



National  
Kidney  
Foundation®

*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.

# Classification of CKD Based on GFR and Albuminuria Categories: "Heat Map"

CKD is classified based on:

- Cause (C)
- GFR (G)
- Albuminuria (A)

|   |     |                                  |       | Albuminuria categories     |                             |                          |
|---|-----|----------------------------------|-------|----------------------------|-----------------------------|--------------------------|
|   |     |                                  |       | Description and range      |                             |                          |
|   |     |                                  |       | A1                         | A2                          | A3                       |
|   |     |                                  |       | Normal to mildly increased | Moderately increased        | Severely increased       |
|   |     |                                  |       | <30 mg/g<br><3 mg/mmol     | 30-299 mg/g<br>3-29 mg/mmol | ≥300 mg/g<br>≥30 mg/mmol |
| GFR categories (ml/min/1.73 <sup>2</sup> )<br>Description and range | G1  | Normal or high                   | ≥90   | 1 if CKD                   | Monitor<br>1                | Refer*<br>2              |
|   | G2  | Mildly decreased                 | 60-89 | 1 if CKD                   | Monitor<br>1                | Refer*<br>2              |
|   | G3a | Mildly to moderately decreased   | 45-59 | Monitor<br>1               | Monitor<br>2                | Refer<br>3               |
|   | G3b | Moderately to severely decreased | 30-44 | Monitor<br>2               | Monitor<br>3                | Refer<br>3               |
|   | G4  | Severely decreased               | 15-29 | Refer*<br>3                | Refer*<br>3                 | Refer<br>4+              |
|   | G5  | Kidney failure                   | <15   | Refer<br>4+                | Refer<br>4+                 | Refer<br>4+              |

**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.

Adapted from Kidney Disease: Improving Global Outcomes (KDIGO) CKD Work Group. *Kidney Int Suppl.* 2013;3:1-150.

# eGFR, SCr Comparison

| Age | Weight in lbs<br>Height in Ft/in | Sex | Race      | SCr<br>mg/dl | eGFR ml/<br>min<br>per CKD-EPI | eGFR<br>Adj for BSA |
|-----|----------------------------------|-----|-----------|--------------|--------------------------------|---------------------|
| 25  | 285<br>6'                        | M   | AA        | 1.6          | 68                             | 97                  |
| 49  | 180<br>5'4"                      | F   | Hispanic  | 1.6          | 38                             | 41                  |
| 67  | 155<br>5'8"                      | M   | Asian     | 1.6          | 44                             | 46                  |
| 92  | 98<br>5'1"                       | F   | Caucasian | 1.6          | 28                             | 22                  |



# Average Measured GFR by Age in People Without CKD

| Age (Years) | Average Measured GFR (mL/min/1.73 m <sup>2</sup> ) |
|-------------|--|
| 20-29       | 116  |
| 30-39       | 107  |
| 40-49       | 99   |
| 50-59       | 93   |
| 60-69       | 85   |
| 70+         | 75   |

# 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

# 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  $\geq 300$  mg albumin/g creatinine
  - 24-hour urine albumin  $>300$  mg/d
- Proteinuria
  - (+) urine dipstick at  $>30$  mg/dl
  - $\geq 200$  mg protein/g creatinine
  - 24-hour urine protein  $>300$  mg/d





# 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.

# Goals for Renoprotection

- Target blood pressure in non-dialysis CKD:<sup>1</sup>
  - ACR <30 mg/g:  $\leq 140/90$  mm Hg
  - ACR 30-300 mg/g:  $\leq 130/80$  mm Hg\*
  - ACR >300 mg/g:  $\leq 130/80$  mm Hg
  - Individualize targets and agents according to age, coexistent CVD, and other comorbidities.
- **Avoid ACEi and ARB in combination.**<sup>3,4</sup>
  - 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.)<sup>2</sup>

- 1) Kidney Disease: Improving Global Outcomes (KDIGO) Blood Pressure Work Group. *Kidney Int Suppl.* (2012);2:341-342.
- 2) KDOQI Commentary on KDIGO Blood Pressure Guidelines. *Am J Kidney Dis.* 2013;62:201-213.
- 3) Kunz R, et al. *Ann Intern Med.* 2008;148:30-48.
- 4) Mann J, et al. ONTARGET study. *Lancet.* 2008;372:547-553.

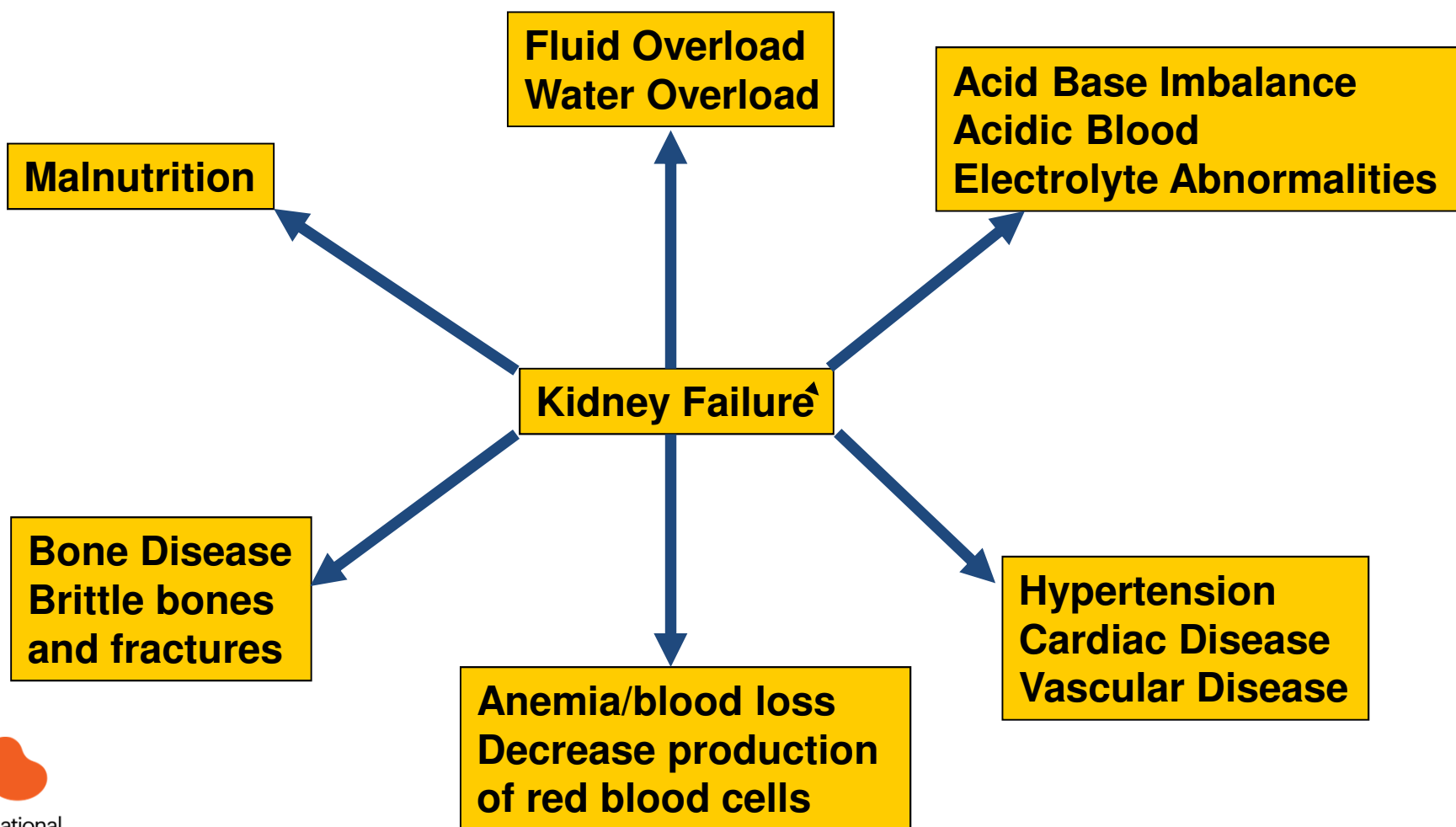
# Managing Hyperglycemia

- 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.

# Complications of Kidney Failure Start in Stage 3 and Progress



# 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.