All’s well that ends well; still the fine’s the crown;
Whate’er the course, the end is the renown.

William Shakespeare,
All’s Well That Ends Well
The prevalent hemodialysis and transplant populations have seen the greatest growth since 1990, while the number of patients on peritoneal dialysis has continued to fall since its peak in 1996 (fig 3.1). The decline in this latter population appears to coincide with the publication of studies showing adverse outcomes on peritoneal dialysis compared to hemodialysis (Bloembergen 1995). More recent studies, however, have shown that the two therapies are more difficult to compare than previously thought, and that certain patient populations fare better on one modality than on the other (Fenton 1997, Collins 1999, Vonesh 1999). Readers are referred to the literature for a more complete discussion of these issues.

Figures 3.2 and 3.3 illustrate modality use by ESRD network and state. The use of peritoneal dialysis, for example, is as low as 5% in Network 4 and as high as 11% in Network 12. The geographic distribution of the modalities (figs 3.5–7) shows patterns that are most likely the result of incident rates, survival rates, and, for transplant patients, the combination of organ availability and graft survival. For hemodialysis there is a 51% difference between areas of the country with the lowest percent of patients on the modality (the Midwest and upper north-west) and areas with the highest (the southern and eastern coasts). Areas of higher peritoneal dialysis use, in contrast, are scattered across the country, and these areas have more than three times the percent of patients on PD as the areas in which it is not as common. Areas with the greatest percentage of patients transplanted are the upper northeast, the Upper Midwest, the western states, and Alaska.

Long-term survival with ESRD is highly associated with modality (fig 3.13). Among patients who have had ESRD for six years or longer, increasing numbers are treated with renal transplantation. Of the dialytic therapies, hemodialysis is associated with the best outcome, while peritoneal dialysis is associated with the fewest long-term survivors. Any comparisons between the dialysis modalities should recognize that there are more long-term options for therapy and access type for hemodialysis patients than for patients on peritoneal dialysis.
The highest proportions of patients who begin ESRD therapy on peritoneal dialysis occur in Alaska, Connecticut, Idaho, and Nebraska, while patients in Minnesota, North Dakota, and Utah are the most likely to begin therapy with a transplant. Hemodialysis is used to the greatest extent in Alabama, Washington D.C., Louisiana, and Texas.

Figure 3.3
Percent of ESRD patients on initial modality, by state
incident patients, 1999

INCLUDED IN THIS CHAPTER
- Graphs, a table, and maps of the distribution of prevalent patients by modality
- Graphs of median age and modality by network
- Graphs of modality by time on ESRD, and a graph of the relative risk of changing modalities
- Maps of the odds of being on each modality, by race
- A graph of total years of ESRD, by modality
In both genders, more than 68% of pediatric patients have a functioning transplant. This number averages only 8.4% for patients 65 and older, over 86% of whom are on hemodialysis. Though the difference is small, whites and Asians of both genders are more likely to be on peritoneal dialysis than blacks and Native Americans, and patients with a primary diagnosis of diabetes or hypertension have the least likelihood of receiving a transplant.

Table 3.1
Percent distribution of patients by modality
December 31st point prevalent patients, 1999

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Functioning transplant</th>
<th>Center home</th>
<th>Home hemo</th>
<th>CAPD</th>
<th>CCPD</th>
<th>Other PD</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-19</td>
<td>5,724</td>
<td>72.4</td>
<td>16.0</td>
<td>0.3</td>
<td>1.9</td>
<td>9.0</td>
<td>0.3</td>
</tr>
<tr>
<td>20-44</td>
<td>77,782</td>
<td>50.4</td>
<td>41.6</td>
<td>0.9</td>
<td>4.1</td>
<td>2.9</td>
<td>0.1</td>
</tr>
<tr>
<td>45-64</td>
<td>132,280</td>
<td>33.9</td>
<td>58.1</td>
<td>1.0</td>
<td>4.3</td>
<td>2.6</td>
<td>0.1</td>
</tr>
<tr>
<td>65+</td>
<td>115,534</td>
<td>8.4</td>
<td>84.7</td>
<td>0.9</td>
<td>3.6</td>
<td>2.4</td>
<td>0.0</td>
</tr>
<tr>
<td>Male</td>
<td>180,718</td>
<td>32.1</td>
<td>60.7</td>
<td>0.9</td>
<td>3.6</td>
<td>2.6</td>
<td>0.1</td>
</tr>
<tr>
<td>Female</td>
<td>150,602</td>
<td>26.5</td>
<td>65.3</td>
<td>1.0</td>
<td>4.4</td>
<td>2.8</td>
<td>0.1</td>
</tr>
<tr>
<td>White</td>
<td>204,104</td>
<td>36.4</td>
<td>55.5</td>
<td>0.8</td>
<td>4.3</td>
<td>2.9</td>
<td>0.1</td>
</tr>
<tr>
<td>Black</td>
<td>109,357</td>
<td>16.9</td>
<td>76.5</td>
<td>1.1</td>
<td>3.1</td>
<td>2.3</td>
<td>0.1</td>
</tr>
<tr>
<td>Native American</td>
<td>5,316</td>
<td>22.2</td>
<td>68.8</td>
<td>2.7</td>
<td>4.3</td>
<td>2.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Asian</td>
<td>12,543</td>
<td>31.5</td>
<td>60.0</td>
<td>0.9</td>
<td>4.8</td>
<td>2.8</td>
<td>0.1</td>
</tr>
<tr>
<td>Hispanic</td>
<td>32,839</td>
<td>27.2</td>
<td>65.2</td>
<td>1.0</td>
<td>3.7</td>
<td>2.9</td>
<td>0.1</td>
</tr>
<tr>
<td>Non-Hispanic</td>
<td>298,481</td>
<td>29.8</td>
<td>62.5</td>
<td>0.9</td>
<td>4.0</td>
<td>2.7</td>
<td>0.1</td>
</tr>
<tr>
<td>Diabetes</td>
<td>112,673</td>
<td>17.5</td>
<td>74.7</td>
<td>0.7</td>
<td>4.3</td>
<td>2.7</td>
<td>0.1</td>
</tr>
<tr>
<td>Hypertension</td>
<td>76,855</td>
<td>16.0</td>
<td>76.5</td>
<td>1.1</td>
<td>3.8</td>
<td>2.6</td>
<td>0.0</td>
</tr>
<tr>
<td>Glomerulonephritis</td>
<td>52,843</td>
<td>45.8</td>
<td>45.2</td>
<td>1.2</td>
<td>4.5</td>
<td>3.2</td>
<td>0.1</td>
</tr>
<tr>
<td>Cystic kidney</td>
<td>14,615</td>
<td>53.0</td>
<td>39.0</td>
<td>1.0</td>
<td>4.1</td>
<td>2.8</td>
<td>0.0</td>
</tr>
<tr>
<td>All</td>
<td>331,320</td>
<td>29.5</td>
<td>62.8</td>
<td>0.9</td>
<td>4.0</td>
<td>2.7</td>
<td>0.1</td>
</tr>
</tbody>
</table>
The mean percentage of patients on hemodialysis is 51% greater in the highest quintile (primarily the southeastern portion of the country) than in the lowest.

The mean percentage of patients on peritoneal dialysis is three and a half times greater in the highest quintile than in the lowest.

The mean percentage of patients with functioning transplants is more than twice as large in the highest quintile (primarily the northern and northwestern portions of the country) than in the lowest.
Figure 3.8
Median age & modality, by ESRD network

December 31st point prevalent patients, 1997–1999 combined

The percentages of treatment modalities add up to 100%.

The median age of the prevalent population is lowest in Network 16 at 55 years, and highest in Network 7 at 60 years. Network 16 has the lowest percent of patients on hemodialysis (52.3%), and Network 6 the highest (70.7%), while patients in Network 12 (10.8%) have the greatest likelihood of being placed on peritoneal dialysis. The highest proportion of transplant patients occurs in Networks 11 and 16.

Table 3.2
Percent distribution of patients, by modality & ESRD network

December 31st point prevalent ESRD patients, 1997–1999 combined

Dialysis percentages add across to 100%. The functioning transplant column shows the proportion of patients aged 0–64 who have functioning transplants.
Figure 3.9
Modality at initiation, one year, & two years
all incident Medicare patients who survive 90 days
While the percent of patients on hemodialysis is consistently less at two years than at initiation, the percent of patients on this modality at initiation, at one year, and at two years has increased steadily since 1991.

Figure 3.10
Modality & death at two years after first ESRD service, by age
incident patients, 1995–1997 combined
At two years following the first therapy for ESRD, 54.7% of pediatric patients have a functioning transplant, and only 6.3% have died. In patients 65 and older, in contrast, 52.7% have died, and 42.5% are on hemodialysis.

Figure 3.11
Relative risk (Cox model) of changing dialytic modalities
incident Medicare adult dialysis patients, 1991–1998, with one-year follow-up, adjusted for age, gender, race, diabetic status, & incident year
The likelihood of changing dialytic modalities was 22% higher in 1996 than in 1995. In 1998, patients were significantly less likely to change modalities, which may reflect greater selection bias towards patients chosen to go on peritoneal dialysis.
Figure 3.12
Relative risk of being on a modality, by race/ethnicity
December 31st point prevalent patients, 1999, by state

The national median state is used as the baseline for each map. The mean relative risk of being on hemodialysis varies 39% and 34% between the lowest and highest quintiles for whites and blacks, respectively. For peritoneal dialysis, however, this difference is 144% for whites, and almost 900% for blacks. The mean relative risk of being a transplant patient differs 53% for whites between the outer quintiles, 161% for blacks, and 381% for Hispanics. Black patients in the southeastern states have the highest risk of being on hemodialysis, while those living in the northeast and in Minnesota, Montana, Wyoming, Utah, Alaska, and Hawaii are most likely to be transplanted. The highest relative risk of transplantation for Hispanic patients occurs in Louisiana and in the midwest and northwest portions of the country.
Figure 3.12 (continued)
Relative risk of being on a modality, by race/ethnicity
December 31st point prevalent patients, 1999, by state
The national median state is used as the baseline for each map.
Almost 70% of patients who have lived ten or more years with ESRD have a functioning transplant, while approximately 30% are on hemodialysis and only 3% are on peritoneal dialysis.