The Elderly Patient with Low eGFR: Beyond a Disease-Oriented Approach

Maroun Azar, M.D.
Disclosures

• None, no conflicts of interest
Are CKD Definitions Relevant in Older Adults?

By Michelle Hogan

NATIONAL HARBOR, MD—Older patients make up the largest segment of the population defined as having chronic kidney disease (CKD) and, in some ways, the most controversial. While the condition is pervasive in this group, disease progression, at least until recently, has been reported to be less common in older than in younger patients, prompting concerns about potential overdiagnosis of CKD in older individuals.

In a debate here at the National Kidney Foundation (NKF) 2012 Spring Clinical Meetings, Michael G. Shlipak, MD, MPH, Professor of Medicine, University of California, San Francisco, and San Francisco VA Medical Center, and Richard J. Glassock, MD, Professor Emeritus, David Geffen School of Medicine at UCLA, strove to bring clarity to the controversy.

The 2002 NKF Kidney Disease Outcomes Quality Initiative (KDOQI) guidelines defined chronic kidney disease as kidney damage or glomerular filtration rate (GFR) less than 60 mL/min/1.73 m² for at least three months, with the condition categorized into five GFR-based stages.

Kidney Disease: Improving Global Outcomes (KDIGO) has proposed to keep that definition but update the classification by emphasizing cause, if known; adding albuminuria stages; and splitting CKD Stage 3 in two, with one subclassification including GFR 30-44 mL/min/1.73 m², and the other 45-59 mL/min/1.73 m². This consensus came out of a 2009 KDIGO conference in London, during which a meta-analysis of 1.5 million people from 43 cohorts revealed a strong and consistent relationship of risk with estimated GFR and urine albumin-to-creatinine ratio.

At the NKF meeting, Dr. Shlipak took the side that the current and proposed definitions make sense in older adults, while Dr. Glassock argued that they do not.

Yes

Three main points underpinned Dr. Shlipak’s support for the application of CKD definitions to older adults:

No

While the current and proposed CKD definitions are not entirely applicable to older patients, they represent a significant advance, Dr. Glassock
Some of the Arguments

• Are current definitions of CKD accurate in the elderly?
• Is a moderate decrease in GFR physiological aging or is it disease?
• Does GFR in the elderly add anything as a risk factor for adverse outcomes?
Some concerns with KDOQI definition and classification

- **Over diagnosis**, especially in the elderly
- **Terms** Earlier stages of chronic kidney disease should be labeled ‘risk factor’ or ‘pre-disease’ rather than ‘disease’
- **Methods of GFR and proteinuria estimation**, and number of measurements
- **Coherence** Some patients at earlier stages are at higher risk of adverse outcomes than those at later stages
- **Threshold values GFR and albuminuria** vary according to age, sex, or race
Objectives

At the end of this talk, you should be able to:

1. Recite the basics of kidney aging with a focus on the glomerulus, and define the challenges of evaluating kidney function and applying current CKD guidelines in the elderly.

2. Discuss the prognostic implications of low eGFR in the elderly.

3. Define the advantages of an individualized patient-centered approach versus the traditional disease-based approach.

I will NOT be discussing all actual specific treatments of CKD in the elderly
The Aging Kidney (senescence)
What is “normal” kidney aging?

• Statistically: normal distribution encompasses the range of variation in an unselected population

• Per current definitions, CKD prevalence is very high in elderly -> normal??
What is “normal” kidney aging?

- A more colloquial definition: changes in the kidney with “natural and healthy” aging in the absence of known CKD risk factors
Anatomic / Histologic Changes

• In humans, the number of glomeruli present in adulthood are predetermined between weeks 32 and 36 of gestation.

• The superficial cortex glomeruli differ in size from the juxta-arcuate glomeruli until age 2. At this time, the size of all of the glomeruli are the same, and the kidney is functioning at adult capacity.

• The number of glomeruli among individuals is quite variable, ranging from 247,652 to 1,825,380 per kidney, and decreases with age at a rate of approximately 6752 glomeruli/yr after the age of 18.
Anatomic / Histologic Changes

- Renal mass increases from 50 g at birth to 400 g during the third and fourth decades of life before decreasing to 300 g by the ninth decade.

- The latter decrease correlates with the loss of the renal cortex.

- Radiographically, the size of the kidney has been shown to decrease in size by 10% after age 40 to 30% by age 80 (but not always)

- This decrease in size correlates with a decrease in function and in the renal blood flow to the cortex
# Histologic Changes

<table>
<thead>
<tr>
<th>Site</th>
<th>Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glomerulus</td>
<td>Thickening basement membrane, increase in mesangial matrix, focal global sclerosis (mostly superficial cortex), hypertrophy</td>
</tr>
<tr>
<td>Podocytes</td>
<td>Intermittent fusion, detachment, vacuoles, hypertrophy</td>
</tr>
<tr>
<td>Interstitium</td>
<td>Tubule atrophy, tubular casts, monocyte infiltrates, interstitial fibrosis</td>
</tr>
<tr>
<td>Vessels</td>
<td>Atrophy of afferent and efferent arterioles, hyalinosis of vessels, agglomerular vessels</td>
</tr>
</tbody>
</table>
Histologic Changes
Prevalence of nephrosclerosis by age group among 1203 living kidney donors at the Mayo Clinic

<table>
<thead>
<tr>
<th>Age group</th>
<th>Crude prevalence</th>
<th>Crude prevalence after excluding persons on therapy for hypertension</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-29 y</td>
<td>2.7% (1.1% to 6.7%)</td>
<td>2.7% (1.1% to 6.7%)</td>
</tr>
<tr>
<td>30-39 y</td>
<td>16% (12% to 20%)</td>
<td>15% (12% to 20%)</td>
</tr>
<tr>
<td>40-49 y</td>
<td>28% (24% to 32%)</td>
<td>26% (22% to 31%)</td>
</tr>
<tr>
<td>50-59 y</td>
<td>44% (38% to 50%)</td>
<td>42% (36% to 49%)</td>
</tr>
<tr>
<td>60-69 y</td>
<td>58% (47% to 67%)</td>
<td>55% (44% to 66%)</td>
</tr>
<tr>
<td>70-77 y</td>
<td>73% (43% to 90%)</td>
<td>75% (41% to 93%)</td>
</tr>
<tr>
<td>Overall</td>
<td>28% (25% to 30%)</td>
<td>26% (24% to 29%)</td>
</tr>
</tbody>
</table>

Functional Changes

- Renal blood flow decrease by 10%/decade after age 40
- GFR decrease by 0.87 ml/min per year
- Increase in RVR, increase in FF
- Normal renal reserve (15 ml/min/1.73m2)
- Decrease diluting / concentrating capacity: more prone to water and sodium problems
Measuring kidney function

- Challenges and limitations of all methods
Real Example 1

- 85 WF with HTN, controlled with losartan and metoprolol. W 97 lbs, H 59””.
- Creat 0.87, Urine PCR 0.44
- eGFR (CKD-EPI) 66 mL/min/1.73m2
- 24h urine: Creat Cl = 41 mL/min (or 53 corrected for BSA), protein 144 mg/24 h
Real Example 2

• 61 healthy WM on vitamin D and Lipitor.
• Runs 5 miles a day all year
• BP 110/80. W 170 lbs, H 71”
• Creat 1.3-1.4, eGFR 54-59, bland UA

• 24 h urine: CrCl x 2 = 96-102 mL/min/1.73m²
Baltimore Longitudinal Study of Aging

- 1958 to 1981
- Subset of 254 “normal subjects”
- Mostly white men
- Ages 22-97
- Serial 24 h CrCl (5-14 x)
- Did not exclude diabetics if they had no proteinuria or other UT abnormalities
Baltimore Longitudinal Study of Aging

Six representative subjects followed 6 to 14 years showing significant decreases in serial creatinine clearances [negative B<sub>60</sub> > 2 cc/min]

Six representative subjects followed 11 to 22 years showing small but significant decreases in serial creatinine clearances [negative B<sub>cr</sub> < 2 cc/min]

Six representative subjects followed 15 to 21 years showing no decrease in serial creatinine clearance [positive B<sub>ci</sub>]

Lindeman et al: JAGS 1985
Figure 1.
The relationship between glomerular filtration rate (GFR) and age in persons with nephrosclerosis (red x) and in persons without nephrosclerosis (blue o). Regression of glomerular filtration rate onto age in persons with nephrosclerosis (red line) is similar to persons without nephrosclerosis (blue line). Dashed curves represent the 95% confidence interval.

More on kidney senescence

- Island-dwelling indigenous Kuna Indians of Panama, adapted to consumption of large amounts of flavones and very low protein intake, are remarkably free of CV disease and do not show progressive rise in BP with age.

- Hollenberg at al. (Nephron 1999;82: 131-138) report GFR decline with age in a small sample (N=16) of islanders (age 18-86).
Decline in GFR/eGFR is variable

Does this decline matter in the elderly?
Figure 1. Adjusted Hazard Ratios (HRs) for All-Cause Mortality and Mean Mortality Rates According to eGFR and ACR Within Each Age Category.
Figure 2. Adjusted Hazard Ratios (HRs) and Mean Incidence Rates for ESRD According to eGFR and ACR Within Each Age Category
<table>
<thead>
<tr>
<th>GFR categories (ml/min/1.73m²)</th>
<th>Persistent albuminuria categories</th>
<th>Description and range</th>
<th>A1</th>
<th>A2</th>
<th>A3</th>
</tr>
</thead>
<tbody>
<tr>
<td>G1 Normal or high</td>
<td>Normal to mildly increased</td>
<td>≥90</td>
<td>55.6</td>
<td>1.9</td>
<td>0.4</td>
</tr>
<tr>
<td>G2 Mildly decreased</td>
<td>Moderately increased</td>
<td>60-89</td>
<td>32.9</td>
<td>2.2</td>
<td>0.3</td>
</tr>
<tr>
<td>G3a Mildly to moderately decreased</td>
<td>Severeally decreased</td>
<td>45-59</td>
<td>3.6</td>
<td>0.8</td>
<td>0.2</td>
</tr>
<tr>
<td>G3b Moderately to severely decreased</td>
<td>Severeally decreased</td>
<td>30-44</td>
<td>1.0</td>
<td>0.4</td>
<td>0.2</td>
</tr>
<tr>
<td>G4 Severely decreased</td>
<td></td>
<td>15-29</td>
<td>0.2</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>G5 Kidney failure</td>
<td></td>
<td>&lt;15</td>
<td>0.0</td>
<td>0.0</td>
<td>0.1</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>93.2</td>
<td>5.4</td>
<td>1.3</td>
</tr>
</tbody>
</table>
If we can now agree that low GFR is bad in the elderly

• Then what?
Disease-based Approach
Individualized Approach

- Maintain independence
- Relieve suffering
- Spend time with family
- Prevent disease progression
- Improve survival

Kidney damage

Functional Status

Geriatric Syndromes

Symptoms

Social Support

- Individualized and based on patient preferences
- Not determined by specific disease
- Outcomes including, but not limited to, kidney failure and death
Disease-Oriented (DO) vs Individualized Patient-Centered (PC) Approach

DO Pros
- Provides a systematic framework for standardized evidence based for evidence based management of single disease processes.
- Is readily adapted to outcome assessment and performance measurement

PC Pros
- Embraces possibility that elderly may have x comorbidities and that there is heterogeneity in health status, life expectancy, treatment efficacy, and patient preferences among elderly
Disease-Oriented (DO) vs Individualized Patient-Centered (PC) Approach

DO cons
- Provides little guidance for how to negotiate conflicting priorities in patients with comorbidities, limited life expectancy and distinct treatment preferences

PC cons
- Clinicians may be inadequately prepared to identify patient preferences and goals and incorporate these into treatment strategies
- There may be little evidence to support treatment decisions if outcomes that matter to the patient have not been studied.
- Does not lend itself to standardized practices, performance measures and outcomes assessment
### What may limit benefits of DO approach in elderly

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>• X comorbidities increasingly common with older age</td>
<td>• Conflicting treatments with possible unintended adverse consequences</td>
</tr>
<tr>
<td>• Signs and symptoms often do not result from a single disease</td>
<td>• May limit benefit of interventions targeting underlying disease. May undermine interventions targeting non specific symptoms</td>
</tr>
</tbody>
</table>
What may limit benefits of DO approach in elderly

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life expectancy, functional status and health priorities can vary widely among patients of same age</td>
<td>Benefits and harms of recommended interventions and relevance of DO outcomes can widely vary</td>
</tr>
<tr>
<td>Elderly are often implicitly or explicitly excluded from RCTs</td>
<td>Safety and efficacy of standard interventions are often unknown in elderly</td>
</tr>
</tbody>
</table>
Example

• An 80 yo woman with severe arthritis, HTN and CKD stage 3 with moderate proteinuria. “Can I take ibuprofen?”

• DO approach

• PC approach:
• PC approach requires accurate prognostic information to help craft a plan.

• Many outcomes, not limited to mortality or ESRD, may be important
Relationship between age, eGFR and risk of death in relation to risk of ESKD

209,622 US veterans with CKD stages 3 to 5 followed for a mean of 3.2 years.

O’Hare et al: JASN 2007
Other Recent Insights

Figure 4. Percentage of Cohort Experiencing Treated Kidney Failure, Untreated Kidney Failure, and Composite Kidney Failure (Treated and Untreated) by Age

Hemmelgarn et al: JAMA, June 20, 2012—Vol 307, No. 23
Figure 3. Adjusted Rates per 1000 Person-Years of Composite (Treated and Untreated) Kidney Failure by Age and eGFR

<table>
<thead>
<tr>
<th>eGFR Stratum, mL/min/1.73 m²</th>
<th>Age 18-44 y</th>
<th>Age 45-54 y</th>
<th>Age 55-64 y</th>
<th>Age 65-74 y</th>
<th>Age 75-84 y</th>
<th>Age ≥85 y</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.</td>
<td>Events</td>
<td>Person-Years</td>
<td>Rate per 1000 Person-Years (95% CI)</td>
<td>Events</td>
<td>Person-Years</td>
<td>Rate per 1000 Person-Years (95% CI)</td>
</tr>
<tr>
<td>290</td>
<td>261</td>
<td>2548901</td>
<td>0.10 (0.08-0.13)</td>
<td>157</td>
<td>923455</td>
<td>0.15 (0.10-0.22)</td>
</tr>
<tr>
<td>60-89</td>
<td>125</td>
<td>633150</td>
<td>0.19 (0.13-0.28)</td>
<td>173</td>
<td>760085</td>
<td>0.21 (0.15-0.30)</td>
</tr>
<tr>
<td>45-59</td>
<td>66</td>
<td>12191</td>
<td>3.23 (1.81-5.76)</td>
<td>70</td>
<td>28139</td>
<td>1.54 (0.88-2.71)</td>
</tr>
<tr>
<td>30-44</td>
<td>97</td>
<td>2713</td>
<td>11.48 (7.04-18.79)</td>
<td>117</td>
<td>4137</td>
<td>9.27 (5.91-14.59)</td>
</tr>
<tr>
<td>15-29</td>
<td>162</td>
<td>1000</td>
<td>36.45 (24.46-54.32)</td>
<td>179</td>
<td>1909</td>
<td>26.47 (13.03-38.85)</td>
</tr>
</tbody>
</table>

eGFR indicates estimated glomerular filtration rate. Adjusted for sex, income quintile, residence, First Nations status, proteinuria, diabetes, hypertension, and Charlson comorbidities (cancer, cerebrovascular disease, congestive heart failure, chronic obstructive pulmonary disease, dementia, myocardial infarction, mild liver disease, paraplegia/hemiplegia, peptic ulcer disease, peripheral vascular disease, and rheumatologic disease).

Hemmelgarn et al: JAMA, June 20, 2012—Vol 307, No. 23
• Older patients with advanced CKD perhaps are less likely to progress to ESKD (death first) than their younger counterparts with similar levels of renal function

• Nevertheless, most patients on dialysis are elderly
So who progresses?
Serial Creatinines?
Rapid Kidney Function Decline and Mortality Risk in Older Adults

Acute Kidney Injury Increases Risk of ESRD among Elderly

A Predictive Model for Progression of Chronic Kidney Disease to Kidney Failure

Navdeep Tangri, MD, FRCPC
Lesley A. Stevens, MD, MS, FRCPC
John Griffith, PhD
Hocine Tighiouart, MS
Ognjenka Djurdjev, MSc
David Naimark, MD, FRCPC
Adeera Levin, MD, FRCPC
Andrew S. Levey, MD

AN ESTIMATED 23 MILLION people in the United States (11.5% of the adult population) have chronic kidney disease (CKD) and are at increased risk

Context Chronic kidney disease (CKD) is common. Kidney disease severity can be classified by estimated glomerular filtration rate (GFR) and albuminuria, but more accurate information regarding risk for progression to kidney failure is required for clinical decisions about testing, treatment, and referral.

Objective To develop and validate predictive models for progression of CKD.

Design, Setting, and Participants Development and validation of prediction models using demographic, clinical, and laboratory data from 2 independent Canadian cohorts of patients with CKD stages 3 to 5 (estimated GFR, 10-59 mL/min/1.73 m²) who were referred to nephrologists between April 1, 2001, and December 31, 2008. Models were developed using Cox proportional hazards regression methods and evaluated using C statistics and integrated discrimination improvement for discrimination, calibration plots and Akaike Information Criterion for goodness of fit, and net reclassification improvement (NRI) at 1, 3, and 5 years.

Main Outcome Measure Kidney failure, defined as need for dialysis or preemptive kidney transplantation.
Survival Outcomes of Elderly with ESKD (Dialysis vs Conservative)

- UK
- Retrospective
- ITT study
- Excluded late referrals
- 12 months MDT care
- Mean age 79.6 (HD)
  VS 83 (CONS)

Survival Outcomes of Elderly with ESKD (Dialysis vs Conservative)

With high comorbidity (score=2)

Survival Outcomes of Elderly with ESKD (Dialysis vs Conservative)

With ischaemic heart disease

Survival Outcomes of Elderly with ESKD (Dialysis vs Conservative)

Distribution of Days Survived: Hospital-free Days, Outpatient Hemodialysis Days and Hospital Inpatient Days

MCM pts n = 29

All HD-only pts n = 112

Survival (months) including first 90 days
Trajectory of Functional Decline in the Last Year of Life in conservatively managed ESRD

CKD and Frailty

<table>
<thead>
<tr>
<th>Table 2</th>
<th>Prevalence of Frailty and Domains</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Overall</td>
</tr>
<tr>
<td></td>
<td>% (SE)</td>
</tr>
<tr>
<td>Shrinkage</td>
<td>2.64 (0.20)</td>
</tr>
<tr>
<td>Weakness</td>
<td>13.13 (0.83)</td>
</tr>
<tr>
<td>Exhaustion</td>
<td>4.01 (0.38)</td>
</tr>
<tr>
<td>Low activity</td>
<td>21.85 (0.70)</td>
</tr>
<tr>
<td>Slow walking(^a)</td>
<td>13.35 (0.71)</td>
</tr>
<tr>
<td>Frail(^b)</td>
<td>2.77 (0.34)</td>
</tr>
</tbody>
</table>

CKD = chronic kidney disease; SE = standard error.
\(^a\)The slowest-walking quintile adjusted for gender was defined before adjustment for complex survey design.
\(^b\)Frail persons exhibit ≥ 3 of 3 to 5 available frailty domains.

CKD and Frailty

Functional dependencies among the elderly on hemodialysis

WL Cook¹ and SV Jassal²,³


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**Figure 1** Figure showing ADL dependence in nine aspects of personal care measured using the Barthel Index. The percentage of individuals who reported requiring help or supervision with this activity is shown in the dark bars.

**Figure 2** Figure showing IADL dependence in eight aspects of day-to-day living measured using the Lawton-Brody Scale. The percentage of individuals who reported requiring help or supervision with this activity is shown in the dark bars.
Functional Status of Elderly Adults before and after Initiation of Dialysis

Tamura et al: NEJM 361;16  october 15, 2009
QOL in ESRD: dialysis vs MCM

• Silva Gane et al. (CJASN, December 2012)
• N = 170 ESRD, mean age >70, UK cohort, PD vs HD vs MCM, 3 year follow up
• SF 36, HADS, SWLS

• Results:
- SF 36 and HADS changed little in all groups

- SWLS scores decreased significantly after dialysis initiation and did not subsequently recover.

- SWLS score did not change over time in the MCM group
Future? CGA to aid prognosis/decisions

(validated in cancer but not in ESKD)

Table 1. Functional age (stages of aging\(^1\)) categories with clinical measures

<table>
<thead>
<tr>
<th>ACOVE Stage*</th>
<th>Healthy/Usual</th>
<th>Vulnerable</th>
<th>Frail</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0–2</td>
<td>3–6</td>
<td>7+</td>
</tr>
<tr>
<td>VES-13 score(^t)</td>
<td>&gt;0.77</td>
<td>&lt;0.42</td>
<td></td>
</tr>
<tr>
<td>Walking speed (m/s)(^t)</td>
<td>&lt;11.2</td>
<td></td>
<td>Unable, &gt;60</td>
</tr>
<tr>
<td>Chair stand time(^t) (sec)(^s)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frailty score(^n)</td>
<td>0</td>
<td>1–2</td>
<td>3–5</td>
</tr>
<tr>
<td>Syndromes**</td>
<td>0</td>
<td>1</td>
<td>2+</td>
</tr>
<tr>
<td>Remaining life expectancy(^t)</td>
<td>High</td>
<td>Middle</td>
<td>Low</td>
</tr>
</tbody>
</table>

Common geriatric assessment measures

<table>
<thead>
<tr>
<th>ADLs</th>
<th>Instrumental ADLs</th>
<th>Mini Mental State Examination</th>
<th>Geriatric Depression Scale</th>
<th>Polypharmacy (no. of medications per day)</th>
<th>Comorbidity</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>&gt;26</td>
<td>0</td>
<td>&lt;5</td>
<td>None limiting</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>23–26</td>
<td>5</td>
<td>5–8</td>
<td>Slight</td>
</tr>
<tr>
<td>2+</td>
<td>2+</td>
<td>&lt;23</td>
<td>6+</td>
<td>9+</td>
<td>Severe</td>
</tr>
</tbody>
</table>

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*ACOVE (Assessing Care of Vulnerable Elders) is a project that uses quality indicators to identify and treat noninstitutionalized vulnerable elders (http://www.rand.org/health/projects/acove/acove3/).

\(^t\)The Vulnerable Elders Survey (VES-13) (http://www.rand.org/health/projects/acove/survey.html) is a self-administered brief function-based tool for screening community-dwelling populations to identify older persons at risk for adverse outcomes and has been studied in cancer patients. A score of ≥3 identifies vulnerable adults at risk for geriatric deficits, functional decline, and death.\(^4\)

\(^t\)Time it takes for patient to rise from a straight chair five times as quickly as possible.

\(^n\)Validated frailty screening tool with five frailty components: (1) >10-lb weight loss in last year; (2) poor endurance (self-report tool); (3) low physical activity (self-report tool); (4) slow walking time (s/15 ft); (5) weak grip strength (hand dynamometer); ≥3 criteria present = positive for frailty phenotype.\(^4\)

**Dementia, delirium, depression, falls.

\(^t\)See reference 1, Table 2, p. 1938 and reference 15.

Functional age categories

- **Healthy/usual**: this is the most optimal dialysis patient who might also be a transplant candidate.

- **Vulnerable**: this is a more typical dialysis candidate. Geriatric assessment and intervention plans (e.g., rehabilitation, pain control, treatment of cognitive deficits and depression, limiting polypharmacy, preventing falls, instituting home services) may slow the progression of geriatric susceptibility factors that will adversely affect prognosis, QOL, and the dialysis experience.

- **Frail**: This is a suboptimal dialysis candidate and should be considered for a nondialytic treatment plan or a time-limited dialysis trial.

- **Final decisions will hinge on patient preferences, QOL, and contextual issues**
Shared Decision Making

- Morton et al: patient trade offs

  - Would chose HD > CKM if HD increases life expectancy, if HD during day or eve versus only day, and if subsidized transport was available
  
  - CKM > HD if HD = more hospital days and more restrictions on travel
  
  - Would trade off 7 months of life expectancy to reduce hospital visits and 15 months of life expectancy to increase ability to travel.
  
  - In reality, evidence suggests decision to do dialysis is made with little input from patient