You are neither here nor there,
A hurry through which known and strange things
pass
As big soft buffettins come at the car sideways
And catch the heart off guard and blow it open.
patients with CKD face many challenges. Control of blood pressure, salt intake, lipid levels, and cardiovascular disease, in addition to exercise, are needed to address the management of cardiovascular risk factors. And the disease’s progression, with the potential for accelerating cardiovascular disease event rates and for reaching kidney failure, poses additional issues.

On the next page we illustrate the likelihood of death versus the progression to ESRD. At the end of the two-year follow-up period, 38.6 percent of those with CKD, diabetes, and CHF had died, 6.8 percent had reached ESRD, and the remaining 54.5 percent were alive. These data show the dramatic loss of life in Medicare patients with recognized CKD—who are more than five times more likely to die than to ever reach ESRD. We expand these data on the following pages, showing that, among Medicare and dually-enrolled patients age 66 and older, up to 70 percent of those with CKD, diabetes, and congestive heart failure (CHF) die in the five years after the entry period, while just 18 percent reach ESRD. Not restricted to the older Medicare population, these findings also play out among EGHP patients in the Medstat and Ingenix i3 datasets. The probability of death and/or ESRD reaches 14–18 percent at five years for those with CKD, diabetes, and CHF. The multiplier effect of CKD is clear, and data are consistent with published reports from many investigators.

The high likelihood of death is mirrored by advancing cardiovascular comorbidity. Seventy percent of CKD patients remaining alive at the end of a two-year follow-up period have some service and diagnosis codes for cardiovascular disease. CHF and atherosclerotic heart disease (ASHD) develop at comparable rates in those who reach ESRD, at 54–55 percent of the population; in those who die by the end of the follow-up, 63 percent have CHF and 57 percent have ASHD. In the 24 months prior to initiation of ESRD therapy, the increase in cardiovascular disease services and codes is similar in the Medicare and EGHP populations; the younger group, however, starts with half the disease burden, but enters ESRD with just 25 percent less. Patients reaching ESRD and known to carry a CKD diagnosis code in the year prior to initiation appear to carry a higher disease burden, suggesting that the recognition of CKD is associated with cardiovascular disease.

Infectious complications are a well-known source of morbidity in the kidney disease population. Not surprisingly, they occur at higher rates among CKD patients who die at the end of the follow-up period than in those who reach ESRD or remain alive. Pneumonia and bacteremia/sepsis, the two most common causes of hospitalization for infection, are twice as likely in CKD patients who reach ESRD, and almost 4–5 times more likely in those who die by the end of the follow-up period. Among patients who do reach ESRD, the probability of an infection increases during the two years prior to initiation. Almost 25 percent of Medicare patients who reach ESRD have had a hospitalization for infection, a rate almost 50 percent greater than that of the younger EGHP populations. These rates are similar in those known to have CKD in the year prior to ESRD, demonstrating that CKD patients may need more active interventions, including vaccinations against influenza and pneumococcal pneumonia.

Given the challenges of disease progression and morbidity, it is unclear how frequently providers have recognized CKD in patients who actually reach ESRD. Interestingly, up to 50 percent of Medicare patients who reach ESRD have carried a CKD diagnosis code up to 20 months prior to ESRD initiation. In the both the Medstat and Ingenix i3 populations this 50 percent recognition occurs at 16.5 months. This is not to say that a patient’s condition is unknown, but that services directed at CKD were not noted until those time periods. This is in marked contrast to nephrology referral services, for which the 50 percent mark is not reached until 10.5, 0.5, and 9.5 months prior to ESRD in the Medicare, Medstat, and Ingenix i3 populations, respectively. These observations suggest that care may not be reaching needed levels.

Data on laboratory monitoring ordered up to a year before ESRD show that the rate of testing for complications associated with kidney disease is relatively low. Only 50 percent of Medicare patients, for example, had had a creatinine measurement by 3.5 months before ESRD initiation, and this number has improved only modestly since 2002. Such lack of monitoring makes it difficult for providers and patients to guide treatment in a way that can avoid the progression and complications of the disease. Monitoring related to other complications of bone and mineral disease, and of lipid and glycosylated hemoglobin levels, is even lower.

EGHP datasets are the only available source of information on the use of medications typically prescribed to address the progression of CKD and to reduce cardiovascular disease. It appears that just 50 percent of patients receive an ACE-I/ARB 9–10 months before reaching ESRD, and that this number reaches only 60 percent even two months before ESRD. These findings may reflect provider concerns about increased serum creatinine levels, a well-known complication of such...
will address in more detail the ordering of and billing for treatments, and about higher serum potassium levels, which could complicate ACE-I/ARB therapy. In the 2009 ADR we will address in more detail the ordering of and billing for tests such as serum electrolytes, as well as lipid therapies for hyperlipidemia. Use of beta blockers — a mainstay of therapy for heart failure and a treatment for ischemic heart disease and hypertension — reaches 50 percent at seven months prior to initiation. In the one month prior to initiation, use of Vitamin D therapy and phosphate binders each approach 25 percent, while the use of erythropoiesis stimulating agents (ESAs) for anemia reaches 43 percent. In the future we will expand our assessment of laboratory data in CKD patients who reach ESRD as well as those who survive with a CKD diagnosis, determining the degree of risk factor monitoring and the use of therapies that can be directed at these abnormalities.

At the end of the chapter we address vascular access placement rates in patients reaching ESRD, examining patterns of care in the months prior to and following the initiation of therapy. Catheter placements are dominant in the Medicare population at the beginning of ESRD, while arteriovenous fistula placements reach only 10 percent up to three months before initiation. In the Medstat and Ingenix data, catheter placements are noted in 5–10 percent of patients prior to ESRD, but this may reflect the lack of a clear registration system for these patients, since the start of dialysis is defined from three months of claims records rather than something like the Medical Evidence form used for Medicare patients. Fistula placement rates are slightly higher in the EGHP population reaching dialysis, but the numbers are still far below those needed for most patients to have a functioning access before ESRD. Attempts at placements after ESRD are considerably higher in all populations, reaching 50 percent for fistulas.

Data in this chapter suggest not only that the CKD population is at a high risk of adverse events, but that coordination of care appears to be far less than expected, which may impact outcomes. The USRDS will develop additional methods to address the disease burden of the recognized CKD population, and improve adjustments to the event rates to reduce potential selection biases based on increasing recognition of CKD by providers. The use of laboratory data to define CKD will add specificity and sensitivity for case definitions, while use of the new diagnosis codes noted in Chapters Two and Three will increase over time.

figure 4.1 Likelihood of death vs. ESRD in the Medicare population
point prevalent Medicare patients age 66 & older, 2004, with two-year follow-up

figure 4.3 The probabilities of death and ESRD are greater in the dually-enrolled population than among Medicare-only patients. These findings suggest that efforts to address cardiovascular disease and hypertension should be directed at their impact on death and adverse events rather than solely on progress to ESRD. figures 4.6–7 CKD patients who die carry a high level of cardiovascular disease, approaching 91 percent overall; 57 percent have a diagnosis of atherosclerotic heart disease, and 63 percent a diagnosis of congestive heart failure. figure 4.15 Among patients who progress to ESRD, referrals to a nephrologist are infrequent, even though providers may be aware that patients have CKD. Fifty percent of Medicare ESRD patients had a nephrology referral 10.5 months prior to initiation, a level not reached in the Medstat population until the month prior to ESRD. figure 4.20 Lipid studies are infrequent in the year prior to ESRD, a concern for patients known to have high rates of cardiovascular disease events and poor outcomes.

highlights

contents

predictors of ESRD & death · 68 predictors of ESRD, death, or the combined event ~ probability of ESRD, death, or the combined event, by comorbidity development of comorbidity · 70 cardiovascular comorbidity & infection patient care prior to ESRD · 72 probability of a CKD claim, of a nephrologist claim, & of seeing a nephrologist after CKD diagnosis laboratory evaluations prior to ESRD · 74 creatinine testing ~ calcium phosphorus testing ~ parathyroid hormone testing ~ lipid studies ~ hemoglobin testing ~ glycosylated hemoglobin testing prescription drug use · 76 ACE-Is/ARBs ~ lipid lowering agents ~ beta blockers ~ calcium channel blockers ~ diabetic drugs ~ vitamin D ~ phosphate binders dialysis access placement during the transition to ESRD · 78 catheter, fistula, & graft placements
In the Medicare population, age is generally a weak predictor of ESRD but a strong predictor of death. Racial predictors are also significant for ESRD, but less so for death. Compared to whites, African Americans have the same likelihood of death, but a two-fold higher likelihood of ESRD. Not surprisingly, a diagnosis of CKD is a major predictor of ESRD, and is highly interactive with diabetes and CHF. These same conditions are just one-tenth the hazard for death, but are still significant predictors.

Predictors of ESRD, death, or the combined event: Medicare-only patients

<table>
<thead>
<tr>
<th>Comorbidity</th>
<th>ESRD (RR, CI p-value)</th>
<th>Death (RR, CI p-value)</th>
<th>ESRD or death (RR, CI p-value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>In the Medicare population, age is generally a weak predictor of ESRD but a strong predictor of death. Racial predictors are also significant for ESRD, but less so for death. Compared to whites, African Americans have the same likelihood of death, but a two-fold higher likelihood of ESRD. Not surprisingly, a diagnosis of CKD is a major predictor of ESRD, and is highly interactive with diabetes and CHF. These same conditions are just one-tenth the hazard for death, but are still significant predictors.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.2 Probability of ESRD, death, or the combined event, by comorbidity: Medicare-only patients point prevalent Medicare patients age 66 & older, 2004, with two-year follow-up

Figure 4.2 This figure illustrates differences in the likelihood of death versus ESRD for interactions of CKD, diabetes, and CHF. As also shown in Table 4.a, the likelihood of death in older Medicare patients is 3–6 times more likely than that of ESRD.
**Figure 4.3** The probabilities of death and ESRD are greater in the dually-enrolled (Medicare/Medicaid) population than among Medicare-only patients. These findings suggest that efforts to address cardiovascular disease and hypertension should be directed at their impact on death and adverse events rather than solely on progress to ESRD.

**Figure 4.4** Among EGHP patients in the Medstat database, the relationship of interactive CKD groups to the likelihood of progressing to ESRD is similar to that seen with Medicare and dually-enrolled patients. (The competing event of death cannot be assessed in the EGHP data, as data are available only for deaths in the hospital.)

**Figure 4.5** Data on the likelihood of ESRD among patients in the Ingenix i3 dataset show that those with CKD accompanied by CHF have a higher probability of ESRD than do those with CKD and diabetes. This pattern differs somewhat from those seen with Medicare patients and with the primarily-self insured patients in the Medstat database.
CKD patients who die carry a high level of cardiovascular disease, approaching 91 percent overall; 57 percent have a diagnosis of atherosclerotic heart disease, and 63 percent a diagnosis of congestive heart failure. CKD patients who reach ESRD have a slightly lower burden, while the lowest is found in CKD patients who survive the follow-up period and do not acquire ESRD. At least 82 percent of Medicare ESRD patients have four or more cardiovascular disease claims in the two years prior to initiation, compared to 53 and 48 percent in the Medstat and Ingenix i3 cohorts, respectively.

At 18.5 months before ESRD, 50 percent of Medicare patients have evidence of cardiovascular disease. In the Medstat CKD population, in contrast, this 50 percent level is not reached until 9.5 months prior to ESRD, and in the Ingenix i3 cohort it is reached even later, at just two months before ESRD initiation. These differences likely represent the impact of age, with the mean age of the Medicare population close to 72, compared to just 50 in the EGHP populations.

In the population known to have CKD in the year prior to ESRD, the number of Medicare patients with cardiovascular comorbidity reaches 50 percent at 8.5 months prior to ESRD, compared to 2.5 and 1.5 months in the Medstat and Ingenix i3 cohorts, respectively.

Cardiovascular comorbidity

**Figures 4.6–7**

<table>
<thead>
<tr>
<th>Patients with CV comorbidity, based on outcome</th>
<th>Medicare CKD pts age 65+, 03–04</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent of patients</td>
<td>Alive, ESRD, Death</td>
</tr>
<tr>
<td>CVD: all</td>
<td>0</td>
</tr>
<tr>
<td>ASHD</td>
<td>20</td>
</tr>
<tr>
<td>CHF</td>
<td>40</td>
</tr>
<tr>
<td>Percent of patients</td>
<td>60</td>
</tr>
<tr>
<td>Death</td>
<td>80</td>
</tr>
<tr>
<td>100</td>
<td>100</td>
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**Figures 4.7**

<table>
<thead>
<tr>
<th>Cumulative probability of cardiovascular comorbidity during the transition to ESRD, by dataset</th>
<th>incident ESRD patients, 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medicare (67+)</td>
<td>Medstat</td>
</tr>
<tr>
<td>PerfECT</td>
<td>Ingenix i3</td>
</tr>
<tr>
<td>Four+</td>
<td>Three</td>
</tr>
<tr>
<td>Two</td>
<td>One</td>
</tr>
<tr>
<td>Zero</td>
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</tr>
</tbody>
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**Figures 4.8**

<table>
<thead>
<tr>
<th>Cumulative probability</th>
<th>Medicare (age 67+)</th>
<th>Medstat</th>
<th>Ingenix i3</th>
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<tr>
<td>All cardiovascular disease</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>ASHD</td>
<td>0.2</td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td>CHF</td>
<td>0.4</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>1.0</td>
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**Figures 4.9**

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<th>Cumulative probability</th>
<th>Medicare (age 67+)</th>
<th>Medstat</th>
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<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
</tbody>
</table>

**Figures 4.10** point prevalent Medicare enrollees in 2003–2004, age 65 or older on January 1, with CKD in 2003, not diagnosed with ESRD in 2003–2004, not enrolled in a health maintenance organization (HMO), & surviving through 2004. Infections represent inpatient stays with an infection as the principal diagnosis during the one year prior to outcome. For Figures 4.11–13, infections & infection claims represent inpatient stays with infection as principal diagnosis.
Infections complications occur at rates much lower than those seen with cardiovascular disease complications, but with a similar layering based on final outcome at the end of the follow-up period. Compared to those who survive, 2–4 times more CKD patients who die in the follow-up period have an infectious hospitalization. Twenty-one percent of Medicare ESRD patients have at least one claim for an infectious hospitalization in the two years before initiating ESRD therapy, compared to 15 and 13 percent of Medstat and Ingenix i3 patients, respectively.

Figure 4.12. The probability of any infectious hospitalization accelerates as a person approaches ESRD, between month three and the month of ESRD increasing 47, 34, and 36 percent in the Medicare, Medstat, and Ingenix i3 populations, respectively. Similar growth occurs for pneumonia hospitalizations, while rates of hospitalization for bacteremia/septicemia increase 55–109 percent close to ESRD.

Figure 4.13. In those known to carry a CKD diagnosis one year before ESRD, infectious complications rise in a way similar to that seen with the entire CKD population advancing to ESRD (Figure 4.12). It is unclear how these infectious complications are treated, and to what extent vaccinations, which can lower the rates, are used as a preventive measure.
Figure 4.14 Determining the time at which CKD is identified in patients who later reach ESRD is an important issue for determining if or when care is anticipated and whether such care is actually provided. Here we determine the time, in the two years prior to ESRD, at which a diagnosis code of CKD is documented, and from what source. In the Medicare population, 50 percent of those who reach ESRD carry a diagnosis code for CKD by 19.5 months prior to initiation. In the Medstat and Ingenix i3 cohorts, this 50-percent point occurs at 16.5 months. The CKD diagnosis codes are documented primarily at outpatient sites of service, suggesting that providers recognize the disease in a non-acute care location, which in turn provides an opportunity to address recommended clinical care in these settings.
figure 4.15 Among patients who progress to ESRD, referrals to a nephrologist are infrequent, even though providers may be aware that patients have CKD. Fifty percent of Medicare ESRD patients had a nephrology referral 10.5 months prior to initiation, a level not reached in the Medstat population until the month prior to ESRD, but reached at 9.5 months in the Ingenix i3 cohort. Late referral is common among Medicare patients, but even more likely in those with EGHP coverage. The exact reasons for these patterns are unclear, and require further investigation.

figure 4.16 In those known to carry a CKD diagnosis prior to ESRD, the likelihood of a nephrology referral increases after the diagnosis is in place. During the month before initiation, probabilities are similar in the Medicare and Ingenix i3 cohorts; before this time, however, Ingenix i3 patients have the greatest likelihood of a referral. Referrals are least likely for Medstat patients. Such differences may be associated with the variations in care illustrated on the next pages (Figures 4.17–22).
figures 4.17–19 Serum creatinine levels are used to assess the progression of kidney disease. Since the test can be included in several laboratory panels or ordered on its own, we look here at all available CPT-coded services to count any time a creatinine is run. There are striking differences across datasets in the monitoring of kidney function in patients who advance to ESRD. In the Medicare population, for example, 50 percent of patients who progress to ESRD have had a serum creatinine measured 3.5 months prior to initiation. In the Medstat and Ingenix i3 populations, in contrast, only 21 and 36 percent have had this test by the month of initiation. If real, these differences are raise serious concerns regarding access to and monitoring of care in the CKD population. The EGHP population may be covered by a capitated care payment system that includes laboratory data, or laboratory services may be under different agreements, each making the care identified through CPT-coded services difficult to assess. These same observations are true for calcium and phosphorus testing and for testing of parathyroid hormone levels, both known areas of abnormalities in the CKD population.
Lipid studies are infrequent in the year prior to ESRD, a concern for patients known to have high rates of cardiovascular disease events and poor outcomes. Hemoglobin levels appear to be monitored with increasing frequency in the Medicare population, but the percent of patients tested has actually fallen since 2002 in both the Medstat and Ingenix i3 populations. And levels of glycosylated hemoglobin monitoring are very low among patients with diabetes — a surprising finding, since glycemic control is central to reducing the complications of cardiovascular disease and kidney disease. These data should be examined in the context of data on prescription drug therapy, reported in Figures 4.23–30.
figures 4.23–4.26 At 8.5 months prior to ESRD, 50 percent of patients in the Medstat and Ingenix i3 databases are using ACE-Is/ARBs; this reaches 60 percent in the month before initiation. Since these medications are the mainstay of preventive care, it is difficult to understand the lack of progress over the past five years in the treatment of patients known to reach ESRD. In the 2009 ADR we will explore actual dosing patterns and ranges to determine if therapy titration is occurring in an attempt to slow CKD progression. Therapy data show marked differences from the monitoring data, suggesting that dose modification may be unaddressed, since the monitoring of kidney disease progression does not meet the levels recommended by the K/DOQI guidelines.

In the month before starting ESRD therapy, lipid lowering agents are used in up to 56 percent of Medstat patients and 51 percent of the Ingenix i3 cohort. Once again, therapy titration may not be completed, as monitoring is at such a low level. Alternatively, providers may have developed the maximum tolerated doses, so that added monitoring provides little benefit. Additional data on dosing patterns and potential complications will be needed to address this area.

Beta blocker therapy for heart failure or hypertension is used in 50 percent of Medstat patients by 7.5 months before ESRD, while the 50-percent mark is not reached until 1.5 months in the Ingenix i3 cohort. These data are consistent with the increasing rates of hospitalization for CHF noted in other chapters.

Lastly, the use of calcium channel blockers in both the Medstat and Ingenix i3 populations reaches 50 percent at 6–7 months before ESRD. More detailed linking of these data with data on complications may help determine the primary indication for use.

figures 4.23–4.26 Medstat: incident ESRD patients with fee-for-service & drug coverage during entire study period. Ingenix i3: incident ESRD patients with coverage during entire period. Figure 4.27 limited to diabetic patients; diabetes defined during the 12 months prior to ESRD.
figures 4.27–30 Among diabetic patients, the use of oral hypoglycemic agents declined between 2002 and 2006 in the Medstat population, while insulin use increased. The diabetic Ingenix i3 population, in contrast, has seen little change over the last five years in the use of oral diabetic agents versus insulin. The reasons for these changes are unclear, but may reflect formulary management by health plans or changing concerns about these agents based on data about complications. Additional data will be needed to address the specific types of agents being used and the potential complications that can be assessed.

Anemia management has been an issue in the CKD and ESRD populations for many years, with 42–44 percent of patients now receiving ESA therapy before reaching ESRD. The percentage receiving Vitamin D oral therapy prior to ESRD has doubled over the past five years in both EGHP populations. And therapy with phosphate binders reaches just 25 percent of the population by the month before initiation. Several of the binder medications are expensive, thereby potentially limiting their use or their likelihood of being on the health plan formularies.
The use of dialysis catheters in the ESRD population is discussed in detail in Volume Two. Here we present data on the first access used by patients who start ESRD therapy on hemodialysis. Catheter use in the Medicare population, as identified from claims records, is high at initiation, a finding consistent with data reported on the Medical Evidence form. During the entire two years prior to ESRD, catheters appear to be placed more frequently in the Medstat and Ingenix i3 populations than in patients with Medicare coverage. It is not clear, however, if these data truly represent dialysis catheters rather than other types of access, an issue which merits further analysis.

Fistula placements in the Medicare population rise as patients near the initiation of ESRD therapy, though fewer than 15 percent of patients have had this access placed three months before beginning hemodialysis. Placement attempts increase in the first six months after ESRD, approaching 50 percent — a number which has grown since 2000. There has been similar growth in fistula placements across the Medstat and Ingenix i3 populations.
Figure 4.33 The use of arteriovenous grafts in patients who begin ESRD therapy on hemodialysis has declined, a finding similar to that noted in data from the CMS Clinical Performance Measures (CPM) Project data reported in Volume Two.

Figure 4.34 Peritoneal dialysis catheters appear to be placed near or at the initiation of ESRD, a finding that suggests early placement is uncommon. It is unclear why the number of incident peritoneal dialysis patients with a peritoneal dialysis catheter does not reach 100 percent; it may be due to unidentified billing issues.
**Chapter Summary**

- **Probability of ESRD or death in Medicare patients 66+, 2001 (5-year follow-up; 4.2)**
  - CKD (NDM, non-CHF) 0.43
  - CKD + DM + CHF 0.75

- **Probability of ESRD or death in dually-enrolled pts 66+, 2001 (5-year follow-up; 4.3)**
  - CKD (NDM, non-CHF) 0.58
  - CKD + DM + CHF 0.77

- **Probability of ESRD in Medstat patients age 50–64, 2001 (5-year follow-up; 4.4)**
  - CKD (NDM, non-CHF) 0.06
  - CKD + DM + CHF 0.18

- **Probability of ESRD in Ingenix i3 patients age 50–64, 2001 (5-year follow-up; 4.5)**
  - CKD (NDM, non-CHF) 0.03
  - CKD + DM + CHF 0.14

- **Pts with 4+ cardiovascular disease claims in the 2 years prior to ESRD, 2006 (%; 4.7)**
  - Medicare (67+) 82
  - Medstat 48
  - Ingenix i3 53

- **Patients with 1+ infection claims in the 2 years prior to ESRD, 2006 (%; 4.11)**
  - Medicare (67+) 21
  - Medstat 13
  - Ingenix i3 15

- **Months prior to ESRD at which 50% of patients have a CKD claim (4.14)**
  - Medicare (67+) 19.5
  - Medstat 16.5
  - Ingenix i3 16.5

- **Months prior to ESRD at which 50% of patients have a nephrologist claim (4.15)**
  - Medicare (67+) 10.5
  - Medstat 1.0
  - Ingenix i3 9.5

- **Patients receiving creatinine testing in the year prior to ESRD, 2006 (%; 4.17)**
  - Medicare (67+) 66
  - Medstat 21
  - Ingenix i3 36

- **Patients receiving calcium phosphorus testing in the year prior to ESRD, 2006 (%; 4.18)**
  - Medicare (67+) 42
  - Medstat 8
  - Ingenix i3 14

- **Patients receiving PTH testing in the year prior to ESRD, 2006 (%; 4.19)**
  - Medicare (67+) 4.0
  - Medstat 1.6
  - Ingenix i3 2.4

- **Prescription drug therapy in the year prior to ESRD, 2005: Medstat (% of pts, 4.23–26)**
  - ACE-Is/ARBs 62
  - Lipid lowering agents 56
  - Beta blockers 61
  - Ca++ channel blockers 61

- **Prescription drug therapy in the year prior to ESRD, 2006: Ingenix i3 (% of pts, 4.23–26)**
  - ACE-Is/ARBs 60
  - Lipid lowering agents 51
  - Beta blockers 52
  - Ca++ channel blockers 56

- **Medicare patients with an AV fistula placed by 6 months after ESRD initiation (4.32)**
  - 2000 36%
  - 2005 52%

- **Medstat patients with an AV fistula placed by 6 months after ESRD initiation (4.32)**
  - 2000 35%
  - 2005 48%

- **Ingenix i3 patients with an AV fistula placed by 6 months after ESRD initiation (4.32)**
  - 2000 34%
  - 2005 48%