapidly expanding health care costs, the Medicare ESRD program has experienced relatively modest cost increases. However, very little analysis has been published about the components of ESRD costs. Medicare pays for inpatient care and physician costs as well as for dialysis and transplantation. What is the distribution of these costs and have they changed over time? Do costs vary by age, sex, and race categories? Are there differences in the costs of care for different causes of renal failure (e.g., glomerulonephritis, primary hypertensive disease, diabetic nephropathy)? How do costs of dialysis patients compare with transplant patients? Has this relationship changed over time? What are the relative costs of home dialysis and facility dialysis?

This article is a sequel to a previous analysis of the incidence and prevalence of ESRD (Eggers et al., 1984) and attempts to clarify some of the issues outlined above by presenting per capita Medicare program expenditures for the years 1974 through 1981. Longitudinal analyses determine the sources of changes in program expenditures and cross-sectional analyses of 1979 data explore demographic and therapy variations in program expenditures. Finally, gaps in current knowledge and directions for further research are identified.

Data and methods

Data for this study were taken from two sources: the Medicare statistical system (MSS) and the ESRD program management and medical information system (MMIS). The MSS is a byproduct of the basic administrative data system used to determine beneficiary eligibility and to monitor program utilization and expenditures for the 30 million beneficiaries currently entitled to Medicare. The master beneficiary record, a part of the MSS, is used to maintain individual entitlement information and to provide the basic age, sex, race, residence, entitlement, and death information used in the analysis. From 1974 through 1979, approximately 100,000 different people were identified as Medicare beneficiaries with ESRD for some length of time. Some of these individuals are eligible for Medicare benefits as aged or disabled persons. Others are eligible specifically because of renal failure. The analyses in this study are based on the universe of ESRD patients covered by Medicare during these years.

Expenditure data were taken from Medicare billing records, also maintained as part of the MSS. The bill records include inpatient and skilled nursing facility billings (HCFA 1453), outpatient billings (HCFA 1483), physician and supplier billings (HCFA 1490), and home health billings (HCFA 1487). These records were summarized into yearly reimbursement totals for each beneficiary. Reimbursements, expenditures, and costs are used interchangeably in this article. All refer to that part of ESRD costs paid for by Medicare. Deductibles, coinsurance, and noncovered costs are not included in the analysis.

Specific MMIS data elements were taken from various HCFA medical reporting forms developed for the ESRD program: these include primary diagnosis and date of first dialysis (HCFA Form 2742), evidence of dialysis services (HCFA Form 2743), and date of transplantation (HCFA Form 2745). Nonresponse rates on the MMIS forms were in the range of 50 percent or more during the period covered by this analysis.[3] Therefore, it was not possible to completely differentiate between dialysis and transplant patients or to assign primary cause of renal failure to all patients. Thus, many of the ensuing analyses will, of necessity, be based on subsets of the population for whom MMIS data were available.

MSS and MMIS data were linked for each beneficiary to form a single record summarizing entitlement, reimbursement, and medical information. Reimbursement rates were calculated by person-year equivalents. Persons with less than a full year of Medicare entitlement in any year (either their first year of entitlement or the year in which they died) were given a person-year weight equal to the number of months of entitlement divided by 12.

Results

Trends in reimbursements

Table 1 presents end-stage renal disease (ESRD) reimbursements, enrollment, and per capita reimbursements for 1974 through 1981. In 1974, the first full year of coverage of ESRD, total Medicare reimbursements for persons with ESRD were $229 million. By 1981, reimbursements had risen to $1,471 million, over six times more than 1974, or an annual growth rate of 30.5 percent. However, the rate of growth has slowed considerably in recent years. Between 1974 and 1975, the rate of growth was 58

[3]Nonresponse can largely be attributed to the fact that reimbursement was not dependent on submission of these data forms and there was no mechanism in place to assure compliance. This has been improved considerably in two ways. First, the HCFA 2742, which was voluntary, has been replaced by the HCFA 2728, which is the basic entitlement form. ESRD patients not already covered as an aged or disabled beneficiary now cannot become entitled unless the form is completed. Second, ESRD networks have been given the responsibility of collecting data forms for areas of the county within their jurisdiction. The response rate for the HCFA 2745, still a voluntary form, has risen from about 50 percent in 1979 to 95 percent in 1982.

Table 1

Medicare reimbursement, enrollment, and per capita reimbursement, for persons with end-stage renal disease: 1974-1981

Year	Reimbursement		Enrollment [1]		Reimbursement per enrollee	
	Amount in millions	Percent change	Number in thousands	Percent change	Amount	Percent change
1974	$ 228.5	[2]	16.0	[2]	$14,300	[2]
1975	361.1	58.0	22.7	41.9	15,900	11.2
1976	512.2	41.8	28.9	27.3	17,700	11.3
1977	641.3	25.2	34.8	20.4	18,400	4.0
1978	799.5	24.7	43.1	23.9	18,500	.5
1979	1,009.7	26.3	50.8	17.9	19,900	7.6
1980	1,249.6	23.8	57.8	13.8	21,600	8.5
1981	1,471.1	17.7	64.1	10.9	23,000	6.5

[1]Includes enrollees entitled to Medicare benefits as aged or disabled persons and persons entitled by the provisions of section 2991 of Public Law 92-603, i.e., "renal only."
[2]Not applicable.

SOURCE: Health Care Financing Administration, Office of Statistics and Data Management, ESRD Archival Reimbursement Abstract.

percent. For the most recent year's experience (1980 to 1981) the growth has slowed to 17.7 percent.

This pattern of growth in reimbursements is largely the result of growth in the ESRD population. There were 16,000 ESRD enrollees in 1974. By 1981, this total was 64,100, or four times greater. Enrollment increases were greatest in the early years of the program. Although the overall annual growth rate has been 21.9 percent, it was 41.9 percent from 1974 to 1975 and only 10.9 percent from 1980 to 1981. Per capita reimbursements rose from $14,300 in 1974 to $23,000 in 1981, an annual growth rate of 7.0 percent.[4]

The growth in total ESRD reimbursements can be disaggregated into the two components of enrollment and per capita reimbursements. This analysis shows that 76 percent of the growth is the result of the increase in enrolled population and only 24 percent is because of the increase in reimbursements per enrollee (Klarman et al., 1970).

The distribution of reimbursements by type of service has changed little since the program's inception. Table 2 shows program reimbursement by type of service for the years 1974 through 1981. Outpatient billings, which account for the majority of dialysis reimbursements, accounted for $135.5 million in 1974, and 59 percent of total program expenditures. By 1981, outpatient billings had risen to $732.1 million (a 27-percent annual rate of increase), but accounted for only 50 percent of total program costs. Most of this shift in reimbursements was accounted for by an increase in physician/supplier billings. Physician/supplier billings include payments for physicians' services as well as payments to suppliers for furnishing the materials needed for home dialysis. These payments grew from 12 percent of program costs in 1974 ($27.6 million) to 21 percent of program costs in 1981 ($303.0 million). However, most of this shift is an artifact of the manner in which physicians have been paid. In 1974, all physicians were paid $9.60 which was added to the dialysis fee screen (referred to as the "initial" method). Thus, most routine physician costs came through the outpatient billing mechanism. In 1975, HCFA instituted an alternative method in which physicians were paid an amount per patient per month. These billings would appear in the physician/supplier records. By 1979, 75 percent of all physicians were paid through the alternative method.[5] Therefore, much of this change in mix of payments is an artifact of billing procedures and not because of any underlying change in the provision of care.

Interestingly, inpatient reimbursements have remained a relatively constant portion of program expenditures despite the rapid rise in hospital costs in general. Inpatient costs were 28 percent of program costs in 1974 ($64.9 million) and were 29 percent in 1981 ($430.7 million). Two factors account for this. First, transplant patients, who have very high inpatient costs, have decreased as a percent of program enrollment. In 1974, almost 20 percent of Medicare beneficiaries received transplants. By 1981, only 7 percent had transplants. Thus, their impact on total inpatient expenditures has decreased. A second reason for the stability of inpatient costs is the decrease in hospitalization rates for dialysis patients (Table 3).

Table 3 shows discharge rates, average length of stay, rates for total days of care, and per capita inpatient reimbursement for dialysis patients for the years 1974 through 1979. Hospitalization rates decreased

[4]Rates calculated in this paper are not strictly comparable to those cited by Rettig and Marks because of differences in the population counts and the use of more recent expenditures data.

[5]Currently all routine physician care is reimbursed by a method similar to the alternative method.

Table 2

Medicare reimbursement for end-stage renal disease, by type of service: 1974-1981

Year	Type of service									
	Total	Outpatient	Inpatient	Physician or supplier [1]	Other [2]	Total	Outpatient	Inpatient	Physician or supplier [1]	Other [2]
	Amount in millions					Percent distribution				
1974	$ 228.5	$135.5	$ 64.9	$ 27.6	.5	100.0	59.3	28.4	12.1	.2
1975	361.1	205.2	99.1	55.7	1.1	100.0	56.8	27.4	15.4	.3
1976	512.2	289.6	136.3	84.5	1.8	100.0	56.5	26.6	16.5	.4
1977	641.3	368.0	164.1	106.8	2.4	100.0	57.4	25.6	16.7	.4
1978	799.5	453.0	208.5	135.2	2.8	100.0	56.7	26.1	16.9	.4
1979	1,009.7	557.9	266.9	181.2	3.7	100.0	55.3	26.4	17.9	.4
1980	1,249.6	665.7	341.1	238.3	4.5	100.0	53.3	27.3	19.1	.4
1981	1,471.1	732.1	430.7	303.0	6.4	100.0	49.7	29.2	20.6	.4

[1]Includes physicians' services and home dialysis treatments.
[2]Includes home health and skilled nursing facility.

SOURCE: Health Care Financing Administration, Office of Statistics and Data Management, ESRD Archival Reimbursement Abstract.

Table 3

Medicare utilization and reimbursement for end-stage renal disease inpatient dialysis patients: 1974-1979 [1]

Year	Utilization			Inpatient reimbursement per enrollee
	Discharges per 1,000 enrollees	Average length of stay per discharge	Days of care per 1,000 enrollees	
1974	2,075	11.9	24,614	$4,963
1975	2,101	11.5	24,219	5,370
1976	2,044	11.0	22,577	5,619
1977	2,025	10.6	21,484	4,856
1978	1,850	9.6	17,733	4,660
1979	1,731	9.2	15,966	4,924

[1]Rates are based on person-years of enrollment.

SOURCE: Health Care Financing Administration, Office of Statistics and Data Management, ESRD Archival Reimbursement Abstract.

markedly during that time. Discharge rates decreased by 17 percent and average length of stay decreased by 23 percent, resulting in a 35 percent decrease in the rate of total days of care. These decreases in total hospital use offset the general increases in hospital per diem costs to the point that per capita inpatient reimbursements in 1979 ($4,924) were slightly less than in 1974 ($4,963).

Patient costs for dialysis and transplants are compared in Table 4. In 1974, reimbursements for dialysis patients averaged $16,558 per person. Reimbursements for transplant patients during the same year were $21,159, a difference of 28 percent. However, in the following years, transplant patient costs rose twice as fast (10.5 percent per year) as did dialysis patient costs (5.2 percent per year). As a result, transplant patient costs in 1979 ($34,914) were 64 percent higher than dialysis patient costs ($21,325).

Of the total cost of care for a transplant patient in 1979, approximately 45 percent, or $15,629, was attributable to the hospital stay in which the transplant occurred (Table 5). This table also shows hospital charges for the transplant stay broken down by cost center.[6] Of the $21,951 in total charges, 19 percent was for accommodation (the average length of stay was nearly 30 days). Another 7 percent was for intensive care unit services (about 5 days per transplant stay were spent in the ICU). The bulk of the charges (74 percent) were for various ancillary services. Laboratory services accounted for $3,910 (18 percent of the total) and other ancillary services which include kidney acquisition and dialysis treatments accounted for $7,662 (25 percent of total charges).

Program expenditures: 1979

This section examines variations in Medicare payments for ESRD patients in 1979 by therapy type, by demographic categories, and by primary cause of renal failure. Table 6 shows Medicare reimbursements for home and in-unit hemodialysis patients. In 1979, home patient costs averaged $18,659 per person, or 21 percent lower than the average program costs of $23,591 for in-unit dialysis patients. It is not possible to determine how much of this differential is a result of lower dialysis costs because much of the home dialysis costs are included with the physician/supplier

[6]The inpatient stay record used in this table lists hospital charges by cost center. Prior to the implementation of prospective payment in 1983, Medicare paid on a cost basis. In 1979, the average cost-to-charges ratio was .712. This ratio was used to calculate the estimated reimbursement per transplant stay. Under prospective payment, kidney transplants will be reimbursed as a separarate diagnosis-related group (DRG) category with the costs of kidney acquisition included as a pass-through cost.

Table 4

Per capita Medicare reimbursement, by type of therapy: 1974-1979

Year	Type of therapy							
	All enrollees [1]		Dialysis [2]		Transplants [3]		Other unknown [4]	
	Amount per enrollee	Number of enrollees	Amount per enrollee	Number of enrollees	Amount per enrollee	Number of enrollees	Amount per enrollee	Number of enrollees
1974	$14,381	16,742	$16,558	10,707	$21,159	612	$ 9,318	5,423
1975	15,856	23,557	18,818	13,570	23,944	848	10,707	9,139
1976	16,698	31,332	20,167	15,983	26,426	873	12,567	15,476
1977	17,494	37,079	20,041	17,405	32,923	2,003	13,236	17,671
1978	18,397	43,709	20,376	19,720	35,575	2,668	14,417	21,321
1979	18,080	53,213	21,325	22,475	34,914	2,167	14,251	28,571

[1]Rates are based on person-years of enrollment.
[2]Includes only persons never having transplants.
[3]Includes only persons having transplants in reference year.
[4] Includes persons who received a transplant in a previous year and returned to dialysis, many home dialysis patients, and other persons not specifically identified as transplant or dialysis patients.

SOURCE: Health Care Financing Administration, Office of Statistics and Data Management, ESRD Archival Reimbursement Abstract.

Table 5

Medicare covered charges, reimbursement, and covered days for kidney transplant stays, by cost center: 1979

Cost center	Charges		Reimbursement [1]	Covered days
	Amount	Percent		
Total	$21,951	100.0	$15,629	29.6
Accommodation	4,238	19.3	(3)	24.7
Intensive care or coronary care	1,445	6.6	(3)	4.9
Ancillary	16,268	74.1	(3)	(3)
Operating room	1,422	6.5	(3)	(3)
Pharmacy	1,700	7.7	(3)	(3)
Laboratory	3,910	17.8	(3)	(3)
Radiology	809	3.7	(3)	(3)
Medical supplies	502	2.3	(3)	(3)
Anesthesia	263	1.2	(3)	(3)
Other [2]	7,662	34.9	(3)	(3)

[1]Reimbursements estimated by applying 1979 Medicare cost-to-charges ratio of .712.
[2]Includes kidney acquisition and back-up dialysis.
[3] Not applicable.

SOURCE: Health Care Financing Administration, Office of Statistics and Data Management, ESRD Archival Reimbursement Abstract.

Table 6

Per capita reimbursement for Medicare end-stage renal disease dialysis patients, by place of dialysis and type of service: 1979 [1]

Type of service	Reimbursement by place of dialysis			
	In-unit		Home	
	Amount per enrollee	Percent distribution	Amount per enrollee	Percent distribution
Total	$23,591	100.0	$18,659	100.0
Outpatient	14,506	61.5	6,427	34.4
Inpatient	5,519	23.4	4,743	25.4
Physician/ supplier [2]	3,496	14.8	7,459	40.0
Other [3]	70	.3	30	.2

[1]Rates are based on person-years of enrollment.
[2]Includes physicians' services and home dialysis treatments.
[3] Includes home health and skilled nursing facilities.

SOURCE: Health Care Financing Administration, Office of Statistics and Data Management, ESRD Archival Reimbursement Abstract.

costs. However, it is interesting to note that home patients use fewer hospital resources than do in-unit patients ($4,743 and $5,519, respectively). This may be attributed to the fact that home patients are believed to be in better health than in-unit patients. Still, leaving aside the question of case mix, it appears that in 1979 the cost savings to Medicare of having patients dialyze at home was approximately $5,000 per person.

Dialysis patient costs are compared to transplant patient costs in Table 7. As discussed above, in 1979, transplant patient costs were 64 percent higher than dialysis patient costs. Not surprisingly, most dialysis patient costs are for outpatient dialysis and physicians' services. Nevertheless, almost one-fourth of dialysis patient costs ($4,924) are for inpatient care episodes. Most transplant patient costs ($20,980) are generated through inpatient stay episodes. On average, transplant patients are hospitalized three times for a total of about 50 days during the year in which the transplant occurs (including the stay for the transplant). Transplant patients also have higher physician costs than do dialysis patients ($5,722 and $3,521, respectively) primarily because of transplant surgeons' fees. According to the 1983 ESRD Annual Report to Congress, reimbursements for physicians' transplant services range between $1,387 and $2,300. Transplant patients also incur large outpatient (i.e., dialysis) costs as well. There are two reasons for this. First, this analysis is based on transplants occurring within a calendar year. Given a more or less random distribution of transplant dates, the average patient

Table 7

Per capita Medicare reimbursement, by type of therapy and type of service: 1979 [1]

Type of service	Type of therapy			
	Dialysis		Transplant	
	Amount	Percent	Amount	Percent
All services	$21,325	100.0	$34,914	100.0
Outpatient	12,825	60.1	8,186	23.4
Inpatient	4,924	23.1	20,980	60.1
Physician/ supplier [2]	3,521	16.5	5,722	16.4
Other [3]	55	.3	26	.1

[1]Rates are based on person-years of enrollment.
[2]Includes physicians' and home dialysis treatments.
[3]Includes home health and skilled nursing facilities.

SOURCE: Health Care Financing Administration, Office of Statistics and Data Management, ESRD Archival Reimbursement Abstract.

Table 8

Per capita Medicare reimbursement, by type of therapy and patient characteristics: 1979 [1]

Patient characteristics	Type of therapy			
	Dialysis		Transplant	
	Amount per person	Number of persons	Amount per person	Number of persons
All persons	$21,325	22,475	$34,914	2,167
Age				
Under 25 years	23,036	968	32,958	533
25-44 years	21,695	5,182	34,481	1,112
45-64 years	21,868	10,229	37,817	518
65 years or over	19,784	6,096	39,061	5
Sex				
Male	20,693	11,994	35,108	1,356
Female	22,048	10,481	34,588	811
Race				
White	21,180	15,383	34,782	1,658
Black	21,710	5,981	36,154	375
Other/unknown	21,249	1,112	33,083	134

[1]Rates are based on person-years of enrollment.

SOURCE: Health Care Financing Administration, Office of Statistics and Data Management, ESRD Archival Reimbursement Abstract.

will have had 6 months of dialysis prior to the transplant. Second, many transplants fail and the beneficiary returns to a dialysis regimen. The kidney graft in about 44 percent of cadaveric transplants and 25 percent of live related donor transplants will fail in the first year following the transplant (Krakauer et al., 1983). Therefore, some of the dialysis costs are incurred post transplantation.

Medicare reimbursements for dialysis and transplant patients by age, sex, and race are shown in Table 8. Generally these demographic characteristics have little impact on expenditure levels. For dialysis patients there appears to be a slight inverse relationship of reimbursements with age. Persons under 25 years of age received $3,252 more in reimbursements than persons 65 years of age or over. However, part of this difference could be because of the under-reporting of transplants. About one-half of the transplants occurring in 1979 were reported to the ESRD-MMIS. The other patients who had transplants show up as dialysis patients. The impact of this nonresponse is an upward bias of the dialysis patient costs and this bias is much greater in the under 25 age group where transplants account for 25 percent of all patients than in the 65 or over age group where transplants are very rare. So, the real reimbursement differences by age for dialysis patients are probably less than suggested by this table. There is also a small difference in reimbursements by sex with female dialysis patients accounting for 7 percent higher per capita reimbursements than male dialysis patients ($22,048 and $20,693, respectively). Differences by race were very slight with white persons receiving two percent less in reimbursements than did black persons.

For transplant patients there were also minor differences by sex and by race. However, there was a direct relationship between age and per capita reimbursements. Persons 25-44 years of age and 45-64 years received 5 percent and 15 percent more in reimbursements than did persons under 25 years. Increasing costs by age can be attributed to higher rates of transplant failure in the older age groups.[7] As will be shown in a subsequent analysis, transplants that fail are markedly more expensive than successful transplants.

It is of interest to examine the extent to which the primary cause of renal failure affects reimbursement amounts. The primary cause of renal failure has a significant impact on patient survival (Eggers et al., 1984). Persons whose renal failure is a result of polycystic kidney disease have the best 5-year survival (58 percent) and persons with diabetic nephropathy experience the worst 5-year survival rate (21 percent).

Table 9 shows the per capita reimbursements for dialysis and transplant patients for the five most commonly reported primary diagnoses leading to renal failure. There is very little difference in per capita reimbursements by primary diagnosis for dialysis patients. Four of the five diagnoses show reimbursements in the range of $20,000 to $21,000. Patients with diabetic nephropathy had reimbursement rates of $22,770 which was about $2,000 higher than the other major diagnostic categories. Some of this difference can be attributed to the higher mortality rate among diabetic patients. As shown in Table 10, dying dialysis patients have higher costs than do surviving dialysis patients. There is a slightly wider range of reimbursements among transplant patients. Transplant patients with glomerulonephritis had the lowest per capita reimbursements at $34,024. Transplant patients whose renal failure was a result of hypertensive nephropathy had the highest reimbursements ($38,028), suggesting that these patients have more complications than other patients receiving transplants.

Table 10 presents 1979 Medicare reimbursements

[7]The transplant failure rate is less a function of age than the fact that a higher percent of younger patients receive live related donor grafts than do older patients (Krakauer et al., 1983).

Table 9

Per capita Medicare reimbursement, by type of therapy and primary diagnosis: 1979 [1]

Primary diagnosis	Type of therapy: Dialysis — Amount per enrollee	Dialysis — Number of enrollees	Transplant — Amount per enrollee	Transplant — Number of enrollees
All diagnoses	$21,325	22,475	$34,914	2,167
Glomerulonephritis	20,934	5,739	34,024	475
Hypertensive nephropathy	20,413	4,408	38,028	140
Diabetic nephropathy	22,770	2,529	35,454	138
Polycystic kidney disease	20,396	2,068	36,072	90
Other interstitial nephritis	21,248	2,014	35,172	97
Other [2]	22,141	5,717	34,737	1,227

[1]Rates are based on person-years of enrollment.
[2]Includes collagen vascular disease, hereditary interstitial nephritis, analgesic abuse nephropathy, acquired obstructive uropathy, congenital obstructive uropathy, amyloidosis, multiple myeloma, gouty nephropathy, unspecified causes and unknown etiologies.

SOURCE: Health Care Financing Administration, Office of Statistics and Data Management, ESRD Archival Reimbursement Abstract.

for ESRD patients by type of therapy and patient outcome. The first five figures show reimbursement amounts for transplant patients by transplant outcome. Although the average transplant patient accrued $34,914 in reimbursements in 1979, there were large differences depending on graft and patient outcome. For those transplants in which the patient survived and the graft was functioning at the end of the year, the costs ($29,860) were $5,054 less than the overall average. If the graft failed but the patient survived and returned to dialysis, reimbursements averaged $42,432, or $12,572 more than the successful transplant. These additional costs result from rejection costs (the average hospital stay cost for a rejection with nephrectomy was $8,941 in 1979) and costs of maintenance dialysis after rejection. If the patient received a transplant and died in the same year, the costs were $60,679.[8] For patients receiving a transplant in a year prior to 1979 but having a graft rejection in 1979, the per capita costs were $30,189. However, for those earlier transplant patients whose graft continued to function through 1979, the costs to Medicare were $4,074 per person. For those successful transplant patients who lose entitlement 36 months after the transplant, the costs to Medicare drop to $0. Recent enrollment data show that about one-half of transplant patients with functioning grafts remain sufficiently disabled to require continued Medicare coverage. The remaining patients continue to receive Medicare coverage as disabled beneficiaries.

[8]As with the other per capita costs, this figure is based on person-year equivalents. In reality, dying patients have an average of one-half a year of life in the year they die. So the costs per patient are lower than $60,679 but are compressed into a much shorter time-period.

Table 10

Average Medicare per capita reimbursement, by patient outcome: 1979 [1]

Patient outcome	Medicare reimbursement per person-year
All transplants	$34,914
Transplant—1st year—graft functioning	29,860
Transplant—1st year—graft failed	42,432
Transplant—1st year—death	60,679
Transplant—2nd year and over—graft failed	30,189
Transplant—2nd and 3rd year—graft functioning	4,074
All dialysis	21,325
Dialysis, living	19,541
Death on dialysis	28,253

[1]Rates are based on person-years of enrollment.

SOURCE: Health Care Financing Administration, Office of Statistics and Data Management, ESRD Archival Reimbursement Abstract.

As shown in Table 4 earlier, dialysis patient costs in 1979 were $21,325. In Table 10, dialysis patients are divided into surviving and dying patients. For surviving dialysis patients the per capita costs were $19,541 whereas for decedents the costs were $28,253.

The costs presented in Table 10 have been used with patient and transplant graft survival rates to model the general cost effectiveness of kidney transplantation (Eggers, 1983). The results of that analysis show that the higher initial costs of transplantation are "paid back" in about four years in terms of person life years and lower program costs when compared with the relatively constant costs of dialysis therapy. The analysis did not account for variations in quality of life. If one assumes that a functioning transplant provides a patient with a higher quality of life, then the relative cost-effectiveness of transplantation is increased.

Summary and conclusions

The analyses presented in this article have shown some of the reasons for increases in program expenditures during the early years of the program as well as some variations in program costs in the most recent year for which patient specific data are available (1979).

The results show that although expenditures rose at a 30-percent annual rate in the first 8 years of the ESRD program, most of that increase (76 percent) can be attributed to a rapid growth in the beneficiary population. The per capita costs of the program have risen at a 7-percent rate, well below the general inflation in medical care prices. Per capita costs have not risen uniformly. Transplant patients costs have risen twice as fast as dialysis patient costs. This is most likely because of the fact that providers have been reimbursed for the costs of dialysis only up to a predetermined fee screen. Once the fee screen was reached, dialysis costs were held constant. There have been no cost controls imposed on transplantation.

For dialysis patients, about 75 percent of total costs are attributable to dialysis treatments and physicians' services. For transplant patients, about one-half of total costs are for the transplant stay itself with an additional $2,000 for the surgeon's fee. However, cumulative transplant patient costs after about four years following a transplant are low enough to offset the higher initial costs.

In 1979, total program costs for home dialysis patients were about $5,000 less than for in-unit dialysis patients. Although much of this difference is a result of lower dialysis costs, it is likely that home patients are in better health as evidenced by lower hospitalization costs. Patient characteristics appear to have little effect on either dialysis or transplant reimbursement amounts. Age appears to have a slight impact on dialysis costs and a more significant impact on transplant costs. However, the age effect on dialysis may be due to miscoded transplant patients. The age impact on transplant costs is probably related to the more prevalent use of live related donor kidneys (and consequent better success rates) among younger patients. Neither sex, race, nor primary diagnosis had much impact on patient costs.

Thus, as of 1979, the ESRD program was rapidly growing in enrollments. Although transplant patient costs were rising faster than dialysis patient costs, the impact was partially offset by the fact that transplants are a decreasing percent of the patient population.

The trends in program expenditures since 1979 need to be examined as there have been a number of changes that could impact on per capita costs. From 1978 through 1983, HCFA granted exceptions to the $138 dialysis fee screens to 503 facilities. These exceptions should have had the effect of raising per capita dialysis patient reimbursements. On the other hand, the composite rate that went into effect in August 1983 should have the immediate effect of reducing dialysis costs and should be noticeable in 1984 expenditures. In addition, the 1981 OBRA change which makes Medicare the second payer for the first year after renal failure should reduce Medicare expenditures somewhat. HCFA's Office of Financial and Actuarial Analysis estimates that this provision will reduce program expenditures by 1.7 percent by the end of the decade (HCFA, 1984).

Two therapy changes following the period covered in this article could impact on program expenditures. One was the introduction and rapid proliferation of continuous ambulatory peritoneal dialysis (CAPD). In 1979, only a few hundred persons were on this therapy. By the end of 1983, over 8,500 persons were on this therapy, almost twice as many as on home hemodialysis. The cost impact of this shift to CAPD has yet to be determined. Although the dialysis costs may be low, there is some concern that problems with peritonitis may push up hospitalization costs, thus negating any dialysis savings. The other change in therapy is the introduction of cyclosporin as an immunosuppressant for transplant patients. This drug has the potential to reduce graft rejection rates and thus not only improve patient outcomes but decrease program costs as well.

Recent changes in Medicare legislation (Public Law 98-21) will impact on hospitalization through the implementation of the prospective payment system. The impact of this change should be to reduce the rate of increase in transplant patient costs but it will impact on dialysis patients as well.

Thus, there is reason to believe that Medicare program expenditures for ESRD will increase at a lower rate in the future. However, the full impact of specific regulatory and legislative changes have yet to be determined. As more current data become available, it will be possible to assess not only changes in reimbursement levels but changes in the population being served and utilization of available therapies.

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