The painter who draws merely by practice and by eye, without any reason, is like a mirror which copies every thing placed in front of it without being conscious of their existence.

Leonardo da Vinci
With the great complexity of their disease burden, patients with end-stage renal disease (ESRD) pose many challenges for providers, public health officials, and policy makers. Over the past decade, improvements in ESRD care have been identified by a number of organizations. Most notable is the assessment of provider performance under the ESRD Clinical Performance Measures (CPM) project of the Centers for Medicare and Medicaid Services (CMS), which looks at the implementation of the National Kidney Foundation’s Dialysis Outcomes Quality Initiative (KDOQI) guidelines. KDOQI targets for dialysis therapy, vascular access, and clinical indicators are shown on the next page, along with other targets based on practice guidelines and safety issues. It appears that 93 percent of patients receive the recommended amount of hemodialysis, a level relatively stable over the last five years, and limited by factors such as vascular access blood flow issues, dialysis catheter use, and the small number of patients new to dialysis who run only twice a week since they have residual kidney function. Such function, not reported in the dialysis populations, may be an important aspect of care, as it makes volume control and interdialytic weight gain easier to manage. Vascular access has received increased attention since the release of data on high catheter use at initiation and on increasing rates of infectious hospitalization in the first months of therapy. The CMS Fistula First program has contributed to a major effort to increase the use of arteriovenous (AV) fistulas, which have lower complication rates and associated costs. But the original KDOQI target — that 50 percent of new patients start therapy with a fistula — has not yet been realized. Just 14.5 percent of incident hemodialysis patients in 2007 used an AV fistula on their first outpatient dialysis run, while another 16.7 percent had a catheter with a maturing fistula (see Figure 3.1). Data from the CPM project do show that 41 percent of new patients have a functioning fistula in the first year of dialysis (see Figure hp.11), and that 50.3 percent of prevalent patients use the access — a new high. Further increase may be limited by the use of catheters and the high failure rate of fistula placement, recently reported by the NIH vascular access network study of preventive care for vascular access thrombosis. Pre-ESRD fistula placement is infrequent (see Volume One, Figure 7.25); fewer than 15 percent of incident dialysis patients have any attempted placement prior to ESRD, consistent with late referral to a nephrologist, and with insufficient time for evaluation and for placement and maturation of the access. The new Medicare CKD education benefit, addressing modality selection and early evaluation and placement of an internal vascular access, is to be implemented in January, 2010, and is intended to increase fistula use and thereby lower the use of dialysis catheters. Among new patients, hemoglobin levels after initiation are rising at the rate noted in 2003 — a major shift from the last two years. The mean hemoglobin has started to fall, as has the weekly dose of erythropoietin. The percentage of patients with a hemoglobin above 13 g/dl in any single month has declined in association with changes in labeling for erythropoiesis stimulating agents (ESAs) that reflect safety concerns.
and CMS payment policies, while the percentage of patients with a hemoglobin lower than 10 g/dl has increased slightly. Comprehensive patient care has long been a focus of the ADR. Among diabetic patients, there continues to be slow but steady progress in glycemic control monitoring, lipid monitoring, and the use of eye examinations, although only 17.5 percent of prevalent patients received all three types of care in 2005–2006. The apparent improvement in influenza vaccination rates seen in 2000–2003 has stalled. There has, however, been progress in the pneumococcal pneumonia vaccination rate, which reached 19 percent by 2006–2007, a 73 percent increase over 2000–2001. These vaccinations are limited by the package insert recommendations to once every five years — longer than the average survival of a dialysis patient, and thereby limiting the number who can achieve high use of this preventive care. The USRDS Coordinating Center will develop simulations of an ideal vaccination system, incorporating competing survival issues, to give perspective on this measure. Importantly, the CDC has not reported adverse reactions in those vaccinated more frequently. Several studies have shown that dialysis and transplant patients may not retain their antibodies longer than two years, which may limit vaccination effectiveness. These areas will need more investigation to help guide reasonable targets. We conclude by looking at vascular access placement and complications — a major source of morbidity. The growth of catheter use since 1998, and the dramatic increase in fistula use, are in contrast to the patterns seen with access complications, particularly related to overall infections and to sepsis. As has long been recognized, catheters have the highest rates of infectious complications, and fistulas the lowest. What may be more important, however, is that infectious complications associated with grafts are only slightly higher than those seen with fistulas — bringing into question the reason for the dramatic fall in graft use while catheter use continues to rise. These findings are particularly important when considering the infectious complications noted in the first months on dialysis (see Chapter One). This year we show that, for the first time, infectious hospitalization rates in the hemodialysis population have declined for two successive years (see Figure 6.4). These observations may be an early sign that the rates of infectious hospitalizations and complications associated with catheters may be starting to decline. These changes appear as well to be associated with the increased use of IV antibiotics noted in Chapter One, also an encouraging sign.

We Figure 5.1; see page 366 for analytical methods.
Recent clinical trials (CHOIR and CREATE) and KDOQI recommendations have questioned the safety and benefits of high hemoglobins. Early KDOQI guidelines set a target hemoglobin of 11 g/dl or higher, but in 2007 a prior target of 11–12 g/dl was re-established. In 2007, 34.8 percent of patients were within the target, and the mean monthly hemoglobin was 11.8 g/dl. The mean EPO dose in units per week has fallen 8.8 percent, to 17,966.

Mean hemoglobin levels in the incident dialysis population rise quickly in the first four months following initiation, and then stabilize. In 2007, the mean hemoglobin at six months was 12.0 g/dl, compared to 10.6, 11.6, and 12.1 g/dl, respectively, in 1995, 1999, and 2003. Six-month levels in hemodialysis patients tend to be higher in those who initiate with higher hemoglobins; the same is not true, however, for those on peritoneal dialysis. The mean weekly EPO dose is lowest in the first month of therapy and peaks in month two before falling. In 2007, the mean dose per week was 18,770 units at initiation, and rose to 29,954 at month two; at month six, the mean dose was 20,176 units. Figures 5.2–5; see page 367 for analytical methods. Period prevalent dialysis patients (5.2–3); incident dialysis patients (5.4–5).
In the first six months of dialysis, nearly 40 percent of patients receive IV iron each month, while 24 percent receive iron for three or fewer months; these numbers have been relatively stable over the past three years. Close to 45 percent of patients with an arteriovenous fistula are given IV iron during each of these first six months, compared to 41 percent of those with an arteriovenous graft, and 39 percent of those with a catheter.

Thirty-three percent of incident dialysis patients in 2007 received at least 2,700 units of IV iron in the first six months of therapy, while close to one in five were given 1,200 units or less. The highest doses are seen slightly more often in patients with arteriovenous fistulas, at 35 percent, compared to 28 and 33 percent among those with an arteriovenous graft or a catheter, respectively.

In 2002, the average number of months with IV iron in the first six months of dialysis was 4.94 in the upper quintile, seen in small scattered areas of the country. Since then, use of IV iron in multiple months has persisted, and in 2007 was much more widespread nationwide, again averaging 4.94 months in the upper quintile. The total IV iron dose during the first six months of dialysis is highest in the eastern part of the country, averaging 2,320 and 2,224 units, respectively, in 2002 and 2007. See page 367 for analytical methods. Incident dialysis patients.
Diabetic preventive care is fundamental to glycemic control. The American Diabetes Association recommends that persons with diabetes receive 2–4 glycosylated hemoglobin (A1c) tests per year, depending on changes in therapy and the attainment of treatment goals. Results in the ESRD population are encouraging, with rates for patients receiving four or more tests nearly doubling in this decade, to 52.7 percent. General Medicare patients with diabetes have fewer medical complications than do diabetic ESRD patients, yet should still receive regular A1c testing. In 2006–2007, 62.6 percent received at least two tests, but only 13 percent were tested four or more times.

Fasting lipid profiles should be measured at least annually in most adults, and more often in those with high-risk lipid values. Individuals with diabetes are predisposed to lipid abnormalities, putting them at risk for cardiovascular disease. More than half of general Medicare and ESRD patients with diabetes had at least two lipid tests in 2006–2007; 8.2 and 28.8 percent, respectively, received four or more tests.

Diabetes increases the likelihood of vision problems such as cataracts, glaucoma, and retinopathy. Frequent eye examinations are lacking among both general Medicare and ESRD patients with diabetes, with 49.3 and 51.4 percent, respectively, receiving no yearly test, and only 16.1 and 22.3 percent having two or more exams.

Comprehensive diabetic monitoring includes at least four A1c tests, two lipid tests, and one eye examination yearly. In 2007, fewer than one in five diabetic ESRD patients, and fewer than one in 16 diabetic general Medicare patients, received this comprehensive monitoring. Within the ESRD population, rates were highest in Asians and Hispanics at 18.9 and 20.5 percent, respectively, compared to 17.1, 16.7, and 11.4 percent in whites, African Americans, and Native Americans. Figures 5.10–13; see page 267 for analytical methods. General Medicare & point prevalent ESRD patients age 67–75 with diabetes.
Rates of reported influenza vaccinations continue to improve overall, reaching 59.4 percent in 2007, but are noticeably lower in children than in adults. Rates in adults have increased across ages, to 48.2, 57.4, 64.3, and 67.8 percent, respectively, for those age 20–44, 45–64, 65–74, and 75 and older, but have fallen in children, from 30.4 to 28.4 percent between 2006 and 2007. In 2007, whites and Native Americans were the most likely by race to be vaccinated, at nearly 62 percent. Of interest is the nearly 10 percent relative increase in vaccination rates for Native Americans between 2006 and 2007. By modality, vaccination rates are highest in patients on hemodialysis, at 63.8 percent. It should be noted that patients may be vaccinated through non-Medicare programs.

Overall, fewer than one in five ESRD patients received a vaccination for pneumococcal pneumonia in 2006–2007. Vaccination rates increase with age, from 7.8 percent in pediatric patients to 21.1 percent in those age 75 and older. Native Americans are the most likely by race to receive a pneumococcal pneumonia vaccination, at 24.1 percent, compared to 19–20 percent in whites, African Americans, and Hispanics, and 16.9 percent among Asians.

Dialysis patients should begin a series of three hepatitis B vaccinations soon after initiating therapy. The likelihood of receiving just one vaccination, however, is low, evidenced by an overall rate of 20.4 percent in 2007. Figures 5.14–16; see page 367 for analytical methods. Point prevalent ESRD patients.
Despite guidelines promoting arteriovenous fistulas as the vascular access of choice, catheter use in the prevalent hemodialysis population has remained at 18–19 percent since 2003. Since 1998, use has grown 55 percent among patients age 20–44, and 51 and 52 percent among women and African Americans, respectively. Figure 5.17; see page 367 for analytical methods. Prevalent hemodialysis patients age 20 & older; ESRD CPM data.

One in two prevalent hemodialysis patients had an arteriovenous fistula in 2006, up from 45 percent the previous year. Rates differ dramatically by gender, at 60 percent in men and 38 percent among women. By race, rates range from 43 percent among African Americans to 61 percent among Native Americans. Figure 5.18; see page 367 for analytical methods. Prevalent hemodialysis patients age 20 & older; ESRD CPM data.

With catheter and fistula use both on the rise, it is not surprising that the use of arteriovenous grafts continues to fall across patient populations — 47 percent overall since 1998, with 31 percent of hemodialysis patients using this access in 2006. Use remains greatest among women and African Americans. Figure 5.19; see page 367 for analytical methods. Prevalent hemodialysis patients age 20 & older; ESRD CPM data.
In the prevalent hemodialysis population, the most common access-related event continues to be replacement with a catheter, at 0.65 events per year in 2006 for those already using a catheter, 0.12 for those with an arteriovenous fistula, and 0.24 for those with an arteriovenous graft. These rates have remained relatively steady since the late 1990s.

Access complication rates have varied more over time. Among patients with an arteriovenous access, however, angioplasty rates continue to rise, in 2006 reaching 0.4 and 0.95 events per patient year for those with a fistula or graft, respectively — 2.6 and 1.9 times greater than in 1998.

Among peritoneal dialysis patients, the rate of peritonitis events has increased since 2004, reaching 2.4 events per patient year in 2006, a level 7.6 percent higher than in 1998. See pages 367 for analytical methods.
In 2007, 34.8% of patients had a HEMOGLOBIN of 11–12 g/dl; the mean monthly hemoglobin was 11.8 g/dl. • 5.2–3

In the first six months of dialysis, nearly 40% of patients receive IV IRON each month, while 24% receive iron for three or fewer months. • 5.6

Nearly 53% of diabetic ESRD patients received four or more A1c tests in 2006–2007. • 5.10

Among diabetic ESRD patients, 56% receive two or more annual LIPID tests. • 5.11

ONE IN TWO diabetic ESRD patients does not receive a diabetic EYE EXAMINATION. • 5.12

Just 28% of pediatric ESRD patients receive an INFLUENZA vaccination, compared to 59% in the overall ESRD population. • 5.14

Fewer than ONE IN FIVE ESRD patients received a vaccination for pneumococcal PNEUMONIA in 2006–2007. • 5.15

CATHETER use in the prevalent hemodialysis population has remained at 18–19% since 2003. • 5.17

Rates of arteriovenous FISTULA use differ by gender, at 60% in men and 38% among women. • 5.18

By race, rates of AV fistula use range from 43% among African Americans to 61% in Native Americans. • 5.18

ANGIOPLASTY rates continue to rise, in 2006 reaching 0.4 & 0.95 events per year for those with an AV fistula or graft, respectively. • 5.21–22