

---

Chapter 5

# **Costs of Treatment End-Stage Renal Disease**

# Costs of Treatment for End- Stage Renal Disease

---

## INTRODUCTION

The rapidly escalating expenditures of the End-Stage Renal Disease (ESRD) program have been well recorded. Less attention has been given, however, to how these expenditures distribute among the components of care involved—dialysis treatments themselves, physician services, and hospitalizations. Furthermore, the relationship between ESRD program expenditures and the resource costs of the services they cover has been virtually unexplored. Better cost information is urgently needed.

Preliminary insights can be gained, however, from existing information. To this end, this chapter examines the results of the cost audits of dialysis treatment facilities that have been performed and projects the costs of dialysis from these audits and from average Medicare ESRD reimbursement rates. These results refer only to the cost of dialysis treatments themselves, with or without physician supervision, and do not include hospitalizations or medical care unrelated to dialysis. In chapter 6, Medicare ESRD reimbursement data for 1981 and 1982 are analyzed, and the total costs of treatment of ESRD, including hospitalizations, are compared for continuous ambulatory peritoneal dialysis (CAPD), center hemodialysis (HD), and home HD.

The diverse sources of information and diverse measures of cost used create a confusing array of results. To help clarify interpretation the following definitions are used:

- **Cost:** The dollar value of a product or service determined by audit or special investigation. The word cost is also used in a generic sense.
- **Charge or Price:** The dollar value placed on a product or service by a supplier or provider.
- **Reimbursement Rate:** The dollar value of a product or service as determined by a Federal program (or health insurer) based either on costs or charges or on some proportion of costs or charges.
- **Projected Cost:** The dollar value of a service calculated as the product of unit cost or average reimbursement rate and assumed utilization.
- **Expenditure:** The dollars actually paid for a product or service based on costs, charges, reimbursement rates, or some combination. Expenditures usually take the perspective of a particular program (e. g., the ESRD program), the individual payor, or some combination of payers.

## PROJECTED COST OF DIALYSIS FROM COST AUDITS

In response to the ESRD Program Amendments of 1978 (Public Law 98-292), the Health Care Financing Administration (HCFA) performed an audit in 1980 of a selected sample of 105 facilities (66 hospitals and 39 independent dialysis centers). From this audit, HCFA estimated a median cost of \$135 per HD treatment in a hospital center and \$108 per treatment in an independent dialysis center (15). Home dialysis costs were not assessed.

The Omnibus Budget Reconciliation Act of 1981 (Public Law 97-35) promoted home dialysis and led to a subsequent HCFA audit of 23 centers and 2 State programs that provided both center dialysis and supervised home dialysis. The centers selected were from those having large patient populations. Cost estimates obtained were \$87 per treatment for home HD and \$114 per “treatment equivalent” for home CAPD. (Because CAPD

treatments are given daily, the the weekly costs of dialysis were divided by three to provide a cost equivalent to that for a single HD treatment, since HD treatment schedules generally call for three treatments per week. )

In 1981, the General Accounting Office (GAO) performed an independent audit of home dialysis costs from data provided by carriers and financial intermediaries on 656 randomly selected patients (47). This audit estimated costs of \$103 per treatment for home HD and \$110 for CAPD (47). An interesting finding of the GAO audit was that 70 percent of home dialysis patients were purchasing their supplies and equipment directly from commercial suppliers rather than through supervising dialysis centers. The question arises as to whether the higher estimate obtained for home HD in the GAO audit may, at least in part, reflect higher prices of supplies to individual purchasers. Alternative explanations, of course, might be differences in sampling techniques and the audit methodology.

The HCFA audit has been widely criticized, because its sample of dialysis centers was not representative, and because it used less than optimal auditing techniques. This is particularly true for the examination of home dialysis costs, which HCFA admits was done hastily under considerable time pressure. Despite their limitations, HCFA figures were used as the basis for calculating Medicare's recently implemented composite reimbursement rates.

Table 5-1 presents projections of the yearly cost of dialysis treatments based on HCFA and GAO

**Table 5-1.—Cost of Dialysis per Patient-Year as Estimated From Health Care Financing Administration and General Accounting Office Cost Audits**

Dialysis modality	Cost/day <sup>a</sup>	Cost/yr <sup>b</sup>
<b>Health Care Financing Administration Audit:</b>		
Center HD:		
Hospital center . . . . .	\$135	\$21,060
Independent center. . . . .	108	16,848
Home HD . . . . .	87	13,572
CAPD . . . . .	114	17,784
<b>General Accounting Office Audit:</b>		
Home HD <sup>c</sup> . . . . .	\$103	\$16,068
CAPD <sup>c</sup> . . . . .	110	17,160

<sup>a</sup>Represents median costs from 1980 data for center HD (67 hospital and 38 independent centers) and 1981 data for home dialysis (23 centers).

<sup>b</sup>Assumes full compliance with regimens of 3 dialysis treatments or "treatment equivalents" (CAPD) per week.

<sup>c</sup>Represents mean costs of home dialysis in 1981.

SOURCE: Office of Technology Assessment.

audits. These figures refer only to the cost of the dialysis treatments and do not include physician fees. They assume full compliance with prescribed dialysis treatments. The yearly cost of HD in a hospital center is slightly over \$4,000 more expensive than HD in an independent dialysis center. CAPD appears to cost about the same as HD in an independent center, and home HD is less expensive than either CAPD or center HD (how much depends on whether one prefers the HCFA or GAO audit results). If the cost of a home health aide to assist with home HD were added, any cost savings from home HD would be greatly reduced or eliminated.

## PROJECTED COST OF DIALYSIS FROM 1982 MEDICARE ESRD REIMBURSEMENT RATES

Reimbursement rates paid by the ESRD program provide a second method by which to assess the projected costs of dialysis. Differences between estimates based on ESRD reimbursement rates and cost audit results would reflect profit margins (revenues minus costs), if the cost audit results accurately reflect resource costs and if complete collection of deductibles and the 20 percent coinsurance required by Medicare were achieved.

Medicare's ESRD reimbursement rates in 1982 averaged \$159 per treatment in a hospital center and \$138 in an independent center. No comparable figures exist for home dialysis. Multiple formulae have been used to determine reimbursements for home dialysis, which alternatively, have been based on reasonable costs to the hospital or independent center, negotiated Target Rate Reimbursement Agreements with centers, or reason-

able charges for supplies and equipment billed by the patient or the commercial supplier.

Physician supervision of dialysis is not included in these reimbursement rates and has averaged \$220 per month for center dialysis and \$154 for home dialysis under the cavitation-based "alternative reimbursement method" option. Average estimates for physician services billed under the "fee for service" option were not obtained for this study.

Table 5-2 shows projected yearly costs of \$24,804 for HD in a hospital center and \$21,528 in an independent center. These figures, which are 18 percent and 28 percent higher than costs projected from the HCFA cost audit for hospital and independent centers, respectively, provide crude estimates of the magnitude of "profits" enjoyed by dialysis centers.

Physician supervision of dialysis adds \$2,640 to the average yearly cost of center HD and \$1,848 per year for supervision of home dialysis.

**Table 5-2.—Cost of Dialysis Per Patient-Year From 1982 Medicare Reimbursement Rates**

Dialysis modality . . . . .	Projected yearly cost <sup>a</sup>	
	Dialysis Physician	Total
HD—Hospital center . . . . .	\$24,804 <sup>b</sup>	\$27,444
HD—Independent center. . . . .	21,528 <sup>d</sup>	24,168

<sup>a</sup>Assumes 156 dialysis treatments Per Year (3 per week)

<sup>b</sup>Based on a reimbursement rate of \$159 per treatment for HD in a hospital dialysis center.

<sup>c</sup>Based on the average monthly physician reimbursement rate of \$220 per patient for supervision of dialysis in a center.

<sup>d</sup>Based on the ESRD "screen" or maximum allowed reimbursement rate of \$138 per treatment for HD performed in an independent center. Most centers obtained the maximum rate.

SOURCE: Office of Technology Assessment

## PROJECTED COSTS OF DIALYSIS UNDER HCFA's 1983 COMPOSITE REIMBURSEMENT RATES

The composite reimbursement rates that were implemented on August 1, 1983 were designed to encourage home dialysis and, at the same time, to help contain the costs of the ESRD program. Under this rate structure, a single rate is applied to all dialysis performed under the supervision of a center, and a single monthly rate is paid for physician supervision regardless of whether the treatment is furnished in the center or at home. The regulation does not in any way alter the ability of the patient to purchase equipment and supplies directly from the supplier. Reasonable charges continue to be the basis for these purchases.

HCFA's assumptions are that dialysis centers will be provided an incentive to offer home dialysis alternatives to their patients because of the lower resource cost of home dialysis. In addition, HCFA assumes that physicians will encourage home dialysis because they will be reimbursed the same amount for the lesser effort required to supervise home patients than is required by dialysis treatments performed three times a week in a center.

Average reimbursement rates were set at \$127 per treatment for dialysis supervised by an independent center and \$131 per treatment supervised by a hospital center. The rates were based on a formula that took into consideration the distribution of dialysis among home and center dialysis settings and relied heavily on the HCFA cost audit results. Adjustments are to be made to these average rates to adjust for geographic wage differences. Furthermore, dialysis training sessions are to be reimbursed at an additional \$20 per session. Exceptions to the above rates will be granted under special circumstances. Physicians are reimbursed at an average rate of \$184 per patient per month, again adjusted for geographic wage differences.

Table 5-3 shows the projected average yearly costs of dialysis under the 1983 HCFA prospective reimbursement formula. Compared to cost estimates based on 1982 ESRD reimbursement rates (table 5-2), the yearly cost of center HD will be reduced by 18 percent in hospital centers and by 8 percent in independent centers.

**Table 5-3.—Estimated Projected Cost of Dialysis Per Patient-Year Under HCFA's 1983 Composite Reimbursement Rates**

Dialysis modality and location	Projected yearly cost <sup>a</sup>		
	Dialysis <sup>b</sup>	Physician <sup>c</sup>	Total
Center HD:			
Hospital . . . . .	\$20,436	\$2,208	\$22,644
Independent . . . . .	19,812	2,208	22,020
Home HD or CAPD:			
Supervised by hospital . . . . .	\$20,436	\$2,208	\$22,644
Supervised by independent center. . . . .	19,812	2,208	22,020

<sup>a</sup>Assumes full compliance with 156 treatments per year (3 Per week × 52 weeks) or, in the case of CAPD, "treatment equivalents."

<sup>b</sup>Based on average per treatment reimbursement rates of \$131 and \$127 in hospital and independent centers, respectively, regardless of dialysis modality or location.

<sup>c</sup>Based on an average monthly capitation rate of \$184 for supervision of dialysis.

SOURCE: Office of Technology Assessment.

Average physician capitation fees under the 1983 composite rate formula will increase from \$1,848 per year to \$2,208 per year (19 percent) for supervision of home dialysis and decrease from \$2,640 per year to \$2,208 (16 percent) for center dialysis.

The most obvious effect of the new rates is to reduce the level of reimbursement for center dialysis from \$159 to \$131 in hospitals and from \$138 to \$127 in independent centers.

## FINANCIAL INCENTIVES CREATED BY HCFA's 1983 COMPOSITE REIMBURSEMENT RATES

If the HCFA cost audit results represent valid estimates of the average resource costs of dialysis treatments, financial incentives favoring one dialysis modality or another should operate in relation to differences between reimbursement rates and the unit costs determined by the audits. The validity of the cost audit results can be questioned, but, pending better cost information, no better assumption is obvious.

The estimated yearly costs of dialysis from the cost audits and from the 1983 composite reimbursement rates are compared in table 5-4.

Three observations are germane:

1. a strong disincentive has been created for performing HD in hospital dialysis centers;
2. approximately similar incentives exist in independent centers for center HD and CAPD; and
3. a very strong incentive has been created for home HD that would be mitigated if unit costs rise as a result of the need to furnish more home health aides when home HD is offered to a broader spectrum of patients with more comorbidity or less than adequate home support.

If these incentives alone were to drive utilization, center HD, home HD, and CAPD all would

**Table 5-4.—Comparison Between Estimates of the Projected Cost of Dialysis Per Patient-Year Based on HCFA and GAO Cost Audits and HCFA's 1983 Composite Reimbursement Rates**

Dialysis type and location	Projected yearly cost		
	cost audits <sup>a</sup>	1983 Composite rates <sup>b</sup>	Percent difference
Center HD:			
Hospital . . . . .	\$21,060	\$20,436	-3 %
Independent center. . . . .	16,848	19,812	18
Home HD:			
Supervised by hospital center . . . . .	13,572	20,436	51
Supervised by independent center. . . . .	13,572	19,812	46
Direct purchase <sup>c</sup> . . . . .	16,068	7	?
CAPD:			
Supervised by hospital center . . . . .	17,784	20,436	15
Supervised by independent center. . . . .	17,784	19,812	11
Direct purchase . . . . .	17,160	?	?

<sup>a</sup>From table 5-1.

<sup>b</sup>From table 5-3.

<sup>c</sup>From the results of the GAO audit in which 70 percent of the patients sample were purchasing supplies directly from the supplier.

SOURCE: Office of Technology Assessment.

be expected to increase under the 1983 rates largely at the expense of HD in hospital dialysis centers.

Many factors other than financial incentives created by the 1983 rates, of course, may affect

patterns of utilization. The change in cavitation rates for physician supervision of dialysis, for example, clearly favors home dialysis over center dialysis. Because the physician plays a major role in the selection of dialysis modality, this financial incentive may be at least as powerful as that operating on dialysis centers. Physician acceptance of home dialysis techniques will be strongly

influenced by convictions about patient suitability and medical effectiveness, in addition to financial considerations. Finally, patient acceptance almost certainly will become an increasingly important determinant as public information on medical effectiveness and quality of life considerations become more widely distributed.

## COST IMPLICATIONS OF THE DIRECT PURCHASE OF SUPPLIES FOR HOME DIALYSIS

HCFA's 1983 rates apply only to the reimbursement of dialysis centers and do not affect the ability of the patient to purchase equipment and supplies for home dialysis directly from suppliers. The GAO cost audit indicated that 70 percent of home dialysis patients were direct purchasers under previous regulations. Questions that need to be raised include:

1. Are prices for supplies purchased directly by the patient higher than those for supplies purchased by a hospital or independent dialysis center?
2. If so, will the new reimbursement rates affect the number of direct purchasers and in what direction?

Higher prices for direct purchasers and any increase in their numbers, obviously, will be inflationary for the ESRD program.

In the absence of regulations to the contrary, suppliers probably do charge individuals higher prices than they do bulk purchasers such as dialysis centers or hospitals. CAPD provides an example of the possible consequences. Patients on CAPD require nearly 3,000 liters of sterile dialysate solution per year packaged in plastic bags plus a variety of ancillary supplies, including sterilization or "prep" kits, connecting tubes, and other apparatus. Two estimates of the yearly cost of supplies, provided by Travenol Laboratories, Inc., the supplier with the dominant market share, range from \$13,000 per year (1) to over \$19,000 per year (Travenol Price List, November 1, 1982). The details of these estimates appear in table 5-5. This wide range suggests that prices to direct purchasers may, in fact, be considerably higher.

**Table 5.5.—Estimates of the Annual Cost of CAPD Supplies and Equipment**

Travenol Laboratories Testimony to Congress (1982) <sup>a</sup> . . . . .	13,147
Travenol Price List—Nov. 1, 1982 <sup>b</sup> . . . . .	19,688
<sup>a</sup> Based on four exchanges per day or 1,460 per year at \$732 Per bag, \$100 for a prep kit for each exchange, and \$1,000 for other ancillaries	
<sup>b</sup> Based on 1,460 exchanges per year with Dianeal 137 Solution, 1.5 or 2 liters, at \$64.20 for case of 6 and Prep Kit Model 3 at \$6300 for case or 30 with each exchange, and \$1,000 for other ancillaries,	
SOURCE Office of Technology Assessment	

Furthermore, it suggests that, if Medicare is to retain the direct purchase option, it should establish limits on allowable charges that are directly linked to production costs, and at the same time, ensure a preferred customer relationship for persons enrolled in the ESRD program.

It is difficult to predict how many home dialysis patients will select the direct purchase option under the new rates. On the one hand, dialysis centers may find the new reimbursement rates and financial arrangements with suppliers sufficiently attractive that they will actively encourage patients to obtain their supplies through the center. In this case, the proportion, and even the total number, of direct purchasers might fall. If, however, centers see the financial incentives created by the new rates to be insufficient to offset the operational problems of distributing supplies, they might take actions to "assign" supply functions to the supplier or encourage direct purchase. This latter scenario would create the risk for ESRD program cost escalation.

In summary, it appears highly likely that HCFA's intent to encourage diffusion of home dialysis techniques will be fulfilled. Far less certain,

---

however, are the effects this diffusion will have on stemming the rising tide of ESRD costs. As a prudent purchaser of services, HCFA should consider taking the necessary steps to reassess the equity of the new rates in relation to the resource costs of the services they cover; to monitor

changes in the organization and patterns of utilization of dialysis services as they occur; and to devise mechanisms for determining the effects of these reimbursement decisions on the quality of ESRD treatment as well as its costs.