CKDinform: A PCP’s Guide to CKD Detection and Delaying Progression
Learning Objectives

• Describe suitable screening tools, such as GFR and ACR, for proper utilization in clinical practice related to the diagnosis and monitoring of CKD.

• Define and classify CKD, based on GFR and albuminuria categories, in order to guide appropriate treatment approaches.

• Recognize evidence-based management strategies that will help delay CKD progression in at-risk patients and improve outcomes.
Case Question 1

A 55 year-old Caucasian-American man, with a history of type 2 diabetes (15 years), hypertension (3 years) dyslipidemia (5 years) and cardiovascular disease (myocardial infarction 3 years ago). He was recently diagnosed with CKD. His most recent labs reveal an eGFR of 45 ml/min/1.73m² and an ACR of 38 mg/g. Which of the following should be avoided?

A. ACE and ARB in combination

B. Daily low-dose aspirin

C. NSAIDs

D. Statins

E. A and C
Case Question 2

All of the following adult patients should be referred for nephrology consultation, EXCEPT?

A. Initial visit: eGFR 26 & 3 months later: eGFR 28 (mL/min/1.73m²)

B. Initial visit: eGFR 55, & 3 months later: eGFR 43 confirmed with repeat eGFR 45 (mL/min/1.73m²)

C. Initial visit: ACR 450 & 3 months later: ACR 355 (mg/g) on both dates the eGFR >60 mL/min/1.73m²

D. Initial visit: eGFR >60 & 3 months later: eGFR >60 (mL/min/1.73m²) with personal history of Autosomal Dominant Polycystic Kidney Disease

E. Initial visit: eGFR 42 & 3 months later: eGFR 44 (mL/min/1.73m²) on both dates the ACR <30 mg/g
Steps to CKD Patient Care

1. Does the patient have CKD?
2. Assess GFR, albuminuria.
3. Determine etiology.
4. Assess for evidence of progression.
5. Assess for associated complications.
6. Patient education.
Definition of Chronic Kidney Disease

- CKD is defined as abnormalities of kidney structure or function, present for >3 months, with implications for health.

### Criteria for CKD (either of the following present for >3 months)

<table>
<thead>
<tr>
<th>Markers of kidney damage (one or more)</th>
<th>Albuminuria (AER ≥ 30 mg/24 hours; ACR ≥ 30 mg/g [≥3 mg/mmol])</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urine sediment abnormalities</td>
<td></td>
</tr>
<tr>
<td>Electrolyte and other abnormalities due to tubular disorders</td>
<td></td>
</tr>
<tr>
<td>Abnormalities detected by histology</td>
<td></td>
</tr>
<tr>
<td>Structural abnormalities detected by imaging</td>
<td></td>
</tr>
<tr>
<td>History of kidney transplantation</td>
<td></td>
</tr>
</tbody>
</table>

| Decreased GFR                                                                                         | GFR < 60 ml/min/1.73 m² (GFR categories G3a-G5)                                                        |

## Albuminuria Categories in CKD

<table>
<thead>
<tr>
<th>Category</th>
<th>ACR (mg/g)</th>
<th>Terms</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>&lt;30</td>
<td>Normal to mildly increased</td>
</tr>
<tr>
<td>A2</td>
<td>30-300</td>
<td>Moderately increased*</td>
</tr>
<tr>
<td>A3</td>
<td>&gt;300</td>
<td>Severely increased**</td>
</tr>
</tbody>
</table>

*Relative to young adult level. ACR 30-300 mg/g for >3 months indicates CKD.

**Including nephrotic syndrome (albumin excretion ACR >2220 mg/g).
# Assign GFR Category

## GFR Categories in CKD

<table>
<thead>
<tr>
<th>Category</th>
<th>GFR</th>
<th>Terms</th>
<th>Clinical Presentations</th>
</tr>
</thead>
<tbody>
<tr>
<td>G1</td>
<td>≥90</td>
<td>Normal or high</td>
<td>Markers of kidney damage (nephrotic syndrome, nephritic syndrome, tubular syndromes, urinary tract symptoms, asymptomatic urinalysis abnormalities, asymptomatic radiologic abnormalities, hypertension due to kidney disease)</td>
</tr>
<tr>
<td>G2</td>
<td>60-89</td>
<td>Mildly decreased*</td>
<td></td>
</tr>
</tbody>
</table>
| G3a      | 45-59| Mildly to moderately decreased | • Mild to severe complications:  
  o Anemia  
  o Mineral and bone disorder  
    ▪ Elevated parathyroid hormone  
  o Cardiovascular disease  
    ▪ Hypertension  
    ▪ Lipid abnormalities  
  o Low serum albumin |
| G3b      | 30-44| Moderately to severely decreased |                                                                                                                                                       |
| G4       | 15-29| Severely decreased     | • Includes all of the above  
  • Uremia |
| G5       | <15  | Kidney failure         |                                                                                                                                                       |

GFR = mL/min/1.73m²

*Relative to young adult level

In the absence of evidence of kidney damage, neither GFR category G1 nor G2 fulfill the criteria for CKD. Refer to a nephrologist and prepare for kidney replacement therapy when GFR <30 mL/min/1.73m².

Classification of CKD Based on GFR and Albuminuria

**Categories: “Heat Map”**

CKD is classified based on:
- **Cause (C)**
- **GFR (G)**
- **Albuminuria (A)**

<table>
<thead>
<tr>
<th>Albuminuria categories Description and range</th>
<th>A1</th>
<th>A2</th>
<th>A3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal to mildly increased</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderately increased</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severely increased</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>&lt;30 mg/g</th>
<th>30-299 mg/g</th>
<th>≥300 mg/g</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;3 mg/mmol</td>
<td>3-29 mg/mmol</td>
<td>≥30 mg/mmol</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>GFR categories (ml/min/1.73 m²) Description and range</th>
<th>G1</th>
<th>G2</th>
<th>G3a</th>
<th>G3b</th>
<th>G4</th>
<th>G5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal or high</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥90</td>
<td>1 if CKD</td>
<td>Monitor 1</td>
<td>Refer* 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mildly decreased</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60-89</td>
<td>1 if CKD</td>
<td>Monitor 1</td>
<td>Refer* 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mildly to moderately decreased</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>45-59</td>
<td>Monitor 1</td>
<td>Monitor 2</td>
<td>Refer 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderately to severely decreased</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30-44</td>
<td>Monitor 2</td>
<td>Monitor 3</td>
<td>Refer 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severely decreased</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15-29</td>
<td>Refer* 3</td>
<td>Refer* 3</td>
<td>Refer 4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kidney failure</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;15</td>
<td>Refer 4+</td>
<td>Refer 4+</td>
<td>Refer 4+</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Colors:** Represents the risk for progression, morbidity and mortality by color from best to worst. **Green:** low risk (if no other markers of kidney disease, no CKD); **Yellow:** moderately increased risk; **Orange:** high risk; **Red,** very high risk.

**Numbers:** Represent a recommendation for the number of times per year the patient should be monitored.

**Refer:** Indicates that nephrology referral and services are recommended.

*Referring clinicians may wish to discuss with their nephrology service depending on local arrangements regarding monitoring or referral.

Screening Tools: eGFR

• Considered the best overall index of kidney function.
• Normal GFR varies according to age, sex, and body size, and declines with age.
• The NKF recommends using the CKD-EPI Creatinine Equation (2009) to estimate GFR. Other useful calculators related to kidney disease include MDRD and Cockcroft-Gault.
• For GFR calculators search: GFR calculator – The National Kidney Foundation

# eGFR, SCr Comparison

<table>
<thead>
<tr>
<th>Age</th>
<th>Weight in lbs Height in Ft/in</th>
<th>Sex</th>
<th>Race</th>
<th>SCr mg/dl</th>
<th>eGFR ml/min per CKD-EPI</th>
<th>eGFR Adj for BSA</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>285 6’</td>
<td>M</td>
<td>AA</td>
<td>1.6</td>
<td>68</td>
<td>97</td>
</tr>
<tr>
<td>49</td>
<td>180 5’4”</td>
<td>F</td>
<td>Hispanic</td>
<td>1.6</td>
<td>38</td>
<td>41</td>
</tr>
<tr>
<td>67</td>
<td>155 5’8”</td>
<td>M</td>
<td>Asian</td>
<td>1.6</td>
<td>44</td>
<td>46</td>
</tr>
<tr>
<td>92</td>
<td>98 5’1”</td>
<td>F</td>
<td>Caucasian</td>
<td>1.6</td>
<td>28</td>
<td>22</td>
</tr>
</tbody>
</table>
### Average Measured GFR by Age in People Without CKD

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Average Measured GFR (mL/min/1.73 m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-29</td>
<td>116</td>
</tr>
<tr>
<td>30-39</td>
<td>107</td>
</tr>
<tr>
<td>40-49</td>
<td>99</td>
</tr>
<tr>
<td>50-59</td>
<td>93</td>
</tr>
<tr>
<td>60-69</td>
<td>85</td>
</tr>
<tr>
<td>70+</td>
<td>75</td>
</tr>
</tbody>
</table>

Use These Equations Cautiously, if at all in ....

- Patients who have/are:
  - Poor nutrition/loss of muscle mass
  - Amputation
  - Chronic illness
  - Not African American or Caucasian
  - Changing serum creatinine
  - Obese
  - Very elderly, young
Clinical Evaluation of Patients with CKD

- Blood pressure
- HbA1c
- Serum creatinine
  - Use a GFR estimating equation or clearance measurement; don’t rely on serum creatinine concentration alone.
  - Be attentive to changes in creatinine over time--even in “normal” range.
- Urinalysis
  - Urine sediment
  - Spot urine for protein-to-creatinine or albumin-to-creatinine ratio.
- Albuminuria/Proteinuria
- Electrolytes, blood glucose, CBC
Clinical Evaluation of Patients with CKD

- Depending on stage: albumin, phosphate, calcium, iPTH
- Renal imaging
- Depending on age and H&P
  - Light chain assay, serum or urine protein electrophoresis (SPEP, UPEP)
  - HIV, HCV, HBV tests
  - Complements, other serologies—limited role unless specific reason
Clinical Evaluation of Patients with CKD

- Standard urine dipsticks detect total protein >30 mg/dL - not sensitive enough for “microalbuminuria” screening.
- Untimed, random “spot” urine for albumin-to-creatinine or protein-to-creatinine ratio (first morning void preferred).
Definitions: Albuminuria and Proteinuria

- **Normal Albuminuria**
  - Albumin-to-creatinine ratio <30 mg/g creatinine

- **Moderately Increased Albuminuria**
  - Albumin-to-creatinine ratio 30-300 mg/g creatinine
  - 24-hour urine albumin 30-300 mg/d

- **Severely Increased Albuminuria**
  - Albumin-to-creatinine ratio >300 mg albumin/g creatinine
  - 24-hour urine albumin >300 mg/d

- **Proteinuria**
  - (+) urine dipstick at >30 mg/dl
  - >200 mg protein/g creatinine
  - 24-hour urine protein >300 mg/d
Slowing Progression of CKD
CKD - Progression of Kidney Failure Concept

Variable depending on several factors including (1) type of disease and (2) how well it is treated

- Stage 2
- Stage 3
- Stage 4
- Stage 5 (Dialysis)
Blood Pressure and CKD Progression

- Control of BP more important than exactly which agents are used.
  - Avoidance of side-effects is important.
- With proteinuria: diuretic + ACEi or ARB.
- No proteinuria: no clear drug preference
  - ACEi or ARB ok to use.

Slowing CKD Progression: ACEi/ARB

- Check labs after initiation.
  - If less than 25% SCr increase, continue and monitor.
  - If more than 25% SCr increase, stop ACEi and evaluate for RAS.
- Continue until contraindication arises, no absolute eGFR cutoff.
- Better proteinuria suppression with low Na diet and diuretics.
- Avoid volume depletion.
Goals for Renoprotection

• Target blood pressure in non-dialysis CKD.\(^1\)
  - ACR <30 mg/g: ≤140/90 mm Hg.
  - ACR 30-300 mg/g: ≤130/80 mm Hg.*
  - ACR >300 mg/g: ≤130/80 mm Hg.
  - Individualize targets and agents according to age, coexistent CVD, and other comorbidities.

• Avoid ACEi and ARB in combination.\(^3,4\)
  - Risk of adverse events (impaired kidney function, hyperkalemia).

*Reasonable to select a goal of 140/90 mm Hg, especially for moderate albuminuria (ACR 30-300 mg/g).\(^2\)
Relationship Between Achieved BP and Decline in Kidney Function from Primary Renal Endpoint Trials

Nondiabetes

REIN. *Lancet.* 1997
AASK. *JAMA.* 2002
Parsa A et al. *NEJM* 2013

Diabetes

IDNT. *NEJM.* 2001
RENAAL. *NEJM.* 2001
ABCD. *Diabetes Care (Suppl).* 2000

ARBs and Progression of Diabetic Nephropathy

- Most placebo-controlled studies in type 2 DM have been in patients with either moderate albuminuria (A2) or established nephropathy treated with ARB.
- ARB and ACEi appear to be equivalent for moderate albuminuria (A2) and proteinuria reduction.

Managing Hyperglycemia

- Hyperglycemia is a fundamental cause of vascular complications, including CKD.
- Poor glycemic control has been associated with albuminuria in type 2 diabetes.
- Risk of hypoglycemia increases as kidney function becomes impaired.
- Declining kidney function may necessitate changes to diabetes medications and renally cleared drugs.
- Target HbA1c ~7.0%.
  - Can be extended above 7.0% with comorbidities or limited life expectancy, and risk of hypoglycemia.
Other Goals of CKD Management

• NSAID avoidance

• Limit sodium intake to <90 mmol (2 gm sodium; or 5 gm sodium chloride or salt) per day.

• CVD management: lipids, ASA (secondary prevention), etc.
Lipid Disorders in CKD

- Use statin alone or statin + ezetimibe in adults \( \geq 50 \) yrs with CKD 3-5(ND).
- Use statin alone in adults \( \geq 50 \) yrs with CKD 1-2.
- In adults <50 yrs use statin alone if history of known CAD, MI, DM, stroke.
- Treat according to a “fire and forget” rather than “treat to target” strategy.
  - Treat CKD patients (Non dialysis) with statins or Statin/exterminate combinations without the need for follow up blood tests.


http://kdigo.org/home/2013/11/04/kdigo-announces-publication-of-guideline-on-lipid-management/
A 32% reduction in LDL → 17% reduction in primary outcome (nonfatal MI, coronary death, nonhemorrhagic stroke, arterial revascularization).

No reduction in CKD progression, overall or CAD mortality, other individual CAD end-points.

10-Year Coronary Risk Based on Age and Other Patient Characteristics

Future 10-year coronary risk based on various patient characteristics. Data are unadjusted rates from 1,268,029 participants in the Alberta Kidney Disease cohort.¹,²

CABG, coronary artery bypass grafting; CHD, coronary heart disease; CKD, chronic kidney disease; CVA, cerebrovascular accident; DM, diabetes mellitus; MI, myocardial infarction; PTCA, percutaneous transluminal coronary angioplasty; TIA, transient ischemic attack.

Overview of Managing CKD Complications
Complications of Kidney Failure Start in Stage 3 and Progress

Malnutrition

Bone Disease
Brittle bones and fractures

Fluid Overload
Water Overload

Anemia/blood loss
Decrease production of red blood cells

Acid Base Imbalance
Acidic Blood
Electrolyte Abnormalities

Hypertension
Cardiac Disease
Vascular Disease
Anemia in CKD

• Initiate iron therapy if TSAT ≤30% and ferritin ≤500 ng/mL (IV iron for dialysis, oral for non-dialysis CKD).

• Individualize ESA therapy – Start ESA if Hb <10 g/dl, and maintain Hb <11.5 g/dl. Ensure adequate Fe stores.
  o Appropriate iron supplementation is needed for ESA to be effective.

• ESA usually not required for nephrogenic anemia until late CKD 4/CKD 5.

• Diagnostic workup of anemia is particularly important if severity of anemia is disproportionate to CKD staging.

• Important to avoid transfusion in transplant candidates.
  o If transfused use leukocyte filter to reduce HLA sensitization.
## CKD-MBD Testing

<table>
<thead>
<tr>
<th>CKD Stage</th>
<th>Calcium, Phosphorus</th>
<th>PTH</th>
<th>25(OH)D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 3</td>
<td>Every 6-12 months</td>
<td>Once then based on CKD progression</td>
<td>Once, then based on level and treatments</td>
</tr>
<tr>
<td>Stage 4</td>
<td>Every 3-6 months</td>
<td>Every 6-12 months</td>
<td></td>
</tr>
<tr>
<td>Stage 5</td>
<td>Every 1-3 months</td>
<td>Every 3-6 months</td>
<td></td>
</tr>
</tbody>
</table>

Use CKD progression, presence or absence of abnormalities, treatment response, and side effects to guide testing frequency.
CKD-MBD

- Treat with D3 as indicated to achieve normal serum levels.
- 2000 IU D3 po qd is cheaper and better absorbed than 50,000 IU of D2 monthly dose.
- Limit phosphorus in diet, with emphasis on decreasing packaged products - Refer to renal RD.
- May need phosphate binders.
- DEXA doesn’t predict fracture risk in CKD 3-5.
Metabolic Acidosis

- Often becomes apparent at GFR <25-30 ml/min/1.73m².
- More severe with higher protein intake.
- May contribute to bone disease, protein catabolism, and progression of CKD.
- Correction of metabolic acidosis may slow CKD progression and improve patients functional status.¹,²

Adults with CKD (eGFR 15-30 ml/min/1.73m²) with bicarbonate 16-20 mmol/L; treated with sodium bicarbonate for 2 years to normalize serum bicarbonate concentration.²

Metabolic Acidosis

- Maintain serum bicarbonate $\geq$ 22 mmol/L.
  - Start with 0.5-1 mEq/kg per day.
  - Sodium bicarbonate tablets:
    - 325mg, 625 mg tablets; 1 g = 12 mEq.
  - Sodium citrate solution:
    - 1 mEq/ml.
    - Avoid if on aluminum phosphate binders.
  - Baking soda:
    - 54 mmol/level tsp.
Hyperkalemia

- First try reduction of dietary potassium.
- Stop NSAIDs, COX-2 inhibitors.
- Stop potassium sparing diuretics.
  - Aldactone
- Stop or reduce beta blockers.
- Avoid salt substitutes that contain potassium.
- Stop or reduce ACEi/ARBs.
# Acute Management of Hyperkalemia

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Expected serum K+ ↓</th>
<th>Peak effect</th>
<th>Duration</th>
<th>Mechanism</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV Calcium chloride</td>
<td>None</td>
<td>Instant</td>
<td>Transient</td>
<td>Stabilize myocardium</td>
</tr>
<tr>
<td>Insulin + dextrose</td>
<td>0.5-1 mEq/L</td>
<td>30-60 mins</td>
<td>4-6 hrs</td>
<td>Cellular shift</td>
</tr>
<tr>
<td>B2-adrenergic agonists</td>
<td>0.5-1 mEq/L</td>
<td>30 mins</td>
<td>2 hrs</td>
<td>Cellular shift</td>
</tr>
<tr>
<td>Sodium bicarbonate</td>
<td>Variable depending on acidosis</td>
<td>4h</td>
<td></td>
<td>Cellular shift</td>
</tr>
<tr>
<td>Loop/ thiazide diuretics</td>
<td>Hours</td>
<td></td>
<td></td>
<td>↑ renal K+ excretion</td>
</tr>
</tbody>
</table>

Chronic Management of Hyperkalemia

- Loop or thiazide diuretics.
- Laxatives:
  - As effective as cation exchange resins in sorbitol.
  - Those that induce secretory diarrhea may be more effective (e.g. bisacodyl).
  - Diphenolic laxatives may stimulate colonic K+ secretion.
- Cation exchange resins:
  - Sodium polystyrene sulfonate
  - Mechanism:
    - Theoretical: Bound Na+ exchanged for K+ in colonic/rectal lumen.
    - Likely: Accompanying sorbitol induces diarrhea.
  - Usually requires multiple doses.
  - Risk of bowel necrosis or perforation.
Risk Factors for Infection in People with CKD

- Advanced age
- High burden of coexisting illnesses (e.g., diabetes)
- Hypoalbuminuria
- Immunosuppressive therapy
- Nephrotic syndrome
- Uremia
- Anemia and malnutrition
- High prevalence of functional disabilities
Vaccination in CKD

• Annual influenza vaccine for all adults with CKD, unless contraindicated.

• Polyvalent pneumococcal vaccine when eGFR <30 ml/min/1.73m² and at high risk of pneumococcal infection (e.g., nephrotic syndrome, diabetes, receiving immunosuppression), unless contraindicated. Offer revaccination within 5 years.

• Hepatitis B immunization when GFR <30 ml/min/1.73m². Confirm response with appropriate serological testing.

• Use of a live vaccine should consider the patient’s immune status (e.g., immunosuppression).

Malnutrition and CKD

- Malnutrition or protein energy wasting (PEW) is common in CKD, and is associated with poor patient outcomes.
- Malnutrition in CKD begins as early as stages 3 and 4. Risk increases with progression of the disease.
- Preventing PEW or malnutrition may require clinical interventions to assess nutritional status, individualize strategies for prevention and treatment, provide patient instruction, and promote patient adherence.
- A specialty-trained registered dietitian can help address the nutritional aspects so that protein wasting can be diminished.

A Balanced Approach to Nutrition in CKD: Macronutrient Composition and Mineral Content*

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Stage of CKD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1-2</td>
</tr>
<tr>
<td>Sodium (g/d)</td>
<td>&lt;2.3</td>
</tr>
<tr>
<td>Total fat (% of calories)</td>
<td>&lt;10</td>
</tr>
<tr>
<td>Saturated fat (% of calories)</td>
<td></td>
</tr>
<tr>
<td>Cholesterol (mg/d)</td>
<td></td>
</tr>
<tr>
<td>Carbohydrate (% of calories)</td>
<td>50-60</td>
</tr>
<tr>
<td>Protein (g/kg/d, % of calories)</td>
<td></td>
</tr>
<tr>
<td>No diabetes</td>
<td>1.4 (~18)</td>
</tr>
<tr>
<td>Diabetes</td>
<td>0.8 (~10)</td>
</tr>
<tr>
<td>Phosphorus (g/d)</td>
<td>1.7</td>
</tr>
<tr>
<td>Potassium (g/d)</td>
<td>&gt;4</td>
</tr>
</tbody>
</table>

Adapted from DASH (dietary approaches to stop hypertension) diet.

*Adjust so total calories from protein, fat, and carbohydrate are 100%. Emphasize such whole-food sources as fresh vegetables, whole grains, nuts, legumes, low-fat or nonfat dairy products, canola oil, olive oil, cold-water fish, and poultry.
Education and Counseling

- Ethical, psychological, and social care (e.g., social bereavement, depression, anxiety).
- Dietary counseling and education on other lifestyle modifications (e.g., exercise, smoking cessation).
- Involve the patient, family and children if possible.
- Offer literature in both traditional and interactive formats.
- Use educational materials written in the patient’s language.
- Assess the need for low-level reading materials.
- Use internet resources and smartphone apps as appropriate.
- Use visual aids such as handouts, drawings, CDs, and DVDs.
- Involve other health care professionals in educating patients/families.
- Be consistent in the information provided.
Mental Health Counseling

- Psychiatric illnesses like depression are associated with many chronic diseases.
- Depression is linked to early CKD, progressive CKD, kidney failure, hospitalization and increased mortality. ¹-⁴
- Patients with GFR <60 mL/min/1.73m² should undergo regular assessment for impairment of functioning and well-being.⁵

CKD Care Among Special Populations
Considerations for CKD Management in Older Adults

- More than 36 million adults are now over the age of 65, and ~50% have two or more chronic diseases.\(^1\)
- Management requires an individualized approach, with attention to unique considerations for older adults.
- Treatment of hypertension in older adults has been shown to reduce CV morbidity and mortality. However, older frail adults should be monitored for risk of hypotension.\(^2,3\)
- Less stringent glycemic goals can be appropriate for older adults with other comorbidities, or those at higher risk for hypoglycemia.\(^4\)
- Exercise can have multiple benefits. A weight control program should be individually tailored to preserve body cell mass and function, while losing fat mass.\(^5,6\)

Incidence of ESRD Varies Widely by Race and Ethnicity

Panel b: ~Estimate shown is imprecise due to small sample size and may be unstable over time. The line for Native Americans has a discontinuity because of unreliable data for that year. Abbreviations: Af Am, African American; ESRD, end-stage renal disease; N Am, Native American. USRDS ADR 2014.
Additional Online Resources for CKD Learning

• National Kidney Foundation: www.kidney.org
• United States Renal Data Service: www.usrds.org
• CDC’s CKD Surveillance Project: http://nccd.cdc.gov/ckd
• National Kidney Foundation: www.kidney.org
• United States Renal Data Service: www.usrds.org
• National Kidney Disease Education Program (NKDEP): http://nkdep.nih.gov