

# Chapter 9: End Stage Renal Disease

by Joel Greer

## Introduction

End stage renal disease (ESRD) is that stage of kidney impairment which is irreversible, cannot be controlled by conservative management alone, and requires dialysis or kidney transplantation to maintain life. The 1972 Amendments to the Social Security Act (Public Law 92-603) extended Medicare coverage to persons with ESRD, and the Social Security Amendments of 1978 (Public Law 95-292) made changes in the rules governing entitlement to Medicare designed to encourage self-dialysis and transplantation, and to eliminate a number of inequities and difficulties that existed under previous law. Persons eligible for Medicare because of ESRD are entitled to all the benefits available under the Medicare program, not just those directly related to ESRD such as renal dialysis and transplantation.

To be eligible for Medicare ESRD benefits, an application for Medicare must be filed and a physician must certify that the individual requires chronic dialysis or a kidney transplant to maintain life. In addition to having chronic renal failure, the person must either be entitled to a monthly insurance benefit under title II of the Social Security Act (or an annuity under the Railroad Retirement Act); be fully or currently insured under Social Security (railroad work may count); or be the spouse or dependent child of a person who meets one of the previous requirements. There is no minimum age limitation. Provided all eligibility requirements are met, a person's Medicare entitlement as a result of ESRD begins with the earliest of the following four occurrences:

- The third month after the month in which a course of dialysis is initiated. For example, if a course was initiated any time during the month of January, the date of entitlement would be April 1.
- The month a course of maintenance dialysis begins if the individual participates in a self-dialysis training program in an approved facility and is expected to complete the training successfully and self-dialyze thereafter.
- The month of transplant.
- The month an individual is admitted to an approved hospital for procedures preliminary to a transplant, if the transplant takes place within the following 2 months. If the transplant is delayed more than 2 months, Medicare coverage will begin the second month prior to the month the actual transplant takes place, or if earlier, the first day of the third month after maintenance dialysis began.

Because persons entitled to Medicare because of ESRD require medical services to maintain life, most ESRD patients enrolled in Medicare submit bills to Medicare. As a result the terms "enrollee" and "beneficiary" are used interchangeably in this chapter.

A person's entitlement as a result of ESRD terminates with the earliest of the following events:

- The day of death.
- The last day of the 12th month after a person no longer requires maintenance dialysis treatments.
- The last day of the 36th month after the month in which an individual receives a kidney transplant. If within 36 months after transplantation a person requires another transplant or returns to dialysis, there is no interruption in entitlement.

A person whose ESRD entitlement terminates may continue their entitlement if he or she is disabled or is 65 years of age or over. A person whose ESRD entitlement was ended will be re-entitled effective the month his or her new course of dialysis begins with no second qualifying period.

Table 9.1 shows the number of Medicare enrollees with ESRD by their treatment group as of December 31 of each year.

- On December 31, 1990, Medicare covered 164,642 ESRD patients: 128,546 (78.1 percent) on dialysis and 36,096 (21.9 percent) with a functioning graft.
- The number of Medicare ESRD enrollees increased at an average annual rate of change (AARC) of 11.6 percent from 1978 through 1990. This growth rate has slowed somewhat in recent years to 9.7 percent for the period 1989-90, but it remains greater than the rate of growth of the entire Medicare population (1.9 percent for the period 1989-90).
- The number of beneficiaries with a functioning kidney graft transplant has grown at an AARC of 18.3 percent from 1978 through 1990 compared with an AARC of 10.4 percent for dialysis patients. As a result, the proportion of enrollees with a functioning graft has grown from 10.9 percent to 21.9 percent of all ESRD users.

Table 9.2 contains the breakdown of the ESRD population treated by dialysis as of December 31 of each year by age, race, sex, and cause of renal failure. Cause of renal failure is the primary cause of kidney failure as reported by the physician on the medical evidence form when the person is diagnosed as having ESRD. Age, race, and sex are from Social Security Administration records and are those reported by the patient.

- Medicare had 128,546 ESRD enrollees on dialysis as of December 31, 1990. This is an 8.2-percent AARC increase from December 31, 1985, and a 9.2-percent increase from the previous year.
- Almost one-half (47.7 percent) of dialysis patients are between the ages of 55-74. For the period 1985-90, the fastest growing age groups are 65-74 and 75 years or over with AARCs of 10.0 and 15.6, respectively. Dialysis patients are older than the functioning graft population and the average age of the dialysis population continues to increase.

**Table 9.1**  
**Medicare end stage renal disease (ESRD) program enrollment, by dialysis and functioning graft: Calendar years 1978-90**

Year	All patients		Patients on dialysis		Patients with a functioning graft	
	Number	Percent	Number	Percent	Number	Percent
1978	44,083	100.0	39,262	89.1	4,821	10.9
1979	52,103	100.0	46,047	88.4	6,056	11.6
1980	59,957	100.0	52,687	87.9	7,270	12.1
1981	67,424	100.0	58,901	87.4	8,523	12.6
1982	76,284	100.0	65,918	86.4	10,366	13.6
1983	86,389	100.0	73,949	85.6	12,440	14.4
1984	95,678	100.0	80,433	84.1	15,245	15.9
1985	105,247	100.0	86,781	82.5	18,466	17.5
1986	115,388	100.0	92,791	80.4	22,597	19.6
1987	126,308	100.0	100,038	79.2	26,270	20.8
1988	137,023	100.0	107,783	78.7	29,240	21.3
1989	150,065	100.0	117,761	78.5	32,304	21.5
1990	164,642	100.0	128,546	78.1	36,096	21.9
	Average annual rate of change					
1978-90	11.6	—	10.4	—	18.3	—
1989-90	9.7	—	9.2	—	11.7	—

NOTE: Enrollment is the number of Medicare beneficiaries with ESRD who are alive and currently entitled, as of December 31.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data are from the ESRD Program Management and Medical Information System, August 1992 update; data development by the Office of Research and Demonstrations.

**Table 9.2**  
**Medicare end stage renal disease (ESRD) program enrollment for dialysis patients, by demographic characteristics and primary diagnosis: Calendar years 1985-90**

Characteristics and primary diagnosis	Number of dialysis patients						Percent of total in 1990	Average annual rate of change	
	1985	1986	1987	1988	1989	1990		1985-90	1989-90
<b>Total</b>	86,781	92,791	100,038	107,783	117,761	128,546	100.0	8.2	9.2
<b>Age</b>									
Under 15 years	637	658	674	676	677	759	0.6	3.6	12.1
15-24 years	2,755	2,698	2,758	2,861	3,023	3,102	2.4	2.4	2.6
25-34 years	7,724	7,960	8,200	8,681	9,284	9,771	7.6	4.8	5.2
35-44 years	10,981	11,700	12,479	13,460	14,779	16,163	12.6	8.0	9.4
45-54 years	13,992	14,485	15,217	16,415	18,074	19,359	15.1	6.7	7.1
55-64 years	21,111	21,956	23,253	24,445	25,783	27,796	21.6	5.7	7.8
65-74 years	20,816	23,095	25,434	27,538	30,316	33,514	26.1	10.0	10.5
75 years or over	8,765	10,239	12,023	13,707	15,825	18,082	14.1	15.6	14.3
<b>Sex</b>									
Male	46,202	48,950	52,440	56,354	61,625	67,482	52.5	7.9	9.5
Female	40,579	43,841	47,598	51,429	56,136	61,064	47.5	8.5	8.8
<b>Race</b>									
Asian	1,030	1,217	1,388	1,637	1,995	2,370	1.8	18.1	18.8
Black	28,584	31,057	34,033	37,032	40,834	44,853	34.9	9.4	9.8
White	54,403	57,595	61,465	65,580	71,083	76,995	59.9	7.2	8.3
American Indian	718	831	940	1,104	1,297	1,492	1.2	15.8	15.0
Other/unknown	2,046	2,091	2,212	2,430	2,552	2,836	2.2	6.7	11.1
<b>Diagnosis</b>									
Diabetes	15,478	18,056	20,850	23,891	28,363	33,011	25.7	16.4	16.4
Glomerulonephritis	14,994	15,927	16,891	17,756	18,959	20,024	15.6	6.0	5.6
Hypertension	19,593	21,989	24,641	27,174	30,641	34,100	26.5	11.7	11.3
Cystic kidney disease	4,537	4,739	4,910	5,001	5,138	5,270	4.1	3.0	2.6
Interstitial nephritis	3,716	4,051	4,155	4,301	4,493	4,685	3.6	4.7	4.3
Obstructive nephropathy	3,028	3,030	3,050	3,117	3,200	3,229	2.5	1.3	0.9
Other	3,792	4,314	4,845	5,298	6,055	6,759	5.3	12.3	11.6
Unknown	7,134	7,403	8,038	8,467	8,653	8,758	6.8	4.2	1.2
Missing	14,509	13,282	12,658	12,778	12,259	12,710	9.9	-2.6	3.7

NOTE: Enrollment is the number of Medicare beneficiaries with ESRD who are alive and currently entitled, as of December 31.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data are from the ESRD Program Management and Medical Information System, August 1992 update; data development by the Office of Research and Demonstrations.

Table 9.3

**Medicare end stage renal disease (ESRD) program enrollment for patients with functioning grafts,  
by demographic characteristics and primary diagnosis: Calendar years 1985-90**

Characteristics and primary diagnosis	Number of patients with functioning grafts						Percent of total in 1990	Average annual rate of change	
	1985	1986	1987	1988	1989	1990		1985-90	1989-90
<b>Total</b>	18,466	22,597	26,270	29,240	32,304	36,096	100.0	14.3	11.7
<b>Age</b>									
Under 15 years	604	694	772	820	875	909	2.5	8.5	3.9
15-24 years	1,923	2,175	2,303	2,306	2,340	2,484	6.9	5.3	6.2
25-34 years	4,993	5,857	6,347	6,577	6,919	7,411	20.5	8.2	7.1
35-44 years	5,157	6,358	7,411	8,285	9,197	10,342	28.7	14.9	12.4
45-54 years	3,588	4,484	5,473	6,332	7,061	7,883	21.8	17.0	11.6
55-64 years	1,883	2,554	3,234	3,908	4,572	5,295	14.7	23.0	15.8
65-74 years	306	456	699	972	1,279	1,687	4.7	40.7	31.9
75 years or over	12	19	31	40	61	85	0.2	47.9	39.3
<b>Sex</b>									
Male	11,652	14,270	16,499	18,183	19,984	22,219	61.6	13.8	11.2
Female	6,814	8,327	9,771	11,057	12,320	13,877	38.4	15.3	12.6
<b>Race</b>									
Asian	247	358	464	553	652	793	2.2	26.3	21.6
Black	3,404	4,138	4,738	5,332	5,839	6,479	17.9	13.7	11.0
White	14,417	17,663	20,575	22,785	25,174	28,094	77.8	14.3	11.6
American Indian	168	199	240	280	326	370	1.0	17.1	13.5
Other/unknown	230	239	253	290	313	360	1.0	9.4	15.0
<b>Diagnosis</b>									
Diabetes	2,863	3,780	4,574	5,231	5,996	6,893	19.1	19.2	15.0
Glomerulonephritis	5,080	6,168	7,199	7,938	8,667	9,671	26.8	13.7	11.6
Hypertension	1,933	2,471	2,968	3,463	3,858	4,386	12.2	17.8	13.7
Cystic kidney disease	1,001	1,331	1,683	2,026	2,280	2,638	7.3	21.4	15.7
Interstitial nephritis	789	969	1,143	1,257	1,392	1,554	4.3	14.5	11.6
Obstructive nephropathy	594	692	755	782	839	916	2.5	9.0	9.2
Other	1,095	1,443	1,687	1,945	2,224	2,527	7.0	18.2	13.6
Unknown	1,773	2,132	2,414	2,479	2,556	2,676	7.4	8.6	4.7
Missing	3,338	3,611	3,847	4,119	4,492	4,835	13.4	7.7	7.6

NOTE: Enrollment is the number of Medicare beneficiaries with ESRD who are alive and currently entitled, as of December 31.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data are from the ESRD Program Management and Medical Information System, August 1992 update; data development by the Office of Research and Demonstrations.

- Males comprised 52.5 percent of all dialysis enrollees; however, the number of female patients has been increasing slightly faster than the number of men with AARCs since 1985 with 8.5 and 7.9 percent, respectively.
- Dialysis patients are predominately of the white race, but persons of all other races comprise 37.9 percent of the total. Among the other races, 92.1 percent are black with the rest consisting of Asian Americans and Native Americans. Black people represent a larger share of the dialysis population than the U.S. population because they are more likely than white people of similar age and sex to become ESRD and they are less likely to receive a transplant.
- The three most common causes of ESRD for dialysis patients are hypertension (26.5 percent), diabetes (25.7 percent), and glomerulonephritis (15.6 percent). Other kidney diseases comprise most of the remaining patients for whom a primary disease was assigned. Diabetes and hypertension, which are diseases that disproportionately affect older and black Americans, are two of the fastest growing causes of ESRD with AARCs during the period 1985-90, 16.4 and 11.7 percent, respectively.

Table 9.3 shows the breakdown of the ESRD population treated with a functioning kidney graft as of December 31, 1990, by age, race, sex, and cause of renal failure.

- On December 31, 1990, there were 36,096 Medicare ESRD beneficiaries with functioning kidney grafts. This is a 14.3-percent AARC increase from December 31, 1985 and a 11.7-percent increase from the previous year.
- Most functioning graft patients are younger than age 55 (80.4 percent). Medicare participants with functioning grafts are younger than dialysis patients.
- The fastest growth in the functioning graft population is among persons 65 years of age or over. During the period 1985-90 groups between the age of 65-74 and age 75 or over increased by 40.7 and 47.9 percent annually, respectively. This rapid growth is due in part to an increasing proportion of transplants going to older persons. However, persons 65 years or over represent only 4.9 percent of Medicare ESRD beneficiaries with a functioning graft.
- Pediatric patients younger than 16 years of age are a numerically small group, but these patients require

careful medical care to ensure they achieve normal growth and development. 54.5 percent of Medicare pediatric ESRD patients were on a functioning graft in 1990. This is an improvement from 1985 when only 48.7 percent had a functioning graft.

- Males comprised 61.6 percent of all functioning graft enrollees on December 31, 1990. The number of female functioning graft patients increased faster than the number of males since 1985 with AARCs of 15.3 percent and 13.8 percent, respectively.
- White people comprise 77.8 percent of the functioning graft population. Of persons other than white, 84.8 percent are black; the rest consist of Asian Americans and Native Americans. As previously mentioned, 59.9 percent of the dialysis population consist of white persons.
- The three most common primary diseases for ESRD patients with functioning grafts are hypertension (12.2 percent), diabetes (19.1 percent), and glomerulonephritis (26.8 percent). Glomerulonephritis and other kidney disease patients are more likely to be treated by a graft kidney than dialysis because they tend to be younger and in better health than diabetic or hypertensive ESRD patients.

Table 9.4 shows Medicare expenditures per calendar year for beneficiaries with ESRD. The person counts in Table 9.4 differ from those in previous tables in this chapter because they are ever-enrolled. That is they include beneficiaries who were ESRD for any portion of the calendar year. Because of the high incidence and death rates among the ESRD population, the number of persons with ESRD enrolled in Medicare one or more days during the year is substantially larger than the enrollment as of December 31 discussed earlier.

ESRD patients have been classified into four treatment groups based on their methods of treatment during the entire calendar year, or that part of the calendar year in which they were alive with ESRD if that is less than the entire year. Persons who received dialysis the entire part of the year they were ESRD are classified as a dialysis patient. Anyone receiving a transplant is a transplant recipient. Graft failure patients include anyone with a graft failure whose transplant proceeded that calendar year. Finally, functioning graft patients had a functioning graft kidney the entire calendar year, or that part of the year that they were alive with ESRD.

The costs in Table 9.4 are for all Medicare reimbursements on the patient's behalf during the calendar year. For example, costs for transplant patients include not only the reimbursements for the transplant procedure, but also for dialysis for the part of the year before the transplant and for medical services unrelated to ESRD. Expenditures are categorized by the type of service. Inpatient expenditures cover short stay hospitalizations. Outpatient services are those billed under Part B and include most dialysis charges. Physician and supplier charges are bills from physicians and from suppliers of medical supplies and drugs. Other consists of charges for skilled nursing facilities and home health services.

- Medicare expenditures for all ESRD patients were \$5,228 million in 1990. Expenditures have grown at an average annual rate of 14.3 percent since 1985.
- As a result of the provision of the drug erythropoietin (EPO) to patients on dialysis, expenditures have increased at a faster rate since 1988. Outpatient expenditures for dialysis patients grew 21.1 percent during the 1989-90 period compared with an AARC of 10.2 percent for the pre-EPO period 1985-88. Medicare outpatient reimbursements for EPO were \$213 million in 1990.
- Outpatient costs generally grew at a slower rate than did other types of expenditures. Except for functioning graft patients, dialysis treatment payments are the major component of outpatient costs, and the dialysis composite rate was decreased slightly during the 1985-90 period.
- Dialysis patients consumed \$4,399 million or 84.1 percent of total 1990 Medicare ESRD expenditures. Transplant patients required \$546 million, or 10.4 percent of the total. Functioning graft and graft failure patients used \$214 million and \$70 million, or 4.1 and 1.3 percent, respectively.
- Functioning graft patients had the fastest growing Medicare expenditures with an AARC of 19.5 percent during 1985-90. This in part reflects the increase in the number of patients with functioning grafts during the period. Transplant patient costs grew the least, at a 9.1 percent rate.

Table 9.5 gives the number of beneficiaries and estimated per person expenditures for calendar years 1985-90. The number of beneficiaries is less than in Table 9.4 because it includes only persons with a full year of Medicare entitlement prior to January 1. This restriction excludes most patients for whom Medicare is a secondary insurer. Medicare is a secondary payer for patients eligible solely due to ESRD for 1 year following the onset of ESRD. These patients will be eligible for Medicare, but Medicare may pay only a small proportion of their medical costs if they have other employment-based insurance coverage. Including them in the calculation of per-beneficiary Medicare costs would cause the results to be too low. The exclusion of potential Medicare secondary payer beneficiaries has the greatest impact on the transplant population since many younger patients receive transplants during their first year of Medicare coverage.

The average per person Medicare reimbursements are not easily comparable across treatment and expenditure categories. Population demographics differ among the different treatment groups. For example, dialysis patients as a group are older and more likely to have other serious chronic diseases, which are factors likely to raise per person costs. However, dialysis patients on average live fewer days per calendar year so that the costs in the table are for fewer person-days. For example, the dialysis patients in Table 9.5 survived an average of 293 days in 1990 compared with 352 for transplant patients, 348 for functioning graft, and 331 for graft failure patients. Finally, some medical services are not covered by Medicare and the proportion of

Table 9.4

**Medicare end stage renal disease (ESRD) program expenditures, by type of service within patient treatment group: Calendar years 1985-90**

Type of service within treatment group	1985	1986	1987	1988	1989	1990	Percent of total in 1990	Average annual rate of change	
								1985-90	1989-90
<b>All ESRD patients</b>									
Number of persons	125,378	136,957	148,771	164,880	179,734	196,200	100.0	9.4	9.2
Expenditures in millions:									
Total	\$2,680.1	\$3,108.6	\$3,441.7	\$3,842.0	\$4,525.9	\$5,227.6	100.0	14.3	15.5
Inpatient	1,215.7	1,434.9	1,565.4	1,741.5	2,085.5	2,357.3	45.1	14.2	13.0
Outpatient	957.3	1,076.6	1,177.4	1,287.1	1,418.1	1,713.2	32.8	12.3	20.8
Physician and supplier	492.5	581.1	682.0	793.7	995.9	1,111.1	21.3	17.7	11.6
Other	14.7	16.0	17.0	20.0	26.4	45.9	0.9	25.6	73.8
<b>Dialysis</b>									
Number of persons	101,951	109,060	116,858	129,722	141,852	154,653	78.8	8.7	9.0
Expenditures in millions:									
Total	\$2,204.8	\$2,513.9	\$2,796.6	\$3,184.4	\$3,791.6	\$4,398.7	100.0	14.8	16.0
Inpatient	866.4	996.0	1,098.8	1,277.5	1,569.0	1,776.2	40.4	15.4	13.2
Outpatient	898.5	1,004.9	1,097.8	1,202.5	1,328.6	1,608.5	36.6	12.4	21.1
Physician and supplier	426.6	498.8	585.2	687.0	870.8	973.2	22.1	17.9	11.8
Other	13.5	14.1	14.8	17.4	23.3	40.7	0.9	24.7	74.8
<b>Transplant</b>									
Number of persons	7,026	8,274	8,235	8,102	8,104	8,885	4.5	4.8	9.6
Expenditures in millions:									
Total	\$353.9	\$441.9	\$457.0	\$442.5	\$474.1	\$545.8	100.0	9.1	15.1
Inpatient	270.8	340.6	350.7	332.8	357.9	411.4	75.4	8.7	15.0
Outpatient	40.4	48.9	50.2	51.1	51.0	62.2	11.4	9.0	22.0
Physician and supplier	42.4	51.7	55.6	57.9	64.5	70.9	13.0	10.8	10.0
Other	0.4	0.6	0.6	0.7	0.7	1.2	0.2	25.5	72.5
<b>Functioning graft</b>									
Number of persons	15,298	18,408	22,181	25,425	27,912	30,774	15.7	15.0	10.3
Expenditures in millions:									
Total	\$87.5	\$113.3	\$137.1	\$157.5	\$188.0	\$213.5	100.0	19.5	13.6
Inpatient	59.5	75.7	86.7	97.5	116.0	130.5	61.1	17.0	12.5
Outpatient	9.6	12.9	17.0	20.3	23.4	25.9	12.1	21.9	10.6
Physician and supplier	17.7	23.6	32.0	38.0	46.5	53.5	25.1	24.8	15.1
Other	0.8	1.1	1.4	1.7	2.1	3.7	1.7	35.6	72.7
<b>Graft failure</b>									
Number of persons	1,103	1,215	1,497	1,631	1,866	1,888	1.0	11.3	1.2
Expenditures in millions:									
Total	\$33.8	\$39.4	\$51.0	\$57.7	\$72.1	\$69.5	100.0	15.5	-3.6
Inpatient	19.1	22.5	29.2	33.5	42.6	39.3	56.6	15.5	-7.7
Outpatient	8.8	9.8	12.4	13.2	15.1	16.5	23.7	13.4	8.9
Physician and supplier	5.9	6.9	9.2	10.8	14.2	13.4	19.3	17.9	-5.3
Other	0.1	0.2	0.1	0.2	0.2	0.3	0.3	23.0	24.3

NOTES: Patients are categorized by treatment method during the calendar year. Dialysis patients, for example, are those receiving dialysis the entire year (or the entire part of the year they have ESRD).

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data are from the ESRD Program Management and Medical Information System, August 1992 update; data development by the Office of Research and Demonstrations.

Table 9.5

**Medicare end stage renal disease (ESRD) program expenditures per person<sup>1</sup>, by patient treatment group: Calendar years 1985-90**

Type of service within treatment groups	1985	1986	1987	1988	1989	1990	Percent of total in 1990	Average annual rate of change	
								1985-90	1989-90
<b>All ESRD patients</b>									
Number of persons	90,975	99,769	108,474	119,885	132,001	144,597	100.0	9.7	9.5
Expenditures per person:									
Total	\$23,479	\$24,957	\$25,501	\$25,879	\$27,823	\$29,497	100.0	4.7	6.0
Inpatient	10,177	11,087	11,190	11,429	12,555	13,065	44.3	5.1	4.1
Outpatient	8,774	8,999	9,057	8,929	8,917	9,831	33.3	2.3	10.3
Physician and supplier	4,392	4,737	5,122	5,383	6,182	6,331	21.5	7.6	2.4
Other	136	134	132	139	170	271	0.9	14.8	59.4
<b>Dialysis</b>									
Number of persons	72,946	78,228	83,751	91,904	100,926	110,195	76.2	8.6	9.2
Expenditures per person:									
Total	\$25,007	\$26,700	\$27,891	\$28,716	\$31,159	\$33,165	100.0	5.8	6.4
Inpatient	9,644	10,443	10,890	11,429	12,831	13,341	40.2	6.7	4.0
Outpatient	10,355	10,810	11,040	10,963	10,984	12,167	36.7	3.3	10.8
Physician and supplier	4,852	5,296	5,812	6,165	7,149	7,344	22.1	8.6	2.7
Other	155	152	149	158	196	313	0.9	15.1	59.7
<b>Transplant</b>									
Number of persons	3,288	3,876	3,729	3,787	3,892	4,379	3.0	5.9	15.5
Expenditures per person:									
Total	\$61,669	\$68,036	\$70,559	\$72,051	\$76,435	\$79,955	100.0	5.3	4.6
Inpatient	46,130	51,731	53,128	53,622	57,135	59,878	74.9	5.4	4.8
Outpatient	8,039	8,270	8,597	8,895	8,886	9,664	12.1	3.8	8.8
Physician and supplier	7,426	7,936	8,731	9,417	10,290	10,221	12.8	6.6	-0.7
Other	73	99	104	117	124	191	0.2	21.2	54.0
<b>Functioning graft</b>									
Number of persons	13,788	16,627	19,721	22,843	25,657	28,404	19.6	15.6	10.7
Expenditures per person:									
Total	\$5,733	\$6,160	\$6,184	\$6,138	\$6,756	\$6,930	100.0	3.9	2.6
Inpatient	3,901	4,120	3,935	3,817	4,184	4,250	61.3	1.7	1.6
Outpatient	621	694	754	780	826	823	11.9	5.8	-0.4
Physician and supplier	1,157	1,287	1,431	1,476	1,668	1,734	25.0	8.4	4.0
Other	54	59	65	65	78	123	1.8	17.9	57.7
<b>Graft failure</b>									
Number of persons	953	1,038	1,273	1,351	1,626	1,619	1.1	11.2	-0.4
Expenditures per person:									
Total	\$31,436	\$33,802	\$35,541	\$37,304	\$39,837	\$39,333	100.0	4.6	-1.3
Inpatient	17,666	19,416	20,534	21,812	23,502	22,316	56.7	4.8	-5.0
Outpatient	8,190	8,293	8,572	8,486	8,425	9,333	23.7	2.6	10.8
Physician and supplier	5,507	5,932	6,333	6,897	7,782	7,525	19.1	6.4	-3.3
Other	74	161	103	109	128	159	0.4	16.5	24.2

<sup>1</sup>Excludes Medicare secondary payer patients.

NOTES: Patients are categorized by the treatment method during the calendar year. Dialysis patients, for example, are those receiving dialysis the entire year (or the entire part of the year they have ESRD).

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data are from the Medicare Decision Support System; data development by the Office of Research and Demonstrations.

charges which Medicare reimburses differs across cost categories.

- The average Medicare ESRD beneficiary cost was \$29,497 in 1990. This is a 4.7 percent per year increase over 1985.
- Transplant recipients were most costly for Medicare in 1990 at \$79,955. However, successful transplants—that is functioning graft patients—were the least expensive at \$6,930. Patients experiencing a graft failure cost \$39,333 and dialysis patients \$33,165.
- The fastest growing expenditure categories are for other and for physician or supplier services. These are the two areas where few charges are capitated or prospectively determined. (Physician supervision of dialysis is capitated, but even for dialysis patients monthly capitation payment charges are a minority of physician or supplier costs.) As previously mentioned, much of the increase in outpatient reimbursements in 1989-90 for outpatient services is due to the drug EPO.

## Conclusion

The number of persons diagnosed and treated for ESRD has increased rapidly since the inception of the Medicare ESRD program. Between 1978 and 1990, the number of ESRD program beneficiaries has grown at an AARC of 11.6 percent. It is not clear why the number of ESRD patients is growing so much faster than is the U.S. population. The rate of increase is highest among the elderly (age 65-74) and the most elderly (ages 75 or over); among females and persons other than white; and among persons whose primary cause of renal failure is diabetes or hypertension. The ESRD population is becoming older with more serious comorbidities.

The combined effect of more transplantations and a higher graft survival rate is shifting the ESRD population from one primarily dependent on dialysis to one increasingly composed of patients with functioning grafts. The proportion of ESRD beneficiaries with a functioning graft grew from 10.9 percent in 1978 to 21.9 percent in 1990. For ESRD patients under 35 years, 44.2 percent had a functioning graft in 1990.

It is generally considered that kidney transplantation produces a clinical outcome superior to that of maintenance dialysis for the following reasons:

- Pediatric patients are better able to grow and develop with a graft.
- The quality of life is better with a functioning graft.
- Transplantation is more cost effective than dialysis.

Despite the high initial cost of transplantation, long-term Medicare expenditures may be lower than those of dialysis since patients on dialysis require more medical care per year than do functioning graft patients.

The rate of growth in the number of ESRD beneficiaries with a functioning graft has declined in recent years, primarily because a shortage of kidneys has limited growth in the number of transplants. During the period 1986-89, the number of transplants actually declined slightly. Despite the slow increase in transplants, the number of functioning graft enrollees grew at an AARC of 14.3 percent during 1985-90. This growth is believed to be due to the relatively low mortality rate of functioning graft patients and improvements in graft survival due to improved immunosuppression.

The ESRD program has a high cost, both in aggregate and per person treated. The cost to Medicare for providing medical care to ESRD patients was approximately \$5.2 billion in 1990. The average annual expenditure per ESRD user (\$29,497) was almost 8 times higher than that for all persons served by Medicare (\$3,743).

Not only is the cost of the Medicare ESRD program high, it is growing. During the period 1985-90, ESRD program costs grew at an AARC of 14.3 percent. However, expenditures per ESRD patient grew at an AARC of 4.7 percent. Expenditures per beneficiary for all Medicare participants grew at an AARC of 7.6 percent. Total ESRD costs grew mainly because of an increase in the number of ESRD patients, with price inflation held to low levels. Medicare pays for dialysis and physician supervision of dialysis patients using fixed amount or capitated payment rates rather than fee-for-service rates. This has allowed Medicare to minimize price inflation for these costly services.