

# How available are evening dialysis services?

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*The availability of evening dialysis is considered important if the patient with renal failure is to return to work. Dialysis units are categorized by location and whether or not dialysis services are offered in the evening. The location of dialysis patients is compared with these estimates to determine the percentage of*

*patients having access to evening dialysis either in their own dialysis units or in a unit in their market area. A very large proportion of patients in the working age groups are likely to have access to evening dialysis both in their own market area and in their own dialysis unit.*

## Introduction

An overwhelming majority of the approximately 80,000 patients with end-stage renal disease in the United States generally use a dialysis procedure provided outside the home.<sup>1</sup> Typically, patients receive three hemodialysis treatments a week, each lasting from 3 to 5 hours. The length and frequency of these treatments suggest that patients' ability to choose from a variety of treatment times is likely to be an important factor in their well-being. The recent Task Force to the End-Stage Renal Disease Program (1982), for example, was particularly concerned about the availability of dialysis treatments during evening hours. Specifically, the Task Force was concerned that rehabilitated patients who wish to return to daytime employment may have difficulty in obtaining dialysis during the evening. The Task Force, however, did not offer any evidence on either the availability of night dialysis or on the relationship of such a measure to ESRD patients returning to work. Other sources, however, put the number of ESRD patients working outside the home (full time or part time in 1979) at 25 percent of the patient population, including patients who dialyzed at home and those who dialyzed outside the home (Gutman, Stead, and Robinson, 1982).

Our purpose here is to examine some specific evidence on just how available evening dialysis services are and to provide a general model of the determinants for a dialysis unit offering evening dialysis. We will offer estimates of the number of patients without access to evening shifts, and we will make some other observations based on our findings. It is important to note, however, that our goal is not to provide the definitive number of patients unable to obtain dialysis treatments after 6 p.m. but rather to supply several estimates of the availability of evening dialysis and thus add some specifics to the discussion of this issue raised by the Task Force.

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<sup>1</sup>According to Health Care Financing Administration facility surveys, at least 80 percent of end-stage renal disease patients dialyzed in-unit as of December 31, 1983.

## Data

The data used in this analysis are nationwide, and they are derived from several sources. In 1982, The Urban Institute completed a telephone survey of over 625 medical directors of dialysis units. The dialysis units surveyed were chosen randomly after certain selection criteria were met. (For example, units had to offer routine maintenance dialysis and each unit had to treat at least 10 patients on a regular basis). The sample was very representative of the dialysis units in the mainstream of outpatient care. One of the survey questions asked was whether or not the dialysis unit offered an evening dialysis shift. (For purposes of the interview, an evening shift was the hours from 6 p.m. to 11 p.m.) This information was used to determine the number of evening dialysis shifts available in a given market area.

An estimate of the number of full-time equivalent dialysis patients was taken from data routinely collected by the Health Care Financing Administration (HCFA).<sup>2</sup> Patients who dialyze either at home or at a dialysis unit were included in this figure; however, patients who received transplants in a given year were excluded for that year even if they received dialysis prior to the transplant or returned to it after the transplant.<sup>3</sup> Data on the number and location of end-stage renal disease providers were taken from HCFA's 1981 Master Provider File. The data used in the regression analysis are derived from the above sources and from selected data from the U.S. Census of Population and the U.S. Census of Housing.

## Methods

The first step in the analysis was to divide the census of end-stage renal disease (ESRD) providers into 381 "market areas," defined as either Standard Metropolitan Statistical Areas or nonmetropolitan

<sup>2</sup>The source of the data was HCFA's reimbursement files and the Medical Information System file.

<sup>3</sup>Transplant patients were excluded because of the difficulty of calculating patient-months for such people. The proportion of patients who fall into this category is small, however. Excluding them should not appreciably affect the estimates presented here.

counties.<sup>4</sup> We determined the total number of providers and the number of full-time equivalent ESRD patients located in each market area.

Next, various assumptions were used to estimate the availability of evening dialysis. Market areas were divided into two types: those with at least one unit providing evening dialysis and those with no units offering evening dialysis. The distribution of market areas with evening shifts across market areas of different sizes was calculated and compared with the distribution of patients across market areas to estimate the percent of patients without access to evening dialysis shifts within their own market areas. Two analyses based on different assumptions were performed to determine the number of patients without access to evening dialysis within their own areas. In addition, an analysis was made of the effect of the proportion of a unit's patients dialyzing at home on the likelihood of that unit's offering evening dialysis.

## Results

We first examined the distribution of end-stage renal disease patients and providers across varying sizes of market areas. Market areas were divided into those containing 1, 2-3, 4-6, 7-10, 11-20, 21-30, and more than 30 providers. Our results are presented in Table 1. More than 80 percent of the market areas contain only one to three providers; but one-half of all patients are in market areas with seven or more providers. The smaller market areas, although more numerous, have substantially fewer patients. This fact is not particularly surprising because most of the U.S. population lives in relatively few metropolitan areas.

Two estimates of the percent of patients without access to evening shifts were calculated under differing assumptions to find a range of availability of evening dialysis. For the first estimate, we made an assumption that would result in a lower estimate of the availability of evening dialysis; this would be the best estimate if our survey was *less* representative of the Nation. In the second estimate, we relaxed the assumption and obtained a higher estimate of availability of evening service; this would be the best estimate if our survey was *more* representative of the Nation. The assumptions differ in the magnitude of the potential bias that might result because of the unobserved (not surveyed) dialysis units.

In addition, the two estimates differ in that the first is based on patients' access within their own market areas, and the second is based on patients' access within their own dialysis units.

For the first calculation of availability, an estimate of the percent of market areas with at least one evening shift<sup>5</sup> was determined for groups of market

areas of differing sizes. Patients were said to have access to evening dialysis if at least one provider in their market area offered an evening shift. We calculated the percent of patients without access to evening shifts in each size market area by multiplying the percent of market areas without an evening shift by the percent of the total patient population present in each subsample.

For the first calculation, market areas with survey respondents were considered to be representative of all market areas; only those market areas with at least one survey respondent were included in the analysis. However, units that did not respond to the survey were considered as having no evening shift. In this case, only units surveyed were assumed to have evening shifts, but all patients in the market areas with at least one survey respondent were included in the calculation. That is, patients from surveyed as well as nonsurveyed units were compared with surveyed units only within surveyed market areas. This calculation should give a lower estimate of availability than if surveyed units only were included. The percent of market areas with at least one evening shift was calculated by groups of market areas of differing sizes, and the percent of patients without access to evening shifts was determined (Table 2). Note that under this assumption, the total of our estimate of patients without access to an evening shift in their market area is only 18.0 percent.

In the first estimate, however, we may have understated the number of market areas containing evening dialysis facilities. In other words, by assuming that nonsurvey units did not have evening shifts, we are likely to have overstated the number of patients without access to evening dialysis. By using only those units surveyed to determine the number that offer evening dialysis, we left open the possibility that the survey sample did not include other dialysis units that also offer evening dialysis. This possibility is especially strong in smaller market areas.

To answer this concern, a second calculation was made in which we assumed that the surveyed units are representative of the universe of dialysis units. (Because the completion rate of the survey was over 70 percent, and because additional nonresponse analysis showed no obvious source of bias, this assumption is quite plausible.) In this calculation, patient access is determined not for patients in their market areas but for those in their own dialysis units. The number of survey respondents with evening dialysis shifts as a percent of the number of survey respondents in the market area is shown in Table 3. Note that even in the smallest market areas, about one-half of the surveyed units offered evening dialysis. In the largest market areas, about three-quarters of surveyed units offered evening dialysis. This implies that, to the extent that patients are evenly distributed across units within market areas of a given size, about 50 to 75 percent of patients are likely to have access to evening dialysis within their own dialysis unit. Access to evening dialysis was calculated as the mean value of units with evening dialysis,

<sup>4</sup>Only market areas with at least one Medicare approved ESRD provider from the United States are included here; nonmetropolitan counties with no ESRD providers and U.S. territories have been excluded.

<sup>5</sup>In all cases, a dialysis unit was said to have an evening shift if it responded "yes" to a survey question concerning evening dialysis and assumed not to have an evening shift if it answered "no" to the same question.

**Table 1**

**Number and percent distribution of market areas, end-stage renal disease providers and patients, and cumulative percent of patients by number of providers in market area: 1979-81**

Number of providers in market area <sup>1</sup>	Market areas		ESRD providers		ESRD patients <sup>2</sup>		Cumulative percent of ESRD patients
	Number	Percent	Number	Percent	Number	Percent	
Total	381	100.0	1,136	100.0	32,591	100.0	—
1	218	57.2	218	19.2	5,057	15.5	15.5
2-3	95	24.9	214	18.8	5,764	17.7	33.2
4-6	36	9.4	175	15.4	5,280	16.2	49.4
7-10	14	3.7	113	9.9	3,450	10.6	60.0
11-20	12	3.1	170	15.0	5,421	16.6	76.6
21-30	2	0.5	49	4.3	1,436	4.4	81.0
31 or more	4	1.0	197	17.3	6,183	19.0	100.0

<sup>1</sup>Number of providers was taken from the Health Care Financing Administration's 1981 Master Provider File.

<sup>2</sup>Number of ESRD patients refers to full-time equivalent patients for 1979. The actual number of patients at a given point in time may be greater. This number includes patients who dialyze at home as well as those who use a dialysis unit. The data were taken from reimbursement records routinely collected by the Health Care Financing Administration.

NOTE: ESRD = end-stage renal disease. Market areas are defined as either Standard Metropolitan Statistical Areas or nonmetropolitan counties.

**Table 2**

**Number of market areas, estimated percent of market areas with evening shifts, number of survey respondents, facilities, and patients; percent distribution of patients, and estimated percent of patients without access to evening shifts, by number of providers in the market area: 1979-82**

Number of providers in market area <sup>1</sup>	Number of market areas	Estimated percent of market areas with at least one evening shift <sup>2</sup>	Number of survey respondents offering evening service	Number of		Percent distribution of ESRD patients across market areas <sup>3</sup>	Estimated percent of patients without access to evening shifts
				units	ESRD patients		
Total	257	—	333	962	28,695	100.0	18.0
1	126	48.4	61	126	3,127	10.9	5.6
2-3	68	60.3	48	156	4,388	15.3	6.1
4-6	31	71.0	43	151	4,690	16.3	4.7
7-10	14	100.0	45	113	3,450	12.0	0.0
11-20	12	91.7	58	170	5,421	18.9	1.6
21-30	2	100.0	14	49	1,436	5.0	0.0
31 or more	4	100.0	64	197	6,183	21.5	0.0

<sup>1</sup>Number of providers was taken from the Health Care Financing Administration's 1981 Master Provider File.

<sup>2</sup>Survey estimates are from the 1982 Urban Institute Survey of Dialysis Institution Directors.

<sup>3</sup>Percent of ESRD patients was calculated using full-time equivalent patients from 1979. Actual numbers of patients at a given time may be greater than the full-time equivalent. The percent includes patients who dialyze at home as well as those who use a dialysis unit. The data were taken from records routinely collected by the Health Care Financing Administration.

NOTE: ESRD = end-stage renal disease. Market areas are defined as either Standard Metropolitan Statistical Areas or nonmetropolitan counties, and they include only market areas with at least one respondent to the 1981 Urban Institute Survey of Dialysis Institution Directors.

weighted for the number of patients in each group of market areas. The mean shows that 64 percent of patients have access to evening dialysis within their own unit or, conversely, that 36 percent of patients lack access within their own units.

Larger market areas contain a larger percent of facilities offering evening dialysis (Table 3). This fact is notable because it suggests that a potential bias in the first calculation may not be large. The assumption for the first calculation was that if a market area had even one unit with an evening shift, patients had access to it (Table 2). Patients in a large market area with only one unit offering evening dialysis were considered as having access to evening dialysis, but this access may have been available only at a high cost (for example, travel time or long waiting lists for transferring to evening treatment slots). However, large market areas, the ones containing the majority of patients, are likely to have several facilities with

evening shifts, so that the situation of a large market area with only one dialysis unit that offers an evening shift is most unlikely.

The availability of evening dialysis is related to the availability of home dialysis. Presumably, patients who dialyze at home can choose the treatment time that is most convenient to them, and rehabilitated home patients who wish to return to daytime employment would presumably be able to dialyze in the evening. Therefore, it would seem plausible that a relationship might exist between the availability of evening dialysis in a unit and the number of patients dialyzing at home, especially in market areas with few end-stage renal disease providers. In order to test this proposition, we performed a multiple-regression analysis of the survey respondents.<sup>6</sup> The unit of

<sup>6</sup>As described below, the ordinary least squares estimation used here with binary dependent variables can have undesirable statistical properties.

Table 3

Number of market areas, survey respondents with an evening shift, survey respondents, and evening shifts as a percent of survey respondents, by number of providers in market area: 1979-82

Number of providers in the market area <sup>1</sup>	Number of market areas	Number of survey respondents with evening shift <sup>2</sup>	Number of survey respondents	Evening shifts as a percent of survey respondents
Total	257	333	547	<sup>3</sup> 64.0
1	126	61	128	47.7
2-3	66	48	93	51.6
4-6	31	43	74	58.1
7-10	14	45	65	69.2
11-20	12	58	84	69.0
21-30	2	14	18	77.8
31 or more	4	64	85	75.3

<sup>1</sup>Number of providers was taken from the Health Care Financing Administration's 1981 Master Provider File.

<sup>2</sup>Survey estimates are from the 1982 Urban Institute Survey of Dialysis Institution Directors.

<sup>3</sup>This estimate is based on the weighted distribution of patients across market areas (Table 2).

NOTES: Market areas are defined as either Standard Metropolitan Statistical Areas or nonmetropolitan counties, and they include only market areas with at least one respondent to the 1981 Urban Institute Survey of Dialysis Institution Directors. Percent of patients without access to evening dialysis in their own dialysis unit was 36.0.

analysis for the regression was the dialysis unit. The dependent variable was a 0, 1 binary to indicate whether or not a unit offered evening dialysis. Independent variables included the proportion of the unit's patients dialyzing at home; other characteristics of the dialysis unit such as size, type of ownership, and profit status; demographic characteristics of the unit's patients; and characteristics of the market area in which the unit is located, such as the number of units in the area, the density of dialysis units and patients, and the log of the ratio of wage and rent indexes. Results are presented in Table 4.

The results of this analysis clearly indicate that there is a trade-off between the percent of patients dialyzing at home and a unit's offering evening dialysis. As the proportion of home dialysis patients increases, other things being equal, the less likely a particular unit is to offer evening dialysis. The magnitude of the effect of home dialysis at the mean of the sample is, a 5-percent reduction of the proportion of units offering evening dialysis. That is, the proportion of units offering evening dialysis drops from 0.61 to 0.56 at the mean of the sample.<sup>7</sup>

Another notable finding of this analysis is that smaller units, Government-owned units, units that treat more children or a larger proportion of black patients, and units in small market areas are less likely to offer evening dialysis.

The implication of this analysis is that we have overstated the number of patients without access to evening dialysis within their own units. Our estimate of 36 percent for patients who lack access to evening dialysis in their own units may be too high for several

reasons. First, we have included home patients in the above calculations and, as mentioned earlier, home patients already have access to evening dialysis in their own homes. Moreover, as the regression analysis indicates, there is a greater proportion of home patients at units with no evening dialysis. Therefore, we have given undue weight to patients dialyzing in units with no evening dialysis. Second, the weighted average (Table 3) was based on the number of patients in market areas of a given size. The implicit assumption in this calculation was that patients were evenly distributed across dialysis units within market areas of a given size. This is not true, however; units do vary in size. As the coefficient on unit size in the regression analysis indicates, it is the large units that are more likely to offer evening dialysis; therefore, in the calculation of the estimate in Table 3, we have given equal emphasis to small and large units. Consequently, small units that are less likely to offer evening dialysis are overstated. A third bias in our calculation is that not all patients in the population are likely to work. Patients under 20 years of age or those 65 years of age or over, for example, are less likely to be employable than patients in the intermediate age group.

We performed one final analysis to correct for the first two biases in our calculation. The number of patients in survey units with and without evening dialysis and the number of patients without access to evening dialysis are shown in Table 5 by place of dialysis. The number of patients without access to evening dialysis was calculated by dividing the number of unit-based patients in units not offering evening shifts by the total number of patients. Patients in units with evening shifts and all home patients were assumed to have access to evening dialysis. The results of this analysis suggest that patients without access to evening dialysis within their own units is 25.3 percent (Table 5).

<sup>7</sup>This is, of course, an approximate estimate based on the parameter estimate and the mean of the sample. It is recognized that coefficients estimated on binary dependent variables are sometimes biased when estimated with ordinary least squares. However, in general, if the distribution of the binary variables is not centered around 0.2 or 0.8 (as is the case with the data with a mean of 0.61), the bias is not likely to be large (Domencich and McFadden, 1972).

Table 4

**Statistics from regression of evening dialysis on home patients, and facility, patient, and market area characteristics: 1982**

Independent variable	Dependent variable: Evening dialysis offered at facility? (1 = yes; 0 = no)	
	Parameter estimate	Statistical significance
Proportion of patients dialyzing at home	-0.512	0.0230
<b>Facility characteristic</b>		
Size:		
Log of patient-months per year	0.171	0.0001
Type:		
Hospital center <sup>1</sup>	—	—
Hospital facility	0.049	0.5563
Free-standing unit	-0.080	0.2896
Transplant center	0.034	0.6371
Ownership:		
Not-for-profit <sup>1</sup>	—	—
For-profit	-0.114	0.1343
Government	-0.221	0.0015
<b>Patient characteristic</b>		
Age:		
Proportion under 20 years	-0.529	0.0076
Proportion 21-64 years <sup>1</sup>	—	—
Proportion 65 years or over	-0.145	0.4317
Race:		
Proportion white <sup>1</sup>	—	—
Proportion black	-0.293	0.0042
Proportion other races	-0.394	0.4311
Sex:		
Proportion male	-0.151	0.4836
Proportion female <sup>1</sup>	—	—
<b>Market area characteristic</b>		
Size:		
1 Dialysis unit	-0.425	0.0004
2-3 Dialysis units	-0.330	0.0051
4-6 Dialysis units	-0.302	0.0088
7-10 Dialysis units	-0.127	0.2690
11-20 Dialysis units	-0.146	0.1427
21-30 Dialysis units	0.062	0.6677
31 or more Dialysis units <sup>1</sup>	—	—
Price:		
Log of wage index and rent <sup>2</sup>	0.047	0.7291
Density <sup>3</sup> :		
Dialysis units per square mile	-2.718	0.5340
Dialysis patients per square mile	0.095	0.1001
Constant term	0.404	0.5992
R <sup>2</sup>	0.2247	—
Joint F-statistic	5.91	0.0001
Mean of dependent variable	0.611	—
Sample size	450	—

<sup>1</sup>Reference group.

<sup>2</sup>This is the ratio of the Health Care Financing Administration's area (hospital) wage index to the resident populations median 1980 rent per month in the SMSA or county of the dialysis unit.

<sup>3</sup>Square miles is the area in the market area of the dialysis unit.

NOTE: The parameter estimates are the estimated coefficients for ordinary least-squares estimation of the independent variables on the binary dependent variable. Statistical significance is the probability of a type one error.

SOURCES: *Federal Register*: Medicare program, end-stage renal disease program, prospective reimbursement for dialysis services and approval of special purpose renal dialysis facilities. Vol. 48, No. 92, May 11, 1983; U.S. Bureau of the Census: 1980 Census of Housing, Supplementary Reports and Selected Housing Characteristics by States and Counties, 1981.

Table 5

**Number of facilities offering and not offering evening dialysis and number of patients without access to evening dialysis, by treatment location: 1982**

Location of treatment	Patients in surveyed units		Patient without access to evening dialysis
	Offering evening dialysis <sup>1</sup>	Not offering evening dialysis	
Total	19,328	7,325	6,748
In-facility patients <sup>2</sup>	18,115	6,748	6,748
Home patients	1,213	577	0

<sup>1</sup>Units included in the 1982 Urban Institute Survey of Dialysis Institution Directors.

<sup>2</sup>Number of patients was estimated for each unit from Medicare claims data (and states the actual number of patients rather than the full-time equivalent used earlier). Transplant patients are included.

NOTE: Percent of patients without "access" to evening dialysis, corrected for size of unit and proportion of home patients (6,748/(19,328 + 7,325)) was 25.3.

It was not possible to correct directly for the number of patients who are not in the age group most likely to work. However, we have calculated that, in 1980, 67.4 percent of dialysis patients were between the ages of 21 and 64 (which we assume is the most likely age group to engage in the labor force). This would suggest that if patients of different ages are evenly distributed across dialysis units, the number of working age patients lacking access to evening dialysis in their own dialysis unit might be closer to 67 percent of 25 percent, or approximately 17 percent.

In summary, the evidence presented in this article suggests three conclusions: First, most dialysis patients in the United States are located in larger market areas even though there are numerous small market areas. In other words, during the period of this study, most of the patients are concentrated in larger market areas that had a high proportion of units with evening dialysis. Secondly, there is a trade-off between home and in-facility evening dialysis. Other things being equal, the likelihood of a unit offering evening dialysis is negatively correlated to the proportion of patients in that unit who dialyze at home. Finally, the magnitude of the problem of low access to evening dialysis is likely to be smaller than common wisdom suggests: During 1982, our *highest* estimated percent of patients without access to evening dialysis in their own market areas was 18.0 percent; 25.3 percent was our *highest* estimate for those who lacked access in their own dialysis units. The latter estimate is likely to be substantially lower when patient working age is taken into account.

## Discussion

The preceding sections were designed to provide estimates of the magnitude of the problem of access to evening dialysis, as measured in late 1982. Based

on the data presented here, it would appear that evening dialysis services are generally available to the vast majority of end-stage renal disease patients. Although this article does not address the causal relationship between evening dialysis and rehabilitation, these results suggest that, even if access to evening dialysis was found to be a major impediment to rehabilitation, the cost of increasing access may not be as great as common wisdom suggests. As was mentioned earlier, Gutman, Stead, and Robinson (1981) estimated that 25 percent of dialysis patients worked outside the home in 1979. Our analysis has shown that as many as 75 percent of patients had access to evening dialysis within their own areas.

The estimates presented in this article have two limitations. First, the preceding analysis of access within market areas presumes that patients have access to evening dialysis when a unit in their market area offers an evening shift. In fact, such access may require patients to change dialysis units because their unit does not offer an evening shift. We do not know how much of a problem this may be, although changing dialysis units is generally perceived to be difficult for some patients. Further, in addition to the psychological costs (and perhaps risks) of changing dialysis units, patients changing units may incur greater financial costs for such matters as transportation. Again, we do not know how great these costs would be, but we add that a reasonable estimate is that at least 75 percent of patients had access to evening dialysis at their existing unit (Table 5).

A second potential limitation of this analysis is that many influences have changed in the dialysis industry since these data were collected (August 1982), and it is possible that the situation has changed. We will discuss several of these influences and their likely impact. We cannot, however, determine in this article what the net effect of these influences will be.

First, the composite rate regulations (*Federal Register*, 1983) that went into effect in August 1983 lowered the reimbursement rate for outpatient dialysis. These regulations have put additional financial pressure on dialysis units to reduce costs. Has this pressure led to reduced numbers of evening dialysis shifts? Although we cannot be definitive on this issue, we believe it is likely that these financial pressures may have worked to reduce the number of evening shifts. This speculation is based on the previous work of Held and Pauly (1982). They showed that, based on traditional cost-minimizing criteria, dialysis units were generally not minimizing costs and that, on the average, units had too few dialysis stations compared with the number of staff. If pressure to reduce costs was to push dialysis

providers towards more dialysis stations, then larger numbers of patients would be dialyzed during a given shift, implying a likely decrease in the number of shifts offered. Although we do not have definitive data, our supposition is that the day shifts are more popular in general (with both staff and patients), so that reductions in the number of shifts are more likely to come from either early morning or evening shifts.

The cause of undercapitalization (too few dialysis stations compared with the number of staff) reported by Held and Pauly is likely to be the minimum utilization requirements (MUR) and other restraints on the supply of dialysis equipment or providers, such as certificate of need (CON); without these restraints, dialysis units would be likely to expand the number of dialysis stations, other things being equal. To the extent that MUR, CON, and other restraints on expansion of the number of dialysis stations are reduced, there may be a movement toward larger numbers of patients per shift and fewer shifts overall. In fact, there is considerable movement to remove CON and other restrictions on the number of dialysis providers. For example, California (California Medical Association, 1984) and Colorado (Colorado, 1982 and 1983) have greatly reduced the CON impediments to opening new dialysis units.

On the other hand, increasing the number of dialysis units may have precisely the opposite effect of increasing dialysis stations: To the extent that this environment leads to more competition for patients by providers, there will be more response to patient preference, including evening dialysis if that is what patients prefer. (Held and Pauly, 1983).

Finally, recent changes in the economic environment of the dialysis industry could affect dialysis units in other ways, too. Smaller units, and, possibly, hospital units, are likely to find operation more difficult under the new reimbursement schedule and, to the extent that they close, there will be growth in the size of the remaining dialysis units. This may lead to more evening shifts at the larger units. (The coefficient on facility size presented in Table 4 clearly suggests that larger units are more likely to offer evening dialysis.) In addition, the composite rate regulations provide for the same dialysis payment regardless of the type or location of treatment. Consequently, providers may offer patients more incentives to undergo dialysis at home, where patients could dialyze in the evening if they preferred. Similarly, the new regulations may induce more providers to offer self-dialysis in a center, perhaps during the evening.

What might be appropriate Government policy if there is a movement by providers away from evening dialysis or if access to evening dialysis, for whatever

reason, is perceived to be a problem for rehabilitation? It is not an easy question to answer, but, in any case, the following points should be considered:

- Requiring all providers to have an evening shift is likely to have unforeseen and possibly substantial costs both for the Government and for patients. For example, because they lack economies of scale, small units are already feeling substantial financial pressure, and, if they must offer an evening shift, it may well be at the expense of a day shift. This will have consequences for patients who prefer to dialyze in the day time. Such a requirement might also put more pressure on some units to close entirely, because, for example, night work by dialysis staff may cost more.
- Patients have different preferences for time of dialysis, among other things, so some system with flexibility is needed to make the tradeoffs between majority and minority preferences. Coordination of units so that at least one in an area has evening shifts may be a possibility, especially in areas where changing dialysis units is not especially difficult.
- If a reward system for encouraging providers to offer evening dialysis is considered, it would be preferred to distinguish between the providers who begin to offer an evening dialysis shift because of the bonus and those providers who already had offered one before the bonus system was implemented. If one cannot distinguish between these two types of providers for purposes of policy, costs in the form of bonus payments will be much greater. Such distinctions, however, are likely to be impossible.
- There should be some consideration of the potential for financing patients to travel to a unit with evening dialysis. This may be much less costly than requiring all providers to offer evening dialysis.

## Conclusion

This article has provided some specific estimates of the availability of evening dialysis. Although we do not directly test the effect of access to evening dialysis on rehabilitation, data in the Results and Discussion sections of this article suggest that both the belief that there is a lack of availability evening dialysis and the belief that such a lack has a dramatic impact on the rehabilitation of patients should be regarded skeptically. The majority of patients are likely to have evening dialysis available in their own dialysis unit. Even greater proportions are likely to have access to evening dialysis if one examines the data from a

market area perspective. Moreover, most dialysis patients live in larger urban areas, where the great proportion of dialysis units offer evening dialysis. However, changing economic conditions undoubtedly push one to be prudent in extrapolating data from 1982 to the present. More information is needed about the current state of events, yet it is unlikely that the situation has changed totally.

Rehabilitation of patients with end-stage renal disease is an ongoing issue about which we are only beginning to gain knowledge. It is important, especially in this day of budget retrenchment, that the issue be well defined and supported with hard facts, otherwise the chances of successful policy change will be greatly reduced. The evidence presented in this article suggests that evening dialysis is generally available to the great majority of patients. Consequently, even if a causal link between the availability of evening dialysis and rehabilitation is established, a policy of mandating or otherwise encouraging evening dialysis is unlikely to have a dramatic impact on patient rehabilitation.

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