CKD for the PCP

Brian Donohoe, MD
UCLA Family Medicine Grand Rounds
February 24th, 2021
Objectives

- Review the definition and classification of chronic kidney disease
- Review the PCP’s role in screening for and managing chronic kidney disease
- Review indications for referral to specialty care in patients with chronic kidney disease
KDIGO

- Kidney Disease: Improving Global Outcomes
- “Global organization developing and implementing evidence based clinical practice guidelines in kidney disease.”
- Independent, volunteer-led, self-managed charity incorporated in Belgium.
  - Originally established by the National Kidney Foundation in 2003
  - Later became an independently incorporated non-profit governed by an international volunteer Executive Committee (made up of leading Nephrology experts around the world)
Defining CKD

- Presence of kidney damage (usually detected as urinary albumin excretion of ≥30 mg/day or equivalent) or decreased kidney function (defined as eGFR <60 mL/min/1.73 m²) for **three or more months**

- Persistence past three months is important to distinguish from AKI
Calculating GFR

► CKD-EPI
  ► Uses gender, age, serum creatinine +/- race
  ► This is what is used for eGFR in UCLA labs
  ► When this equation was developed, they allowed for local data to be added so that the data can be customized for different areas around the world
  ► Pitfall: less accurate in certain populations (pregnant women, those with “unusual” body mass)

► Creatinine clearance:
  ► Using a 24-hour urine collection (need to plug values into a calculator, including total creatinine and urine volume)
  ► Pitfall: Difficult to collect. Incomplete collection leads to underestimate of creatinine excretion and, therefore, GFR.
Classification

- Staging of CKD depends on two factors:
  - eGFR
  - Presence/absence and degree of albuminuria
Albuminuria

- Earliest marker of kidney damage and can often appear prior to any decrease in GFR

### Persistent Albuminuria Categories

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
<th>UACR</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>Normal to mildly increased</td>
<td>&lt; 30 mg/g (&lt; 3 mg/mmol)</td>
</tr>
<tr>
<td>A2</td>
<td>Moderately increased</td>
<td>30-300 mg/g (3-30 mg/mmol)</td>
</tr>
<tr>
<td>A3</td>
<td>Severely increased</td>
<td>&gt; 300 mg/g (&gt; 30 mg/mmol)</td>
</tr>
</tbody>
</table>

Abbreviation: UACR, urine albumin-to-creatinine ratio.
## 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  
    ▪ Low serum albumin                          |
| G3b      | 30-44 | Moderately to severely decreased |                                                                                        |
| G4       | 15-29 | Severely decreased        |                                                                                        |
| G5       | < 15  | Kidney failure            | • Includes all of the above in addition  
  • Uremia                                      |

GFR = mL/min/1.73 m²  
*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.
What does it mean?

<table>
<thead>
<tr>
<th>GFR categories (mL/min/1.73 m²)</th>
<th>Description and range</th>
<th>A1</th>
<th>A2</th>
<th>A3</th>
</tr>
</thead>
<tbody>
<tr>
<td>G1</td>
<td>Normal or high</td>
<td>≥90</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G2</td>
<td>Mildly decreased</td>
<td>60-90</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G3a</td>
<td>Mildly to moderately decreased</td>
<td>45-59</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G3b</td>
<td>Moderately to severely decreased</td>
<td>30-44</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G4</td>
<td>Severely decreased</td>
<td>15-29</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G5</td>
<td>Kidney failure</td>
<td>&lt;15</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

Green: low risk (if no other markers of kidney disease, no CKD); Yellow: moderately increased risk; Orange: high risk; Red, very high risk. KDIGO 2012
Initial triage

- Assess for any urgent indications for HD:
  - Refractory pulmonary edema
  - Hyperkalemia
  - Metabolic acidosis
  - Encephalopathy

- Assess the duration of injury:
  - Rapid, significant declines in GFR may necessitate an urgent referral to the ED or to a Nephrologist
  - Ideally, compare to prior serum values. If none available, look for historical clues
Focus on the history

- History of diabetes or HTN (especially if any sequelae)
- Peripheral arterial disease or PAD risk factors may indicate renovascular disease
- History of severe or prolonged AKI
- Family history of inherited disorders
- History of cancer, chemo or radiation therapy
- Prior urologic or pelvic history that can lead to obstruction
- LUTS in men
- Risk factors for HIV, HBV, HCV
- Medication review
Clinical evaluation

- Blood pressure
- Urinalysis with microscopy
- Urine albumin to creatinine ratio and protein to creatinine ratio*
- CBC
- BMP (want to evaluate Cr/GFR and electrolytes)
- Renal US
- A1C
- Targeted testing:
  - SPEP/UPEP, serum immunofixation, serum light chains
  - HIV/HBV/HCV
To refer or not to refer? Indications:

- GFR < 30 (CKD 4 or 5)
- Severe albuminuria (UACR > 300 mg/g)
- Abnormal urine microscopy
- Personal history of systemic AI disease
- Large cystic kidneys
- Known history of multiple myeloma or monoclonal gammopathy
- Evidence of relatively rapid decline in eGFR*
- Single kidney with GFR < 60
Referral indications (continued)

- Inability to identify an etiology (especially in younger patients)
- Lab abnormalities that are difficult to manage (hyperkalemia, acidosis, anemia requiring EPO, hyperphos, hypocalcemia)
- Resistant HTN
- Pregnancy
- Confirmed or presumptive inherited disease (ADPKD, Alport, etc)
- Recurrent or extensive nephrolithiasis
What can we do?

- Most patients will not need a referral to Nephrology at the time of diagnosis.
- We can do our part to prevent/reduce progression of disease, improve patient education, and review goals of care.
Monitoring CKD labs

- What labs?
  - BMP (eGFR, creatinine, Calcium, K, Bicarb)
  - Phosphorus
  - CBC
  - PTH - responds to both hyperphosphatemia and hypocalcemia
  - Vitamin D
  - ACR
How frequent?

- Stage 2-3: every 6-12 months
- Stage 4: every 3-6 months
- Stage 5: every 1-3 months
Blood pressure goals

- DM and non-DM adults with CKD and urine albumin excretion <30 mg/24 hrs or equivalent: ≤140/90
- DM and non-DM adults with CKD and urine albumin excretion ≥30 mg/24 hrs or equivalent: ≤130/80
A note on antihypertensives

- **ACEi/ARB**: especially if albuminuria or DM
  - Watch for decrease in GFR, hyperkalemia
- **Spironolactone**: helps to reduce albuminuria when used in combination with ACEi/ARB (but must closely follow K)
- **Thiazides**: better BP control than loop diuretics
- **Loop diuretics**: more useful for treating edema (especially in patient with CKD 4-5)
- **CCB’s**: DHP CCBs like amlodipine and nifedipine can worsen edema and should not be used in patients with proteinuria unless also on an ACEi/ARB
Other targets for renal protection:

- Dietary protein restriction*
- Tobacco cessation
- Use of bicarb to treat chronic metabolic acidosis
- Blood sugar/DM control
  - Goal A1c of < 7 in patients with CKD
  - SGLT2 inhibitors (the “flozin’s”)
Managing complications: Volume overload

- Volume overload becomes significant issue at very low GFR (10-15)
- Prior to that, patients with mild-moderate kidney disease are less able to respond to rapid intake of sodium, which can result in fluid overload
- Recommendations for management:
  - Use of loop diuretics as needed
  - Sodium-restricted diet (KDIGO recommends < 2 grams daily for all patients with CKD)
Hyperkalemia

- Typically requires other factors (in addition to CKD) that would increase potassium levels
  - Hypoaldosteronism
  - High potassium diet
  - Tissue damage
  - Oliguria

- Management recommendations:
  - Low potassium diet (<40 to 70 mEq/day or 1500 to 2700 mg/day)
  - Avoiding certain medications (NSAIDs, may need to d/c ACEi/ARB)
  - Consider potassium binders (Lokelma, Veltassa) with goal of normal K
Metabolic acidosis

- Goal serum bicarb: >22 mEq/L
- Start sodium bicarb at 0.5 to 1.0 mEq/kg per day
- Potential benefits:
  - Slowed progression of CKD
  - Improved bone health
  - Improved nutritional status
Mineral and bone disorders

- Phosphate retention and low Vitamin D are common in CKD
- Both contribute to secondary hyperparathyroidism
- Although elevated PTH is an appropriate response to the phosphate and Vitamin D levels, it can result in renal osteodystrophy
- Primary goal of treating phosphate, Vitamin D, and PTH abnormalities is to prevent these complications
Phosphate

- Recommend low-phos diet (< 900 mg/day)
- Phos binders:
  - Usually started in non-HD patients when phos > 4.5 and in HD patients when phos > 5.5
  - Typically recommend use of non-calcium containing binders like sevelamer
  - If cost is an issue, can use calcium-containing binders like calcium carbonate or calcium acetate
Vitamin D

- Start treatment with D3 if levels < 30
PTH

- Typically treat if levels are persistently > 150-200 pg/mL (despite treatment of hyperphos and low Vitamin D)

- Calcitriol (vitamin D analog) is the most common agent
  - Typically start with dose of 0.25 mcg three times weekly and titrate to PTH <150

- Calcimimetics (cinacalcet) can increase the sensitivity of parathyroid gland to calcium
  - Typically used in combination with Vitamin D analogs
  - Not yet approved for treatment of hyperparathyroidism in pre-HD patients
Anemia

- Largely due to decreased EPO production by kidneys
- Screen for anemia at time of initial diagnosis
- Monitoring:
  - In patients without history of anemia:
    - CKD 3: yearly
    - CKD 4-5: every 6 months
    - ESRD on HD: every 3 months
  - In patients with history of anemia (not on EPO):
    - CKD 3: every 6 months
    - CKD 4-5: every 3 months
    - ESRD on HD: monthly
Anemia continued

- **Workup:**
  - Prior to starting treatment with EPO, must rule out other etiologies of anemia
  - **Workup should include:**
    - RBC indices, absolute reticulocyte count, serum iron, total iron-binding capacity, percent transferrin saturation, serum ferritin, white blood cell count and differential, platelet count
    - Include B12 and folate if MCV is elevated
    - Check stool for blood
  - **If other etiologies ruled out, EPO usually started if Hgb < 10**
Dyslipidemia

- Hypertriglyceridemia is the most common abnormality found in CKD patients
- Screen all CKD patients for HLD and have low threshold to start statin in these patients
Don’t forget to vaccinate!

- Annual flu vaccine
- Hepatitis B vaccine for patient with CKD 4-5 at high risk of progression to ESRD
  - Confirm immunization with serology
- Pneumococcal vaccines: CKD considered immunocompromising condition by the United States Advisory Committee on Immunization Practices (ACIP)
  - Recommend both PCV13 (Prevnar) and PPSV23 (Pneumovax) with booster five years later
  - Still need additional ≥ 65yo dose of Pneumovax
Miscellaneous:

- Review medications to assess if any dose reductions are necessary
- Remind patients to avoid NSAIDs
- No bisphosphonates if GFR < 30
- Avoid gadolinium if GFR < 30
References


- National Kidney Foundation [www.kidney.org](http://www.kidney.org)

Questions?