Chapter IX

Hospitalization

Key Words:
Admissions in ESRD hospitalization
Dialysis hospitalization
Standardized hospitalization ratio
Geographic variation in hospitalization
Length of stay

Hospitalization rates reflect many aspects of ESRD therapy. Among the most important are the frequency and duration of reported hospitalizations, both of which may serve as indicators of the level of patient morbidity. Unfortunately, other influential (but unrelated) factors include the health insurance system, local practice patterns, and individual patient needs. Consequently, hospitalization data are subject to numerous sources of variability and tend to be imperfectly reported at both patient and aggregate levels. Despite these faults, such data allow the USRDS to provide reasonably objective characterizations of the morbidity experience in the ESRD population.

The source of hospitalization data for this chapter is Medicare billing records obtained from the HCFA standard analysis files (SAF; see Chapters I and XIII) for the years 1993-1997. The majority of analyses presented here will be based on 1995-1997 data only; 1993 and 1994 data are only used in an empirical investigation of time trends. It was determined by the USRDS that the eligibility criteria used in the 1997 ADR and before did not adequately screen patients for whom Medicare was the secondary payer and consequently a number of such patients (particularly in the later years) contributed relatively sparse information on hospitalization. The failure to capture these events and/or days in the hospital may have biased towards zero (perhaps even differentially by age) the various rates we computed. As in the 1998 ADR, data used in these analyses and in the hospitalization reference tables (Section H) are limited to patients who are covered by Medicare according to Medicare payment activity on January 1 of the year or on day 91 of ESRD during the year. These data are currently available only for 1993-1997. The specific rationale for this is described in the introduction pages (i-iv) of Section K. In short, using an individual's Medicare cost profile to determine eligibility for inclusion in the analysis of hospitalization increases the likelihood of capturing all available hospitalization information on that individual. Patients for whom Medicare is the secondary payer for all or part of the study period are automatically excluded from the analysis because the Medicare bills are unlikely to include all hospitalizations for such patients. The new criteria which went into effect last year in the 1998 ADR should lead to summary rates that better reflect the true hospitalization experience of ESRD patients.

The remainder of this chapter is organized as follows. First, the specific patient eligibility criteria used to select patients for the analyses of this chapter are summarized. Second, the hospitalization experience of incident and prevalent dialysis patients is described via total hospital admissions and hospital days. The first of these analyses are done on a “per calendar year” basis, and consequently do not adjust for the fact that members of the study cohort are at risk for hospitalization for differing periods of time. We then summarize the hospitalization rates of incident and prevalent dialysis patients, defined as the total number of admissions per year at risk for hospitalization. The analyses in the last part of this chapter utilize a comparison measure based on standardized first hospital admission rates (Strawderman), an adaptation of the standardized mortality ratio (SMR) methodology (1997 ADR,

Chapters V and XIII). Using these standardized rates, we compare the standardized hospitalization ratio (SHR) for dialysis patients across states for 1995-1997 and also investigate time trends in hospitalization for 1993-1997. Finally, summaries by age, race, sex, diabetic status, and modality group are given in the reference tables (Section H), and apply to data collected between 1995-1997.

Patient Eligibility

A number of eligibility criteria are used to ensure that complete Medicare payment data (and hence information on hospitalizations) are available for ESRD patients in these analyses. Among the most stringent of these criteria is the exclusion of any patient having Medicare as a secondary payer. This excludes approximately 8 percent of patients with Medicare payments for the period 1993-1997. The reason for this exclusion is that our primary data source (i.e. Medicare bills) only provides an incomplete record of medical care episodes for these patients. Eligibility based on Medicare payment activity for each of the patients included in any of the analyses in this chapter starts 30 days after the latest of (i) January 1, 1993; (ii) first ESRD service date; (iii) Medicare Part B entitlement date; or (iv) the first month in which the dialysis bills for that patient exceed $675. Patients are included in the hospitalization rate calculations if they are eligible based upon Medicare payment activity on their start date for each year (January 1 or day 91 of ESRD). In particular, patients incident during the year are included in the analyses on day 91 of ESRD if they are eligible based on Medicare payment activity on that day. Prevalent patients are included in the analyses according to whether they are eligible based on Medicare payment activity on January 1 of the year; any previously transplanted patient currently on dialysis whose transplant failed within 60 days prior to January 1 is excluded. The latter is done under the presumption that such patients may contribute hospitalizations early during the followup period that are due to the transplant failure and not dialysis-related complications. In addition, all patients who die of AIDS are excluded retroactively at death. Since most patients over age 65 years are covered by Medicare, such coverage is delayed for younger ESRD patients unless they are previously covered by Medicare because of medical disability. Thus, results for younger patients may be slightly biased toward recording more hospitalizations through this selection of more disabled patients.

For analyses in the next two sections, "Trends in Hospitalization" and "Crude Hospitalization Rates Based on Total Admissions", hospitalizations rates are reported per patient rather than per patient year at

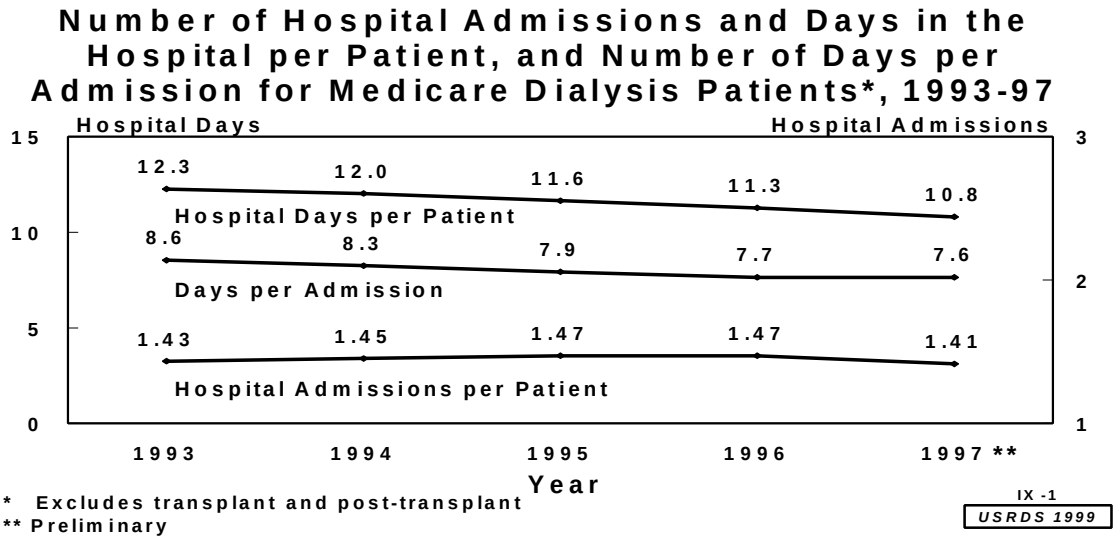

Figure IX-1

Number of hospital admissions and days in hospital per patient and number of days per admission during each year for 1993-97. Includes all Medicare dialysis patients treated during the year. The median number of hospital admissions is 1 for each year. The median number of days spent in the hospital is 4 for 1993-94 and 3 for 1995-97. Patients who died of AIDS are excluded. Source: Special Analysis.

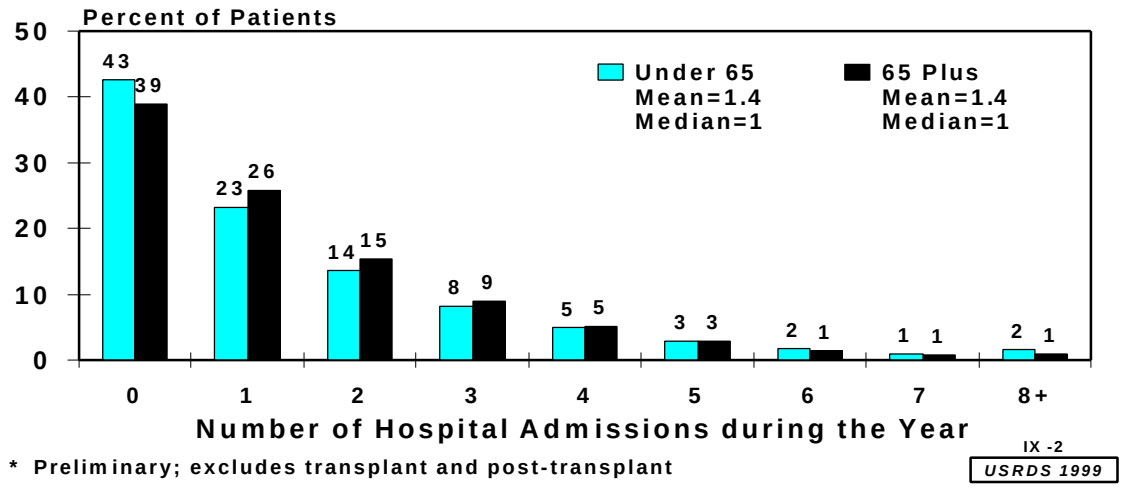

Figure IX-2

Distribution of Medicare dialysis patients with the given number of hospital admissions in a single year, by age, 1997. Mean and median number of hospital admissions are also denoted. Patients who died of AIDS are excluded. This figure shows counts of hospital admissions for all Medicare dialysis patients treated during the year and therefore includes some patients not followed for a full year. As a result, the numbers here are lower than those for total admissions per year at risk. Source: Special Analysis.

risk. Hospitalizations for each patient are counted starting on January 1 or day 91 of ESRD (assuming the patient fulfills the Medicare payment start date criteria) until the end of the year, death, or 3 days prior to the date of transplant.

For the remainder of the chapter, hospitalization rates are reported per patient year at risk. Patients who start followup or die during a year are considered to be at risk for only a portion of the year, and eligible patients who are transplanted during a given year have their at-risk period censored 3 days prior to the date of transplantation. Patients who switch modalities during the year are assigned to the new modality at the start of the next year; in statistical parlance this is known as an "intent-to-treat" treatment assignment scheme, although each year's followup is limited to at most one year.

Trends in Hospitalization

Both the yearly number of hospital admissions and days in hospital per patient are important measures in the study of hospitalization in dialysis patients. Figure IX-1 describes the average number of hospital admissions and average number of days in the hospital per patient for each of the years 1993-1997, as well as the average number of days in hospital per admission. Figures IX-2 and IX-3 describe the distribution of patients having a given number of hospital admissions and total days in the hospital for patients prevalent on January 1, 1997, or incident during 1997, by patient age under or over 65. Note that each of these figures is based on the number of events per calendar year rather than the number per year at risk. Since the time at risk is much less than 1 year for many patients, the number of hospital admissions and days per year at risk (e.g., as seen in Table H.3) are greater than the numbers shown here.

Figure IX-1 shows a slight increase in the average number of admissions per patient by calendar year, from 1.43 in 1993 to 1.47 in 1995 and 1996, with a drop to 1.41 in the average number of admissions for 1997. Days in the hospital per calendar year per patient have decreased approximately 12 percent from an average of 12.3 days in 1993 to 10.8 days in 1997. The average number of days per admission (length of stay) dropped from 8.6 days in 1993 to 7.6 days and 1997. Figures IX-2 and IX-3 indicate that a substantial majority of patients have both a small number of total admissions and hospital days in 1997. Both of these distributions have a long tail extending to the right, with the distribution of days somewhat

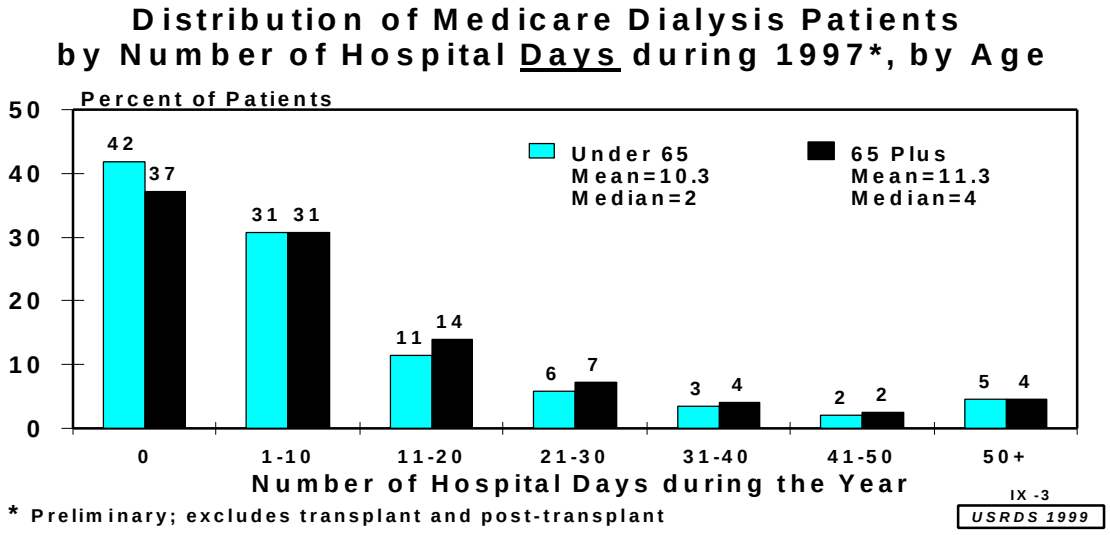

Figure IX-3

Distributions of Medicare dialysis patients by the total number of days hospitalized in a single calendar year by age, 1997. Mean and median number of hospital days are also denoted. Patients who died of AIDS are excluded. This figure shows counts of days in the hospital for all Medicare dialysis patients treated during the year and therefore includes some patients not followed for a full year. As a result, the numbers here are lower than those for hospital days per year at risk. Source: Special Analysis.

more positively skewed than total admissions. 43 to 37 percent of patients had zero admissions and zero days in 1997.

Both the distribution of admissions and days have experienced a very slight shift towards fewer admissions and hospital days compared to what was reported in the 1998 ADR for 1996. Figure IX-2 shows that approximately 65-66 percent of the patients age groups above and below 65 years had at most 1 hospital admission, while 5 and 3 percent respectively had more than 5 admissions in 1997. In the 1998 ADR, 64 percent of both age groups experienced at most one hospitalization in 1996, indicating a modest decrease in the percent of patients being hospitalized during 1997. The median number of admissions is 1 per calendar year in both groups, while the mean number of admissions is 1.4 in both age groups. In terms of hospital days, Figure IX-3 shows that 37 percent and 42 percent of the patients in the older and younger age groups did not require hospitalization in 1997. This compares to 36 and 40 percent respectively reported for these same age groups in the 1996 (USRDS 1998), which is consistent with the decrease in admissions shown in Figure IX-1 for 1997. In 1997, 10 percent of patients in the younger age group, and 11 percent of patients in the older age group spent more than 30 days in the hospital. In addition, the median and mean for hospital days were respectively 4 and 11.3 for patients age 65+ and 2 and 10.3 for patients under 65. These results are comparable to data reported in the 1998 ADR for 1996 for the younger patients, but represent a reduction in both median and mean hospital days for patients 65 and older. The percent of patients with 0 admissions during the year is less than the percent of patients with 0 days in the hospital during the year because of hospitalizations that start in 1996 and end in 1997. For these admissions, the admission is counted in 1996, but the days in the hospital are counted in the year they occur (i.e., some in 1996 and some in 1997).

In general, the trends for hospital admissions and days in the hospital observed here are similar to those reported in earlier ADRs. Specifically, younger patients tend to have less hospitalization, measured on either scale, and the number of hospital days has decreased over time. The decrease in hospitalization days is consistent with the current overall national trend of decreasing length of stay in the hospital, which itself reflects efforts to contain overall health care costs. Because comorbidity is rising with increasing age and diabetes (Chapter II), the more stable trend in the number of admissions may reflect a

shift to fewer hospitalizations for patients of similar comorbidity.

Crude Hospitalization Rates Based on Total Admissions

The patient populations under study in Figures IX-1 through IX-3 include prevalent dialysis patients and hence include patients having different lengths of followup. The above descriptive analyses do not account for this, and therefore we computed an aggregated rate per year at risk for hospitalization, defined as the ratio of total hospital admissions or days to the total time at risk. In order to stabilize the estimated rates, we pooled data for the period 1995-1997, calculated yearly totals for the number of hospital admissions and years at risk for hospitalization, and then computed the ratio of admissions to years at risk in order to obtain the overall rate. These rates are computed for various age, race, sex, and modality groups within the ESRD population in order to compare the hospitalization experience among different groups of patients hospitalized over the period 1995-1997.

Rates Based on Total Admissions and Hospital Days

The hospitalization rates summarized in Figures IX-4 through IX-10 depict the experience of the dialysis population by different subgroups and are computed from information found in Tables H.3 and H.4. For the admissions rates, the years at risk for hospitalization for each patient are determined by subtracting the time actually spent in the hospital from the total time on observation. This calculation explicitly accounts for the fact that patients are not at risk for a new hospitalization while already in the hospital. In counting total admissions, hospitalizations that overlap or occur without any days between discharge and the subsequent admission are combined into a single hospitalization spanning from the admission date of the first to the discharge date of the last; this reduces the total number of hospitalizations by about 10 percent. This methodology differs from that of some other researchers (HCFA 1994).

Rates are also computed for hospital days for various age, race, sex, and modality groups (see Reference Table H.4 for a summary). A difference between rates based on total days and those based on total admissions is that the at-risk period for the former includes time spent in the hospital since being in the hospital does not preclude one from being at risk for an additional day in the hospital. As discussed in earlier ADRs, rates based on total admissions and hospital days must be interpreted with some caution. This is particularly true for the standard error tables, which rely heavily upon an assumption that these counts follow a Poisson distribution. It was shown in the 1996 ADR (Figure VIII-3) that such an assumption is unlikely to hold for these data. One possible reason for this is that for a given patient, the risk of subsequent hospitalization may increase with each new hospitalization. In contrast, the assumption of Poisson-distributed counts requires that the risk of a new hospitalization be independent of the number of prior hospitalizations for each patient.

Figure IX-4 shows the total admission rates by modality as a function of age based on data pooled for the periods 1995-1997. The rates generally increase with age for each treatment modality, the exception being the youngest age groups where hospitalization tends to start high and then initially declines. The rates for all modalities, save CAPD/CCPD, are generally very similar. Hospitalization rates among CAPD/CCPD patients are generally slightly lower than for hemodialysis patients until age 20 and after age 70, but slightly higher in each age group in between. This is consistent with trends reported in the 1996 through 1998 ADRs. It was reported in the 1996 ADR that hospitalization rates for CAPD/CCPD patients have in recent years been steadily falling while those for hemodialysis patients have remained relatively stable. Habach et al (1995) reported such comparisons for 1988 through 1990. Suggested reasons for reduced hospitalizations among CAPD/CCPD patients included changes in the frequency of switching between modalities and differences in age distributions among the two treatment groups. The data presented in the 1997 and 1998 ADRs are very consistent with the present data and suggest that the rate of hospitalization among CAPD/CCPD patients has now begun to stabilize.

The actual differences between rates for CAPD/CCPD and hemodialysis patients might be larger than reported here. As remarked earlier, an "intent to treat" assignment of dialysis modality is used in the analyses of this chapter. That is, hospitalizations for patients who switch in the middle of the calendar year are not attributed to their new modality until January 1 of the following year. The USRDS has previously shown that CAPD/CCPD patients switch to hemodialysis approximately three

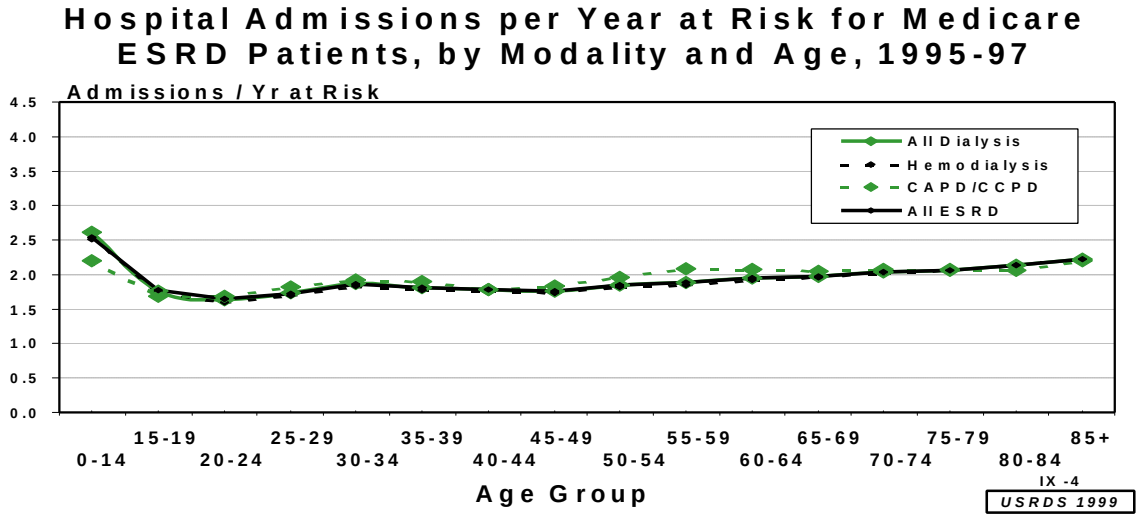

Figure IX-4

Total hospital admissions per patient year at risk for all Medicare dialysis patients by modality and age, 1995-97. Patients are grouped by treatment type based on the treatment method they were using on January 1 of the year. Patients who died of AIDS are excluded. Source: Reference Table H.3.

times as often as hemodialysis patients switch to CAPD/CCPD (USRDS 1995). If hemodialysis patients tend to incur fewer hospitalizations, reported rates for CAPD/CCPD patients may be biased downward (compared to an as-treated model), while rates for hemodialysis patients are likely to be biased upward (although much less so) if CAPD/CCPD patients with poorer health are more likely to switch.

Figures IX-5 and IX-6 show the total admission rates and Figures IX-7 and IX-8 show total hospital day rates broken down by age, race, and sex. The

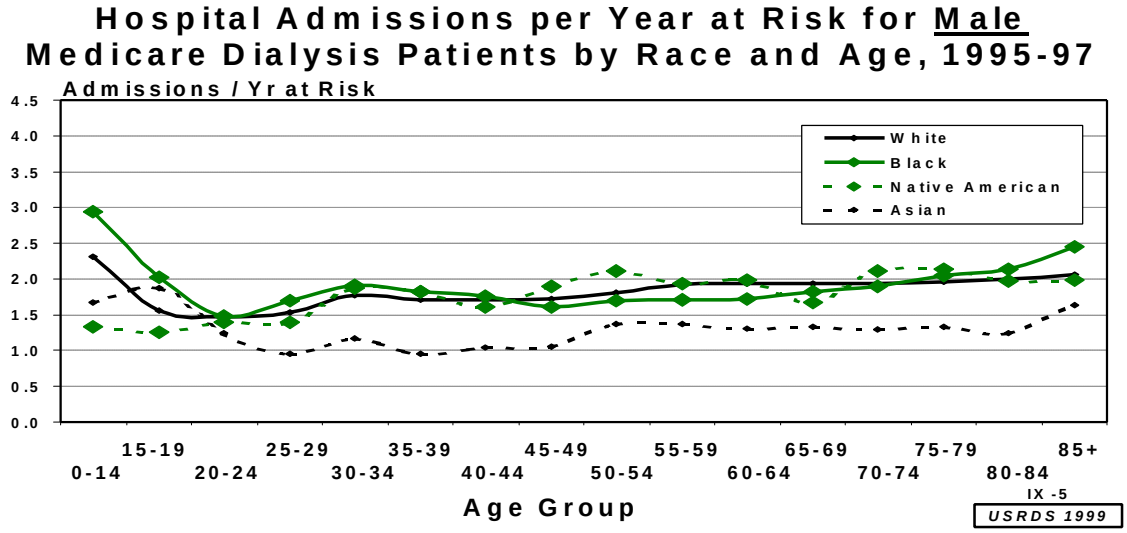

Figure IX-5

Total hospital days per patient year at risk for male Medicare dialysis patients by race and age, 1995-97. Patients who died of AIDS are excluded. Source: Reference Table H.4.

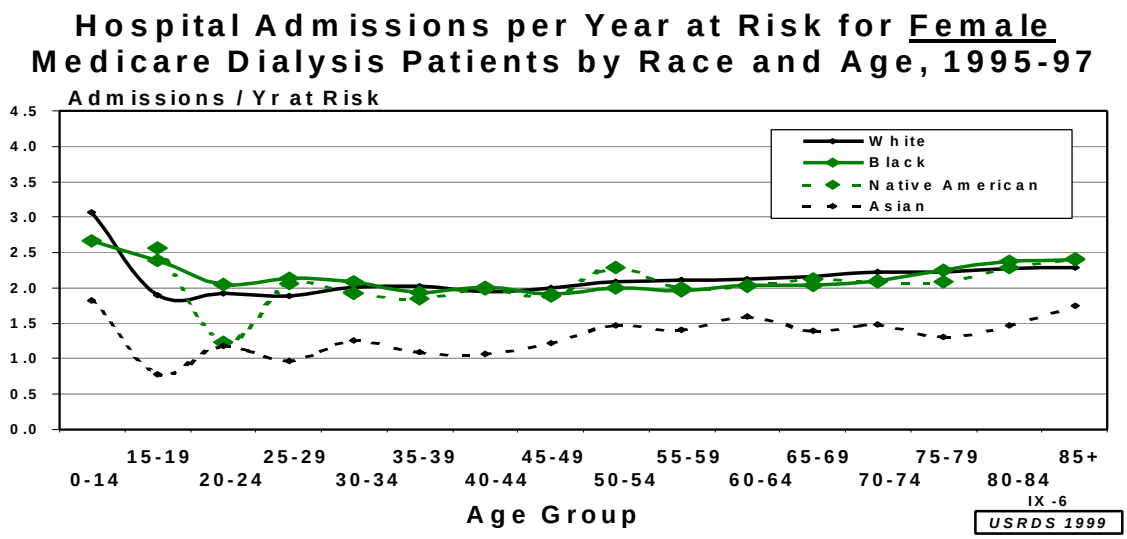

Figure IX-6

Total hospital admissions per patient year at risk for female Medicare dialysis patients by race and age, 1995-97. Patients who died of AIDS are excluded. Source: Reference Table H.3.

overall patterns are very similar whether admissions or total days are considered. The rates for Asians are substantially lower than those for Blacks, Whites, or Native Americans in almost all age groups with the exception of the youngest. This finding agrees with significantly lower mortality risk for Asian Americans (Wong 1999). The rates for Blacks tend to be higher than for Whites both early and late in life, with this pattern being somewhat more pronounced for males than for females. Rates among Black females are higher than for White females up to about age 40, lower to about age 75, and higher after age 75. These results are consistent with those reported in earlier ADRs.

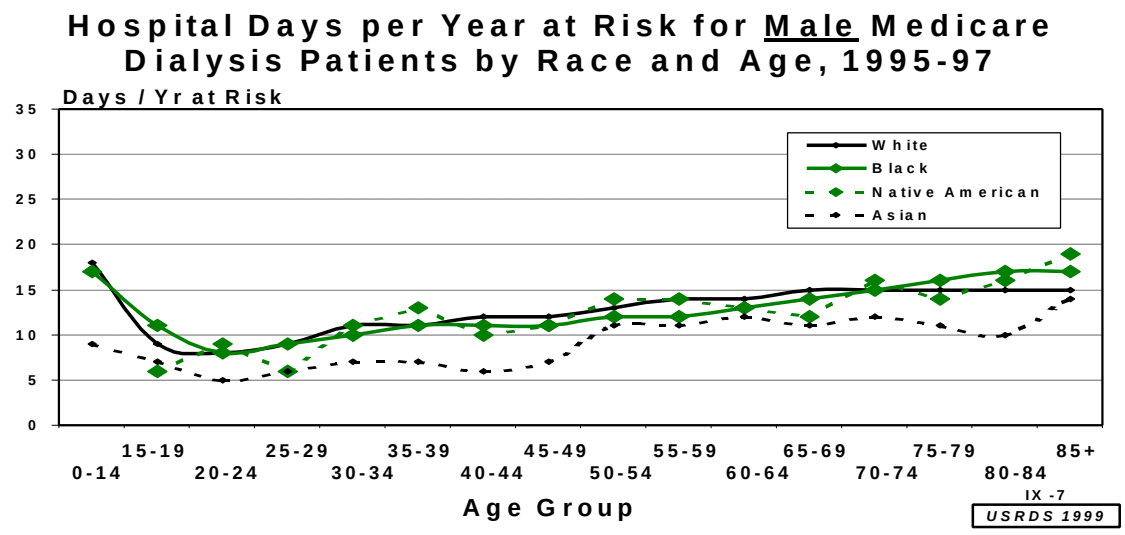

Figure IX-7

Total hospital days per patient year at risk for male Medicare dialysis patients by race and age, 1995-97. Patients who died of AIDS are excluded. Source: Reference Table H.4.

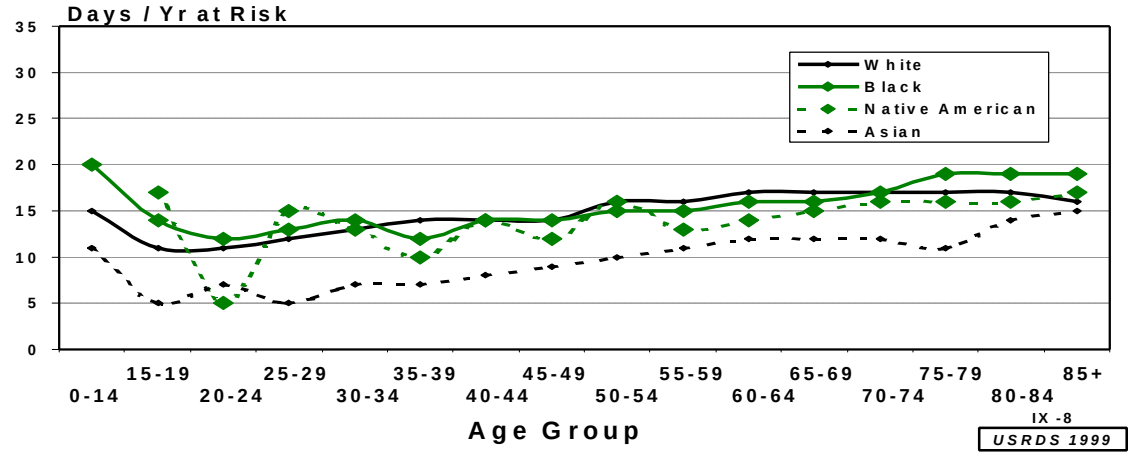

Figure IX-8

Total hospital days per patient year at risk for femal Medicare dialysis patients by race and sex, 1995-97. Patients who died of AIDS are excluded. Source: Reference Table H.4.

It is important to note that the rates for patients aged 0-19 are, relative to the other age groups, based on rather small sample sizes. (In cases where there are fewer than 10 patients in a group, the rate is not shown). This is especially true for Asians and Native Americans, and to a lesser extent Blacks and Whites. Consequently, small changes in either the number of admissions or time at risk may result in large changes in the calculated rates, and the more extreme changes observed in these groups over short time periods may simply be due to rate instability rather than any real difference. Furthermore, the rates for the youngest age group are also likely to be affected by patient selection: Given the high transplantation rate in this

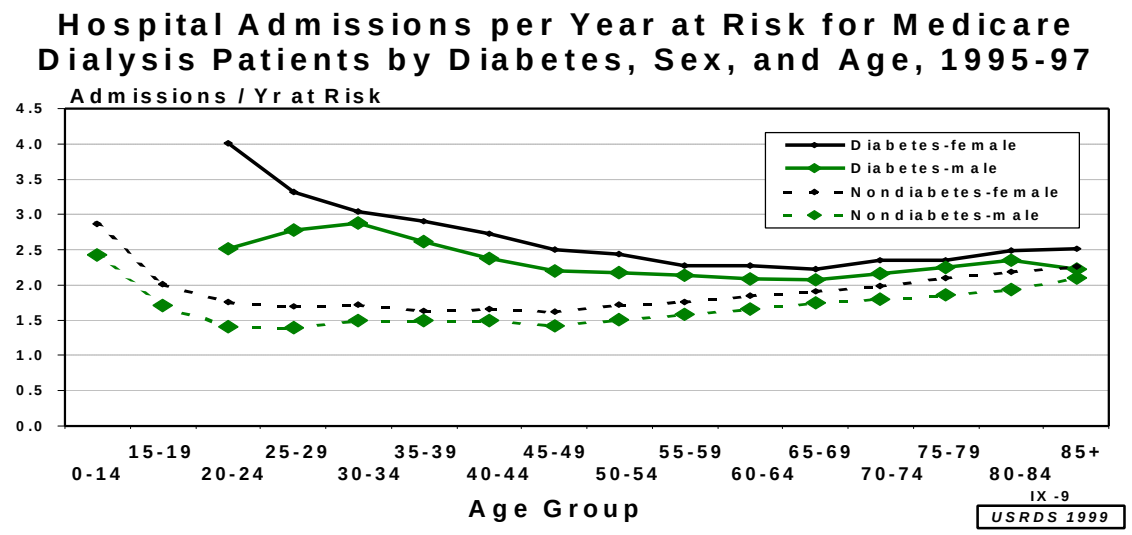

Figure IX-9

Total hospital admissions per patient year at risk for all Medicare dialysis patients by primary cause of ESRD (diabetes, nondiabetes), sex, and age, 1995-97. Patients who died of AIDS are excluded. Source: Reference Table H.3.

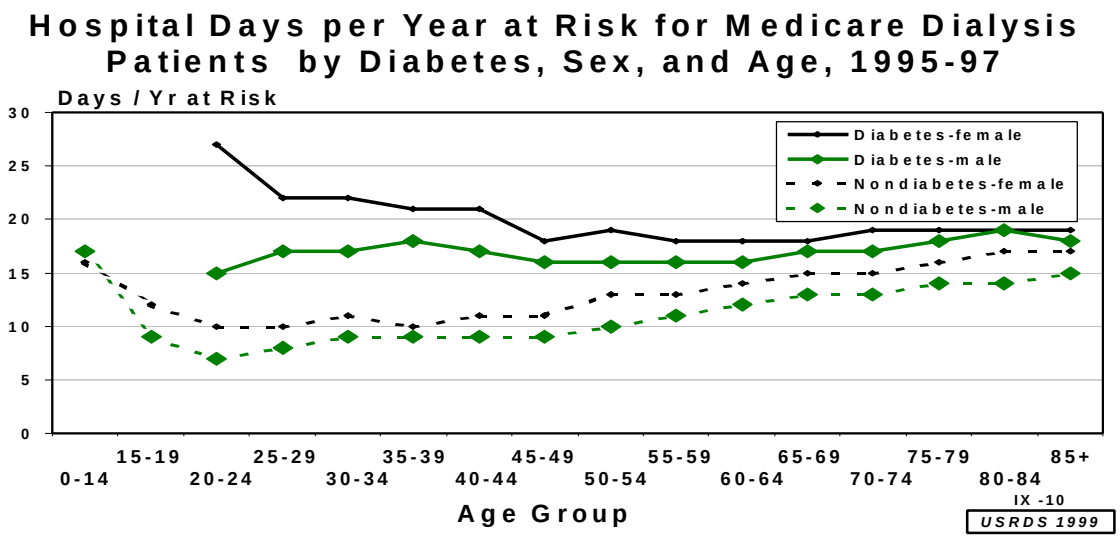

Figure IX-10

Total hospital days per patient year at risk for all Medicare dialysis patients by primary cause of ESRD (diabetes, nondiabetes), sex, and age, 1995-97. Patients who died of AIDS are excluded. Source: Reference Table H.3.

group, those who have never been transplanted are likely to be less healthy and hence have higher hospitalization rates.

Figure IX-9 summarizes differences in hospital admission rates broken down by diabetes status, age, and gender. Female diabetics have a uniformly higher rate of hospital admissions than any other group, followed by diabetic males, nondiabetic females, and finally nondiabetic males. The patterns seen here are virtually identical to those reported in the 1998 ADR. This includes the rather substantial gender differences within the diabetic group for the ages 20-24. The substantial spike in the female diabetic rate may be at least partially attributable to the presence of high-risk pregnancies in that group.

The patterns for hospital days (see Figure IX-10) are strikingly similar. Rates are not provided by diabetic status for patients younger than 20 since the number of patients in this group for which diabetes is considered the cause of ESRD is extremely small.

Standardized Hospitalization Ratio (SHR)

Methods

The standardized hospitalization ratio (SHR) is a measure of ESRD patient hospitalization experience that facilitates comparisons between different groups of patients (e.g., dialysis facilities, census regions, or states). This is accomplished in the following manner. The SHR for a given group of ESRD patients is computed as the ratio of their observed hospitalization experience to what would be expected to occur, if the rates of hospitalization for that group of patients were comparable to those for the national ESRD patient population. This ratio, which is adjusted for the age, race, sex, and diabetes as cause of ESRD patient group, can then be used to compare the hospitalization experience across two or more heterogeneous patient groups. Wolfe et al (1992) first proposed the use of standardized measures of ESRD mortality experience to facilitate comparisons among dialysis facilities and other heterogeneous groupings of ESRD patients. They employed published USRDS national ESRD mortality rates given in deaths-per-patient-year by age, race, and diagnosis group to compute a standardized mortality ratio (SMR). The USRDS has since updated the basic SMR methodology to include genders and now uses a considerably more sophisticated model-based procedure to compute ESRD mortality rates at the national level. The same basic methodology is used in computing the SHR and a more precise description of the rate computation may be found Chapter XIII.

In calculating the SHR, we restrict our attention to the first hospitalization event for each individual.

That is, within a given calendar year, only the first hospitalization event for an individual is counted. The rationale for considering only the first hospitalization event is explained in detail in Strawderman et al (see Chapter IX of the 1997 ADR for a summary). As pointed out in Strawderman et al, the SHR reflects the useful information found in an appropriately defined standardized total admissions rate (STAR). For example, at the dialysis facility level, a low SHR will necessarily indicate a low overall admissions rate; obviously, if there are few first admissions, there can be few total admissions (unless a few patients at the facility have particularly frequent hospitalization patterns). Correspondingly, a high SHR indicates that many more patients at the facility are entering the hospital than at the national level. Compared to the STAR, the SHR is also less sensitive to the level of comorbidity at the patient level, and more sensitive to the scope (or distribution) of comorbidity at the facility. From the point of view of facility evaluation, the latter seems more relevant. Finally, in view of the fact that approximately 65 percent of the patients had 1 or fewer admissions (see Figure IX-2), the results of the analyses to be presented will be similar to any proper analysis of standardized rates based on total admissions.

Computation of the SHR for a given group of patients requires the computation of an expected number of first hospitalizations in a given time period. For the sake of illustration, suppose that the group in question is all patients in a single dialysis facility in a given year, and that we wish to compute the expected number of first hospitalizations would be observed if the rates at this facility were equal to the national rates. This latter calculation requires the following:

1. the national rates of first hospitalization per patient five year age group, race, sex, and diabetic status group for that year.

2. the time at risk for hospitalization for each eligible patient in the facility for that year.

The computation of the national rates also requires the time at risk for each eligible ESRD patient in the US and we cover this aspect of the calculation first. The time at risk is defined as the days from entry until a first hospitalization, a censoring event, or December 31 occurs. Censoring events are death and transplant. A patient's risk period is truncated 3 days prior to transplant in order to avoid attributing the transplant-related hospitalization to the observed count. National first hospitalization rates are then obtained for 248 patient subgroups defined by age (16 groups), race (4 groups), sex (2 groups), and diabetes (2 groups). These are computed for each of the 248 patient subgroups by taking the respective ratio of the total number of first hospitalizations to the total time at risk for that group. As described in Chapter XIII, the variability in these national rates is then smoothed using a log-linear Poisson regression model. The resulting national rates, which are reported in Table H.1 in units of first hospitalizations per 1,000 patient-years, represent weighted averages of the observed and model-predicted rates, with the observed rate being weighted more heavily for larger patient subgroups. Taking a weighted average with the model-predicted rate stabilizes (i.e., reduces the variability of) the resulting rates across time in those patient subgroups having small numbers of patients.

These 248 subgroup-specific national rates can then be used to compute the expected number of first hospitalizations for the dialysis facility. First, the observed patient-years at risk for hospitalization in the facility is apportioned into the 248 different age, race, sex, and diagnosis groups. These times at risk are then multiplied by the corresponding national rate for those groups, and then summed up over all groups to obtain the total expected number of first hospitalizations in that unit for that year.

In summary, to obtain the adjusted SHR for a specific dialysis unit in a specific year, the total number of first hospital admissions for each eligible patient treated during that time period is divided by the expected number of first hospitalizations. The expected number of first hospitalizations is in practice computed as described in the previous paragraph using the 248 national subgroup rates in Table H.1. The ratio of observed to expected yields the unit-specific SHR, adjusted for age, race, sex, and diagnosis. The adjusted SHR shares a similar interpretation to the adjusted SMR. Specifically, values of the SHR larger than 1.0 indicate first hospitalization rates above the national norm while values below 1.0 denote lower rates. Like the SMR, the SHR is subject to random variation and should be interpreted cautiously. For example, some evaluation of statistical significance should always be carried out and is relatively easy to accomplish. Further description and discussion of such matters can be found in Wolfe et al (1992) and also Wolfe (1994).

Analyses by State

The SHRs computed for the analyses of this section are based on data obtained for 1995-1997. Rates are adjusted for age, race, sex, and diagnosis. Small states with relatively small populations, are

grouped together as indicated buy boxes of state codes in Figure IX-11.

Figure IX-11 summarizes the distribution of SHRs for dialysis patients computed on a state-by-state basis, subject to the groupings indicated. States are shaded according to whether the state- or region-specific SHR is in the first (SHR = 0.93), second (SHR between 0.94 and 1.01), third (SHR between 1.02 and 1.08), or fourth (SHR $\geq$ 1.09) quartiles. The higher SHRs tend to be concentrated in eastern and southern United States, as has been reported in previous years. It is unclear which factors are primarily responsible for the geographic variation observed here; several major patient mix characteristics have been adjusted for, but other factors were adjusted may also be important. These trends are consistent with trends observed in studies of non-ESRD patients (Gornick, 1982) as well as past studies of hospitalization among ESRD patients (USRDS 1991, 1995, 1996, 1997, 1998). Figure V-9 (Chapter V), which gives the SMR by state for dialysis patients, shows a rather similar pattern to the SHR. This information can be used, for example, to group states into one of six categories: high, average, or low mortality versus high, average, or low hospitalization. For example, defining "high" and "low" to respectively correspond to the upper and lower tertiles, Connecticut (SHR=1.06, SMR = 0.94) is the only state to fall within the High SHR with Low SMR category, and Missouri (SHR = 0.94, SMR = 1.04) is the only state to fall within the Low SHR with High SMR category. Of the possible combinations, these two are evidently the most interesting, since they indicate that SHR is a process indicator that does necessarily correlate with the SMR as the outcomes indicator. A high SHR with low SMR may indicate success in hospital management to prevent mortality. However, it is important to remember that these results are merely associations suggested by the data and alone do not necessarily provide any evidence of a causal relationship between low hospitalization and increased mortality (or vice versa). A considerable amount of further information that is not currently being taken into account would be needed before such a determination could be made with any degree of confidence.

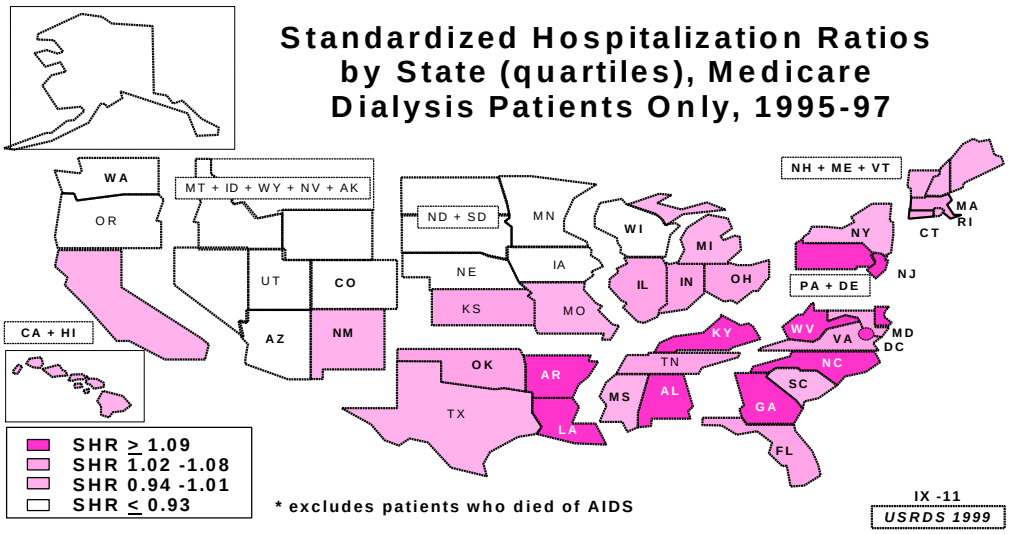

Figure IX-11

Standardized First Hospitalization Ratios for Medicare dialysis patients by state, 1995-97. States with relatively small populations are grouped together by boxes of summed state codes. Rates are adjusted for age, race (Black, White, Asian, Native American), sex, and diagnosis (diabetes, nondiabetes). Patients with missing or unknown race, or missing primary diagnosis are excluded. Patients who died of AIDS are excluded. Source: Reference Table H.2.

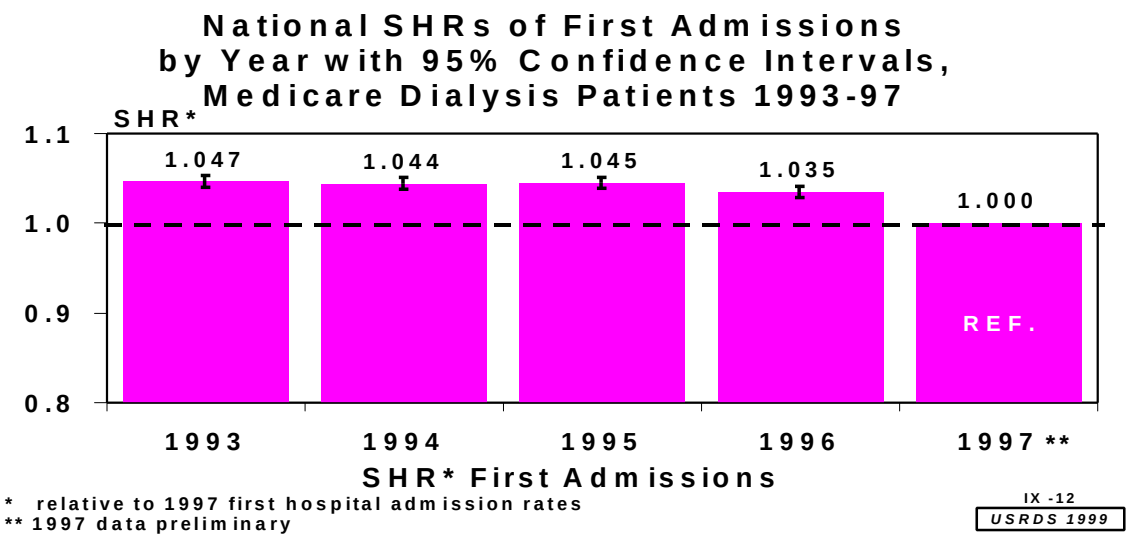

Figure IX-12

Standardized first hospital admissions ratio for Medicare dialysis patients over time, 1993-97. Ratios are standardized by sex, race, age, and cause of ESRD (diabetes, nondiabetes). Ratios are calculated by summing all observed first hospitalizations for each year and dividing them by the respective sum of expected first admissions. Ninety-five percent confidence intervals are indicated for 1993-96; and are not applicable for 1997 since rates are standardized to 1997. Patients who died of AIDS are excluded. Source: Special Analysis.

Time Trends in the SHR

The results in Figure IX-12 indicate that fewer dialysis patients are experiencing hospitalization with each more recent year, with approximately a 5 percent drop in (first) admissions between 1993 and 1997. However, while the rates are decreased only marginally between 1993 and 1996 with no significant differences between any of these years, the rate for 1997 dropped substantially (3.5 percent) and was significantly lower than that for each of the earlier years. This is similar to the pattern seen in the 1998 ADR, so it is possible that the drop in the last year is at least in part the result of delayed reporting. Figure IX-1 indicates that this drop in hospitalization is complemented by an approximately 12 percent reduction in the average number of days spent in the hospital per patient per year over the period 1993-1997.

Chapter X and Section K of the Reference Tables provide estimates of the spending for inpatient care for both dialysis and transplant patients. Medicare spending per patient year at risk for inpatient care in dialysis patients increased by between 0.7 and 7.0 percent each year from 1993 to 1997 (Reference Table K.7). The increase from 1996 to 1997 was the smallest (0.7 percent) which supports the observed reduction in SHR.

In summary, there has been a small decline between 1993 and 1997 in the fraction of patients hospitalized per year, the total days in hospital, and the days per admission. The total number of admissions per patient has changed little during this time period while the average inpatient cost per patient has increased somewhat. This indicates some evidence of more frequent but shorter hospitalizations for a smaller number of patients, with no corresponding reduction in costs. Analyses of this topic are worthy of additional research that is beyond the scope of this current report. Nonetheless the substantial decreases in rates of hospitalization reported above are intriguing and may indicate good news. Until these findings can be reproduced with longer followup, or with independent data within or outside the Medicare system, caution in the interpretation of these trends in SHRs is prudent.

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