

# CKD for the PCP

Brian Donohoe, MD

UCLA Family Medicine Grand Rounds

February 24<sup>th</sup>, 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  $\geq 30$  mg/day or equivalent) or decreased kidney function (defined as eGFR  $< 60$  mL/min/1.73 m<sup>2</sup>) 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

Category	Description	UACR
A1	Normal to mildly increased	< 30 mg/g (< 3 mg/mmol)
A2	Moderately increased	30-300 mg/g (3-30 mg/mmol)
A3	Severely increased	> 300 mg/g (> 30 mg/mmol)

Abbreviation: UACR, urine albumin-to-creatinine ratio.

# Assign GFR category

GFR categories in CKD			
Category	GFR	Terms	Clinical Presentations
<b>G1</b>	≥ 90	Normal or high	Markers of kidney damage (nephrotic syndrome, nephritic syndrome, tubular syndromes, urinary tract symptoms, asymptomatic urinalysis abnormalities, asymptomatic radiologic abnormalities, hypertension due to kidney disease)
<b>G2</b>	60-89	Mildly decreased*	
<b>G3a</b>	45-59	Mildly to moderately decreased	<ul style="list-style-type: none"> <li>▪ Mild to severe complications:               <ul style="list-style-type: none"> <li>○ Anemia</li> <li>○ Mineral and bone disorder                   <ul style="list-style-type: none"> <li>▪ Elevated parathyroid hormone</li> </ul> </li> <li>○ Cardiovascular disease                   <ul style="list-style-type: none"> <li>▪ Hypertension</li> <li>▪ Lipid abnormalities</li> <li>▪ Low serum albumin</li> </ul> </li> </ul> </li> </ul>
<b>G3b</b>	30-44	Moderately to severely decreased	
<b>G4</b>	15-29	Severely decreased	
<b>G5</b>	< 15	Kidney failure	<ul style="list-style-type: none"> <li>▪ Includes all of the above in addition</li> <li>▪ Uremia</li> </ul>

GFR = mL/min/1.73 m<sup>2</sup>  
 \*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/1.73m<sup>2</sup>.



# What does it mean?

## Prognosis of CKD by GFR and Albuminuria Categories

Albuminuria categories Description and range		
A1	A2	A3
Normal to mildly increased	Moderately increased	Severely increased
<30 mg/g <3 mg/mmol	30-299 mg/g 3-29 mg/mmol	≥300 mg/g ≥30 mg/mmol

GFR categories (ml/min/1.73 m <sup>2</sup> ) Description and range	G1	Normal or high	≥90			
	G2	Mildly decreased	60-90			
	G3a	Mildly to moderately decreased	45-59			
	G3b	Moderately to severely decreased	30-44			
	G4	Severely decreased	15-29			
	G5	Kidney failure	<15			

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:  $\leq 140/90$
- ▶ DM and non-DM adults with CKD and urine albumin excretion  $\geq 30$  mg/24 hrs or equivalent:  $\leq 130/80$

# 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  $\geq 65$ yo 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

- ▶ KDIGO 2012 Clinical Practice Guidelines for the Evaluation and Management of Chronic Kidney Disease. *Kidney International Supplements* (2013) 3, 2; doi:10.1038/kisup.2012.74
- ▶ KDIGO 2012 Clinical Practice Guideline for the Management of Blood Pressure in Chronic Kidney Disease. *Kidney International Supplements* (2012) 2, 339; doi:10.1038/kisup.2012.48
- ▶ National Kidney Foundation [www.kidney.org](http://www.kidney.org)
- ▶ Heerspink HJL et al. Dapagliflozin in Patients with Chronic Kidney Disease. *N Engl J Med*. 2020 Oct 8;383(15):1436-1446. doi: 10.1056/NEJMoa2024816. Epub 2020 Sep 24. PMID: 32970396.

Questions?