PRÉCIS

A Summary of the United States ESRD Program

All interest in disease and death is only another expression of interest in life.

Thomas Mann, 
The Magic Mountain
The United States Renal Data System (USRDS) was created in 1988, and manages a comprehensive database on end-stage renal disease (ESRD). Under the direction of the National Institutes of Health (NIH), the USRDS has produced major studies aimed at improving the outcomes of patients with kidney disease.

Five central goals define the mission of the USRDS: to characterize the ESRD population; to describe the prevalence and incidence of ESRD along with trends in mortality and disease rates; to investigate relationships among patient demographics, treatment modalities, and morbidity; to identify new areas for special renal studies and support investigator-initiated research; and to provide data sets and samples of national data to support research by the Special Studies Centers.

There have been eleven previous USRDS Annual Data Reports. This twelfth report, the millennial issue and the first produced by the new Coordinating Center at the Minneapolis Medical Research Foundation, breaks new ground at the USRDS. In the first part of the book we have created an atlas of end-stage renal disease, making the visual display of information our primary focus, and introducing to ESRD research the use of data mapping. We believe that this new focus, which allows us to present more comprehensive data without increasing the number of pages, not only makes the book more interesting and accessible, but presents data that is easier to interpret and more relevant to readers in all parts of the renal community. Most of the text previously found in the chapters has been omitted in favor of succinct chapter summaries and figure captions, and we have moved the data descriptions and the summary of analytical methods to the appendix. The reference sections are comprised of the same tables included in previous editions (with some new tables added), but the order of the sections now matches that of the chapters, and the tables themselves are more consistent in structure and easier to read.


The use of maps enables us to present large amounts of data in a form that is particularly easy for readers to interpret. We believe that using geographic illustrations to describe ESRD care in the U.S. will dramatically increase understanding of the disease, allowing researchers, clinicians, policy makers, patients, and the general public to identify and investigate geographic patterns in outcomes and patient populations, and providing benchmarks for comparisons of patient care throughout the country.

The majority of disease mapping within this atlas is by Health Service Area (HSA), a group of counties described by the authors of the CDC *Atlas of United States Mortality* as “an area that is relatively self-contained with respect to hospital care.” These HSAs are defined in terms of access to general health care; in the future, however, the USRDS will investigate whether the creation of HSAs specific to ESRD care, and defined in terms of patient access to both dialysis and transplant facilities, might provide an enhanced view and understanding of the data.
Mapping by these 805 HSAs, rather than on a county level, alleviates most problems in geographic patterns that arise from low patient and population densities. In some instances multiple maps per page are used to present large amounts of data in a small amount of space, allowing readers to make comparisons over time for rates of disease, hospitalization, and mortality.

While this book contains most of the graphs familiar to readers of previous ADRs, we have provided additional detail within these graphs on race, gender, and modality, allowing readers to compare outcomes across many patient groups. The chapter on patient characteristics (with data from the Medical Evidence Form 2728) has been expanded, chapters on patient survival, mortality, and causes of death have been combined, and the hospitalization chapter now includes information on patient morbidity—including infection and cardiovascular disease—and its relation to hospitalization rates. We have also addressed the guidelines set by the National Kidney Foundation's Dialysis Outcomes Quality Initiative (NKF-DOQI) by adding a new chapter on clinical indicators of care, and have followed the lead set by the National Committee of Quality Assurance (NCQA) by creating a chapter on preventive health care issues of particular relevance to ESRD patients.

All data underlying the maps and figures in this book, along with the reference tables, are available on the USRDS website (www.usrds.org), both in an easily printed PDF format and in ASCII files for downloading and working with the data. The site will be updated throughout the year, enabling users to access the most current information on ESRD. Taking advantage of the web's unique ability to fulfill individual requests, we will also be adding an interactive component to the website which will enable users to create maps on particular topics and geographic areas and to download customized aggregated datasets. We see the printed ADR and the website as complementary—related to and at times echoing one another, but serving distinct functions. This book is for people to keep on hand, to use as an immediate reference and learning tool. We hope, for instance, that the book will be used by unit staff to examine quality of care issues, to compare outcomes in their region to those in the rest of the nation, and so on. Because most unit staff currently have limited computer time and access, we assume that researchers will at first be the primary users of the website, looking for both the tables traditionally included in the ADR and the data behind the maps and graphs, and expecting that data in a form that can be easily manipulated for their own analyses. Ultimately, however, we hope that both researchers and clinicians will find the website to be a valuable resource for customized, aggregated data on both a nationwide and regional level.

In the remainder of this chapter we have selected maps from the ADR that we believe to represent the current state of the ESRD population, to introduce the mapping strategies used throughout our analyses, and to serve as a visual overview of and introduction to the ADR itself. Further detail on these maps, along with graphs of related data, may be found in the body of the book.

It is our hope that this new approach to presenting data on ESRD patients will gain the interest of readers throughout the renal community, help clinicians and policy makers identify areas of the country in which patient outcomes do not meet expectations, prompt discussions on regional differences in the delivery of care, and trigger epidemiological studies and quality improvement initiatives that will continue to improve the quality of care for renal patients in the United States.
Recent rates of growth in the ESRD population have varied across patient groups. While the overall annual increase in the incident rate from 1994 to 1998 is similar to that in the previous five-year period of 1990–1994, the average annual percent change has declined for hypertensive patients on all modalities, with the sharpest decrease seen in the hemodialysis and transplant patient populations. The percent change in the rate of diabetes, in contrast, has increased for dialysis patients. In the prevalent patient population, the average annual percent change in rates per million decreased across all races, primary diagnoses, and modalities.

Adjusted incident and prevalent rates continued their increase in 1998, 306 and 1,160 per million population, respectively. Total cadaveric transplants for Medicare patients were up 4% from 1997, while transplants from living donors were up 12%.

Medicare expenditures for ESRD rose from $3.88 billion to $4.7 billion in 1998 to $12 billion in 1998, with non-Medicare patients up 4%

### Table 1. Summary statistics on reported ESRD therapy in the United States

<table>
<thead>
<tr>
<th>Patient characteristics</th>
<th>Incidence Count</th>
<th>Adj. Rate</th>
<th>December 31 Point Prevalence Count</th>
<th>Adj. Rate</th>
<th>Dialysis Transplant</th>
<th>Medicare kidney transplants</th>
<th>Cadaver</th>
<th>Living donor</th>
<th>ESRD deaths</th>
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<td>0-19</td>
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<td>14</td>
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<td>70</td>
<td>1,850</td>
<td>4,139</td>
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<td>728</td>
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</table>

**Primary diagnosis**

- **Diabetes**
- **Hypertension**
- **Glomerulonephritis**
- **Cystic kidney disease**
- **Urologic disease**
- **Other known cause**
- **Unknown cause**
- **Missing cause**

**Average annual percent change in rates per million**

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<tr>
<td>White</td>
<td>64.7</td>
<td>7.47</td>
<td>2.23</td>
<td>4.48</td>
<td>8.12</td>
<td>8.91</td>
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<td>Black</td>
<td>8.24</td>
<td>6.88</td>
<td>3.59</td>
<td>1.63</td>
<td>7.51</td>
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<td>N. Am.</td>
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<td>12.64</td>
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<td>6.89</td>
<td>4.46</td>
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<td>Asian</td>
<td>11.91</td>
<td>10.20</td>
<td>30.98</td>
<td>2.58</td>
<td>3.29</td>
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<td>11.52</td>
<td>4.34</td>
<td>6.95</td>
<td>6.98</td>
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<td>3.05</td>
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<tr>
<td>Cys Kid</td>
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<td>3.78</td>
<td>-4.18</td>
<td>2.19</td>
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</tbody>
</table>

**Prevalent patients**

- **White**
- **Black**
- **N. Am.**
- **Asian**
- **Diab.**
- **HTN**
- **GN**
- **Cys Kid**
- **All**

**Medicare spending**

Medicare spending for ESRD in 1998 (in billions of dollars)

| SAF paid claims | 11.03 |
| 2% inflation | 0.23 |
| HMO | 0.58 |
| OA | 0.20 |
| Total Medicare costs | 12.04 |

### Sources

- Medicare spending for ESRD in 1998 (in billions of dollars)
- SAF paid claims
- 2% inflation
- HMO
- OA
- Total Medicare costs

- Non-Medicare spending for ESRD in 1998 (in billions of dollars)
- EGHP (non-Medicare)
- Patient obligations
- Non-Medicare patients
- Total Non-Medicare costs

- Change in Medicare spending (%) from 1997 to 1998
- Per patient year
- Adjusted for inflation

- Medicare spending per patient year 1994-1998 (in $1,000s)
- ESRD
- Hemodialysis
- Peritoneal dialysis
- Transplant

### Notes

- A. Incidence new patients with valid birthdates who began ESRD therapy in 1998. Includes only residents of the 50 states and Washington D.C.
- B. Rates were adjusted for age, race, and/or gender using the July 1, 1998 U.S. resident population as the standard population. All rates are per million population. Rates by age were adjusted for race and gender. Rates by gender were adjusted for race and age. Rates by race were adjusted for age and gender. Rates by disease group and total adjusted rates were adjusted for age, gender, and race. Adjusted rates do not include patients with other or unknown race. Includes only residents of the 50 states and Washington D.C.
- C. Patients were classified as receiving dialysis or having a functioning transplant. Those whose treatment modality was unknown on December 31 were assumed to be receiving dialysis. Includes all Medicare and non-Medicare ESRD patients.
- D. Age was computed at the start of therapy for incidence, on December 31 for point prevalence, at the time of transplant for transplants, and on the date of death for death.
- E. Unadjusted total rates include all ESRD patients in the 50 states and Washington D.C.
- F. From the 1998 HCFA Facility Survey.
Incidence & Prevalence

Incidence of ESRD per million population, 1990, by HSA, unadjusted (fig1.2)

The highest rates of new patients in 1990 are found in the southeast and Gulf Coast states.

Incidence of ESRD per million population, 1998, by HSA, unadjusted (fig1.2)

Incident rates for 1998 are highest in the eastern, southeastern, and southern portions of the United States. Isolated high rates are also evident in northern Minnesota, Wisconsin, and Michigan. A comparison of 1990 and 1998 rates shows broad-based growth in the incident population across the entire country.

Percent change in incident rates 1990–1998, by HSA (fig1.2)

While the highest percentage of growth in incident rates varies across the country, a concentrated pattern is evident in an area which includes parts of Ohio, Indiana, Illinois, south Texas, and the Mississippi River Valley.

More information about these maps is available in Chapter One & in Appendix A.
Prevalence of ESRD per million population, 1990, by HSA, unadjusted

The highest prevalent rates in 1990 are found in the southern and southeastern states and in the upper Midwest.

Prevalence is the number of people in a population who have the disease at a given point or during a given period of time.

More information about these maps is available in Chapter One or in Appendix A.
Incident rates
per million population, ESRD patients, 1998, by HSA, adjusted for age, gender, & race (fig 1.8)

Increases in unadjusted incident rates from 1990 to 1998 (page 19) are only partially explained by the advancing age of and increasing numbers of minorities in the patient population. The continued growth in the diabetic population, along with growing numbers of Hispanic, Native American, Asian, and other minority patients, pose new issues that require further investigation.

Prevalent rates
per million population, dialysis patients, 1998, by HSA, adjusted for age, gender, & race (fig 1.9)

When compared to the rest of the nation, areas in California, Arizona, New Mexico, and western Texas show a markedly higher prevalent rate for dialysis patients. Higher rates also exist along the mid-Atlantic portion of the nation.

Prevalent rates increased greatly from 1990 to 1998 (page 20). As with incident rates, this is only partially explained by adjustments for age, gender, and race, and these significant changes in recent patient populations will require further study.

Prevalent rates
per million population, patients with a functioning transplant, 1998, by HSA, adjusted for age, gender, & race (fig 1.9)

Prevalent rates for patients with a functioning transplant are highest in the north central states and areas of northern Utah.

Factors that may influence the prevalent rate for transplant patients include the transplantation rate itself, patient comorbidity and disease severity, and recent improvements in immunosuppressive treatment. Further exploration is needed of the difference in rates between the lowest and highest quintiles of HSAs.

More information about these maps is available in Chapter One & in Appendix A.
Prevalent rates per million population, white ESRD patients, 1998, by HSA, adjusted for age & gender (fig 1.17)

Overall, prevalent rates for whites are highest in the northern and southwestern states. A comparison of rates over time is presented in figure 1.17 of Chapter One.

The geographic distribution of prevalent rates by race shows a dramatic difference between the lowest and highest quintiles of HSAs, differences which are not explained by adjustments for age and gender. Differences in dialysis therapy, anemia treatment, and success rates for organ transplantation may explain some of these results.

Prevalent rates per million population, black ESRD patients, 1998, by HSA, adjusted for age & gender (fig 1.17)

Prevalent rates for blacks are highest in the eastern half of the country. Additional maps in Figure 1.17 of Chapter One show that the percent change in prevalent rates for blacks across the nation for the period 1990–1998 is slightly lower than the change for whites.

Prevalent rates per million population, ESRD patients aged 20–44, 1998, by HSA, adjusted for gender & race (fig 1.18)

Prevalent rates for patients aged 20–44 are highest in the north central states, Maine, and parts of Texas and Missouri. Geographic variations in prevalent rates by age may be influenced by factors similar to those suggested for the different rates by race.

More information about these maps is available in Chapter One & in Appendix A.
Prevalent rates per million population, ESRD patients aged 65–74, 1998, by HSA, adjusted for gender & race (fig 1.18)

Prevalent rates for older patients are highest in southern California, New Mexico, western Texas, and areas in Minnesota, Iowa, the Ohio Valley, and New England.

Percent of prevalent ESRD patients with 2–4 years of prior ESRD time 1998, by HSA, unadjusted (fig 1.23)

The percentage of patients with two to four years of prior ESRD is highest in three areas: Montana, Wyoming, and the western Dakotas; the eastern seaboard; and a band stretching from middle Missouri down through Louisiana.

The varying distribution of prevalent rates by patient vintage may be a result of the same factors suggested for the different rates by race.

Percent of prevalent ESRD patients with 6–10 years of prior ESRD time 1998, by HSA, unadjusted (fig 1.25)

The percentage of patients with six to ten years of prior ESRD is highest in portions of North Dakota, Minnesota, Iowa, and Wisconsin. High rates are also evident in the Rocky Mountain region, Georgia, and South Carolina.

More information about these maps is available in Chapter One & in Appendix A.
Patient
Characteristics

Percent of incident patients with a primary diagnosis of diabetes 1998, by HSA, unadjusted (fig 2.4)

The higher rates in the South-west of patients with diabetes as a primary diagnosis may be explained in part by the greater number of Hispanics, who tend to have higher rates of the disease.

Percent of incident patients with a primary diagnosis of glomerulonephritis 1998, by HSA, unadjusted (fig 2.5)

The highest percentage of patients with glomerulonephritis as a primary diagnosis occurs in the western portions of the United States. Because Asian patients have higher rates of glomerulonephritis, the higher rates of this disease in the Northwest may be explained in part by the greater numbers of Asian patients in this area.

Percent of incident patients with a primary diagnosis of hypertension 1998, by HSA, unadjusted (fig 2.7)

Hypertension as a primary diagnosis occurs most frequently in patients living in the eastern half of the nation, with the highest incidence occurring in the southern states.

More information about these maps is available in Chapter Two & in Appendix A.
Percent of patients receiving erythropoietin prior to initiation 1998, by HSA (fig 2.18)

The percent of patients receiving EPO prior to the initiation of therapy varies considerably across the country, and is only partly explained by geographic variations in hematocrit level and in the time frame for initiating treatment of ESRD. The highest incidence of EPO use is most evident in the northwest and northeast sections of the country.

Mean hematocrit at initiation 1998, by HSA (fig 2.19)

Mean hematocrit at initiation of therapy is highest in the western portions of the United States. It is important to note that hematocrit levels can be influenced by elevation.

These results do not account for levels of renal function, for iron levels or the frequency of iron treatment in patients beginning ESRD, or for the degree of fluid overload secondary to chronic heart failure, all of which may influence hematocrit levels at initiation.

Percent of patients at initiation with serum albumins less than the test’s lower limit 1998, by HSA, unadjusted (fig 2.23)

The percent of patients with initial serum albumins below the test’s lower limit varies across the country.

Some of the low levels in patient albumin levels may reflect patients with proteinuria secondary to diabetes or primary glomerular disease, or patients with fluid overload at the initiation of dialysis.

More information about these maps is available in Chapter Two & in Appendix A
Modality

Percent of point prevalent patients on hemodialysis
1998, by HSA, unadjusted (fig 3.5)
The localization of hemodialysis patients in the eastern, southern, and southeastern regions may reflect racial differences in incident and prevalent rates, as well as differences in the availability and promotion of alternative modalities.

Percent of point prevalent patients on peritoneal dialysis
1998, by HSA, unadjusted (fig 3.5)
Peritoneal dialysis is most prevalent in the central part of the country and in Oregon and western Idaho. Isolated areas in northern Minnesota and North Dakota also exhibit high rates of patients on peritoneal dialysis. The greater popularity of this modality in the central portion of the country should be carefully examined since these differences may be caused by factors other than variations in age, gender, or race.

Percent of point prevalent patients with functioning transplants
1998, by HSA, unadjusted (fig 3.5)
The percent of patients with functioning transplants is highest in the northern half of the nation in states west of Lake Michigan. These geographic patterns are the opposite of those seen for hemodialysis patients.

More information about these maps is available in Chapter Three & in Appendix A.
Clinical Indicators

Percent of patients meeting the DOQI target urea reduction ratio (URR) of ≥65% prevalent hemodialysis patients, 1998, by HSA (fig 4.5)

Texas, New Mexico, Colorado, Wyoming, and southeastern Montana have the highest percentage of patients meeting the DOQI target URR.

Factors which influence dialysis therapy include vascular access type, dialyzer type, blood flow rates, post-dialysis BUN sampling techniques, treatment times, and reuse. Quality assurance programs used by providers may also affect these findings.

Percent of patients meeting the minimum DOQI target hematocrit of ≥33% prevalent dialysis patients, 1998, by HSA (fig 4.7)

The western half of the United States has the highest percentage of patients meeting the minimum DOQI target hematocrit. Since hematocrit levels are influenced by higher elevations, some of this geographic variation can be explained by the higher altitudes of the Rocky Mountain states. Clinical factors, however, may be at play as well, including EPO responsiveness, which may be influenced by inflammatory processes such as those associated with peritonitis and with infectious dialysis catheter complications.

Insertion rates for central venous accesses per 1,000 patient years at risk, prevalent hemodialysis patients, 1998, by HSA (fig 4.15)

Because higher catheter placement rates can cause higher rates of infection and thus lowered EPO responsiveness, the higher insertion rates seen in the southern portion of the country may help to explain the low numbers of patients meeting DOQI target hematocrits in the same region.
Morbidity & Hospitalization

Hospital admissions per patient
prevalent ESRD patients,
1998, by HSA (fig 5.3)

The highest number of admissions occurs in the regions with the lowest hematocrit and the highest insertion rates for central venous accesses. This pattern may be influenced by regional differences in dialysis therapy, prevalent rates, patient comorbidity and disease severity, and the policies of regional health insurers and managed care programs.

Hospital days per admission
prevalent ESRD patients,
1998, by HSA (fig 5.4)

Patterns of days per admission show more regional variation than do the average number of admissions per patient. Variations in patient comorbidity and disease severity may partially explain these differences across the country, as may the impact of managed care and HMOs. Assessments of these geographic patterns should take into account the fact that vascular access and cardiovascular complications are the most frequent causes of hospitalization.

Hospital days per year at risk
prevalent ESRD patients,
1998, by HSA (fig 5.5)

The number of hospital days per year at risk is highest in the southern and eastern third of the country. These patterns reflect a normalized average full year of exposure for each patient.

More information about these maps is available in Chapter Five & in Appendix A.
Pediatric ESRD

Incident rates per million population, patients aged 10–14, 1994–1998 combined, by state, unadjusted (fig 6.3)

Geographic patterns in pediatric incident rates may be influenced by patient demographics, as well as by varying rates of glomerulonephritis, hypertension, and congenital renal disease.

Incident rates per million population, patients aged 10–14, 1994–1998 combined, by state, unadjusted (fig 6.3)

Geographic patterns in pediatric incident rates may be influenced by patient demographics, as well as by varying rates of glomerulonephritis, hypertension, and congenital renal disease.

Incident rates per million population, female pediatric patients, 1994–1998 combined, by state, unadjusted (fig 6.5)

Incident rates for female pediatric patients tend to be highest in the southern and eastern portions of the nation, with high rates also evident in some western states, notably Idaho and New Mexico.

Incident rates per million population, female pediatric patients, 1994–1998 combined, by state, unadjusted (fig 6.5)

Incident rates for female pediatric patients tend to be highest in the southern and eastern portions of the nation, with high rates also evident in some western states, notably Idaho and New Mexico.

Incident rates per million population, pediatric glomerulonephritis patients, 1994–1998 combined, by state, unadjusted (fig 6.6)

Incident rates for pediatric patients with glomerulonephritis tend to be higher in the southern states.

Incident rates per million population, pediatric glomerulonephritis patients, 1994–1998 combined, by state, unadjusted (fig 6.6)

Incident rates for pediatric patients with glomerulonephritis tend to be higher in the southern states.

More information about these maps is available in Chapter Six and in Appendix A.
Transplantation

Cadaveric donations
per million population, patients aged <65, 1997–1998 combined, by HSA (fig 7.3)

Organ availability has been a persistent concern related to transplant as a treatment for ESRD. Cadaveric organ donation rates show a clear regional pattern, with rates in the western states lower than those in the nation’s eastern half. Organ procurement systems, provider practices, donor recruitment, geographic distances to transplant centers, and social factors may all contribute to these differences.

Living donor donations
per million population, patients aged <65, 1997–1998 combined, by HSA (fig 7.4)

The pattern of kidney donations from living donors is noticeably different from that seen with cadaveric donations, a fact which may be related to variations in transplant center programs and to social and ethnic differences.

First-year graft survival (%) for cadaveric transplants
1996–1997 combined, by state, unadjusted (fig 7.17)

These first-year graft survival rates do not account for differences in age, gender, race, immunologic matching, immunosuppressive treatment, renal diagnosis, cold ischemia time, transplant center experience, or transplant complications, each of which may influence outcomes.

More information about these maps is available in Chapter Seven & in Appendix A.
First-year graft survival (%) for living donor transplants
1996–1997 combined, by state, unadjusted (fig 7.17)

When compared to first-year survival rates of cadaveric donations, first-year graft survival rates for living donor transplants tend to be higher across the country. These rates are influenced by the same factors as the rates for cadaveric donations.

Since kidneys transplanted from living donors tend to have better matching of immunologic markers and reduced cold ischemia times, direct comparisons between states should be made with caution.

More information about these maps is available in Chapter Seven & in Appendix A.
Survival & Mortality

First-year death rates per 100 patient years at risk, incident dialysis patients, 1993–1995 combined, by state, adjusted for age, gender, race, & primary diagnosis of diabetes (fig 8.15)

First-year death rates for dialysis patients vary minimally across the nation. The highest rates occur in Illinois, Kentucky, West Virginia, Vermont, New Jersey, and Maryland.

Second-year death rates per 100 patient years at risk, incident dialysis patients, 1993–1995 combined, by state, adjusted for age, gender, race, & primary diagnosis of diabetes (fig 8.15)

Second-year death rates have similar patterns to first-year death rates across the nation.

Fourth-year death rates per 100 patient years at risk, incident dialysis patients, 1993–1995, by state, adjusted for age, gender, race, & primary diagnosis of diabetes (fig 8.15)

Regional differences not explained by variations in age, gender, race should be explored in terms of dialysis therapy, hematocrit, comorbidity, disease severity, and complication rates. Variations in transplant rates, access to the waiting list, organ availability, and the prevalence and treatment of cardiovascular disease may also be factors. Because transplant removes healthier patients from dialysis, leaving those with a lower likelihood of survival, the impact of transplant as a competing risk in survival analyses merits further investigation.
First-year all-cause death rates per 100 patient years at risk, incident hemodialysis patients, 1993–1995 combined, by state, adjusted for age, gender, race, & diabetic status (fig 8.19)

First-year all-cause death rates are highest in Idaho and West Virginia. These rates parallel those for the all-dialysis patient group, and are vulnerable to factors such as comorbidity, diabetic status, severity of disease, hematocrit level, and dialysis therapy, not included in the adjustments.

First-year infectious death rates per 100 patient years at risk, incident hemodialysis patients, 1993–1995 combined, by state, adjusted for age, gender, race, & diabetic status (fig 8.20)

First-year infectious death rates tend to be higher in the eastern half of the country. Factors such as respiratory infections, infectious complications from dialysis catheters, and peripheral vascular disease may have an impact on these results.

First-year cardiac death rates per 100 patient years at risk, incident hemodialysis patients, 1993–1995 combined, by state, adjusted for age, gender, race, & diabetic status (fig 8.21)

Similar to infectious death rates, cardiac death rates tend to be higher in the eastern half of the country, as well as in the southwestern regions. Factors which may contribute to these results include dialysis therapy, anemia treatment, and access to cardiac evaluations. Sudden cardiac deaths may also be influenced by degrees of left ventricular hypertrophy (LVH) and by calcium phosphate abnormalities.

More information about these maps is available in Chapter Eight & in Appendix A.
Preventive Health Care

Percent of patients receiving hepatitis B vaccine
dialysis patients, 1997, by HSA (fig 9.2)
The percent of patients receiving hepatitis B vaccinations is highest in the northern states and in isolated areas of the central part of the nation.

Gray areas indicate HSAs in which there are either no dialysis units or the units have not completed the survey form.

Hepatitis C diagnosis rates
per 100 patient years at risk, hemodialysis patients, 1998, by HSA (fig 9.4)
Hepatitis C diagnosis rates for hemodialysis patients display a distinctive pattern, with lower rates of disease evident in the west central portion of the country. Transmission rates of hepatitis C may be related to staffing ratios, transfusion rates, or compliance with universal precautions. Patterns of this disease are difficult to research because of regional differences in age, gender, race, and renal diagnosis.

Percent of ESRD patients receiving influenza vaccine
all ESRD patients, 1998, by HSA (fig 9.12)
Influenza vaccination rates are highest in the northern regions west of Lake Superior, and in areas of Texas, Oklahoma, and Kansas.

Regions with high influenza vaccination rates are in many cases also areas with the highest percentage of patients meeting the target urea reduction ratio and the minimum hematocrit level set by DOQI. These associations may reflect general patterns of care by providers, and should be more carefully evaluated.

More information about these maps is available in Chapter Nine & in Appendix A
Provider Characteristics

Five-year growth (%) in the number of dialysis units
1994–1998 combined, by state (fig 10.3)

The highest growth rates in the number of dialysis units are most evident in the western and mid-western parts of the nation and are only partially explained by the growth in the ESRD population. Differences in provider characteristics may also influence these patterns.

Five-year growth (%) in the number of dialysis patients
1994–1998 combined, by state (fig 10.4)

Five-year growth in the number of patients tends to be highest in the southern half of the country, where growth rates in the number of units tend to be the lowest. In areas such as the upper Midwest, growth in the number of units has outpaced growth in the patient population. In other areas, however, including Texas, New Mexico, and Oklahoma, the number of patients is growing faster than the number of units available to treat them. Competitive forces, profit status, state policies on certification of need, and growth in the number of chain-affiliated units may influence these rates.

Geographic location of for-profit and non-profit dialysis units
1998 (fig 10.13)

For-profit dialysis units comprise the majority of all dialysis units in the United States.

More information about these maps is available in Chapter Ten & in Appendix A.
Economic Factors

Per Member Per Month (PMPM) Medicare allowable amounts, hemodialysis
period prevalent diabetic ESRD patients, 1998, by HSA, unadjusted (fig 11.4)

The geographic variations in per member per month allowable expenditures can be partially explained by differences in labor and healthcare costs, for which the data are not adjusted. Also at play are regional differences in hospitalization rates, vascular access services, complication rates, cardiovascular mortality, peritonitis rates (for patients on peritoneal dialysis), and the use of erythropoietin, iron, and Calcijex.

Per Member Per Month (PMPM) Medicare allowable amounts, peritoneal dialysis
period prevalent diabetic ESRD patients, 1998, by HSA, unadjusted (fig 11.4)

Per member per month allowable amounts for peritoneal dialysis also vary across the country; these payments, however, are lower than those for hemodialysis.

PMPM Medicare allowable amounts, transplant
period prevalent diabetic ESRD patients, 1998, by HSA, unadjusted (fig 11.4)

While monthly payments for diabetic transplant patients tend to be lower than payments for dialysis patients, geographic patterns in payments are similar to those for both types of dialysis.

More information about these maps is available in Chapter Eleven & in Appendix A