Chapter X

The Economic Cost of ESRD and Medicare Spending for Alternative Modalities of Treatment

Key Words:
Transplantation
Physician specialty
Peritoneal dialysis cost
Cost of ESRD
Geographic variations
Hemodialysis cost
Medicare claims
Physician and supplier files
Consumer price index

This 1999 Annual Data Report (ADR) of the USRDS updates last year's analysis of 1) the economic cost of End-Stage Renal Disease (ESRD), 2) Medicare spending for different treatment modalities, and 3) Medicare spending by physician specialty and supplier type (e.g., medical supply company, ambulance, laboratory). Data are reported through the end of 1997. In addition to updating previously reported information, data on the interstate variation of Medicare spending are reported for the first time. The results are reported in four sections of this chapter.

In the first section, financial expenditures for direct patient care, we present estimates of the total monetary cost of care for patients in the United States with ESRD for the years 1993-1997. In addition, we discuss recent shifts and trends in these cost estimates. These total direct cost estimates are derived from paid Medicare claims and other estimates including private resource use for direct patient care. Therefore, these cost estimates take the perspective of the payers.

The second section, Medicare spending by treatment modality, provides estimates of spending (payments) per time at risk for hemodialysis, peritoneal dialysis, other dialysis and transplant stratified by several patient characteristics. The assignment of treatment modality was done on an "intention-to-treat" basis. That is, a modality is defined at study start and this assignment does not change if the patient switches to another modality (the only exception to this rule is that modality is redefined to transplant for dialysis patients who receive a kidney transplant). The rationale for the intention-to-treat approach is to avoid "blaming" the subsequent modality for high costs associated with a switch. For example, patients whose transplants fail causing a return to dialysis can have very high costs associated with the adverse events leading to the switch. An "as-treated" approach that defines modality by the modality actually in use at any point in time would attribute these high costs to the new modality rather than to the failed modality that led to the high costs in the first place. For example, the as-treated approach would underestimate the expected costs of transplantation because it would only include patients whose grafts had not failed and any costs of transplant-related complications that accrue after

switch to dialysis would be treated just as if they were actually a complication of dialysis.

The data in this study are derived from the USRDS database which contains information from the Medicare payment records as well as extensive epidemiological patient histories. The objective is to compare and contrast Medicare reimbursements (payments) per time at risk for different modalities of renal replacement therapy and different patient characteristics. The results provide information that would be useful in the determination of "capitation" payment rates, i.e., rates of spending per patient per time at risk. However, because these results do not provide simultaneous comparisons of survival and costs across treatment modalities and are not estimated with consideration for lifetime costs, they are insufficient to determine the cost effectiveness of different treatment modalities. Further, because modalities are not randomly assigned, it is likely that patients who are healthier or sicker than average systematically select different modalities.

The third section of the report, spending by physician specialty and supplier type, provides estimates of spending by provider type for the years 1993-1997. Such information can be useful in understanding care patterns for ESRD patients as well as to inform managed care organizations or physicians/suppliers who are considering entering into capitated arrangements for specialty services. (Essentially, physician/supplier spending represents the non-institutional component of Medicare Part B. Note that these "physician/supplier" data do not represent the entirety of Medicare Part B spending. Much of Medicare Part B spending, e.g., outpatient dialysis and most EPO, appears under the Institutional heading in Table X-1).

In the fourth section, interstate variation in Medicare expenditures, we report for the first time information on geographic spending patterns. These data use the intent-to-treat model to demonstrate substantial interstate variation in spending per patient year at risk in aggregate and by type of spending and renal replacement modality.

In the 1998 ADR, an error was made in Figure X-1, "Estimated Total U.S. ESRD Costs, 1996." The "other Medicare payments" (education, capital, and malpractice costs), part of the second bar, was included in both the first and second bars of that figure. They should have been excluded from the second bar. The second bar should have been comprised of donor acquisition and HMO costs, totaling $.45 billion. This reduces the estimated total direct cost to $14.2 billion, as opposed to $14.55 billion which was reported.

Methods

These studies analyze Medicare costs (equivalently, reimbursements or spending) for patients treated with hemodialysis, CAPD/CCPD, or a renal transplant. The primary focus is ESRD patients prevalent on January 1, 1993, or incident at any time during 1993, 1994, 1995, 1996, or 1997. Patient age, gender, race, and cause of ESRD were obtained from the USRDS database. Treatment modality was determined using the Modality Sequence file from the USRDS database (see Chapter XIII). A secondary analysis focuses on total spending for 1997.

Data Sources

The total cost of medical care for ESRD patients was estimated by combining the claims paid for ESRD patients insured by Medicare with other cost estimates of resource use outside the Medicare paid claims files. These other estimates included: 1) Medicare payments for ESRD patients not captured by the paid claims system (e.g., Medicare HMO payments), 2) Medicare patient obligations (copayments and deductibles), 3) payments for patients enrolled in Employer Group Health Plans (EGHP) for whom Medicare is the "Secondary Payer" (MSP) for insurance, and 4) payments for ESRD patients residing in the United States who were not insured by Medicare.

Medicare paid claims, used in all of the analyses reported in this chapter, were obtained from HCFA Standard Analysis Files (SAF; HCFA 1993). These files are constructed for each year of service (determined by the service "to date" listed on the paid claim, where applicable) and are based on all final paid claims listed in the Common Working File by the end of July of the following year (HCFA 1993). The SAFs are organized by year and include all Medicare patients (whether ESRD or not). The analyses reported in this chapter used the SAFs for the calendar years 1993-1997.

In order to identify all Medicare ESRD patients, a "finder file" was constructed that separated claims for ESRD patients from all other Medicare patients. This finder file, constructed from the patient identification numbers (IDs) in HCFA's REBUS, yielded 608,282 patient IDs for the period 1977-97 after screening out

Total Medicare Payments for ESRD by Source of Claim, 1993-97

Category of Spending by Source of Claim	1997 Total SAF Payments[a] No Restrictions[b] $Millions	Medicare Spending[c] $/Year at Risk Intent-to-Treat 1993-97	1997
Patient years at risk (YAR)	*N.A.*	*899,199*	*206,942*
Total Medicare Payments^	**$10,765**	**$42,853**	**$44,764**
Total - Institutional^	**8,733**	**34,614**	**36,226**
Inpatient^	4,142	16,187	16,583
Non-transplant inpatient^	3,811	14,602	15,236
Transplant inpatient^	188	933	788
Outpatient Institutional	440	1,684	1,841
Skilled Nursing Facility	279	816	1,161
Home Health Agency	384	1,318	1,579
Hospice	12	32	39
All Dialysis - Institutional	3,476	14,576	15,023
Hemodialysis - Institutional	3,202	13,269	13,879
Perit Dial - Institutional	268	1,279	1,115
Other Dial- Institutional	6	28	29
Total - Physician/Supplier (Part B)	**2,032**	**8,239**	**8,538**
Dialysis Physician/Supplier	236	1,086	967
Total Hemo - Physician/Supplier	107	529	441
Hemodialysis - Physician/Supplier	93	443	387
Hemodialysis - Home Supply	14	86	55
Total PD - Physician/Supplier	129	558	526
Non-dialysis - Physician/Supplier	1,796	7,153	7,571
PD Catheter - Physician/Supplier	2	12	9
Capitation - Physician/Supplier	343	1,311	1,463
Vascular Access - Physician/Supplier	127	564	533
Transplant - Physician/Supplier	20	105	151
Immunosuppresive - Physician/Supplier	55	146	241
Parenteral Nutrition	9	173	37
Other Surgical - Physician/Supplier	246	955	1,008
Other Medical - Physician/Supplier	297	1,069	1,204
Transportation - Physician/Supplier	196	844	838
Diag Lab/Rad - Physician/Supplier	296	1,272	1,246
DME - Physician/Supplier	106	342	440
Other Physician/Supplier	97	354	397

^ with Hospital Pass Through; Medicare payments added to the DRG amount including kidney acquisition costs, medical malpractice insurance and medical education cost.

[a] 318,008 patients

[b] No Restrictions on Medicare Secondary Payer or $/Month

[c] Excludes Medicare Secondary Payer

Source: Reference Tables K.1 and K.6.

USRDS 1999

Table X-1

deaths occurring before 1/1/93. Changes in patient IDs were tracked using information included in HCFA's Enrollment Database (HCFA 1993). SAF (paid, final) claims were extracted for 583,915 patients in the 1993-97 period.

The SAFs are comprised of 7 files with claims classified as (originating from): 1) inpatient institutional, 2) outpatient institutional, 3) skilled nursing facility, 4) hospice, 5) home health agency, 6) physician and other supplier, and 7) durable medical

equipment, which includes dialysis supplies, parenteral nutrition claims, iron supplement claims, and claims for immunosuppressives administration and supplies.

These SAF files, as selected by the finder file, contain claims for 583,915 patients and 1,171,796 patient years at risk during 1993-97. Using these estimates, Medicare spending for the 1993-97 period totaled $44.93 billion for all Medicare ESRD beneficiaries (both those for whom Medicare is the primary insurer and those for whom Medicare is the secondary insurer) and including the "pass through" on inpatient claims (discussed below).

Classification of Payments

For the purposes of this chapter (and in Reference Tables K), payments have been classified as shown in Table X-1). For institutional claims, claims from the Inpatient HCFA SAF are categorized as Non-Transplant Inpatient if they have a DRG other than 302 and as Transplant Inpatient if they have a DRG of 302. Claims from the HCFA Outpatient Institutional SAF are categorized as Outpatient Institutional if they were not submitted by a dialysis center (i.e., their revenue center code is not Hemodialysis - Institutional, Peritoneal Dialysis - Institutional, or Other Dialysis – Institutional). Note that payments for ancillary services such as EPO that were included in these institutional claims cannot be separated from other institutional costs. The Skilled Nursing Facility, Home Health Agency, and Hospice categories are based on the HCFA SAF from which they are derived.

Physician/supplier claims are categorized based on the HCFA Common Procedure Coding System (HCPCS) with the following refinements: if the HCPCS code indicates that the claim is for dialysis and the HCFA Service Code indicates that the claim is for monthly capitation payments the claim is categorized as capitation; if the HCPCS code indicates that the claim is for dialysis supplies (hemodialysis or peritoneal dialysis), the HCFA place of service code is used to separate the dialysis supply claims into home supplies vs. unit supplies; for claims whose HCPCS codes are not ESRD specific (i.e., claims that are not for dialysis, dialysis supplies, EPO, immunosuppressive drugs, PD catheter related, transplant, vascular access, parenteral nutrition, ESRD capitation, and iron supplies or administration), claims are categorized based on HCPCS (for transportation, diagnostic laboratory or radiology, and durable medical equipment), and on the HCFA service code (for Other Surgery, Other Medical Treatment, and Other Charges). Note that for some types of spending that would be eligible to appear in physician/supplier categories, most of the actual Medicare payments are embedded in the institutional paid claims files. The leading example is EPO payments, which are part of the institutional payments to dialysis units for dialysis rather than appearing in the physician/supplier files or separately in the institutional claims.

Patient Eligibility

For patients incident during any calendar year, only costs occurring on or after the first day of ESRD (as defined in the PMMIS) were included. That is, pre-ESRD Medicare spending and pre-ESRD time at risk were not included in calculating total Medicare spending or time at risk in either the total spending or in the intent-to-treat analysis. Likewise, patients whose ESRD start date occurred during a hospitalization had a linearly pro-rated portion of the costs for that hospitalization allocated to the ESRD period. The exception is transplantation. If the first ESRD service is a kidney transplant then the entire hospital stay is included as a cost even if the first reported day of ESRD occurs during that hospital stay.

The study start date for a patient in the intent-to-treat analysis (limited to 1993-97) was defined as the latest of the following:

- January 1, 1993.
- The first ESRD service date in the USRDS database for the patient.
- For dialysis patients, the beginning of any 1-month period in which the Medicare paid amount for outpatient dialysis was $675 or more (see below for an explanation of the $675 threshold).

The last constraint was designed to exclude patients who were likely to have a Medicare Secondary Payer status even though the Medicare Enrollment Database did not identify them as such**.** This exclusion eliminates patients for whom the Medicare paid claims files are likely to provide a very incomplete picture of total medical spending.

Patients with MSP status on or at any time following the study start date (identified from the Medicare Enrollment Database) were excluded from the intent-to-treat analysis because it is impossible to characterize their total costs of care from payments by Medicare. These patients were treated separately.

Dialysis patients with insufficient activity (defined for outpatient dialysis as less than $675/month for three consecutive months) are censored as lost to followup at the end of the 3-month period. This limit of $675 per month would cover 6 to 7 dialysis treatments. This threshold was chosen because patients would normally be expected to have 12-13 treatments per month and even a patient who dialyses only twice per week would have at least 8 treatments monthly. Thus, a patient that does not meet this billing threshold is unlikely to have Medicare as his/her primary payer. This threshold was at the 10th percentile of Medicare dialysis spending (institutional outpatient plus physician and other suppliers) for all patients. We do not apply a minimum spending threshold to transplant patients because, unlike dialysis, low spending does not necessarily indicate that the Medicare claims files are not capturing all of the patient's care.

In the intent-to-treat analysis, patients entered the study only once during the 1993-97 period, with the exception of transplant patients. Dialysis patients who received a transplant during the study period were censored at the transplant date and were then moved into a separate record as a transplant patient. All payments on paid claims for inpatient transplantation were added to the transplant cost record even though the inpatient stay may have begun during a period also covered by the dialysis record. Patients who had a functioning transplant at the start of the study window were kept in that modality until death or end of study, regardless of any modality changes. Dialysis patients were removed from the analysis at the earliest of: death; 12/31/97; transplant (censored); 3 months with less than $675 dialysis activity (censored). Patient periods at risk were determined by the "from" and "to" dates on the payment records. Unless noted otherwise, periods at risk for mortality and incurred costs were determined for each year with patients frequently counted in more than 1 year.

Separate analyses were also performed for each year. Each of these annual analyses also enlisted patients only once during the period, again except for transplant patients as described above. Patients who had any period of MSP status, as reported in HCFA's Enrollment Database between 1993 and 1997, were treated separately. Patients without any reported MSP during the 1993-97 period were entered into the "primary" intent-to-treat group. For both the primary intent-to-treat group and the MSP group, Medicare payments and survival times were aggregated separately but for identical periods at risk from 1993 through 1997.

For the section on physician/supplier costs, patients were excluded if they were known to have MSP status. Dialysis patients were also excluded if their Part B costs were less than $675 per year. If Medicare were the primary payer for these patients, the monthly capitation payment for dialysis-related nephrology care should place the patient above this threshold in about four months even if they received no other Part B services. These exclusions served to remove patients for whom the Medicare paid claims files are likely to miss a substantial fraction of their medical expenditures.

Cost Measurement Issues

HCFA estimates that the SAF files include 98 percent of paid claims in a given year (HCFA 1993, Section E2, page 15). To account for this, the total dollar amount of SAF claims, as reported in Figure X-1, were raised by 2 percent. In order to maintain comparability to the Reference Tables, all other reported statistics are not adjusted for this undercount in the SAFs. As was done for the first time in the 1998 ADR, inpatient institutional spending includes the Medicare "pass through" payments to hospitals for cost-based items such as medical education, capital investments, and malpractice insurance. These pass-through data were used in the estimates of total costs of ESRD care (the first subsection of the results), but were not used in the intent-to-treat model (the last three subsections of the results).

Patient financial obligations to Medicare, i.e., the coinsurance and deductible, were estimated as 18 percent of the sum of Medicare payments and patient obligations (see the 1995 ADR, Chapter X). Medicare rules for patient obligations are complicated, but generally include a nominal deductible (approximately $100 per year) along with a 20 percent co-payment for approved outpatient charges (Part B). Inpatient (Part A) services require a deductible which approximates the allowable charge for the first hospital day. Additional patient obligations accrue for hospital stays longer than 60 days.

Kidney donor acquisition costs are not paid by Medicare through the fee-for-service DRG claims process and therefore are not directly included in the HCFA SAFs. Medicare pays these charges by inflating the cost of all Medicare inpatient stays (both ESRD and non-ESRD) by an amount equal to the

institutional acquisition cost for all Medicare transplants and other "pass through" amounts. We estimated the Medicare payments for donor acquisitions as $25,000 per acquisition for the 8,000 kidney transplants. The latter was the sum of paid claims for Medicare kidney transplants as recorded in the PMMIS files (6/95). The estimate of $25,000 per donor acquisition was made through detailed examination of the annual Hospital Cost Reports filed with HCFA (personal communication, Paul Eggers, Ph.D.). We assumed an increase of 5 percent per year in total acquisition costs from 1993-97.

Also excluded from the claims process recorded in the HCFA SAFs are charges submitted by Health Maintenance Organizations (HMO) treating ESRD patients. We have estimated these Medicare payments as: [14,000 patients * (the sum of the Part A and Part B Adjusted Average Per Capita Costs (AAPCC) per month) * 12]. We used the 1995 AAPCC of $1,438 per month (Part A Medicare) and $2,040 per month (Part B Medicare) (HCFA, 1995). The 14,000 HMO patient count per year is only approximate (personal communication, Paul Eggers, Ph.D.).

Medicare makes separate payments to inpatient institutions for malpractice insurance, education, capital, and organ acquisition i.e., "pass through payments". Organ acquisition costs were estimated as described above. Estimates for the other three items are based on a pass through per diem amount and a count of covered days provided in the inpatient SAF.

Payments by Employer Group Health Insurance Plans are private (non-Federal) payments for Medicare ESRD patients and are not reported in the SAFs. We estimated these payments as follows: from the HCFA Enrollment Database, we identified the subset of Medicare patients recorded as being insured under a Medicare Secondary Payer for either all or part of the time they were included in the intent-to-treat analysis. Furthermore, some dialysis patients, though not identified in the HCFA Enrollment Database as having Medicare Secondary Payer status,

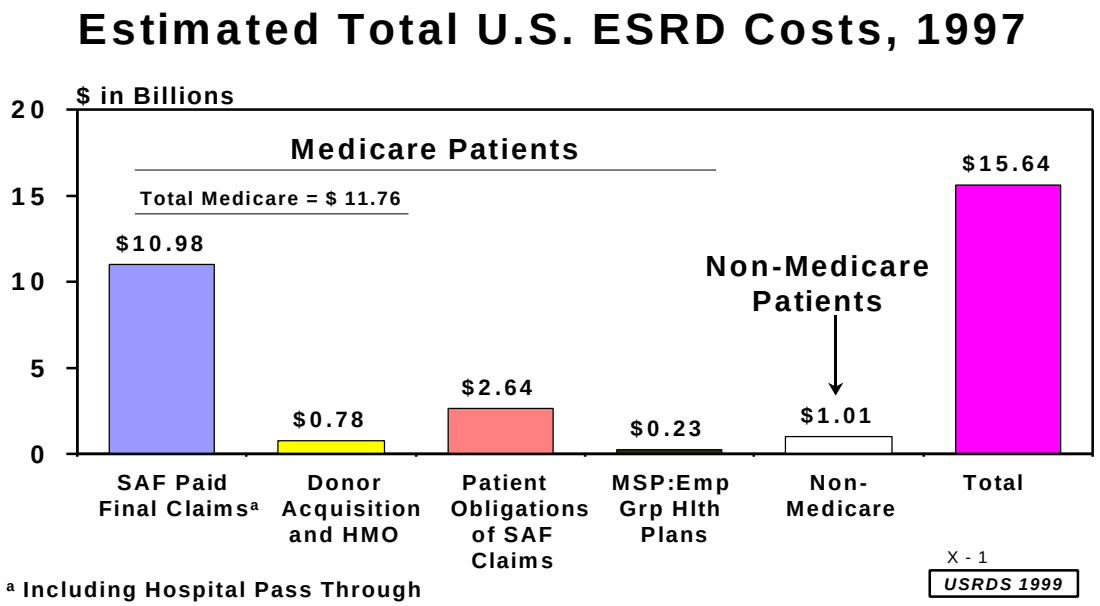

Figure X-1

Estimated total direct monetary cost of treating ESRD in the United States, 1997. Separate estimates of cost are reported according to patient eligibility for Medicare insurance. The estimated cost of treating Medicare ESRD patients includes the following components: total Medicare payments from the HCFA Standard Analysis File (SAF) claims; estimated Medicare payments for organ donor acquisition and for patients enrolled in a Health Maintenance Organization (HMO); patient obligations of Medicare claims; and payments by private sources for patients who are covered by an employer group health plan and for whom Medicare is a secondary insurance payer (MSP). Source: Reference Table K.1 and Special Analysis.

have very low dialysis billings in the HCFA claims database (see the discussion of study start time for the intent-to-treat analysis). Thus, it is likely that some MSP patients are not identified in the enrollment database and the EGHP payments identified here represent a very conservative estimate of private health insurance payments.

For these analyses, we assessed their Medicare payments per year at risk. We then calculated the difference between the average Medicare payments per year at risk for the MSP patients and the average Medicare payment per year at risk for patients without MSP status, the "primary" intent-to-treat group. This difference was taken to be the average amount paid by EGHPs for MSP patients. This result was then multiplied by the number of patient years at risk in the MSP group in order to derive an estimate of the total EGHP payments for the 1991-1994 period. One fourth of this total was assumed to arise in 1994. (See the 1996 ADR). The 1995-97 estimates are based on the 1994 estimate inflated by 5 percent annually.

The estimated expenditure for non-Medicare ESRD patients was 7.5 percent of total Medicare claims arising from all "finder file" patients plus patient obligations. This estimate of 7.5 percent is based on the count of non-Medicare dialysis patients (see Chapter XI) and non-Medicare incident kidney transplants.

Unless otherwise stated, spending accruing in different years has not been adjusted for inflation or discounted. Thus, the dollar amounts reported can be interpreted as approximating 1995 U.S. dollars. When 1997 estimates are provided these are 1997 current dollars.

Rates of increase in Medicare spending per patient year at risk (reported in the first subsection of the results) were estimated from the intent-to-treat analysis by aggregating yearly spending estimates and yearly time at risk. The ratio of these estimates provides an estimate of the spending per patient year. This estimate is unadjusted for changes in patient characteristics, including age, sex, race, diabetes and modality. These estimates of spending change are compared to rates of change in the consumer price index as reported by the U.S. Department of Labor.

Results

Financial Expenditures for Direct Patient Care of ESRD Patients in the United States, 1993-97

The Medicare SAF paid claims for ESRD patients totaled $7.12 billion in 1993, $7.87 billion in 1994, $8.97 billion in 1995, $10.21 billion in 1996, and $10.77 billion in 1997 for a total of $44.93 billion over the 5-year period.

The first column of Table X-1 presents estimates of the total 1997 direct monetary cost of medical care for United States ESRD patients aggregated from HCFA paid SAF files. There are no restrictions for MSP or for periods of eligibility of any kind. These costs are the total payments by Medicare for all identified ESRD patients as measured by paid claims in the SAF (i.e., excluding pass through payments and the estimated 2 percent of claims that arrive after the annual claims files are constructed). The costs are subdivided into several categories of institutional payments (institutional source and dialysis) and several categories of physician/supplier payments (dialysis, ESRD related treatment such as vascular access, and other treatments). The rapid growth in payments to Skilled Nursing Facilities, Home Health Agencies, and Hospices noted in the 1998 ADR has largely continued (growth in Home Health Agency spending has moderated somewhat, but still outpaces the growth rate for all expenditures). Combined, these three categories accounted for 6.3 percent of total expenditures in 1997 versus only 3.3 percent in 1993 (figures for 1993-97 can be found in Reference Table K.1). Monthly capitation payments to nephrologists remained flat in 1997 following the substantial growth that occurred in 1996 as a result of the addition of these services to the Medicare fee schedule for physician payment which raised the capitation payments by nearly 40 percent.

The second column in Table X-1 presents estimates of 1993-1997 spending for ESRD patient medical care per year at risk from the intent-to-treat analysis. The costs are again divided into institutional categories and physician/supplier categories, as in the first column. The third column of Table X-1 also presents spending estimates per year at risk, but for the 1997 period alone.

Total estimated direct medical payments for ESRD by public and private sources were $15.64 billion during 1997 (Figure X-1). In the terminology of cost effectiveness analysis, this total would reflect

the perspective of payers, both public and private. The estimated total Federal spending would be $11.76 billion or 75 percent of the total estimated cost. This $11.76 billion in Federal costs consists of SAF paid claims of $10.77 billion adjusted to $10.98 billion in order to account for the estimated 2 percent of bills that would not have been filed in time to enter the SAFs (see Methods) plus the estimated $0.78 billion organ acquisition costs. Other Federal and state funding is provided through Medicaid and likely accounts for at least some of the patient obligations for SAF claims and payments for non-Medicare patients.

Given the $10.98 billion paid by Medicare in 1997, patient obligations were estimated to be $2.64 billion (see Figure X-1). There are no precise studies regarding how much of these obligations patients actually pay, but the speculation is that most are paid by either patients, insurance or philanthropy.

Employer Group Health Plans were estimated to have paid $230 million in 1997 for the care of Medicare ESRD patients with Medicare as Secondary Insurer. This estimate of total spending for Employer Group Health Plans (EGHP) for ESRD is likely to be a minimum estimate since EGHP generally pay more than Medicare for the same services. The share of costs paid by EGHPs, though small, is likely to increase as the length of time during which the EGHP remains the primary payer was increased during 1997.

The distribution of health insurance coverage in 1996 for incident hemodialysis and peritoneal dialysis patients was reported in Figures X-2 and X-3 in the 1997 ADR. Overall, only about one-fifth of incident patients had Medicare as the sole insurer. Among those with multiple sources of insurance, the majority had non-Medicaid coverage.

Rates of Medicare spending increases for ESRD patients per year at risk are shown in Figure X-2. Spending per patient year at risk declined at a very modest rate of 0.2 percent in 1996-97. This represents a substantial decrease compared to the 5.4 percent growth rate in 1995-96 and a break in the upward trend in cost growth reported in the 1998 ADR (2.2 percent change in 1993-94, 3.8 percent change in 1994-95 and 4.5 percent in 1995-96). These spending increases are in nominal (non-inflation-adjusted) dollars. Note that the 1995-96 growth rate reported in the current ADR is 0.9 percentage points higher than what was reported in the 1998 ADR, reflecting more complete data files.

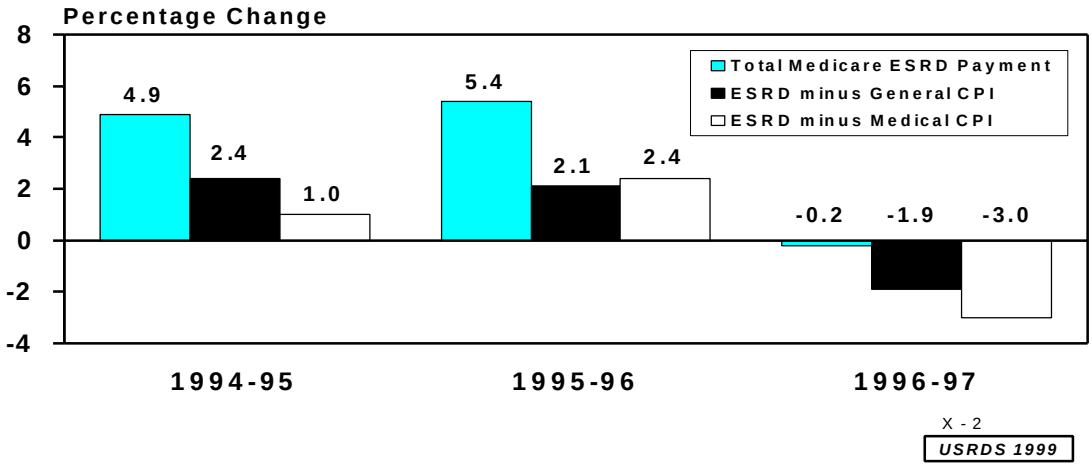

Figure X-2

Changes in Medicare payment Rates for ESRD and changes in the Consumer Price Index, 1994-97. Medicare spending rates are from Intent-to-Treat, not adjusted for changes in age and comorbidity. Includes only patients and years at risk with Medicare payments. Excludes Medicare Secondary Payer patients. Numbers reported are percentage change. Sources: Reference Table K.6 and U.S. Department of Labor, Bureau of Labor Statistics. http://stats.bls.gov/cpihome.htm.

If a similar upward revision occurs next year for the 1996-97 estimates, the change in spending per patient year at risk would become positive but would still be exceedingly small.

To determine the real (inflation-adjusted) change in spending per ESRD patient, the nominal changes can be adjusted by either of two consumer price indices. The general consumer price index (CPI) would be the correct index to choose if one were examining rates of change in the context of what other social and economic purpose resources devoted to ESRD could serve. A point of view which considers only the management of ESRD care relative to other medical care, on the other hand, would suggest the use of the medical component of the CPI.

Real spending per ESRD patient year declined between 1996 and 1997 using either price index (1.9 percent real decrease using the general CPI; 3.0 percent using the medical CPI). The measure of patient years at risk is not adjusted for changes in case mix (age, diabetes etc.). Therefore, the small change in spending reported in Figure X-2 is the net result of several factors including changes in prices, changes in the volume or types of services provided to a given set of patients, or changes in the volume or types of services arising from changes in case mix severity.

Because total ESRD program costs grew by 5.5 percent between 1996 and 1997 (derived from Reference Table K.1) while nominal spending per patient year decreased only 0.2 percent, the increase in the number of patients was the dominant source of growth in program expenditures.

Limitations of this Research

- The estimates for organ procurement and HMO payments by Medicare are particularly soft, as are the estimates of payments from non-Medicare sources such as Employer Group Health Plans.
- There are a number of medical and non-medical costs that are not included in the tally shown in Figure X-1. Examples of excluded costs are outpatient prescription and over-the-counter drugs not covered by Medicare, transportation not paid by Medicare, costs incurred by the Department of Veterans Affairs, and lost labor productivity in and out of the home. In addition, there are substantial transfer payments involved with ESRD such as Social Security Payments which are not technically a true cost of ESRD, but are nonetheless substantial items on the public policy agenda. While the cost of Medicaid payments for ESRD is included in the tally shown in Figure X-1, the Federal portion of these Medicaid costs is not identified. The Federal expenses for Medicaid insurance would be included under the heading of patient obligations and in the cost of non-Medicare patients.
- There is evidence that not all claims make their way into the HCFA billing records. (Petronis; Sadler; Held). So the estimated spending from HCFA records may have a downward bias.
- The period for which Medicare remains the secondary insurer for patients with EGHP coverage was extended from 18 months to 30 months in 1997. By excluding patients with known MSP status and dialysis patients with implausibly low spending in the Medicare paid claims files, we do not believe this change has affected our estimates. However, if these extra MSP patients have not been screened out, our 1997 spending per patient year at risk estimates would be biased down compared to estimates of spending in earlier years.

Medicare Spending by Treatment Modality

Introduction

This study updates the analysis of Medicare spending by treatment modality for patients with chronic renal failure. The analyses were stratified by age, sex, race, and diabetes. However, no other adjustments for case mix severity were attempted. Since the data are observational (patients were not randomly assigned to treatment modalities), the results are presented with the caveat that there may be selection of patients with particular comorbidities into particular treatment modalities.

A secondary motivation for performing these analyses is the increasing proportion of Medicare's enrollees who are being treated in managed care alternatives to the traditional fee-for-service (FFS) system. In March 1997, 13.3 percent of all Medicare beneficiaries (not restricted to ESRD) were enrolled in at-risk Health Maintenance Organizations, a doubling of enrollment since 1994 (HCFA, Managed Care Market Penetration, Quarterly State/County Data Files, April 1997; GAO, 1995). Currently, the Health Care Financing Administration sets capitation rates paid to at-risk HMOs on the basis of Medicare spending in the FFS system. (This rate is called the AAPCC for Adjusted Average Per Capita Cost).

These rates take ESRD status and the local price level into account, but a wide variety of additional predictors of costs are not explicitly used in the rate-setting process. To the extent that costs of care vary predictably with respect to patient characteristics that are not included in the rate-setting method, the incentives for at-risk HMOs to enroll and care for certain types of patients can be substantially affected.

Currently, the only Medicare ESRD patients who are in managed care are those who were enrolled in Medicare managed care prior to the onset of ESRD and who choose to remain in their managed care plans rather than switching to the traditional, fee-for-service Medicare program. With the initiation of HCFA's ESRD managed care demonstration project, it seems unlikely that the Medicare ESRD program will continue to be "off limits" to managed care.

Results

For each patient, length of followup and Medicare costs during the followup period in the analysis were calculated. The total Medicare payments from the

Medicare Payments ($1000s) Per Patient Year at Risk (YAR) by Age and Diabetic Status, 1993-1997 Intent-to-Treat Analyses[a]

	Modality											
	All ESRD		Dialysis		HD		CAPD/CCPD		Other		TX[b]	
Age Group	PMT	YAR	PMT	YAR	PMT	YAR	PMT	YAR	PMT	YAR	PMT	YAR
All Patients												
All Ages	**$43**	899	**$51**	680	**$52**	577	**$45**	96	**$69**	7	**$18**	219
0-19 years	**23**	15	**43**	5	**44**	2	**42**	2	**48**	<1	**14**	10
20-44	**31**	231	**44**	125	**45**	98	**41**	26	**51**	2	**16**	106
45-64	**41**	319	**49**	232	**50**	195	**46**	35	**55**	2	**19**	86
65-74	**52**	217	**54**	201	**55**	175	**48**	24	**79**	2	**22**	16
75+	**57**	118	**57**	117	**57**	106	**49**	9	**104**	1	**23**	1
Diabetic												
All Ages	**51**	279	**57**	232	**57**	199	**52**	31	**75**	2	**25**	47
0-19	**43**	<1	**52**	<1	**53**	<1	*****	*	*****	*	**29**	<1
20-44	**39**	52	**54**	27	**55**	20	**49**	7	**60**	<1	**23**	26
45-64	**50**	115	**55**	96	**55**	81	**53**	14	**61**	1	**26**	19
65-74	**58**	83	**58**	80	**59**	71	**53**	8	**84**	1	**32**	2
75+	**63**	28	**63**	28	**62**	26	**54**	2	**111**	<1	**48**	<1
Nondiabetic												
All Ages	**39**	553	**48**	402	**48**	338	**42**	59	**65**	5	**16**	150
0-19	**23**	13	**43**	4	**43**	2	**42**	2	**45**	<1	**14**	9
20-44	**30**	159	**42**	89	**42**	70	**38**	17	**48**	1	**15**	70
45-64	**36**	181	**45**	122	**45**	101	**41**	20	**50**	1	**17**	59
65-74	**48**	119	**51**	108	**52**	93	**44**	14	**73**	1	**21**	12
75+	**55**	80	**55**	79	**55**	72	**47**	7	**101**	1	**24**	1

[a] Excludes patients with Medicare Secondary Payer status at any time. Dialysis patients are censored at transplatation or end of study.

[b] Tx = Functioning transplant at 1/1/93 and new transplants thereafter; no censoring at graft failure.

PMT=Mean Medicare payment ($1000s) per patient year at risk, 1993-1997

YAR=Years at risk (1000's) for the PMT estimate

* = Insufficient data

Source: Reference Table K.5

USRDS 1999

Table X-2

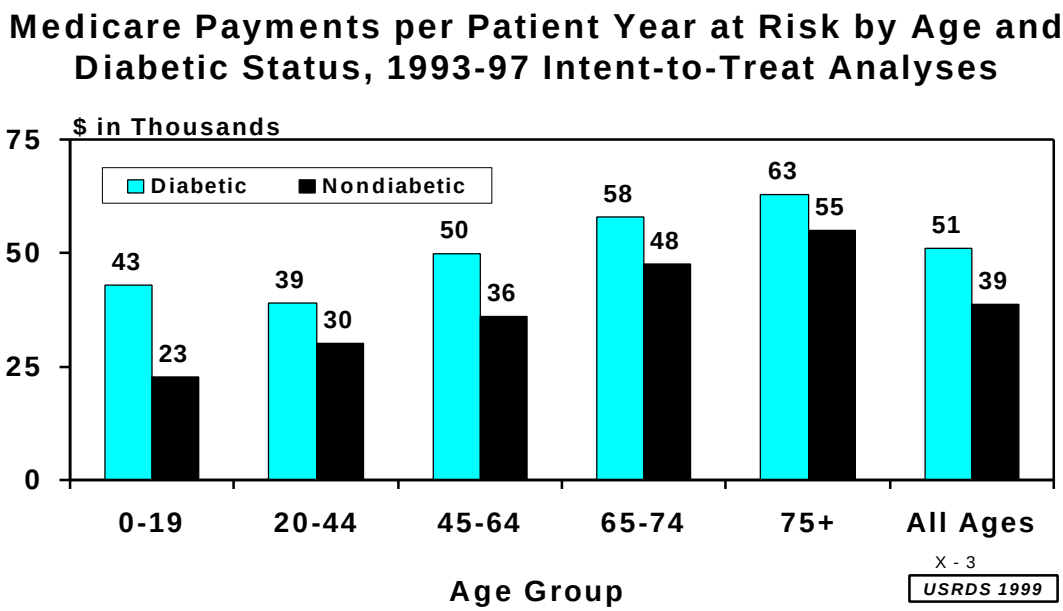

Figure X-3

Medicare payments per patient year at risk by age and diabetic status, 1993-97 Intent-to-Treat analyses. This figure is based on the first column of Table 2 (Medicare payments per patient year at risk, 1993-97; modality is 'All ESRD'). Source: Reference Table K.5.

Standard Analysis Files for identified Medicare ESRD patients from January 1, 1993, until December 31, 1997, were $44.93 billion (Reference Table K.1). Ninety-one percent of these total program costs were incurred by patients who were included in the primary intent-to-treat model (Reference Table K.2). The remaining 9 percent of Medicare costs were incurred by patients with Medicare Secondary Payer status indicated in the HCFA system and other patients with low spending at some time during the study period, including patients who were lost to followup (see Methods) or who had insufficient billing information to establish that the patient had received a transplant or was receiving regular dialysis. The latter two low-spending categories likely include patients for whom there was incomplete billing, patients with short treatment periods that were associated with very low spending, or possibly other patients with MSP sometime during the study period. See the Methods section earlier in this chapter for further details.

Table X-2 illustrates the Medicare payments per patient year at risk by treatment modality. Total Medicare spending per year at risk for all treatment modalities combined was $43K, which includes spending for hospitalizations. However, considerable variation existed across modalities. While Medicare spending for all dialysis patients averaged $51K per year, Medicare payments for transplant patients (not including payments for organ procurement) were only $18K per year. Hemodialysis payments averaged $52K per year whereas CAPD/CCPD payments averaged $45K per year. Patients treated with other or uncertain (less than 60 days on a modality) dialysis were the most costly, averaging $69K per year. The number of patients in this "other or uncertain" category represents less than 1 percent of total patient years at risk in the intent-to-treat model.

Results for five age groups (0-19, 20-44, 45-64, 65-74, and 75 years and older) also appear in Table X-2. Annual costs for ESRD treatment rise steadily with age from a low of $23K per person per year for ages 0-19 to a high of $57K per person per year for ages 75 and older (148 percent increase between the youngest and oldest age groups). There is an increase of 30 percent from the youngest age group to the oldest for hemodialysis patients. The analogous age-related increase is 17 percent for CAPD/CCPD patients, 117 percent for patients with other and uncertain dialysis modality, and 64 percent for transplant patients.

Medicare Payments ($1000s) Per Patient Year at Risk (YAR), by Age, Race, and Sex, 1993-1997 Intent to Treat Analyses[a]

Nondiabetic Patients

Patient Age, Race, Sex	Modality: All ESRD PMT	All ESRD YAR	Dialysis[b] PMT	Dialysis[b] YAR	TX[c] PMT	TX[c] YAR
All Ages						
Black Female	**$ 45**	90	**$50**	77	**$22**	13
Black Male	**41**	105	**46**	84	**21**	20
White Female	**39**	142	**50**	99	**15**	43
White Male	**36**	189	**47**	124	**15**	64
Age 0-19 yrs.						
Black Female	**35**	1	**48**	1	**21**	1
Black Male	**30**	2	**43**	1	**20**	1
White Female	**22**	4	**43**	1	**14**	3
White Male	**19**	5	**41**	1	**12**	4
Age 20-44 yrs.						
Black Female	**39**	25	**45**	18	**21**	7
Black Male	**37**	39	**43**	29	**20**	10
White Female	**26**	35	**41**	16	**13**	19
White Male	**23**	50	**38**	21	**13**	29
Age 45-64 yrs.						
Black Female	**43**	32	**47**	27	**21**	5
Black Male	**40**	42	**44**	33	**22**	9
White Female	**34**	43	**46**	26	**15**	17
White Male	**31**	56	**43**	31	**16**	25
Age 65-74 yrs.						
Black Female	**52**	20	**52**	20	**26**	1
Black Male	**49**	15	**50**	14	**28**	1
White Female	**48**	35	**52**	31	**19**	4
White Male	**46**	45	**50**	39	**21**	6
Age 75+ yrs.						
Black Female	**58**	12	**58**	12	*****	*
Black Male	**55**	7	**55**	7	**34**	<1
White Female	**56**	25	**56**	25	**23**	<1
White Male	**53**	33	**53**	33	**23**	<1

[a] Excludes patients with Medicare Secondary Payer status at any time

[b] Censored only at transplantation or end of study.

[c] Tx = Functioning transplant at 1/1/93 and new transplants thereafter; no censoring at graft failure

PMT=Mean Medicare payment ($1000s) per patient year at risk, 1993-1997

YAR=Years at risk (1000s) for the PMT estimate

* = Insufficient data

Source: Reference Table K.5.

USRDS 1999

Table X-3

Thus, annual costs within any given modality do not rise as sharply with age as costs averaged across all treatment modalities. This finding reflects the sharp decline in the ratio of transplanted to dialyzed patients with age. For example, transplants account for two-thirds of all patient years at risk observed in

the 0-19 age group, but represent less than one percent of years at risk in over 75 age group.

Cost per patient year at risk among all ESRD patients was higher for diabetics ($51K) than for nondiabetics ($39K). Care for diabetic ESRD patients was more costly in each of the five age groups (lower two panels of Table X-2). Table X-3 reports spending per patient year at risk by age/race/sex/modality cell for nondiabetics. Table X-4 reports analogous information for diabetics. Again, diabetics have uniformly higher costs than nondiabetics in the same age/race/sex/modality cell.

For nondiabetics in all ESRD modalities, White males ($36K) incurred the lowest Medicare spending per patient year at risk among those groups reported in Table X-3, followed by White females ($39K), Black males ($41K), and Black females ($45K). Note that for dialysis patients, spending per patient year at risk varies little by race and sex, ranging from $46K for Black males to $50K for Black or White females. Thus, the differences by race and sex for all ESRD patients arise primarily from race and sex differences in the percent of patients in the lower cost, transplant modality. Whereas transplants accounted for more than one-third of the total, nondiabetic White male years at risk, transplants accounted for only one-seventh of total, nondiabetic Black female years at risk. In addition, costs within the transplant modality were significantly higher for black patients ($21K and $22K for males and females respectively) than for white patients ($15K for either males or females). This difference is likely to arise from higher transplant rejection rates among blacks (recall that the intention to treat model includes in the transplant modality both patients with functioning kidney transplants and those who have returned to dialysis following graft rejection). Similar patterns exist among diabetic patients (Table X-4).

Conclusions and Limitations

The USRDS/HCFA database is certainly rich and powerful. However this database is dynamic and not always complete. The system is constantly evolving (See Chapter XIII). There have been many changes in the USRDS and other databases in recent years, leading to a variety of subtle and unmeasured changes in the cost estimates. Therefore, some caution is warranted in the interpretation of these analyses.

The current analyses aimed to include a well-defined subpopulation that is known to be insured primarily by Medicare and for whom time at risk could be precisely estimated. Neither of these objectives is easily achieved. We remain somewhat uncertain about whether and when a patient has MSP status. When this happens the financial indicators can be quite misleading because most spending for the patient would not be captured by Medicare claims. It is not easy to find a well defined population for which the spending and time at risk is precisely known. Each year, our updated data bases lead to (usually) small changes in previously reported cost estimates. For example, duplicate patient i.d.s may be identified and removed over time.

These spending analyses clearly demonstrate substantial differences in the patterns of resource utilization by patient demographics and treatment modality. Age, diabetes, and sex can readily be measured and verified and should make for reasonable indices on which to base payment for a capitation plan. However, within each of these groups there is still substantial predictable variation, and there is always the possibility that providers and patients may well have information that would permit "gaming" the system (Brown et al, 1993). Although such possibilities suggest that these demographic indicators may not be an adequate basis for setting capitation rates, they do provide a reasonable starting point.

These spending analyses reflect the pattern observed in the fee for service system. When incentives are changed, as under a managed care plan, in all likelihood there will be different patterns of spending. It remains to be seen if the costs can be lower and the quality of care as good or better under a managed care plan (Hirth and Held, 1998).

Medicare Spending by Physician Specialty and Supplier Type

In addition to the gross cost categories reported in Reference Table K.1, Medicare Part B physician/supplier payments have been disaggregated by physician specialty or type of supplier (Table X-5). This information can be useful in a managed care context. First, it provides an understanding of care patterns for ESRD patients that can aid an organization in ensuring that its provider panel is sufficiently broad to make available an appropriate array of services. Second, this disaggregation of spending by provider type can inform managed care

Medicare Payments ($1000s) Per Patient Year at Risk (YAR), by Age, Race, and Sex, 1993-1997 Intent to Treat Analyses[a]

Diabetic Patients

Patient Age, Race, Sex	Modality					
	All ESRD		Dialysis[b]		TX[c]	
	PMT	YAR	PMT	YAR	PMT	YAR
All Ages						
Black Female	**$56**	58	**$58**	55	**$33**	3
Black Male	**52**	35	**55**	31	**32**	4
White Female	**53**	82	**59**	67	**24**	15
White Male	**47**	85	**56**	62	**23**	23
Age 0-19 yrs.						
Black Female	**53**	<1	**60**	<1	*****	*
Black Male	*****	*	*****	*	*****	*
White Female	*****	*	*****	*	*****	*
White Male	**40**	<1	*****	*	*****	*
Age 20-44 yrs.						
Black Female	**52**	5	**57**	4	**33**	1
Black Male	**49**	6	**54**	4	**32**	1
White Female	**36**	16	**56**	7	**22**	9
White Male	**34**	23	**51**	10	**21**	13
Age 45-64 yrs.						
Black Female	**54**	26	**56**	24	**33**	2
Black Male	**51**	18	**53**	16	**32**	2
White Female	**52**	29	**57**	24	**25**	5
White Male	**47**	33	**55**	24	**24**	9
Age 65-74 yrs.						
Black Female	**58**	20	**58**	20	**37**	<1
Black Male	**56**	9	**57**	8	**35**	<1
White Female	**60**	27	**61**	27	**35**	<1
White Male	**56**	21	**58**	20	**29**	1
Age 75+ yrs.						
Black Female	**63**	6	**63**	6	*****	*
Black Male	**62**	3	**62**	3	*****	*
White Female	**63**	10	**63**	10	*****	*
White Male	**63**	8	**63**	8	*****	*

[a] Excludes patients with Medicare Secondary Payer status at any time

[b] Censored only at transplantation or end of study.

[c] Tx = Functioning transplant at 1/1/93 and new transplants thereafter; no censoring at graft failure

PMT=Mean Medicare payment ($1000s) per patient year at risk, 1993-1997

YAR=Years at risk (1000s) for the PMT estimate

* = Insufficient data

Source: Reference Table K.5.

USRDS 1999

Table X-4

organizations or physicians/suppliers who are considering entering into capitated arrangements for specialty services whether or not the proposed rates are reasonable.

Third, knowing which specialties have high and/or rapidly growing expenditures can help target cost control efforts. Of course, this should only be used to indicate which areas are worthy of further study as the existence of high or growing expenditures is not sufficient to conclude that the spending is medically or economically inappropriate.

Aggregate physician/supplier spending is substantial, totaling $10,015 per year at risk in 1997 and grew at an annualized rate of 2.3 percent between 1993 and 1997 (in nominal dollars). The categories in Table X-5 are ordered from highest to lowest by the amount of spending in 1997. In the 1998 ADR, we had reported an anomalous spike in spending during 1994 and urged that it should be interpreted cautiously. After additional data cleaning by HCFA (e.g., removing duplicate records), this spike no longer appears in the data. Therefore, we believe that the 1994 physician/supplier spending reported in the current ADR is more reliably measured than that reported in last year's ADR.

In all but three categories, the denominator for total spending is years at risk for all patients. The exceptions are those specialties that are only relevant to particular, identifiable demographic groups. The denominator for pediatric medicine is years at risk only for patients under 20 years of age. For geriatric medicine, the denominator is years at risk for patients over 64 years of age. Finally, for obstetrics/gynecology, the denominator is years at risk for female patients over the age of 13 years.

Among categories for which the entire ESRD population is the denominator, the largest single category of physician/supplier spending is nephrology care, totaling $2,154 per patient year at risk, a slight decrease from 1996. This represents 21.5 percent of physician/supplier expenditures. Given the update in the monthly capitation payment for dialysis-related nephrology care that occurred in 1996, this category can be expected to remain the largest for the foreseeable future. Some nephrology services may also have been billed under other specialties, particularly the "multispecialty clinic/group practice" category ($282 per patient year at risk).

The second largest category of physician spending is for the primary care specialties, led by internal medicine at $737 per patient year at risk. Adding general and family practice ($131) and pediatrics ($16 when using all patient years at risk as the denominator) and geriatric medicine ($3 when using all years at risk as the denominator), spending for primary care specialties totaled $887 per patient year at risk. This represents 8.9 percent of all Part B physician/supplier spending and does not incorporate expenditures for primary care services provided by non-primary care specialists, particularly nephrologists, obstetrician/gynecologists or physicians in the "multispecialty clinic/group practice" category.

Spending for pediatric medicine per pediatric year at risk ($2,498) was almost three times the average primary care spending for all patients ($887). While pediatric spending almost certainly includes some pediatric nephrology specialty care, there is little doubt that the primary care demands for pediatric ESRD patients are high. This suggests that any managed care plan enrolling pediatric ESRD patients should have the capacity to provide substantial and sophisticated pediatric primary care services as these patients tend to have complex medical issues requiring multidisciplinary care and coordination.

It is also interesting to note that expenditures on geriatric medicine remain extremely small even when using the geriatric population as the denominator ($16 in 1997). It is possible that some physicians specializing in geriatric medicine are coded under internal medicine, causing this number to be somewhat understated.

Emergency medicine expenditures continue to grow rapidly (annualized growth rate of 15.1 percent between 1993 and 1997. A portion of these expenditures is likely to also represent primary care services. If this proportion is large, the rapid growth rate of emergency medicine spending may reflect the lack of access to a regular source of primary care services among some ESRD patients.

Total Medicare Payments per Patient Year at Risk for ESRD by Physician/Supplier "Specialty", 1993-1997

"Specialty"	1993	1994	1995	1996	1997	Annual %Change 1993-1997
Total	**$9,131**	**$8,850**	**$ 9,254**	**$9,890**	**$10,015**	**2.3**
Pediatric Medicine[a]	2071	2481	2562	2718	2498	**4.8**
Nephrology	1932	1876	1939	2205	2154	**2.8**
Medical Supply Company	722	861	1006	1076	1148	**12.3**
Ambulance Service Supplier	860	911	930	926	943	**2.3**
Laboratory	858	855	898	949	925	**1.9**
Internal Medicine	649	598	649	742	737	**3.2**
General Surgery	636	626	672	646	627	**-0.4**
Radiology (diagnostic & therapeutic)	319	335	395	435	439	**8.3**
Cardiology	278	283	304	317	334	**4.7**
Anesthesiology	288	270	284	293	311	**1.9**
Multispecialty Clinic/Group Practice	204	242	234	268	282	**8.4**
Pharmacy[b]	1	209	205	198	183	**-**
Ophthalmology	156	158	176	172	174	**2.7**
Vascular Surgery	131	137	160	166	174	**7.3**
General and Family Practice	103	102	115	127	131	**6.2**
Thoracic Surgery	163	144	148	138	126	**-6.3**
Emergency Medicine	72	84	105	117	126	**15.1**
Unknown	9	94	78	91	124	**93.6**
Gastroenterology	104	100	107	112	116	**2.8**
Pulmonary Disease	69	67	81	91	97	**8.7**
Urology	90	85	91	95	95	**1.2**
Orthopedic Surgery	67	74	80	82	85	**6.4**
Neurology	54	57	62	67	70	**6.5**
Hematology/Oncology	37	40	49	58	67	**15.6**
Infectious Disease	37	38	48	56	65	**15.0**
Therapeutic Services	33	37	45	52	55	**14.0**
Podiatry	31	36	44	49	54	**14.7**
Pathology	59	57	56	54	50	**-4.0**
Dermatology	27	30	33	34	37	**8.3**
Cardiac Surgery	27	28	34	35	36	**7.3**
Ambulatory Surgery Center	82	68	25	30	34	**-19.7**
Psychiatry (includes Neuropsychiatry)	27	27	29	29	31	**3.5**
Endocrinology	20	20	23	24	26	**6.5**
Obstetrics/Gynecology[c]	20	22	24	24	24	**5.1**
Plastic and Reconstructive Surg	16	19	21	23	22	**8.3**
Otolaryngology	16	17	19	20	20	**6.6**
Neurosurgery	12	14	15	16	17	**7.8**
Geriatric Medicine[d]	11	10	14	16	16	**11.2**
Rheumatology	8	8	8	9	10	**6.2**
Peripheral Vascular Disease	12	10	10	9	9	**-6.2**
Optometry	5	6	8	8	9	**15.6**
Other Medical Care/Supplies	871	166	3	3	9	**-68.5**

[a] Pediatric Medicine rate uses years at risk for ages < 20

[b] Effective October 1993

[c] Obstetrics/Gynecology rate uses Females years at risk for Age 14+

[d] Geriatric Medicine rate uses years at risk for ages ≥ 65

Source: Reference Table K.7.

USRDS 1999

Table X-5

For non-nephrology specialty care, the largest expenditures are for general surgery ($627 per patient year at risk; 6.3 percent of Part B physician/supplier spending), radiology ($439; 4.4 percent), cardiology ($334; 3.3 percent), and anesthesiology ($311; 3.1 percent). The higher than average 1993-97 growth rates for spending on vascular surgery (7.3 percent) and diagnostic and therapeutic radiology (8.3 percent) may reflect a rising incidence of vascular access complications (see the 1997 ADR for a study of the costs of vascular access-related claims). This interpretation is consistent with research reporting a strong trend away from the type of vascular access (native arterio-venous fistula) that is associated with the fewest complications (Hirth et al., 1996).

Some of the highest growth rates were observed among the specialties of hematology/oncology, infectious disease, therapeutic services, and podiatry. Expenditures in each of these categories rose at least 14 percent annually and nearly doubled over the period under investigation. This growth is likely to be a result of increasing age and level of comorbidities of the ESRD population (see Table V-1).

Three types of non-physician suppliers dominated non-physician Part B spending. Medical supply companies ($1,148 in 1997), laboratories ($925), and ambulance services ($943) combined to account for 30.1 percent of all Part B physician/supplier spending for ESRD patients. Among these categories, only medical supply companies showed above average (12.3 percent) growth rates over the 1993-97 period. However, much of this growth may be an artifact of a shift in the categorization of expenditures away from the "other medical care/supplies" over the 1993-1995 period. Growth subsequent to 1995 was at a more modest (though still above average) annual rate of 6.8 percent. The high level of spending for ambulance services may warrant further investigation into whether or not many of these services were provided in non-emergent situations in which less costly transportation services could have been substituted.

Conclusions and Limitations

This analysis of Medicare Part B physician/supplier expenditures by physician specialty or type of supplier provides substantial detail on the type of services provided to ESRD patients. Nonetheless, classifying spending by type of provider is an imperfect proxy for spending by type of service. For example, some billings from nephrologists may represent primary care services rather than nephrology specialty care. Likewise, some categories such as multispecialty clinic/group practice are impossible to categorize by type of service. Finally, Medicare does not cover outpatient drugs (with the exception of EPO and immunosuppresants). Therefore, these expenditures, which are known to be growing rapidly throughout the U.S. health care system, are obviously not captured in this analysis.

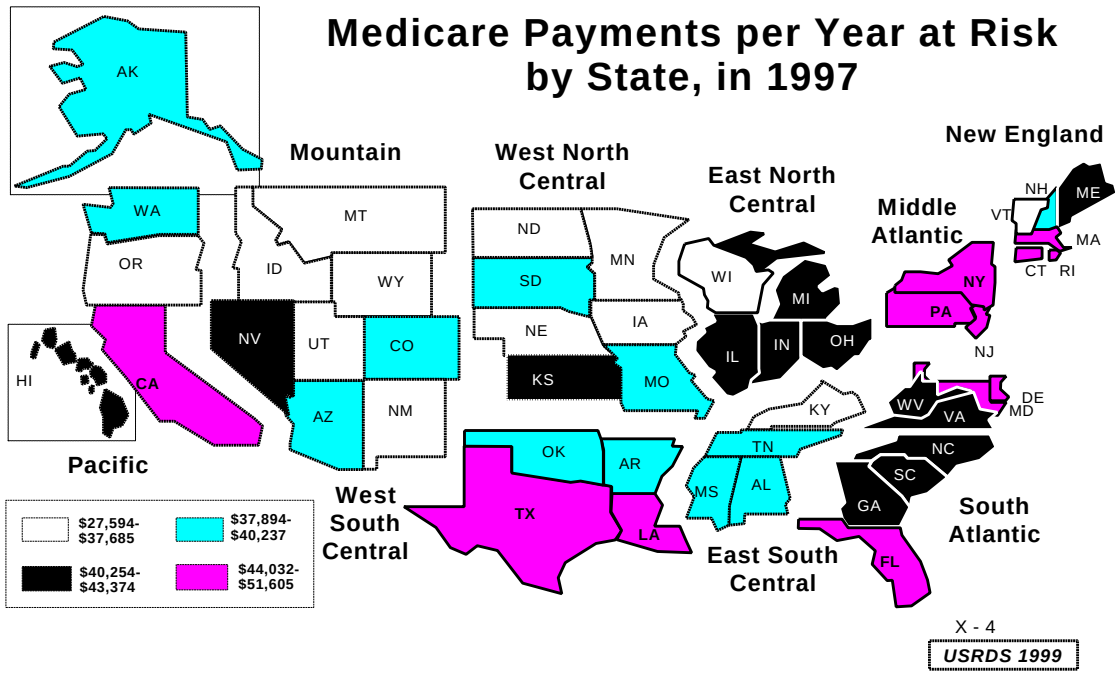

Figure X-4

Medicare payments per year at risk by state, in 1997. Medicare spending are from Intent-to-Treat model, across all modalities, and summarized by quartiles. Source: Reference Table K.9 (available on the USRDS website: http://www.med.umich.edu/usrds/).

Interstate Variation in Medicare Expenditures

Geographic variations in medical care utilization have long been noted in many segments of the U.S. health care system. Thus, we were interested in documenting the magnitude of interstate spending differences within the single payer, single disease Medicare ESRD program. For the first time, this ADR reports data on geographic patterns of Medicare spending for ESRD. Spending per patient year at risk was calculated in aggregate and by category of spending and baseline treatment modality in the 1997 intent-to-treat model. Aggregate spending per patient year at risk across all modalities is summarized by quartiles in Figure X-4. Tables reporting spending by category and modality (analogous to reference Table K.4) for each of the 50 states, the District of Columbia, Puerto Rico, and other U.S. Territories will be available on the USRDS website (Reference Table K.9) but are not reproduced in the printed version of the ADR due to space limitations.

Expenditures vary almost twofold from a low of $27,594 in North Dakota to $51,605 in Connecticut. The mean expenditure across states (not weighted by the states' ESRD populations) was $40,513 (median $40,245) with a standard deviation of $5,461. Many of the highest spending states were concentrated in the New England and Middle Atlantic regions. Other high expenditure states included Florida, Louisiana, Texas, and California. With the exception of Oregon, the lowest spending states were found exclusively in the Mountain and West North Central regions.

Several factors contribute to this variation in spending, including differences in prices paid by Medicare for various services, case mix, distribution of patients across modalities, and regional practice patterns with respect to the types and intensities of services provided. Examining data for individual states provides preliminary insights into the relative importance of these sources of variation. More detailed analyses will be required to place definitive weights on alternative sources of interstate variation in spending.

The prices HCFA pays for various services have regional adjustments to account for geographic differences in input costs faced by providers. For example, HCFA adjusts the composite rate per dialysis session for geographic variation in health care wages. The maximum downward adjustment is to 90 percent of the national average and the maximum upward adjustment is to 130 percent of the national average (note that this adjustment is applied only to the labor component of the composite rate, which is about half of the total; thus, the actual range of variation in payments is less than the 90-130 percent of the national average). Given this relatively modest geographic adjustment to the dialysis price and the nearly universal use of a 3 sessions per week schedule for hemodialysis (and analogous payment procedures for CAPD/CCPD), it is not surprising that dialysis payments per dialysis patient varied little across states (dialysis institutional payments were tightly clustered in the $19,000-$21,000 range; see Table K.9 on the website). However, this lack of variation in dialysis spending (which accounts for nearly half of all spending) makes the substantial variation in total spending even more impressive.

In absolute terms, the largest variation occurred in the inpatient category. Price variation certainly contributes to the observed pattern of spending variation, with inpatient institutional spending varying almost threefold from $7,575 in North Dakota to $21,119 in the District of Columbia. Cities and rural areas within many of the high expenditure states have above average adjustment factors for inpatient payments from HCFA. Likewise, many of the low expenditure states have below average adjustment factors. However, payment differences cannot account for the full range of variation in inpatient expenditures. For example, the District of Columbia adjustment factor is 1.08 vs. North Dakota's adjustments of 0.9537 for urban areas and 0.7514 for rural areas. Further, some states with average or below average adjustment factors have relatively high expenditures (e.g., Texas and Georgia). Considerable variation also exists in spending categories such as physician/supplier payments, home health care and skilled nursing facilities.

Another factor contributing to geographic spending differences is variation in the relative prevalence of transplantation vs. dialytic treatment of ESRD. Lower spending states tended to have larger proportions of the less costly transplant patients.

These calculations of the ESRD spending per patient year at risk are conceptually similar to the manner in which HCFA calculates the Adjusted Average Per Capita Cost which is the basis for the managed care payment rates for ESRD. Future analyses should compare these two sets of estimates. The differences in spending per patient year should have substantial implications for managed care organizations. For example, it appears that managed

care organizations in states with a substantial fraction of patients with a functioning transplant will receive lower payments for the average ESRD patient than will organizations in states with a higher fraction of dialysis patients.

Conclusions and Limitations

The magnitude of interstate spending variation within the single payer, single disease Medicare ESRD program is substantial. Further research is necessary to quantify the relative importance of various factors that contribute to these geographic variations in spending. Further, it would also be useful to examine variation across urban and rural areas, Metropolitan Statistical Areas (MSAs), and Health Services Areas (HSAs).

References

Brown RS, Bergeron JW, Clement DG, Hill JW, Retchin SM. Does Managed Care Work for Medicare? An Evaluation of the Medicare Risk Program for HMOs, Mathematica Policy Research Inc., Princeton NJ, December 1993.

Cox D. Regression models and life tables. J R Stat Soc. 34:187-201, 1972.

Data Users Reference Guide. U.S. Department of Health and Human Services; Health Care Financing Administration; Bureau of Data Management and Strategy. November 1993.

Eggers PW, Kucken LE. Cost issues in transplantation. Surg Clin North Am 74:1259-1267, 1994.

Eggers P. Personal communication, April 1996, March 1997.

End-Stage Renal Disease Research Report 1992. U.S. Department of Health and Human Services; Health Care Financing Administration; Bureau of Data Management and Strategy. September 1994.

Health Care Financing Administration; Data and Statistics; http://www.hcfa.gov/stats/erate95. HCFA 1995.

Held PJ, Port FK, Carroll CE, Petronis KR. Race and access to erythropoietin by patients on hemodialysis (letter; reply). JAMA 272:1819, 1994.

Hirth RA, Held PJ. Some of the small print on managed care proposals for end-stage renal disease. ARRT 4:314-324, 1998.

Hirth RA, Turenne MN, Woods JD, Young EW, Port FK, Pauly MV, Held PJ. Predictors of type of vascular access in hemodialysis patients. JAMA 276:1303-1308, 1996.

Petronis KP, Carroll CE, Held PJ, Port FK. Effect of race on access to recombinant human erythropoietin in long-term hemodialysis patients. JAMA 271:1760-1763, 1994.

Sadler JH. Race and access to erythropoietin by patients on hemodialysis (letter; comment). JAMA 272:1818-1819, 1994.

U.S. General Accounting Office. Medicare managed care: Growing enrollment adds urgency to fixing HMO payment problem. Washington, DC, November 1995.

United States Renal Data System. USRDS 1995 Annual Data Report; National Institute of Health; National Institute of Diabetes, Digestive, and Kidney Diseases, Bethesda, MD, June 1995.