CKDinform:
A Primary Care Approach to CKD Management
Learning Objectives

- Identify timely testing and intervention strategies in patients at-risk for chronic kidney disease (CKD).
- Explain appropriate clinical measures to manage risk, and increase patient safety in CKD.
- Recognize co-management and referral of patients to nephrology specialists, when appropriate, in order to improve outcomes in CKD.
Primary Care Practitioners – First Line of Defense Against CKD

- Primary care professionals can play a significant role in early diagnosis, treatment, and patient education.
- A greater emphasis on detecting CKD, and managing it prior to referral, can improve patient outcomes.
CKD Risk Factors*

**Modifiable**
- Diabetes
- Hypertension
- History of AKI
- Frequent NSAID use

**Non-Modifiable**
- Family history of kidney disease, diabetes, or hypertension
- Age 60 or older (GFR declines normally with age)
- Race/U.S. ethnic minority status

*Partial list
AKI, acute kidney injury
Improved Diagnosis...

Studies demonstrate that clinician behavior changes when CKD diagnosis improves. Significant improvements realized in:¹⁻³

- Increased urinary albumin testing
- Increased appropriate use of ACEi or ARB
- Avoidance of NSAIDs prescribing among patients with low eGFR
- Appropriate nephrology consultation

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.

Summary of the MDRD Study and CKD-EPI Estimating Equations:
Screening Tools: ACR

- Urinary albumin-to-creatinine ratio (ACR) is calculated by dividing albumin concentration in milligrams by creatinine concentration in grams.
- Creatinine assists in adjusting albumin levels for varying urine concentrations, which allows for more accurate results versus albumin alone.
- Spot urine albumin-to-creatinine ratio for quantification of proteinuria.
  - New guidelines classify albuminuria as mild, moderately or severely increased.
- First morning void preferable.
- 24hr urine test rarely necessary.
Criteria for CKD

• Abnormalities of kidney structure or function, present for >3 months, with implications for health.
• Either of the following must be present for >3 months:
  o ACR >30 mg/g
  o Markers of kidney damage (one or more*)
  o GFR <60 mL/min/1.73m²

*Markers of kidney damage can include nephrotic syndrome, nephritic syndrome, tubular syndromes, urinary tract symptoms, asymptomatic urinalysis abnormalities, asymptomatic radiologic abnormalities, hypertension due to kidney disease.
# Classification of CKD Based on GFR and Albuminuria Categories: “Heat Map”

## Albuminuria categories

<table>
<thead>
<tr>
<th>Description and range</th>
<th>A1</th>
<th>A2</th>
<th>A3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal to mildly increased</td>
<td>30-299 mg/g</td>
<td>≥300 mg/g</td>
<td></td>
</tr>
<tr>
<td>Moderately increased</td>
<td>3-29 mg/mmol</td>
<td>≥30 mg/mmol</td>
<td></td>
</tr>
<tr>
<td>Severely increased</td>
<td>&lt;3 mg/mmol</td>
<td>&lt;30 mg/g</td>
<td></td>
</tr>
</tbody>
</table>

## Prognosis of CKD by GFR and Albuminuria Categories

<table>
<thead>
<tr>
<th>GFR categories (mL/min/1.73m²)</th>
<th>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>≥90</td>
<td>Green</td>
<td>Yellow</td>
<td>Orange</td>
<td>Red, very high risk</td>
<td>Yellow</td>
<td></td>
</tr>
<tr>
<td>Mildly decreased</td>
<td>60-89</td>
<td>Green</td>
<td>Orange</td>
<td>Yellow</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mildly to moderately decreased</td>
<td>45-59</td>
<td>Yellow</td>
<td>Orange</td>
<td>Red</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderately to severely decreased</td>
<td>30-44</td>
<td>Orange</td>
<td>Red</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severely decreased</td>
<td>15-29</td>
<td>Red</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kidney failure</td>
<td>&lt;15</td>
<td>Yellow</td>
<td></td>
<td></td>
<td></td>
<td></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

Impact of Primary Care CKD Detection with a Patient Safety Approach

Improved diagnosis creates opportunity for strategic preservation of kidney function.

CKD Patient Safety Issues

- **Medication errors**
  - Toxicity (nephrologic or other)
  - Improper dosing
  - Inadequate monitoring

- **Electrolytes**
  - Hyperkalemia
  - Hypoglycemia
  - Hypermagnesemia
  - Hyperphosphatemia

- **Miscellaneous**
  - Multidrug-resistant infections
  - Arm preservation/dialysis access

CKD Patient Safety Issues

• **Diagnostic tests**
  - Iodinated contrast media: AKI
  - Gadolinium-based contrast: Nephrogenic systemic fibrosis (NSF)
  - Sodium Phosphate bowel preparations: AKI, CKD

• **CVD**
  - Missed diagnosis
  - Improper management

• **Fluid management**
  - Hypotension
  - AKI
  - CHF exacerbation

AKI = acute kidney injury; CHF = congestive heart failure; NSF = nephrogenic systemic fibrosis.
Key Points on Medications in CKD

- CKD patients at high risk for drug-related adverse events.
- Several classes of drugs renally eliminated.
- Consider kidney function and current eGFR (not just SCr) when prescribing meds.
- Minimize pill burden as much as possible.
- Remind CKD patients to avoid NSAIDs.
- No Dual RAAS blockade.
- Any med with >30% renal clearance probably needs dose adjustment for CKD.
- No bisphosphonates for eGFR <30 mL/min/1.73m².
- Avoid GAD for eGFR <30 mL/min/1.73m².
Indications for Referral to Specialist Kidney Care Services for People with CKD

- Acute kidney injury or abrupt sustained fall in GFR
- GFR <30 mL/min/1.73m² (GFR categories G4-G5)
- Persistent albuminuria (ACR >300 mg/g)*
- Atypical Progression of CKD
- Urinary red cell casts, RBC more than 20 per HPF sustained and not readily explained
- Hypertension refractory to treatment with 4 or more antihypertensive agents
- Persistent abnormalities of serum potassium
- Recurrent or extensive nephrolithiasis
- Hereditary kidney disease

*Significant albuminuria is defined as ACR ≥300 mg/g (≥30 mg/mmol) or AER ≥300 mg/24 hours, approximately equivalent to PCR ≥500 mg/g (≥50 mg/mmol) or PER ≥500 mg/24 hours

**Progression of CKD is defined as one or more of the following: 1) A decline in GFR category accompanied by a 25% or greater drop in eGFR from baseline; and/or 2) rapid progression of CKD defined as a sustained decline in eGFR of more than 5mL/min/1.73m²/year. KDOQI US Commentary on the 2012 KDIGO Evaluation and Management of CKD.