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.

National Kidney Foundation®

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

CKD is classified based on:

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

GFR categories (ml/min/1.73 m^2) Description and range				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**
	G1	**Normal or high**	**≥90**	1 if CKD	Monitor 1	Refer* 2
	G2	**Mildly decreased**	**60-89**	1 if CKD	Monitor 1	Refer* 2
	G3a	**Mildly to moderately decreased**	**45-59**	Monitor 1	Monitor 2	Refer 3
	G3b	**Moderately to severely decreased**	**30-44**	Monitor 2	Monitor 3	Refer 3
	G3	**Severely decreased**	**15-29**	Refer* 3	Refer* 3	Refer 4+
	G5	**Kidney failure**	**<15**	Refer 4+	Refer 4+	Refer 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 Suppls*. 2013;3:1-150.

National Kidney Foundation®

eGFR, SCr Comparison

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

National Kidney Foundation®

Average Measured GFR by Age in People Without CKD

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

National Kidney Foundation®

Coresh J, et al. *Am J Kidney Dis.* 2003;41(1):1-12.

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

National Kidney Foundation®

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

National Kidney Foundation®

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

National Kidney Foundation®

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.

National Kidney Foundation®

Fujisaki K, et al. Impact of combined losartan/hydrochlorothiazide on proteinuria in patients with CKD and hypertension. *Hypertens Res*. 2014;37:993-998.

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).

National Kidney Foundation®

*Reasonable to select a goal of 140/90 mm Hg, especially for moderate albuminuria (ACR 30-300 mg/g.)[2]

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.

National Kidney Foundation®

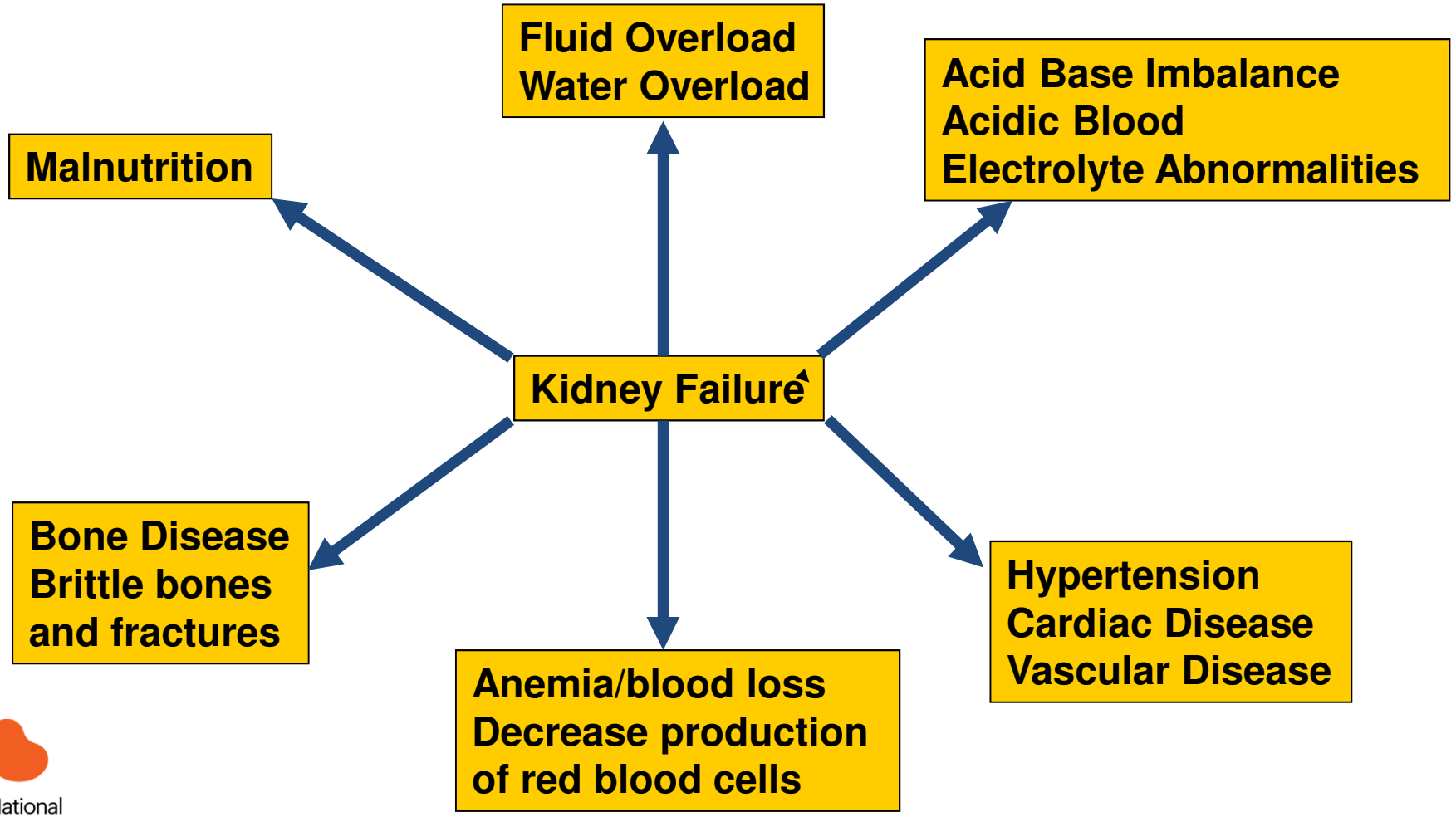
NKF KDOQI. Diabetes and CKD: 2012 Update. *Am J Kidney Dis*. 2012;60:850-856.

Other Goals of CKD Management

- 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.

National Kidney Foundation®

Complications of Kidney Failure Start in Stage 3 and Progress



National Kidney Foundation®

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.

National Kidney Foundation®