outcomes in the transition zone in nursing home patients with chronic kidney disease

The naked world, and the old noise of tears,  
the fear, the expiation and the love,  
a world of the shadowed and alone.  
The journey, and the struggles of the moon.

Muriel Rukeyser, “Ajanta”
The transition between CKD and ESRD is treacherous, and marked by profoundly accelerated rates of adverse outcomes. Last year we reported that the incidence of stroke in prevalent Medicare CKD patients begins to increase shortly before dialysis initiation, peaks at a very high rate shortly thereafter, and declines over the following year to pre-initiation levels. This year, in a new chapter focusing on CKD patients in nursing homes, we examine the effect of the transition to ESRD on multiple outcomes.

In the 2004 ADR, we used data from the Minimum Data Set (MDS), a registry of U.S. nursing home residents, to describe the characteristics, cognitive and physical function, and mortality rates of 1998–2000 MDS nursing home residents with ESRD. MDS data contain CMS-mandated admission and quarterly assessments, conducted by nursing home staff, on comorbid status, acute changes in condition, cognitive and physical function, and laboratory parameters.

This year we look at the 2004–2006 nursing home population, comparing CKD patients who initiate dialysis to those who do not, and examining patterns of change in three outcomes: cognitive function, physical function (functional status), and mortality. In this way we describe the “whole” patient from a geriatric perspective, and the relative effect of dialysis initiation on the ability to make decisions and function in the nursing home setting.

The incident ESRD cohort (N=3,748, mean age 84.2) includes only long-term stay nursing home residents residing in or admitted to a nursing home at least 90 days before the first ESRD service date, with a length of stay of at least one year or until death (not including a departure of less than 15 days). Eligible CKD patients (N=550) are Medicare nursing home residents, age 65 and older, with at least two quarterly (every 90 days) sequential MDS assessments. For CKD patients who initiate dialysis, at least one assessment is required prior to and after dialysis initiation; the first assessment 10–60 days after initiation is used as the first follow-up. The second and third follow-up assessments occur close to 6 and 12 months after initiation.

For CKD patients who do not transition to dialysis, the assessment closest to January 1, 2004 is considered baseline. For those who do transi-
tion, the baseline assessment is the last one prior to initiation, and the first follow-up assessment is the first one after initiation.

Figure 6.1 describes the demographics of the combined 2004–2006 MDS nursing home cohort by CKD and ESRD status. Approximately 85 percent of the CKD cohort is age 75 or older, with a mean age of 84, compared to 79 for the ESRD cohort. About 38 percent of CKD patients, and 20 percent of those with ESRD, carry a diagnosis of dementia.

We next examine the cognitive status of CKD patients residing in nursing homes, comparing those who do and do not initiate dialysis, and assessing three cognitive domains: memory, decision-making (executive function), and making oneself understood (verbal skills), as measured every quarter for one year. We present three perspectives on each cognitive measure: the absolute scores, the change in score status (retained, worse, died), and the change in mean cognitive score. As seen in the cognitive function figures, memory and executive function abilities decline markedly after dialysis initiation, and more than in CKD patients.

The following spread examines physical function, or functional status — the ability to perform daily functions critical to maintaining independence. Seven activities of daily living (ADLs) are rated in the MDS: eating, bathing, dressing, grooming, using the bathroom, transferring from bed to chair, and walking. Compared to CKD patients, about twice as many incident dialysis patients experience decline in physical function by 60 days after dialysis initiation.

In the 2004 ADR we reported a 37 percent one-year survival rate in 1998–2000 prevalent ESRD nursing home patients. For the 2004–2006 incident ESRD cohort described here, it is a meager 14 percent. Kurella et al. also recently noted the poor survival rates of the incident ESRD nursing home cohort of the 1998-2000 MDS population.

Because the number of patients dying is markedly different between the CKD and ESRD cohorts — at six months, 41 percent of CKD patients have died, compared to nearly 75 percent of those with ESRD — there is strong survival bias in all comparisons.

The MDS data suggest that, for many older nursing home patients, dialysis does not appear to extend life. If life is extended, its quality may be poor due to accelerated cognitive and functional decline. Figure 6.1; see page 170 for analytical methods. Nursing home residents, 2004–2006.
Memory scores in 2004–2006 nursing home residents

Decision making scores in 2004–2006 nursing home residents

Changes in memory scores of 2004–2006 nursing home residents

Changes in decision making scores in 2004–2006 nursing home residents

Changes in average memory score in 2004–2006 nursing home residents

Changes in average decision making score in 2004–2006 nursing home residents,

Cognitive function in nursing home patients

The transition zone in nursing home CKD patients
Looking at nursing home patients with CKD, these figures compare cognitive status in those who do not initiate dialysis (top graphs) to those who do (bottom graphs).

The memory score reflects the nursing home staff assessment of the resident’s short- and long-term memory, ability to remember the season, location of their room, and staff names and faces, and whether they realize they are in a nursing home. The maximum score is 6; higher scores are better.

Figure 6.2 describes the percentage of residents with each memory score at baseline, before dialysis initiation, and at the three follow-up periods of approximately two, six, and twelve months. Baseline scores are somewhat higher in patients who go on to dialysis than in those who do not. The percentage with higher scores then declines most quickly for incident ESRD patients. Figures 6.3–4, depicting changes in scores, are the most telling. Nearly twenty percent of ESRD patients have developed worse memory scores by the first follow-up, compared to 10 percent of those with CKD, and the average memory score declines substantially at each follow-up.

Results are similar for the decision making score, while differences between the two cohorts are less marked for the “making self understood” score. Memory and decision making — both essential for daily function and independence — thus decline most after the initiation of dialysis.

†Figures 6.2–10; see page 170 for analytical methods. Nursing home residents with CKD or ESRD, 2004–2006. Follow-up periods: F1 = 2 mo., F2 = 6 mo., F3 = 12 mo.
Here we describe physical function using the MDS Activities of Daily Living (ADL) score, which ranges from 0 to 4 for each of the seven ADLs. A higher score indicates greater dependence; the total score ranges from 0 for no disability to 28 for bedridden. The distribution of the ADL scores shifts toward increasing dependence in both CKD and incident ESRD cohorts over time, but does so to a greater degree in the incident ESRD cohort.

Between baseline and the first follow-up, nearly twice as many newly initiated ESRD patients have a worsening ADL score compared to patients in the CKD cohort; thereafter, a greater proportion of incident ESRD patients die. *Figures 6.11–12; see page 170 for analytical methods. Nursing home residents with CKD or ESRD, 2004–2006. Figure 6.11 excludes patients who died before the period. Follow-up periods: F1 = 2 mo., F2 = 6 mo., F3 = 12 mo.*
In the first follow-up period the change in mean ADL score, shown in Figure 6.13, is more than three times higher for ESRD patients than for those with CKD, though it stabilizes by the third follow-up period. This is likely due to a survival effect; those surviving the first six months are healthier and may have a greater functional reserve.

Figure 6.14 shows that only at the third follow-up is there a substantial age effect: those age 85 and older in the incident ESRD cohort experience a greater functional decline.

Newly-initiated dialysis patients are half as likely to maintain their physical function status at three months follow-up compared to non-CKD nursing home patients (Table 6.a). Age greater than 75 also increases the risk of functional decline, while race other than white or African American is protective. 

* Figures 6.13–14 and Table 6.a; see page 170 for analytical methods. Nursing home residents, 2004–2006. For Figures 6.13–14, changes greater than zero in average MOS-ADL scores indicate a worsening condition. Follow-up periods: F1 = 2 mo., F2 = 6 mo., F3 = 12 mo.
In the 2004 ADR we reported that the overall one-year survival rate of nursing home residents in the prevalent 1998–2000 ESRD cohort was 37 percent. Among the incident ESRD cohort in 2004–2006, it was only 14 percent. Even at six months, unadjusted overall survival of nursing home residents with incident ESRD is 26 percent, compared to 41 percent for CKD patients and 58 percent for those without CKD. Age has a strong modifier effect in the ESRD population: for those age 65–74, one-year survival is 18.5 percent, compared to 10 percent for those age 85 and older. *Figure 6.15; see page 170 for analytical methods.* Nursing home residents, 2004–2006.

Stratified by age, gender, and race, ESRD residents age 75–84, female, or of other race carry higher relative risks of death compared to those without CKD. Although African Americans with ESRD also have a very high relative risk of death, the difference in risk between the African American CKD and ESRD cohorts is relatively small compared to whites and individuals of other races. *Figure 6.16; see page 170 for analytical methods.* Nursing home residents, 2004–2006.
Compared to that of non-CKD patients, the adjusted risk of death is 2.5–2.6 times greater for incident dialysis patients at six months and one year, and 1.6–1.7 times greater for patients with CKD. Further analyses of the ESRD cohort are needed to understand the implications of the adjusted risk of death with increased risk of death.

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### Adjusted Hazard of Death in Nursing Home Residents, 2004–2006

<table>
<thead>
<tr>
<th>Follow-up</th>
<th>No CKD</th>
<th>CKD</th>
<th>Incident ESRD</th>
<th>67-74</th>
<th>75-84</th>
<th>85+</th>
<th>Male</th>
<th>Female</th>
<th>White</th>
<th>African American</th>
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<tbody>
<tr>
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<td>HR</td>
<td>CI</td>
<td>HR</td>
<td>HR</td>
<td>HR</td>
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<tr>
<td>F1 ≈2 mo.</td>
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<td>1.34</td>
<td>1.94</td>
<td>1.70</td>
<td>1.51</td>
<td>1.92</td>
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<td>2.63</td>
<td>2.45</td>
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<tr>
<td>Follow up 3</td>
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<td>0.73</td>
<td>0.90</td>
<td>1.05</td>
<td>0.90</td>
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<td>1.17</td>
<td>1.09</td>
<td>1.25</td>
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</table>

See page 170 for analytical methods.
Among the nursing home patients in this study, nearly 20 percent of those with ESRD developed worse memory scores by the first follow-up, compared to 10 percent of those with CKD, and the average memory score declined substantially at each follow-up. **FIGURES 6.3–4**

Between baseline and the first follow-up, nearly twice as many newly initiated ESRD patients have a declining activities of daily living score compared to patients in the CKD cohort; thereafter, a greater proportion of incident ESRD patients die. **FIGURE 6.12**

Newly-initiated dialysis patients are half as likely to maintain their physical function status at three months follow-up compared to non-CKD nursing home patients. **FIGURE 6.14**

At six months, unadjusted overall survival of nursing home residents with incident ESRD is approximately 26 percent, compared to 41 percent for CKD patients and 58 percent for those without CKD. **FIGURE 6.15**

Compared to that of non-CKD patients, the adjusted risk of death is 2.5–2.6 times greater for incident dialysis patients at six months and one year, and 1.6–1.7 times greater for patients with CKD. **TABLE 6.8**