Chapter five
Clinical indicators & preventive care

In the tale, in the telling, we are all one blood. Take the tale in your teeth, then, and bite till the blood runs, hoping it’s not poison; and we will all come to the end together, and even to the beginning: living, as we do, in the middle.

Ursula Le Guin, speech, 1979, University of Chicago
Since the publication of studies showing higher mortality rates for ESRD patients in the U.S. than in other countries, the quality of care provided to the ESRD population has been of particular concern. Programs to monitor the quality of dialysis therapy, anemia treatment, and vascular access have led to positive changes in clinical practice, but there are still areas in need of further improvement. We begin this chapter by presenting information on trends in anemia correction in the incident population, focusing on the use of EPO and IV iron in patients who have Medicare as their primary payor (approximately 80 percent of all incident ESRD patients). We show here that while patients who initiate ESRD therapy with a low hemoglobin (<9 g/dl) respond to treatment, they achieve lower hemoglobin levels than those whose levels are higher at the start of therapy, suggesting that hyporesponsiveness may be present prior to the initiation of dialysis. In contrast to conditions acquired and treatment occurring after the start of dialysis, such as the use of dialysis catheters, this may indicate an important predisposition of many dialysis patients. Data on anemia correction, illustrated by EPO dosing per kg per week, show important findings. Providers tend to increase the EPO dose in the second month to move patient hemoglobins into the K/DOQI target range of 11–12 g/dl. Subsequent doses fall over the next four months, while hemoglobin levels are maintained. The delivered dose per kg per week for patients who begin therapy with recommended hemoglobin levels is 200, while for those starting with levels of less than 11 g/dl the dose is between 300 and 375 units/kg/week. Dialysis therapy has improved over the last six years, and more than three-quarters of patients now have a URR of at least 65 percent. While most provider groups give comparable therapy, approximately 7 percent of patients still receive a hemodialysis URR of less than 60 percent. Trends in vascular access services have changed considerably since 1991. The use of catheters and arteriovenous fistulas continues to increase, and the rate of interventions delivered by radiologists has grown markedly. Vascular access services delivered by nephrologists, in contrast, have decreased 29 percent. The rate of declotting procedures grew steadily until 1999, when it began to fall; we are investigating whether this reflects a true decrease or a change in the coding for these services. In this year’s analysis of clinical indicators as they relate to rare diseases, we examine anemia.
and dialysis therapy. Patients with conditions such as IgA nephropathy achieve hemoglobin levels comparable to those of patients without the disease, even while using less EPO. Others, like those with systemic lupus erythematosus, multiple myeloma, and AIDS, have lower hemoglobin levels despite their higher EPO doses. Patients with these latter diseases exhibit various levels of hyporesponsiveness to EPO because of inflammation, bone marrow replacement, or fibrosis. We look here as well at the use of dialysis catheters and associated delivered dialysis therapy. Compared to those without the disease, patients with IgA nephropathy are less likely to have dialysis catheters, and have comparable delivered dialysis therapy. Patients with Wegener’s granulomatosis, lupus, and other secondary vasculitides have higher URRs, while those with polycystic kidney disease receive higher doses of dialysis and are far less likely to have catheters. AIDS patients receive less dialysis therapy than those without the disease, but catheter use is similar in the two populations. The USRDS began assessing diabetic care with the 2000 ADR. Although care has improved since that time, there are still areas of concern. Diabetic eye examinations, for example, particularly for young dialysis patients and those with a functioning graft, are performed in as few as one-third of patients. Lipid monitoring is performed in almost 80 percent of the transplant population, but only one-half of dialysis patients are tested. And 30–35 percent of patients receive no glycosylated hemoglobin testing. We also examine rates of lipid testing in non-diabetics with cardiovascular disease. For CKD patients as well as those on dialysis or with a transplant, these rates are quite low. Monitoring generally increases after a cardiovascular event, but even then they remain below 35 percent after most events, and below 50 percent after coronary revascularization.
Anemia treatment

Hemoglobin levels for dialysis patients, both at the beginning of therapy and in the following six months, have risen consistently since 1997, and by the fourth month of treatment a mean level of 11.9–12.0 g/dl is now being achieved and maintained (Figure 5.2). Weekly EPO doses, which have also increased since 1997, peak in the second month of therapy and decline as target hemoglobin levels are achieved (Figure 5.3). The number of patients placed on IV iron therapy by the sixth month of treatment has grown from 83 percent in 1997 to 91 percent in 2001 (Figure 5.4).

The right-hand graphs in these figures illustrate anemia treatment by modality and initial hemoglobin level. Patients with the lowest hemoglobins at initiation continue to have the lowest levels throughout the first six months of treatment, despite receiving the greatest amounts of EPO therapy. While this pattern is similar between the two dialysis therapies, other elements of anemia and its treatment differ. By the sixth month of therapy, for example, weekly EPO doses for peritoneal dialysis patients are less than half of those given to patients on hemodialysis. And approximately 85 percent of hemodialysis patients, regardless of initial hemoglobin, receive iron therapy by month six, compared to fewer than 20 percent of peritoneal dialysis patients, in whom use of the therapy varies more widely by initial hemoglobin level.

Hemoglobin levels have increased 20 percent since 1991 in all adult hemodialysis patients, and in adult diabetic patients as well (Figures 5.5–6). Levels have also increased in peritoneal dialysis patients over the same period, although the overall increase of 15 percent is slightly lower. Hemoglobin levels tend to be lower in peritoneal dialysis patients than in those on hemodialysis, an unsurprising finding since these patients receive much less iron.
In hemodialysis patients, hemoglobin levels are similar in all racial and ethnic groups (Figures 5.7–8). Black patients, however, regardless of diabetic status, appear to need higher amounts of EPO to achieve their hemoglobin levels. Although approximately 90 percent of patients appear to receive iron in the first six months of ESRD treatment (Figure 5.4), a more detailed investigation of iron use by race may be helpful in determining the differences in EPO use in black patients and those of other races.
At the beginning of 1991 more than half of prevalent dialysis patients had a hemoglobin of less than 10 g/dl (Figure 5.9). By June 2002 this had fallen to less than 9 percent, and three-quarters of patients met the target of at least 11 g/dl set by the Kidney Disease Outcomes Quality Initiative (K/DOQI). Mean hemoglobin levels and weekly EPO doses have begun to stabilize, reaching 11.7 g/dl and almost 17,000 units in June 2002 (Figure 5.10).

Mean hemoglobins are highest in the Pacific Northwest, the Southwest, and the Ohio Valley, and mean levels in the entire country meet the K/DOQI target (Figure 5.11). Mean EPO doses are highest in the eastern states, with the average dose in the upper quintile 39 percent higher than in the lowest (Figure 5.12).

K/DOQI guidelines also set a target urea reduction ratio of ≥65 percent—met by 83.5 percent of hemodialysis patients in 2000 (Figure 5.13). This proportion has grown steadily since 1993. Delivered dialysis therapy may be influenced by the policies of different providers. Chains 4 and 6 have the greatest proportion of patients treated with higher doses of therapy (Figure 5.14).

In patients treated with peritoneal dialysis, the mean weekly Kt/V has increased steadily since 1995, when 12 percent of patients had a Kt/V greater than 2.6; by 2000, more than a quarter had reached this level, and nearly half had Kt/Vs above 2.3 (Figure 5.15). The proportion of patients receiving higher levels of therapy is greatest in units run by DaVita and Renal Care Group (Figure 5.16).

CMS’s Clinical Performance Measures Project (CPM) began collecting information on vascular access in 2000. Project data shows that the use of synthetic grafts in hemodialysis patients has decreased 15 percent since 1999, while arteriovenous fistula and catheter use have grown 10 and 25 percent (Figure 5.17). Since 1991, overall vascular access event rates have increased 22 percent; the rate of procedures done by nephrologists during this period has fallen by almost a third, while more procedures are now performed by radiologists (Figure 5.18).

The use of temporary catheters and grafts has declined since the early 1990s, as more patients began to receive fistulas and permanent catheters (Figure 5.19). The use of angioplasty procedures and stents has grown steadily; access revision rates have also increased, though at a slower rate.
**Dialysis therapy**

5.13. Median URR (%), hemodialysis patients

5.14. Median URR (%), HD patients, by provider

5.15. Mean weekly Kt/V, peritoneal dialysis patients

5.16. Mean weekly Kt/V, PD patients, by provider

5.17. Access use: CPM data

5.18. Vascular access rates in prevalent hemodialysis patients, by M D specialty

5.19. Vascular access event rates in prevalent hemodialysis patients, by event type

*Figures 5.15–16* CPM data. Each patient has 1–3 URR measurements (one for each of three consecutive two-month intervals), which are transformed into categories, & the median category is calculated. If the median falls between two categories, 0.5 patients are added to each. *Figures 5.15–16* CPM data. Each patient has 1–3 Kt/V measurements (one for each of three consecutive two-month intervals); the mean of these measurements is calculated. Data by provider include year 2000 period prevalent patients; the number of patients in Chains 5 & 6 is too small to graph. *Figures 5.17* hemodialysis patients; CPM data. No vascular access information collected prior to the 2000 survey. *Figures 5.18–19* period prevalent hemodialysis patients age 18 & older on January 1 of the prevalent year; Part B physician supplier claims.

*Figures 5.17* hemodialysis patients; CPM data. No vascular access information collected prior to the 2000 survey. *Figures 5.18–19* period prevalent hemodialysis patients age 18 & older on January 1 of the prevalent year; Part B physician supplier claims.

The CMS Clinical Performance Measures Project report is based on a national sample of adult dialysis patients without regard to insurance payor status. The year refers to the year collected (e.g. 2000 data come from what is called the "2001 CPM data set").

**Unit affiliation**

All · All units

Chain 1 · Fresenius

Chain 2 · Gambro

Chain 3 · DaVita

Chain 4 · Renal Care Group

Chain 5 · Dialysis Clinics, Inc.

Chain 6 · Nat’l Nephrology Assoc.

NC · Non-chain units

HB · Hospital-based units

U · Unknown affiliation

Year 2000 period prevalent patients. Each patient has 1–3 URR measurements (one for each of three consecutive two-month intervals), which are transformed into categories, & the median category is calculated. If the median falls between two categories, 0.5 patients are added to each. *Figures 5.15–16* CPM data. Each patient has 1–3 Kt/V measurements (one for each of three consecutive two-month intervals); the mean of these measurements is calculated. Data by provider include year 2000 period prevalent patients; the number of patients in Chains 5 & 6 is too small to graph. *Figures 5.17* hemodialysis patients; CPM data. No vascular access information collected prior to the 2000 survey. *Figures 5.18–19* period prevalent hemodialysis patients age 18 & older on January 1 of the prevalent year; Part B physician supplier claims.

The CMS Clinical Performance Measures Project report is based on a national sample of adult dialysis patients without regard to insurance payor status. The year refers to the year collected (e.g. 2000 data come from what is called the "2001 CPM data set").
Dosing patterns of EPO differ by age, gender, and race. Because some of these differences may be secondary to patients’ physical size, we look here at EPO doses/kg/week. We also present chain-affiliated dosing patterns for incident patients over the first six months of anemia treatment, comparing them to patterns seen in prevalent patients.

From 1996 to 2001, the EPO dose/kg/week in the first two months of treatment grew 41–42 percent—from 165 to 233 in the first month, and from 198 to 282 in the second (Figure 5.20). For the sixth month of anemia treatment, the dose increased 26 percent, from 182 to 229 units/kg/week.

EPO dosing patterns in incident patients vary with the initial hemoglobin reported on the Medical Evidence form. Those with the lowest initial hemoglobin levels require the greatest doses of EPO, even as they approach target hemoglobin levels. These patterns appear to reflect EPO resistance, which dates from the initiation of therapy, and may reflect pre-existing higher comorbidity and increased inflammatory mediators. As we report in the Précis, as eGFR and comorbidity increase, C-reactive protein levels increase as well, supporting the pre-ESRD inflammatory state.

Interestingly, non-diabetics and patients with hypertension appear to require higher doses than other patients (Figures 5.22–23). The same layering of EPO dose by initial hemoglobin level is present for both of these primary causes of renal failure.

It is unclear why EPO doses/kg/week are higher than the starting doses recommended under K/DOQI guidelines. As Figure 5.2 shows, in the most recent cohort years the rate of increase in achieved hemoglobin level has been much higher than in prior years.

Dialysis units frequently follow guidelines for EPO dosing, which may reflect NKF
anemia practice guidelines. In Figures 5.24–25 we assess trends in EPO dosing/ kg/week by dialysis provider groups, based on the ownership reported on the Medicare Cost report. There are clear differences over time in the dosing patterns of different providers. Among incident patients starting with a hemoglobin level under 11 g/dl, dosing by Fresenius, DaVita, and Renal Care Group is frequently higher, especially in more recent years. This pattern is also evident in prevalent patients.

In prevalent patients with average hemoglobin levels less than 10 g/dl, EPO dosing patterns increased an average of 46 percent from 1998–2001. Overall dosing increased by 41 percent from 1996 to 2001 in units owned by Fresenius, DaVita, and Renal Care Group, while during that same time period dosing within Gambro and Dialysis Clinics, Inc. increased by only 24 percent. The reasons for these differences require further investigation, with consideration of the use of dialysis catheters, hospitalization rates, and patient distribution by age, gender, and race.

Figures 5.20–24 incident hemodialysis patients with a first EPO claim within 30 days of the ESRD start date & at least one EPO claim in each of the first six months; hemoglobin determined from hematocrit value on Medical Evidence form (2728). Graphs by incident year combine the first six months of incidence.

Figure 5.21 "all" category on the gender graph includes all patients with gender information in the database, & on the race graph includes all patients with race information. Figures 5.22–23 diabetes & hypertension listed as primary cause of renal failure. Figure 5.25 prevalent hemodialysis patients in the USRDS database who are also in the CPM data as hemodialysis patients. Hemoglobin, weight, & EPO dose are determined from the CPM data.

Unit affiliation
All · All units with known affiliation
Group 1 · Fresenius, DaVita, & Renal Care Group
Group 2 · Gambro & Dialysis Clinics, Inc.
NC · Non-chain units
HB · Hospital-based units
Rare diseases

Anemia treatment and dialysis adequacy are two important factors that play a vital role in the clinical outcomes of hemodialysis patients. We present here data on hemoglobin levels, average weekly EPO use, urea reduction ratio (URR), and catheter use in patients with and without rare diseases.

Since 1995 hemoglobin levels have steadily increased in patients with IgA nephropathy/Berger’s/IgM nephropathy, and in those without the disease. While URR levels in each group are comparable, patients without the disease receive slightly more EPO, and a greater proportion of these patients have catheters as their primary dialysis access (Figures 5.26–27).

EPO use has steadily increased since 1991 in patients with Wegener’s granulomatosis. Patients with this disease tend to receive more EPO and have higher URRs than those patients without the disease (Figures 5.28–29).

Hemoglobin levels in patients with or without lupus show similar increases since 1991. Lupus patients tend to have lower hemoglobins than those without the disease, though their average weekly EPO doses are almost 3,900 units higher. Patients with lupus also have higher URRs, and are more likely to have catheters (Figures 5.30–31). Since patients with dialysis catheters tend to have lower achieved dialysis blood flow rates, recirculation in these patients may give falsely low dialysis BUNs, which appear as higher URRs. These areas merit further evaluation.

Patients with other secondary glomerulonephritis/vasculitis have hemoglobin levels that are slightly lower than levels in patients without the disease, yet these patients have higher mean weekly EPO doses—2,700 units in 2001. URR levels in patients with the disease are also higher, though rates of catheter use are the same between the two populations (Figures 5.32–33).

Patients with polycystic kidney disease have higher hemoglobin levels than pa-
Patients without the disease, despite receiving almost 2,500 fewer units per week of EPO. This may be secondary to higher endogenous EPO production in these patients. Levels of URR are similar in the two groups, but a greater proportion of patients without the disease have a catheter for their dialysis access (Figures 5.34–35).

Hemoglobin levels, average weekly EPO doses, and URR levels are similar in patients with and without Alport’s disease; the rate of catheter use in patients without the disease, however, is 5 percent higher (Figures 5.36–37).

Patients with multiple myeloma and light chain nephropathy have hemoglobins that are approximately one-half gram per deciliter less than those of patients without the disease. These patients require 69 percent more EPO than patients without the disease, and their catheter use is higher as well (Figures 5.38–39).

Hemoglobin levels are lower in patients with AIDS nephropathy than in patients without the disease. As is the case in patients with multiple myelomas, AIDS patients require a considerably higher weekly dose (~6,100 units) of EPO to maintain their hemoglobin levels compared to patients without the disease. Patients without the disease tend to have higher URRs, and the use of catheters is the same in both populations (Figures 5.40–41).

Figures 5.26–41 period prevalent hemodialysis patients; hemoglobin & EPO data include patients with at least one EPO claim during their prevalent year.
Diabetic care

Overall, general Medicare patients tend to have a slightly better chance of receiving a diabetic eye examination than do prevalent ESRD patients (Figure 5.42). Geographic patterns indicate that testing of the general Medicare population is more consistent throughout the country, while in both populations patients in the Upper Midwest, New England, and along the East Coast are more likely to be tested.

By modality and age, transplant patients are more likely than those on dialysis to receive diabetic eye exams, and older patients more likely than younger ones (Figure 5.43). The lowest testing rates occur among Native Americans and patients age 18–30. The fact that fewer than 40 percent of these younger patients receive these exams is paradoxical, since they are more likely to have Type I diabetes, which has long been addressed by guidelines from the American Diabetes Association.

Striking geographic differences in diabetic preventive care also occur in the frequency of lipid and glycemic control monitoring (Figures 5.44 and 5.46). With the exception of a few areas such as portions of Minnesota, New England, and Alaska, ESRD patients are far less likely than those in the general population to receive a lipid or glycylated hemoglobin test.

Rates of lipid monitoring, relatively consistent across age groups, differ quite dramatically across modalities, with 79 percent of transplant patients monitored in 2001, compared to 52 percent of those on dialysis (Figure 5.45). Native American patients are, again, least likely to receive this testing.

Since 1992 the proportion of diabetic ESRD patients receiving at least one glycylated hemoglobin test has risen from 19 to 74 percent, compared to 79.1 percent in the general Medicare population (Figure 5.48). Almost a third of the ESRD patients received four or more tests in 2001. Guidelines of the American Diabetic Association, however, recommend that patients with complex disease burdens, which would include those with ESRD, receive...
Glycosylated hemoglobin testing

5.46 Geographic variations in the percent of patients receiving glycosylated hemoglobin testing

ESRD: point prevalent patients

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<th>Transplant</th>
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<tr>
<td>61-75</td>
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General Medicare

5.47 Glycosylated hemoglobin testing in prevalent ESRD patients, by age, race/ethnicity, & modality

5.48 Glycosylated hemoglobin testing in ESRD & general Medicare patients, by the number of tests

Testing at least four times per year. With 70 percent of diabetic ESRD patients not meeting these guidelines, diabetic monitoring requires far greater attention from providers.

- **Figure 5.42**: ESRD patients aged 65-75 who entered dialysis in 2000, alive on December 31, 2000, and had diabetes in 2001 as the primary cause of ESRD, compared to patients who entered dialysis before January 1, 2001.

- **Figure 5.43**: ESRD patients aged 18-75, initiating therapy prior to January 1, 2001, alive on December 31, 2001, and with diabetes in 2001. Claims from 2000 searched for eye exam codes.

- **Figure 5.44 & 46**: ESRD patients aged 18-75, initiating therapy prior to January 1, 2001, alive on December 31, 2001, and with diabetes in 2001. Claims from 2001 searched for eye exam codes.

- **Figure 5.45**: ESRD patients aged 18-75, initiating therapy prior to January 1, 2001, alive on December 31, 2001, and with diabetes in 2001. Claims from 2001 searched for lipid testing codes.

- **Figure 5.47**: ESRD patients aged 18-75, initiating therapy prior to January 1, 2001, alive on December 31, 2001, and with diabetes in 2001. Claims from 2001 searched for lipid testing codes.

- **Figure 5.48**: ESRD patients aged 65-75 prior to January 1 of each year, alive through December 31, and with diabetes during the same year. Patients enrolled in an HMO or diagnosed with ESRD are excluded. Claims from 2000 searched for Hba1c testing codes.
Preventive care & cardiovascular disease

We have previously reported that the greatest increase in treated end-stage renal disease is occurring in patients with the highest risk of cardiovascular disease, older patients, and those with diabetic nephropathy. Non-diabetic patients with a history of cardiovascular disease also represent a group at high risk, and there is a clear need for preventive care monitoring in these patients.

In non-diabetics with cardiovascular disease, the frequency of lipid monitoring is relatively consistent between chronic kidney disease patients and those on dialysis (Figures 5.49–54). Approximately half of these patients receive at least one test, though only 20–30 percent are tested two or more times. Rates are higher in CKD patients with ASHD or coronary revascularization, with 61 and 70 percent of these patients, respectively, receiving at least one lipid test.

Transplant patients are far more likely to receive this type of preventive care. Three quarters of these patients receive at least one test, and 50–60 percent receive two or more.

In non-diabetics without cardiovascular disease, and who have an event in a cohort year, the frequency of lipid monitoring is
similar in both males and females (Figures 5.55–60). If they are tested in the year prior to or following the event, patients are more likely to receive two or more tests than to be tested only once. The frequency of testing is highest in patients who have undergone coronary bypass surgery.

The burden of ESRD coupled with a history of cardiovascular disease greatly amplifies the vulnerability of these patients to increased morbidity and mortality. An increase in the frequency of lipid monitoring may help reduce these risks in this highly susceptible population.

**Figures 5.49–54** CKD patients: general Medicare patients age 65 & older entering Medicare before January 1, 2000, in the program & alive through December 31, 2001, with no diabetes claims in 2000, & with CKD & specific cardiovascular disease diagnosed in 2000. Patients diagnosed with ESRD during the study period are excluded. Dialysis & transplant patients: point prevalent patients age 66 & older prior to January 1, 2001, alive on December 31, 2001, with no diabetes claims six months prior to January 1, 2001, & diagnosed with specific cardiovascular disease during that six-month period. Lipid testing tracked in 2001. **Figures 5.55–60** point prevalent ESRD patients with no diabetes or cardiovascular claims one year prior to January 1 of each year, diagnosed with the cardiovascular disease during the current year, & surviving one year after the cardiovascular event. Lipid testing tracked one year prior to & one year following each cardiovascular event.

**All figures** patients enrolled in an HMO during the study period are excluded; lipid tests are at least 30 days apart. **Figure 5.53** because of the small number of transplant patients with coronary revascularizations, lipid monitoring rates are not presented.
INTRODUCTION Figure 5.1 In the prevalent population, average hemoglobin levels increased from 9.7 g/dl in 1991 to 11.6 g/dl in 2001, a 20 percent increase. EPO doses have risen from 6,400 to 15,000 units per week, a growth of 134 percent. ANEMIA TREATMENT Figure 5.2 Patients incident in 2001 achieved a mean hemoglobin of 11.9 g/dl by the sixth month of treatment; the lowest levels were achieved by those who began therapy with hemoglobins less than 9 g/dl. Figure 5.3 For incident patients in 2001, mean EPO doses per week in the first month of ESRD treatment reached 16,800 units; they rose in the second month, and by month six, when hemoglobin levels stabilize, were at 16,300 units. Figure 5.4 The percent of patients receiving IV iron by month six of ESRD treatment increased from 83.3 percent in 1997 to 91 percent in 2001. Only 19.4 percent of peritoneal dialysis patients under anemia treatment have received IV iron six months into their therapy. Figures 5.5–6 Differences in hemoglobin levels by age have narrowed in hemodialysis patients, but persist in those on peritoneal dialysis. EPO doses now vary more by age, with older patients receiving the lowest doses. Figures 5.7–8 Compared to whites, black patients continue to achieve lower hemoglobin levels and to require higher doses of EPO. FULFILLMENT OF DOQI GUIDELINES Figure 5.9 In 2002, more than 75 percent of prevalent hemodialysis patients had a mean monthly hemoglobin at or above the K/DOQI target of 11 g/dl. Figure 5.11 Mean hemoglobin levels by HSA range from 11.4 to 11.9 g/dl, a 3.7 percent difference between the lowest and highest quintiles. Figure 5.12 EPO doses by HSA range from 12,200 to 17,000 units per week, a 39 percent difference between the lowest and highest quintiles. Figure 5.13 Increasing numbers of patients have URRs greater than 65 percent; in 2000, however, 16.5 percent of patients still had median URRs less this than level. Figure 5.17 In 2001, 31 percent of hemodialysis patients had a functioning fistula, 25 percent had a dialysis catheter, and 44 percent had a graft as their primary access. Catheter use increased 25 percent from 1999 to 2001, and fistula use 10 percent. Figure 5.18 Most vascular access services are delivered by surgeons, though the number performed by radiologists is increasing. Figure 5.19 Placement rates for temporary catheters have declined, while those of permanent catheters have grown. EPO DOSING PATTERNS Figure 5.20 In the first month of ESRD treatment, mean weekly EPO units per kg increased from 165 in 1996 to 233 in 2001. Doses in month two grew from 198 to 282, and in month six they rose from 182 to 229. Figure 5.21 Native American patients receive the lowest weekly EPO doses per kg, and black patients the highest. Figures 5.22–23 Weekly EPO units per kilogram are 9 percent lower for diabetics than for non-diabetics, at 241 versus 262. Doses in patients with hypertension, in contrast, are 5.5 percent higher than in those without a diagnosis of hypertension. Figures 5.26–41 Hemoglobin levels and weekly EPO doses in patients with relatively rare diseases show that those with vasculitis, multiple myeloma, and AIDS require higher doses of EPO and achieve the same or lower hemoglobin levels than other patients. DIABETIC CARE Figures 5.42–48 Rates of diabetic eye exams, lipid testing, and glycosylated hemoglobin testing are significantly lower in ESRD patients compared to the general Medicare population. PREVENTIVE CARE & CARDIOVASCULAR DISEASE Figures 5.49–54 Fewer than half of the patients with CKD or on dialysis, and with cardiovascular disease, receive lipid testing each year; rates are far higher in those with transplants. Figures 5.55–60 Fewer than one-third of patients receive two or more lipid tests in the year prior to coronary revascularization; this number increases only slightly, to 36 percent, in the year following the event.

### Maps: National means & patient populations

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