If you believe in magic don’t bother to choose
If it’s jug band music or rhythm and blues
Just go and listen it’ll start with a smile
It won’t wipe off your face no matter how hard you try
Your feet start tapping and you can’t seem to find
How you got there, so just blow your mind

John Sebastian, “Do You Believe in Magic”
INTRODUCTION

Over the past decade, improvements in ESRD care have been addressed by several organizations. Most notable is CMS’s assessment of provider performance under the ESRD Clinical Performance Measures (CPM) project, which looks at the implementation of guidelines from the National Kidney Foundation’s Dialysis Outcomes Quality Initiative (KDOQI). KDOQI targets for dialysis therapy, vascular access, and clinical indicators are shown on the next page, along with targets based on practice guidelines and safety issues. The CPM project is currently undergoing transition to a full web-based data entry system, including monthly laboratory data from providers. There have been challenges in implementing the system, but by the spring of 2012 most providers should be entering data. Until that time, some elements traditionally reported under the CPM program will not be up to date.

Vascular access has received increased attention since the release of data on high catheter use at initiation and on increasing rates of hospitalization due to infection in the first months of therapy. The CMS Fistula First program has worked to increase the use of arteriovenous (AV) fistulas, with their lower complication rates and associated costs. But just 35 percent of 2009 incident hemodialysis patients had an AV access either in use or maturing at the first outpatient dialysis treatment.

Views of anemia treatment continue to evolve, as safety concerns about targeting higher hemoglobin levels emerge from clinical trials. Just 8.1 percent of patients in a given month now have a hemoglobin level of 13 g/dl or above, considerably lower than the 23 percent seen in December, 2006. Anemia correction in patients treated with erythropoiesis stimulating agents (ESAs) has also changed. At six months after initiation, mean hemoglobin levels in these patients are now 11.5 g/dl, lower than the 11.7 noted in 2001, but the ESA doses used to achieve these levels are higher than in 2001. It is not clear why such high doses are being used to achieve a lower hemoglobin level, but these differences imply that the current use of ESAs is now considerably less effective than in the past.

The new bundled prospective payment system for dialysis patients, implemented in January, 2011, will substantially change incentives for ESA use. Recent changes in the FDA label for ESAs may also impact achieved hemoglobin levels. Data on iron dosing practices show an increased use of IV iron products, and large doses given in the first six months of dialysis treatment, practices which may also change under the new dialysis payment system.

Comprehensive patient care has long been a focus of the ADR. Among diabetic patients, there continues to be slow but steady progress in the use of glycemic control monitoring, lipid monitoring, and eye examinations, although only 17 percent of prevalent patients received all three types of care in 2006–2008. Influenza vaccination rates have again begun to improve, reaching 64.3 percent among prevalent patients in 2009 — still, however, below the target of 90 percent. And there has been progress in the pneumococcal pneumonia vaccination rate, which reached 25.8 percent in 2008–2009.

We next examine vascular access placement and complications. As long recognized, catheters have the highest rates of infectious complications among patients on dialysis, and fistulas the lowest — particularly important when
considering, as shown in Chapter Three, that such complications are a major source of morbidity. This year we show that hospitalizations due to vascular access infections are again declining; there has, however, been a steady rise in those for bacteremia/sepsis. These changes need to be monitored, as the use of cuffed catheters may still expose patients to the risk of infection.

We conclude with new data on use of the Medicare Part D drug benefit. In 2008, ESRD patients used an average of 12–13 medications within a year, though this varies by low income subsidy status. In any single month, patients refill an average of five prescriptions, with antihypertensive medications accounting for 20 percent. The number of reported refills may, however, be affected by the dispensed amount, as some plans allow a 90-day supply on a single refill.

Beta blockers are used by 60 percent of dialysis and transplant patients, a rate 6.5 times greater than that reported in the Dialysis Morbidity and Mortality Study (DMMS, a USRDS Special Study) in the 1990s. Use of lipid lowering agents has reached 40 percent in the dialysis population, and 50 percent among transplant patients; again higher than that reported in the DMMS. Four of five dialysis patients use a phosphate binder. And among patients with diabetes, insulin therapy is used by 50 percent of those on dialysis, and 70 percent of those with a transplant; sulfonylureas are used by close to 20 percent of both dialysis and transplant patients.

Chapter Six presents additional information on the Part D prescription drug benefit, addressing the low income subsidy and the coverage gap, illustrating enrollment among ESRD, CKD, and general Medicare patients, and reporting on the most frequently used medications. These analyses will be expanded in the 2012 ADR, as more Part D data become available to the USRDS.

Figure 2.1; see page 380 for analytical methods.
During 2009, 40 percent of prevalent dialysis patients had a mean monthly hemoglobin within the previous KDOQI target of 11–12 g/dl. The mean EPO dose per week averaged 18,364 units, down from a peak of nearly 20,000 during 2004–2007, when a greater proportion of patients had hemoglobins nearing 12 g/dl. > Figures 2.2–3; see page 381 for analytical methods. Period prevalent dialysis patients.

When compared to 2005 incident patients, those starting dialysis in 2009 did so with slightly lower hemoglobins one month post-initiation, at 10.6 and 10.3 g/dl, respectively. At six months, the mean monthly hemoglobin in 2009 patients was within the KDOQI target of 11–12 g/dl, at 11.5. The mean EPO dose per week at six months after initiation was 19,841 units in 2009, compared to 20,699 in 2005. > Figures 2.4–5; see page 381 for analytical methods. Incident dialysis patients; EPO doses in 2.5 adjusted for inpatient days.

The proportion of incident dialysis patients receiving IV iron in each of the first six months of dialysis continued to increase in 2009, reaching 43 percent. A greater proportion of these patients received higher doses of IV iron than in previous years. In 2000 and 2005, for example, 22 and 30 percent, respectively, received a total iron dose of more than 2,700 units in the first six months of dialysis; this rose to 36 percent in 2009. > Figures 2.6–7; see page 381 for analytical methods. Incident dialysis patients.

During 2009, 40 percent of prevalent dialysis patients had a mean monthly hemoglobin within the previous KDOQI target of 11–12 g/dl. The mean EPO dose per week averaged 18,364 units, down from a peak of nearly 20,000 during 2004–2007, when a greater proportion of patients had hemoglobins nearing 12 g/dl. > Figures 2.2–3; see page 381 for analytical methods. Period prevalent dialysis patients.
The American Diabetes Association recommends that patients with diabetes receive 2–4 glycosylated hemoglobin (A1c) tests per year, depending on changes in therapy and the attainment of treatment goals. In 2008–2009, 73 percent of diabetic ESRD patients received two or more A1c tests in a year, up from just 34 percent in 1996–1997.

Patients with diabetes are generally predisposed to lipid abnormalities, putting them at risk for cardiovascular disease. Ideally, fasting lipid profiles should be measured at least once per year in normal adults, and more often in those with high-risk lipid values. In 1996–1997, just 21 percent of ESRD patients with diabetes had at least two annual lipid tests; this improved to 58 percent in 2008–2009.

While many patients with diabetes suffer from problems with vision due to cataracts, glaucoma, or retinopathy, frequent eye examinations continue to be uncommon among ESRD patients with diabetes. In 2008–2009, only one in five received two or more tests in a year.» Figures 2.8–10; see page 381 for analytical methods. Point prevalent Medicare ESRD patients with diabetes, age 18–75.

Rates of reported influenza vaccinations continue to improve overall, reaching 64.3 percent in 2009, though they remain noticeably lower in children than in adults. By modality, rates are highest in hemodialysis patients, at 69.3 percent, compared to 46.5 percent among transplant patients. Rates should be interpreted with caution, as patients may be vaccinated through non-Medicare programs.

Overall, just over one in four ESRD patients received a vaccination for pneumococcal pneumonia in 2008–2009. Rates are more than twice as high for dialysis patients as for those with a transplant.

Dialysis patients should begin a series of three hepatitis B vaccinations soon after initiating therapy. The likelihood of receiving just one vaccination, however, remains low, with an overall rate of just 22.1 percent in 2009.» Table 2.a; see page 381 for analytical methods. Point prevalent ESRD patients.

Comprehensive diabetic monitoring includes at least four A1c tests, two lipid profile tests, and one eye examination yearly. While the rate of comprehensive monitoring has been increasing over time, in 2008–2009 only 17 percent of prevalent ESRD patients with diabetes received this testing.» Figure 2.11; see page 381 for analytical methods. Point prevalent Medicare ESRD patients with diabetes, age 18–75.
At their first outpatient hemodialysis session, nearly 65 percent of patients have a catheter alone, up from 62 percent in 2005; 82 percent are using either a catheter alone or a catheter with a maturing arteriovenous fistula or graft. Fourteen percent of patients now begin therapy with a fistula, up only slightly from 11.8 percent in 2005. >> Figure 2.12; see page 381 for analytical methods. Incident hemodialysis patients.

In 2009, the percentage of hemodialysis patients starting ESRD with an arteriovenous fistula or graft showed wide variations across the county among both whites and African Americans. In the lower quintile, an average of 13.5 and 12.1 percent, respectively, initiated treatment with an internal access; means in the upper quintile were 23.5 and 23.3 percent.

By location, whites and African Americans residing in the Pacific Northwest, Alaska, and portions of Minnesota and New England were the most likely to initiate dialysis with an internal access. >> Figure 2.14; see page 381 for analytical methods. Incident hemodialysis patients, 2009.

At the start of ESRD therapy, 66 percent of white hemodialysis patients are using a catheter alone, compared to 63 percent of African Americans and 60 percent of patients of other races. Arteriovenous fistula use varies from 13 percent among African Americans to 16.3 percent among those of other races. >> Figure 2.13; see page 381 for analytical methods. Incident hemodialysis patients, 2008.
Access use in prevalent dialysis patients, by age, gender, race, & ethnicity (ESRD CPM data; percent)

<table>
<thead>
<tr>
<th></th>
<th>Catheter</th>
<th>AV fistula</th>
<th>AV graft</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-44</td>
<td>15.0</td>
<td>15.0</td>
<td>15.0</td>
</tr>
<tr>
<td>45-64</td>
<td>15.0</td>
<td>15.0</td>
<td>15.0</td>
</tr>
<tr>
<td>65-74</td>
<td>15.0</td>
<td>15.0</td>
<td>15.0</td>
</tr>
<tr>
<td>75+</td>
<td>15.0</td>
<td>15.0</td>
<td>15.0</td>
</tr>
</tbody>
</table>

As reported in the USRDS 2010 Annual Data Report, the use of catheters remained at 18–19 percent between 2003 and 2007 (the most recent year of available CPM data). Overall, arteriovenous fistula use during this period increased from 38.6 to 55.0 percent, while use of arteriovenous grafts fell from 42.9 to 27.2 percent. » Table 2.b; see page 381 for analytical methods. Prevalent hemodialysis patients age 20 & older; ESRD CPM data.

Access events & complications in prevalent dialysis patients (ESRD CPM data; rate per patient year)

<table>
<thead>
<tr>
<th></th>
<th>Catheter</th>
<th>AV fistula</th>
<th>AV graft</th>
<th>Peritoneal dial. device</th>
</tr>
</thead>
<tbody>
<tr>
<td>Events</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Replace with same type of access</td>
<td>0.07</td>
<td>0.04</td>
<td>0.03</td>
<td>0.04</td>
</tr>
<tr>
<td>Replace with HD catheter</td>
<td>0.05</td>
<td>0.02</td>
<td>0.01</td>
<td>0.02</td>
</tr>
<tr>
<td>Replace with internal HD device</td>
<td>0.06</td>
<td>0.03</td>
<td>0.02</td>
<td>0.02</td>
</tr>
<tr>
<td>Removal</td>
<td>0.13</td>
<td>0.06</td>
<td>0.04</td>
<td>0.06</td>
</tr>
</tbody>
</table>

Among prevalent hemodialysis patients in 2007 (the most recent year of available CPM data), the most common access-related event was replacement with a catheter, at 0.86 events per year for patients already using a catheter, and 0.12 and 0.24, respectively, for those with an arteriovenous (AV) fistula or graft. Sepsis is more common than infection, regardless of access type. In 2007, for example, the rate of sepsis among catheter patients was 1.6 times higher than the rate of infection; among AV fistula patients, the rate was three times higher.

In peritoneal dialysis patients, the rate of access replacement with another peritoneal access has decreased by a factor of two since 1998, while rates of replacement with an internal hemodialysis access or hemodialysis catheter have each fallen, but to a lesser degree. Rates of peritonitis have declined slightly since 1998, while rates of access infection have increased from 0.46 to 0.56; since 2003, the rate of sepsis has fallen from 0.52 to 0.44. » Table 2.c; see page 381 for analytical methods. Catheter, fistula, graft: prevalent hemodialysis patients age 20 & older; ESRD CPM & claims data. Peritoneal dialysis device: prevalent peritoneal dialysis patients age 20 & older.
Most patients with ESRD have enrolled in and use their Medicare Prescription Drug Plan (Part D) for many medications. (In Chapter Six we present more detail on Part D enrollees.)

Dialysis and transplant patients received an average of 13.6 and 12.4 distinct medications, respectively, through their Part D plan in 2008. White dialysis patients received the greatest number, at 14.1, and LIS patients received more than did their non-LIS counterparts. On any given day, dialysis patients had an average of 4.7 available Part D medications, while transplant patients had 5.3. Antihypertensives comprised more than one-fourth of the daily medication load. 

Compared to transplant patients, a higher proportion of dialysis patients receive ACEIs/ARBs/renin inhibitors, beta blockers, hydralazine, and minoxidil. Among dialysis patients, use of beta blockers, DHP calcium channel blockers, and ACEIs/ARBs/renin inhibitors is highest among Asians. In the transplant population, beta blockers, DHP calcium channel blockers, central alpha agonists, diuretics, hydralazine, and minoxidil are used most frequently among African Americans.

Figures 2.15–16; see page 381 for analytical methods.
Fifty-two percent of transplant patients, and 41 percent of those on dialysis, receive statins. Ezetimibe use is relatively low compared to that of statins, and most frequently given to transplant patients; its use may rise, however, based on results from the prospective Study of Heart and Renal Protection (SHARP) trial, which showed a lower rate of atherosclerotic events in Stage 3–5 CKD and dialysis patients receiving a simvastatin/ezetimibe combination compared to a placebo.

Transplant patients are more than twice as likely to receive an oral active vitamin D agent than dialysis patients. More than 76 percent of dialysis patients receive a phosphate binder, with 49, 37, and 11 percent, respectively, on sevelamer, calcium acetate, and lanthanum. Combined use of phosphate binders is not common, and use of sevelamer is highest by race among Asians.

In terms of diabetic medications, insulin use is more common in transplant patients with diabetes than in those on dialysis; the opposite is true for sulfonylureas. Thiazolidinedione use is similar by modalities. 

**Mean monthly hemoglobin after initiation, 2009**

- Month 1: 10.3
- Month 2: 11.3
- Month 3: 11.8
- Month 4: 11.8
- Month 5: 11.7
- Month 6: 11.5 (Fig. 2.4)

**Mean EPO dose per week after initiation, 2009**

- Units: Month 1: 17,398, Month 2: 28,556, Month 3: 25,737, Month 4: 22,258, Month 5: 20,772, Month 6: 19,841 (Fig. 2.5)

**Diabetic patients receiving recommended testing, 2008–2009**

- Percent with 2+ tests in a year:
  - A1C: 73%
  - Lipid testing: 58%
  - Eye examinations: 20%
  (Figures 2.8–10)

**Vaccination rates, by age**

- Influenza, 2009:
  - Age 0–19: 39%
  - 20–44: 56%
  - 45–64: 63%
  - 65–74: 68%
  - 75+: 71% (Table 2.A)

- Pneumococcal pneumonia, 2008–2009:
  - Age 0–19: 11%
  - 20–44: 24%
  - 45–64: 26%
  - 65–74: 26%
  - 75+: 28% (Table 2.A)

- Hepatitis B, 2009:
  - Age 0–19: 8%
  - 20–44: 17%
  - 45–64: 20%
  - 65–74: 24%
  - 75+: 30% (Table 2.A)

**Access use at first outpatient dialysis, 2009**

- Fistula: 14%
- Graft: 3%
- Catheter with maturing fistula: 16%
- Catheter with maturing graft: 2%
- Catheter: 65% (Fig. 2.12)

**Access use in prevalent dialysis patients, 2007 [CPM data]**

- Catheter: 18%
- Arteriovenous fistula: 55%
- Arteriovenous graft: 27% (Table 2.B)

**Cumulative number of Part D medications, 2008**

- Overall:
  - Dialysis patients: 13.6
  - Transplant patients: 12.4 (Fig. 2.15)

- Patients with low income subsidy:
  - Dialysis patients: 14.3
  - Transplant patients: 13.0 (Fig. 2.15)

- Patients without low income subsidy:
  - Dialysis patients: 11.5
  - Transplant patients: 11.4 (Fig. 2.15)