Chapter 3: The Coming Pandemic of CKD/ESKD and the Aging Population

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In chapter 1, data were presented about the growth of the older US population and their special needs. In this chapter, we will discuss the epidemiology of the elderly patients with chronic kidney disease (CKD) and end-stage kidney disease (ESKD).

CHRONIC KIDNEY DISEASE

There is much debate in the literature about whether the incidence of CKD is actually increasing or whether we are measuring changes in the way we detect and define CKD. In 1998, a report using NHANES data estimated the prevalence of CKD as about 11% in the US adult population.[1] This estimate was based on routine creatinine measurements in a subset of the study population. Since that data were published, several developments have altered the way we define CKD. The Modification of Diet in Renal Disease (MDRD) formula was developed and validated.[2] The National Kidney Foundation created a panel of experts, who redefined how CKD was classified and staged.[3] There has been a change in way creatinine is measured. Automated reporting of eGFR based on MDRD formula was initiated in most clinical laboratories across the country. These changes resulted in an apparent "pandemic" of CKD. A study from an academic department in Australia tracked the level of nephrology referrals after the implementation of automated eGFR reporting.[4] General referrals increased by 40%, whereas referrals to the tertiary renal service were 52% above baseline. The patients newly referred were significantly older: 63.2 *versus* 59.3 yr. However, the quality of the referrals declined with as many as 35% being inappropriate. It seems likely with the increases in the incidence of diabetes, vascular disease, and the general aging of the population that the true prevalence of CKD has increased, but it is very hard to get an accurate measure of the extent of the increase.[5,6] Coresh *et al.*[7] have estimated that the overall prevalence of CKD has increased from 10 to 13% of the US adult population since 1988. Because 50% of patients in the United States start dialysis with no previous nephrology care, overreferral is probably preferable to underreferral.[8]

Another contentious area of debate is the decline of renal function with age. It is generally accepted that renal function declines about 1 ml/min per year after the fourth decade of life, even in the absence of comorbidities such as diabetes and hypertension. Many nephrologists regard this as "normal aging" and do not feel that this constitutes a reason for referral. It is certainly true that only a very small fraction of these older patients will progress to end stage or die from renal failure. It is likely that they are at greater risk from vascular disease because there is a very robust association between decline in GFR and vascular deaths.[9]

So, which older patients should the busy nephrologists follow and which should be returned to the care of their primary care physician after an initial evaluation? Clearly signs of ongoing active renal disease such as an active urine sediment or significant proteinuria are reason for a nephrologist's care. eGFR values between 45 and 59 ml/min per 1.73 m^2 in those 70 yr of age and older should be interpreted with caution. If other signs of kidney damage (*e.g.*, proteinuria, hematuria) are not present, a stable eGFR in this range may be consistent with typical GFR for this age and an absence of CKD-related complications. Patients showing the complications of decreased renal function such as anemia, phosphorous retention, and hyperkalemia need nephrology management.

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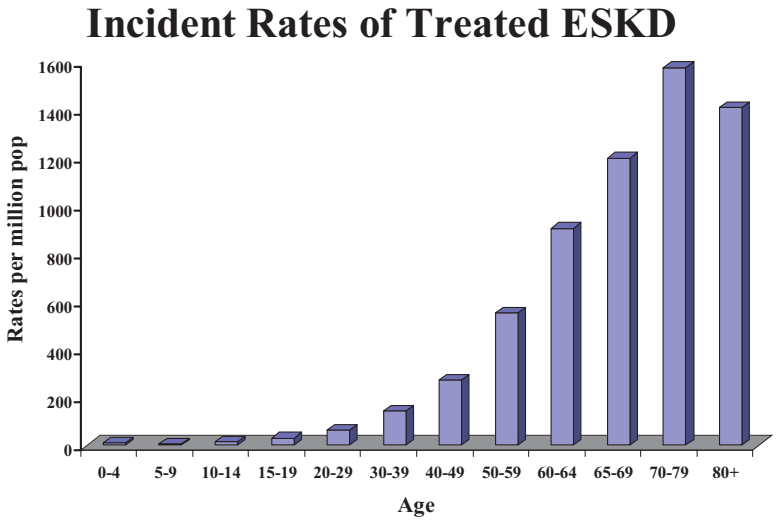

Figure 1. Incident rates of treated ESKD per million of population by decade. Data from the USRDS 2008 annual report.

END-STAGE KIDNEY DISEASE

Because Medicare mandates that all US dialysis units receiving Medicare compensation report clinical data to the US Renal Data System (USRDS), information on patients reaching ESKD is much more robust than the data on CKD. The data for these patients were all taken from the USRDS 2007 annual report.[10]

Data collected by USRDS show that ESKD is a disease of the older population, with numbers starting to rise significantly after the age of 50. Mean age at the start of renal replacement therapy is 62.3 yr for men and 63.4 yr for women. Peak incident counts of treated ESKD occur in the 70- to 79-yr age group at >15,000 patients per year. Peak incident rates of treated ESKD occur in the 70- to 79-yr-old age group at 1543 per million population (Figure 1).

This probably reflects both a real increase in the rates of patients reaching ESKD and an increase in the willingness to offer dialysis, regardless of age or comorbidity. The data show a drop off after 79 yr of age. This probably reflects the tendency of older patients, with significant burden of disease refusing dialysis. The incident rates have been rising steadily over the last 25 yr (Figure 2), with a narrowing gap between rates in the 70- to 79-yr-old age group compared with the 80+-yr age group. These data reflect numbers of patients who have survived at least 90 d on dialysis and do not include those who get acute dialysis in the hospital and do not progress to chronic maintenance dialysis because of recovery or death.

Rates of morbidity and mortality are higher in the ESKD population than in the general Medicare population. Hospital admission rates are particularly high in the oldest patients, with cardiovascular disease being by far the most common cause for hospitalization. Patient admission rates increase linearly with age. A 20-yr-old patient with ESKD spends an average of 9 d per patient year in the hospital compared with 15.5 d for patients over 70 yr of age. Older patients also carry significant burden of disability. Overall, 10% carry a diagnosis of dementia, and this rises to 21% among those over 80 yr of age. This is almost certainly an underestimate because dementia is often undiagnosed. As many as 20% of older patients with ESKD have had a stroke that limits their mobility. These co-

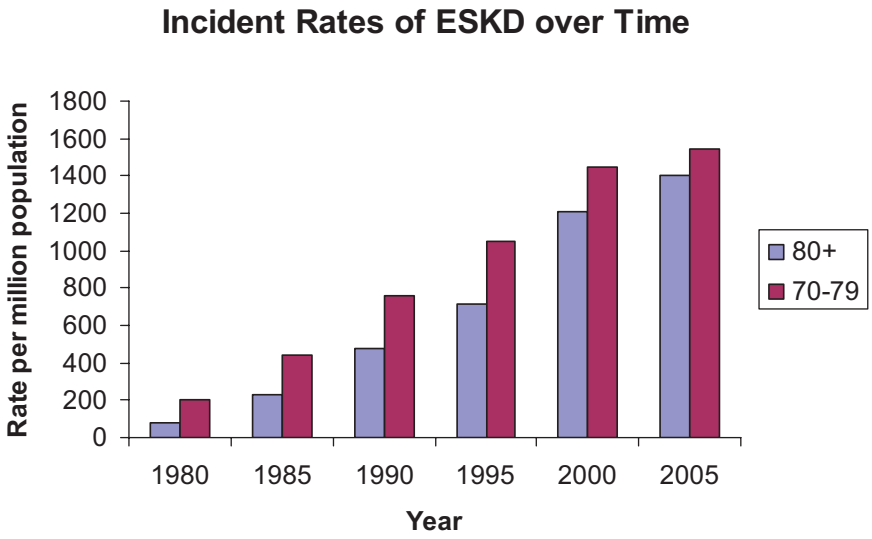

Figure 2. Incident rates of treated ESKD per million population from 1980 to 2005. Blue bars represent patients over 80 yr of age. Red bars represent the 70- to 79-yr-old age group. Data from the USRDS annual report for 2007.

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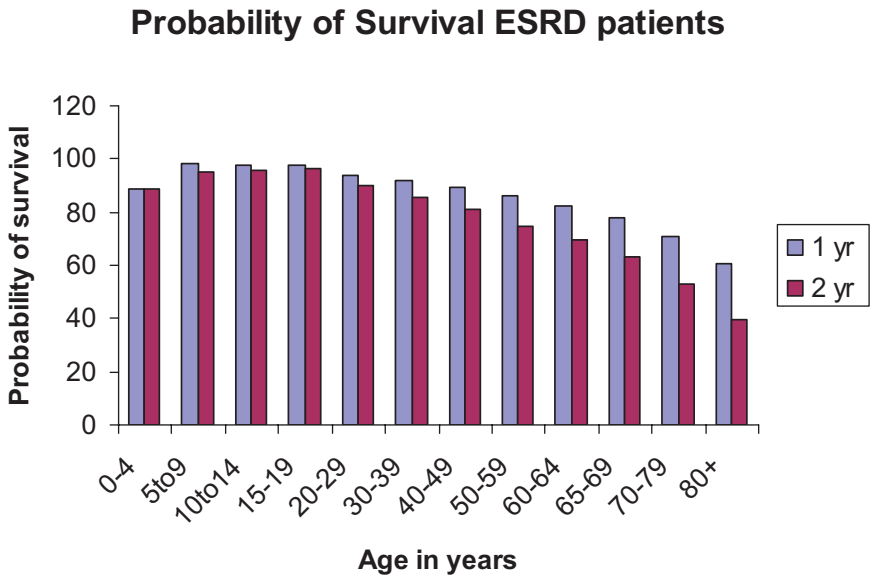

Figure 3. Survival probabilities for patients on dialysis: year 1 in blue and year 2 in red. Data shown for patients across the life span. All age groups show lower survival on dialysis than age-matched controls with normal renal function. Data from USRDS annual report 2007.

morbidities impact significantly on a patient's ability to manage a complex medical regimen.

In addition to the significant burden of comorbidity, all-cause mortality is six times higher in the ESKD population than in the general Medicare population. When discussing dialysis, patients and families need to understand that, although renal replacement therapy does prolong life, life expectancy is very limited in the older population. Average 1-yr survival for a 70 to 79 yr old is 70%, and for an 80 yr old is 60%. By 2 yr, survival drops to 52.7 and 39.7%, respectively (Figure 3).

CKD and ESKD are huge financial burdens to our medical system. In 2005, Medicare costs for CKD were $42 billion and for ESKD were $20 billion. The cost of ESKD was one half that of CKD, although only a very small percentage of patients with CKD progress to ESKD. According to NHANES data, about 11% of the US population has CKD, whereas <0.2% of the US population has ESKD. Despite this low prevalence, ESKD was responsible for 6.4% of the entire Medicare budget. The annual per person cost for dialysis alone exceeded $65,000 in 2005. If all medical care is included, this figure is even higher. For the 70- to 79-yr-old age group, the per person annual cost of dialysis is more than $69,000 and in the 80+-yr group is more than $74,000.

In conclusion, CKD and ESKD are diseases of the elderly. The incidence and prevalence of these conditions are rising, especially in the older age groups. Progressing to ESKD carries a significant burden of comorbidities and clearly shortens life expectancy. Treating patients for ESKD is even more expensive in the older age groups than for younger patients. Preventing progression of CKD should be an urgent priority for every nephrologist, even in the oldest patients.

TAKE HOME POINTS

- eGFR declines with age but does not necessarily indicate clinically significant CKD
- Peak incidence of treated ESKD is in the 70- to 79-yr age group
- Rates of treated ESRK are increasing in all older age groups
- ESKD carries a poor prognosis

DISCLOSURES

None.

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REVIEW QUESTIONS: THE COMING PANDEMIC OF CKD/ESKD AND THE AGING POPULATION

1. The current prevalence of CKD in the US population is
   a. 1 to 5%
   b. 10 to 15%
   c. 20 to 25%
   d. 30 to 35%
   e. None of the above

2. The peak incidence of treated ESKD falls in which of following age ranges?
   a. 50 to 59 yr
   b. 60 to 64 yr
   c. 65 to 69 yr
   d. 70 to 79 yr
   e. 80+ yr

3. A 70-yr-old dialysis patient will spend, on average, how many days per year in the hospital?
   a. 2.5 d
   b. 6.1 d
   c. 8.3 d
   d. 15.5 d
   e. 21.7 d

4. Compared with the general Medicare population, mortality in patients with ESKD is how many fold higher?
   a. 2-fold
   b. 6-fold
   c. 10-fold
   d. 19-fold

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