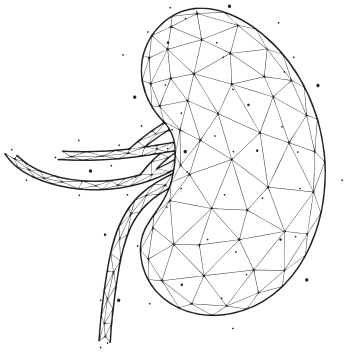
AdventHealth

Clinical Care Pathways

January 2025



Chronic Kidney Disease

CHRONIC KIDNEY DISEASE (CKD) is both significantly negatively impactful to patient health and greatly underdiagnosed. Fourteen percent of US adults, or about 35.5 million people, are estimated to have CKD. Of these, 9 of 10 do not know that they have CKD.[1]

Additionally, chronic kidney disease remains a significant healthcare expenditure. Total Medicare Fee for Service (FFS) spending for all beneficiaries with CKD was $86.1 billion in 2021, representing 22.6% of total Medicare FFS expenditures. Additionally, although inflation-adjusted expenditures for all FFS beneficiaries decreased by 3.3% from 2011 to 2021, there was a 40% increase in spend, from $54.9 billion in 2011 to $76.8 billion in 2021, for individuals with CKD.[2]

This scenario identifies a singular opportunity for primary care providers to both positively impact the health of the patients that they serve by timely identifying, appropriately staging and treating chronic kidney disease and to concurrently reduce avoidable spend by slowing progression of chronic kidney disease to chronic kidney failure.

35.5 M
estimated number of US adults with CKD

9/10
people with CKD do not know they have it

Key Points

- Identify and screen individuals at risk for CKD
- Appropriately differentiate chronic kidney disease from acute kidney injury
- Classify CKD stage using both estimated glomerular filtration rate AND Albumin-to-Creatinine Ratio
- Use CKD stage to identify appropriate treatment plan and therapeutic interventions.

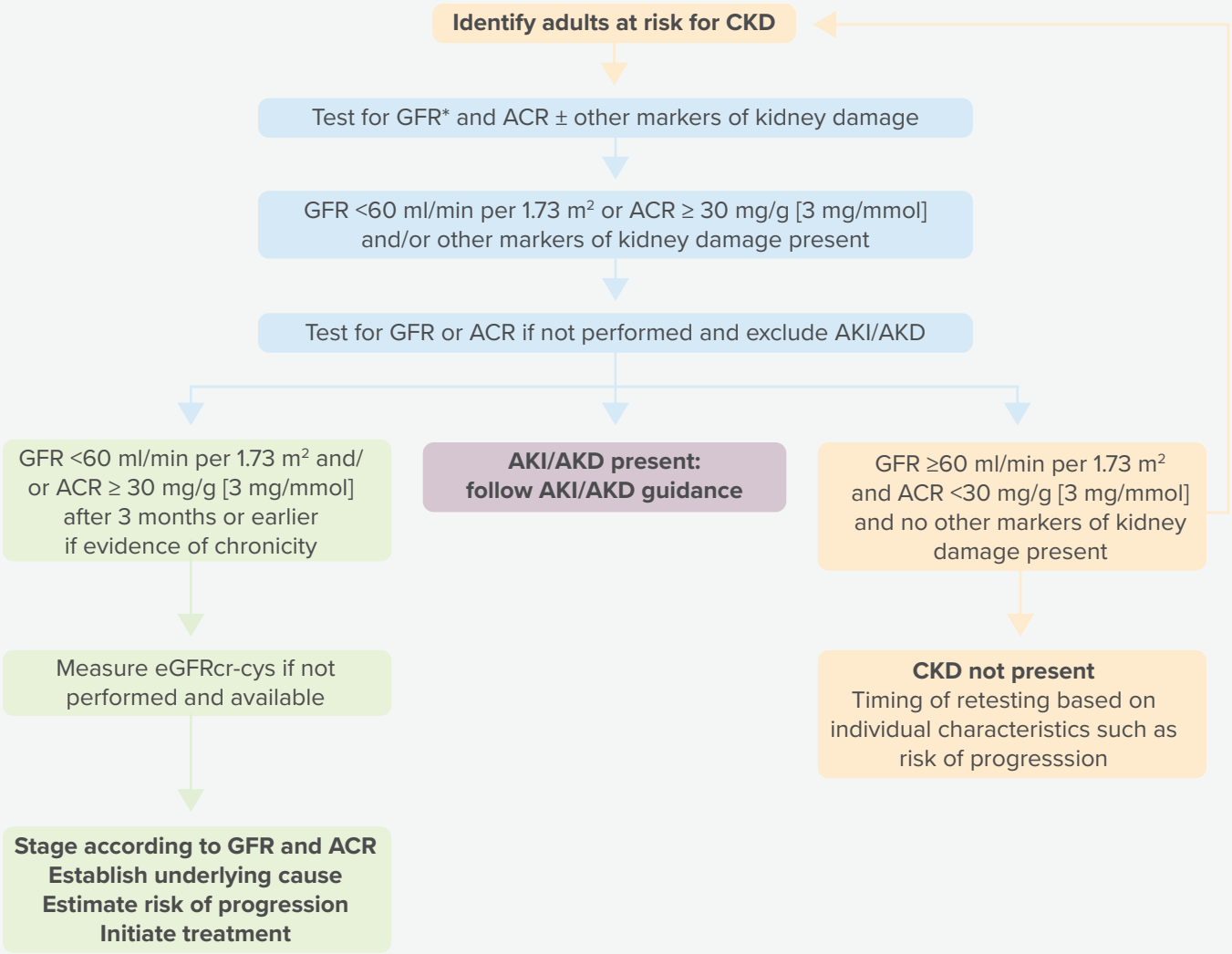
INSIDE

CKD Screening

The AdventHealth Provider Network — Florida (AHPN-FL) board of managers has approved the following recommendations for screening for CKD. These recommendations are based on an amalgamation of National Kidney Foundation and the Kidney Disease Improving Global Outcomes 2024 work group guidelines. A high-level CKD screening, diagnosis, and staging algorithm (Figure 1)[3] is provided below.

FIGURE 1

Algorithm for screening, diagnosis and staging of chronic kidney disease (CKD) in adults



CKD Screening and Management: Clinical Background

The National Kidney Foundation has identified five steps in CKD management. They are ***Know***, ***Recognize***, ***Screen***, ***Classify*** and ***Implement***.

The first step, ***Know***, highlights the importance of a thorough understanding of the criteria for chronic kidney disease. Chronic Kidney disease is defined as abnormalities of kidney structure or function, defined as one or more markers of kidney damage (e.g., increased serum creatinine or electrolyte abnormalities, proteinuria, abnormal renal imaging, urine sediment abnormalities, hematuria or history of kidney transplant) or an estimated glomerular filtration rate (eGFR) less than 60 mL/min/1.73m2. In either case, these abnormalities must be present for a minimum of 3 months and must additionally have implications for health.[3]

The second step, ***Recognize***, identifies the need to recognize diseases that drive ongoing decline in kidney function. These drivers may be sub-categorized into anatomic abnormalities, autoimmune diseases, genetic syndromes, infectious diseases, malignancy, medications and drug use, metabolic, obstructive, and vascular disorders (Table 1).[4] The most common causes of CKD are hypertension and diabetes and collectively, these account for more than 50% of CKD cases.

The third step, ***Screen***, stresses the importance of screening appropriate patient populations and deploying the appropriate screening tests. Screening is performed with an eGFR and urine microalbumin-to-creatinine ratio.

Screen all adults with known hypertension, diabetes, congestive heart failure (CHF), cardiovascular disease (CVD) & all adults 60 or older annually with an eGFR and a urine microalbumin/creatinine ratio.

TABLE 1 | CKD Management Plan

- ***Know*** the criteria for CKD
- ***Recognize*** CKD risk factors
- ***Screen*** for CKD
- ***Classify*** CKD to guide further testing and treatment
- ***Implement*** a clinical action plan based on patient's CKD classification

TABLE 2 | Causes of Chronic Kidney Disease

CATEGORY	EXAMPLES
Anatomic	• Congenital anomalies of urinary tract • Reflux nephropathy • Single kidney
Autoimmune	• Cryoglobulinemia • Poststreptococcal glomerulonephritis • Systemic lupus erythematosus
Genetic	• Alport syndrome • Polycystic kidney disease
Infectious	• Hepatitis B virus • Hepatitis C virus • HIV
Malignancy	• Multiple myeloma • Renal cell cancer
Medications/ drugs	• Chemotherapy • Herbal supplements (anthraquinones, aristolochic acid) • Immunotherapy • Intravenous drug use (cocaine. heroin) • Lithium • Nonsteroidal anti-inflammatory drugs
Metabolic	• Diabetes mellitus
Obstructive	• Benign prostatic hyperplasia • Kidney stones • Pelvic tumor
Vascular	• Heart failure • Hypertension • Peripheral artery disease

It is important to note, however, that all CKD screening tests may be impacted by other patient specific variables.[3, 5] For example, eGFR may over or under-convey CKD status in instances of a patient with high or low muscle mass, or in Black patients. When the clinician is unsure that creatinine based eGFR equation presents the true picture of kidney function, they should consider checking Cystatin C levels. While Cystatin C is not impacted by muscle mass it is, in turn, impacted by other factors, e.g., steroid use, thyroid disease, inflammation, acute renal disease and cancer. Because of this, measurement of renal function utilizing a dual methodology (creatinine and cystatin C) is more accurate and is helpful in specific cases and when clinically appropriate.

Once CKD is diagnosed, the fourth step in the CKD treatment algorithm, ***Classify***, enables appropriate intervention selection based on the severity of the patient's current disease and additionally, an understanding of the future likelihood of a patient's disease progression to renal failure.

Chronic Kidney Disease is defined based on Cause, Glomerular filtration rate (GFR) category (G1–G5), and Albuminuria category (A1–A3), abbreviated as CGA. GFR, in turn, is categorized into five stages (Table 3) with G1 describing normal renal filtration rate and G2 to G5 describing mildly decreased renal filtration rate to renal failure, respectively. Likewise, albumin-to-creatinine ratio (Table 4) is categorized as A1 to A3, with the A1 stage defined as normal and A2 and A3 showing moderate to severe levels of albuminuria.

An understanding of the current eGFR and albumin to creatinine ratio stages enables the practitioner to understand the likelihood of associated CKD complications including an increase in all-cause mortality and cardiovascular mortality and an increased risk of myocardial infarction, stroke, heart failure, atrial fibrillation, and renal failure and to correctly ***Implement*** a stage appropriate CKD treatment plan. Specific risk likelihood per complication are identified on the next page (Figure 2).[3] These demonstrate a significant correlation between decreased eGFR, increased albuminuria and increased morbidity and mortality including a higher risk for progression to renal failure.

TABLE 3 | CKD GFR Stages

G1:	eGFR ≥ 90 ml/min per 1.73 m^2
G2:	eGFR 60-89 ml/min per 1.73 m^2
G3a:	eGFR 45-59 ml/min per 1.73 m^2
G3b:	eGFR 30-44 ml/min per 1.73 m^2
G4:	eGFR 15-29 ml/min per 1.73 m^2
G5:	eGFR <15 ml/min per 1.73 m^2

TABLE 4 | CKD Albuminuria Stages

A1:	< 30 mg/g or less than 3 mg/mmol
A2:	30-300 mg /g or 3-30 mg/mmol
A3:	> 300 mg/g or 30 mg/mmol

Use current eGFR and ACR to:

- Stage CKD
- Understand the likelihood of associated CKD complications including an increase in all-cause mortality and cardiovascular mortality and an increased risk of myocardial infarction, stroke, heart failure, atrial fibrillation, and renal failure.
- Implement a stage appropriate CKD treatment plan.

FIGURE 2

Associations of chronic kidney disease (CKD) staging by estimated glomerular filtration rate by creatinine (eGFRcr) and urine albumin-to-creatinine ratio (uACR) categories and risks for 10 common complications in multivariable-adjusted analysis.

Overall	Urine albumin-creatine ration, mg/g					Urine albumin-creatine ration, mg/g				
eGFRcr	<10	10-29	30-299	300-999	1000+	<10	10-29	30-299	300-999	1000+
	All-cause mortality: 82 cohorts 26 444 384 participants; 2 604 028 events					Myocardial infarction: 64 cohorts 22 838 356 participants; 451 063 events				
105+	1.6	2.2	2.9	4.3	5.8	1.1	1.4	2.0	2.7	3.8
90-104	ref	1.3	1.8	2.6	3.1	ref	1.3	1.6	2.2	3.2
60-89	1.0	1.3	1.7	2.2	2.8	1.1	1.3	1.6	2.2	3.1
45-59	1.3	1.6	2.0	2.4	3.1	1.4	1.7	2.0	2.8	3.7
30-44	1.8	2.0	2.5	3.2	3.9	1.9	2.0	2.4	3.2	4.3
15-29	2.8	2.8	3.3	4.1	5.6	2.7	3.1	3.1	4.2	5.1
<15	4.6	5.0	5.3	6.0	7.0	4.6	5.6	4.8	6.0	6.0
	Cardiovascular mortality: 76 cohorts 26 022 346 participants; 776 441 events					Stroke: 68 cohorts 24 746 436 participants; 461 785 events				
105+	1.4	2.0	3.0	4.1	5.4	1.2	1.6	2.2	3.1	4.3
90-104	ref	1.3	1.9	2.7	3.6	ref	1.3	1.6	2.4	3.1
60-89	1.0	1.4	1.7	2.4	3.2	1.1	1.3	1.7	2.2	3.0
45-59	1.4	1.7	2.2	2.8	3.8	1.4	1.6	1.9	2.3	2.9
30-44	2.0	2.3	2.8	3.7	4.6	1.6	1.7	2.0	2.4	3.0
15-29	3.2	3.1	3.5	5.0	6.5	1.8	2.1	2.1	2.7	3.0
<15	6.1	6.4	6.4	7.3	8.2	3.2	2.8	2.9	3.2	3.8
	Kidney failure with replacement therapy: 57 cohorts 25 466 956 participants; 158 846 events					Heart failure: 61 cohorts 24 603 016 participants; 1 132 443 events				
105+	.05	1.2	2.9	7.7	25	1.2	1.7	2.7	4.2	6.9
90-104	ref	1.8	4.3	12	43	ref	1.3	2.0	2.8	4.2
60-89	2.3	4.9	10	27	85	1.1	1.4	1.9	2.7	4.2
45-59	13	19	37	89	236	1.6	1.8	2.4	3.4	5.0
30-44	50	58	115	240	463	2.2	2.5	3.1	4.2	6.5
15-29	283	301	443	796	1253	3.6	3.5	4.1	5.8	8.1
<15	770	1040	1618	2297	2547	5.1	5.7	5.8	7.9	9.9
	Acute kidney injury; 49 cohorts 23 914 614 participants; 1 408 929 events					Atrial fibrillation: 50 cohorts 22 866 642 participants; 1 068 701 events				
105+	1.0	1.6	2.4	3.7	5.5	1.1	1.3	1.7	2.4	3.5
90-104	ref	1.4	2.1	3.2	5.0	ref	1.2	1.5	1.9	2.3
60-89	1.6	2.2	3.1	4.3	6.7	1.0	1.2	1.4	1.7	2.2
45-59	3.5	4.0	5.1	6.9	9.0	1.2	1.3	1.5	1.8	2.4
30-44	5.6	5.9	6.8	8.6	11	1.4	1.5	1.7	2.0	2.4
15-29	8.3	8.0	8.5	9.9	10	1.9	1.8	2.0	2.6	3.0
<15	8.5	11	7.9	5.5	5.7	2.6	2.5	3.1	3.6	4.2
	Hospitalization: 49 cohorts 25 426 722 participants; 8 398 637 events					peripheral artery disease: 54 cohorts 24 830 794 participants; 378 924 events				
105+	1.4	1.7	2.1	2.1	2.3	0.9	1.4	1.9	2.8	5.0
90-104	ref	1.1	1.3	1.5	1.7	ref	1.3	1.9	2.8	4.3
60-89	1.0	1.1	1.3	1.5	1.8	1.0	1.3	1.8	2.5	3.8
45-59	1.3	1.3	1.5	1.7	2.1	1.5	1.7	2.1	2.9	4.2
30-44	1.5	1.5	1.6	1.9	2.3	2.0	1.9	2.5	3.6	5.0
15-29	1.8	1.8	1.9	2.4	2.8	3.3	3.3	3.8	5.7	8.1
<15	2.7	2.8	3.0	3.2	3.8	9.1	9.0	9.6	13	14

Numbers reflect the adjusted hazard ratio compared with the reference cell. Adjustment variables included age, sex, smoking status (current, former, or never), systolic blood pressure, total cholesterol, high-density lipoprotein cholesterol, body mass index, use of antihypertensive medications, and a medical history of diabetes, coronary heart disease, stroke, heart failure, atrial fibrillation, peripheral artery disease, cancer, and chronic obstructive pulmonary disease, where relevant. The colors were determined for each outcome separately using the following rule: the percentile shaded the darkest green color corresponds to the proportion of cells in the grid without CKD (e.g., 6 of 35 cells with eGFR ≥ 60 ml/min per 1.73 m2 and ACR <30 mg/g [<3 mg/mmol]), and the percentile shaded the darkest red color corresponds to proportion expected to be at highest risk (e.g., 11 of 35 cells with eGFR <15 ml/min per 1.73 m2 and albumin-to-creatinine ratio 1000+ mg/g [100+ mg/mmol]). In this manner, the numbers of green and red cells are consistent across outcomes, but the patterns are allowed to differ. The term "ref" represents the reference cell.

Grams ME, Coresh J, Matsushita K, et al. Estimated glomerular filtration rate, albuminuria, and adverse outcomes: an individual-participant data meta-analysis. JAMA. 2023;330(13):1266–1277.

CKD Management

The AHPN-FL Board of Managers has approved the following recommendations for CKD treatment (see below). These recommendations are based on an amalgamation of National Kidney Foundation and the Kidney Disease Improving Global Outcomes 2024 work group guidelines. As in all medical decision-making, healthcare providers should always consider the indication, benefit-risk profile, and potential side effects of all treatments while concurrently considering patient accessibility and treatment availability, local health policies, cultural practices, affordability, and patient preferences.

Recommend Lifestyle Changes

- **Patients should initiate a Dietary Approaches to Stop Hypertension (DASH), Mediterranean diet, or similar eating plan. Patients with stage 4 or 5 chronic kidney disease, should limit total protein intake to 0.6 to 0.8 g/kg/day to reduce CKD progression.**[3] Protein restriction may additionally be initiated at CKD stage 3b, especially if the patient is at elevated risk for progression to end stage kidney disease, at the provider's discretion. Stringent protein restriction may cause malnutrition and should be avoided.
- **Patients should exercise with goal of a minimum of 150 minutes of moderate aerobic exercise per week.**[3]
- **Advise patients to stop smoking.**[3]

Monitor Renal Function

- **Check eGFR and uACR every 6 months or more frequently if clinically indicated.**

Renal Dosing, Medications, Supplements and Herbals

- **Review all medications, supplements and herbals and adjust as clinically appropriate.** A listing of common medications is attached (Figure 4) but is not intended as a complete listing. Please refer to specific drug monograph for full details, per pharmacologic agent.

Screen and Treat for Other Comorbid Diseases

Screenings and Treatments for Other Comorbid Diseases

DIABETES

- **Screen on diagnosis and then as clinically indicated.**[3, 4]
- **In patients with CKD and diabetes, a target A1C of 6.5% to 8% is recommended.** This has been proven to prevent or slow microvascular disease progression, including nephropathy.
- **Sodium-glucose co-transporter 2 inhibitors (SGLT2i) and metformin are recommended as first-line treatments in patients with CKD and type 2 diabetes who have not reached their glycemic goal.** Metformin is contraindicated in CKD stages 4 and 5. SGLT2i are contraindicated with EGFR of less than 20 mL/min/1.73m2.
- **Glucagon-like peptide-1 (GLP-1) receptor agonists may also be utilized for patients with concurrent obesity given the demonstrated protective effects against CKD progression, cardiovascular disease, and all-cause mortality.**
- **If eGFR is less than or equal to 20 mL/min/1.73m2, insulin is the preferred therapy. Treat patients with urine albumin-to-creatinine ratio of 30 mg/g or greater with a RASi (ACE inhibitors are preferred). Titrate RASi to maximum tolerated dose with goal of reducing urine albumin-to-creatinine ratio to less than 30 mg/g.**
- **Nonsteroidal mineralocorticoid antagonists (ns-MRA) should be used in individuals with type 2 diabetes mellitus and a persistent urine albumin-to-creatinine ratio greater than 30 milligrams/gram and who have a baseline potassium of less than or equal to 5 and an eGFR of ≥ 25 mL/min/1.73m2 and who are on maximum tolerated RASi.**

HYPERLIPIDEMIA

- **Screen on diagnosis and then as clinically indicated. Initiate a Mediterranean-type diet.**
- **Initiate moderate-intensity statin therapy treating hypercholesterolemia or mixed hyperlipidemia in all adults 50 years of age or greater.**
- **Initiate moderate-intensity statin therapy in adults 18-49 years of age with history of known coronary artery, disease, diabetes mellitus, prior ischemic stroke or TIA, revascularization, or PAD or who have an ASCVD risk score of greater than 10%.** Examples of moderate-intensity statin therapy include pravastatin 80 mg, simvastatin 40 mg, atorvastatin 20 mg and rosuvastatin 10 mg.
- **Treat hypertriglyceridemia with a plant based Mediterranean-type diet and activity.**

Please note that KDIGO guidelines recommend against ongoing monitoring of lipids solely for CKD as once patient meets criteria for initiation of statin therapy, as regardless of cholesterol level, statin therapy should continue.

Screenings and Treatments for Other Comorbid Diseases

HYPERTENSION

- **Screen on diagnosis and then at minimum every 6 months in office. Encourage routine patient home testing.**
- **Maintain blood pressure less than 140/90 mm Hg with blood pressure control goal for all CKD patients, if clinically possible, at 120/80 or less mm Hg.**
- **Use a RASi (Renin Angiotensin System inhibitor) such as an ACE inhibitor or an angiotensin receptor blocker, when possible, as first-line agent.** Both classes are preferred in patients without diabetes who have CKD and microalbuminuria due to a demonstrated reduction in progression to end-stage renal disease, with a goal of reaching the highest-tolerated dose to maximize benefit.[4]

OBESITY

- **Screen on diagnosis and then at minimum every 6 months in office. Initiate a team-based lifestyle and dietary program to assist with weight loss. Consider adding a GLP-1 agonist if possible.**

ANEMIA

- **Screen with hemoglobin at minimum every 6 months for stage 3, 4 and 5 chronic kidney disease.**

BONE MINERAL DISEASE

- **Screen for bone loss with DEXA once in a patient with stage 3, 4 and 5 chronic kidney disease then as indicated. Treat as Clinically appropriate.**
- **Screen serum parathyroid hormone, serum calcium and phosphorus every 12 months in a patient with stage 4 chronic kidney disease and every 6 months in a patient with stage 5 chronic kidney disease. Treat as clinically appropriate.**

MALNUTRITION

- **Screen for malnutrition patients with stage 4 and 5 CKD, if patient is 65 years or older or is experiencing involuntary weight loss, frailty or poor appetite every 6 months.** Use a validated tool, e.g., malnutrition universal screening tool (e.g., MUST).

Nephrology Referral

- **Refer all CKD stage G4 and G5 or CKD with stage significant albuminuria. Consider earlier referral based on comfort level or clinical judgement.** This decision was made as patients with higher albumin-to-creatinine ratios and lower glomerular filtration rates are at higher risk to progress to renal failure. This is visually represented in the KDIGO histogram (figure 3). Patient's that should be seen by Nephrology are identified in red in the histogram. Patients that should be considered for referral to Nephrology based on comfort level or clinical judgment are identified in yellow or orange in the histogram.[3]

FIGURE 3

Progression of chronic kidney disease (CKD) by estimated glomerular filtration rate (eGFR) and albuminuria categories

KDIGO: Prognosis of CKD by GFR and albuminuria categories				Persistent albuminuria categories Description and range		
				A1	A2	A3
				Normal to mildly increased	Moderately increased	Severely increased
				<30 mg/g <3 mg/mmol	30-300 mg/g 3-30 mg/mmol	>300 mg/g >30 mg/mmol
GFR categories (ml/min/1.73 m²) Description and range	G1	Normal or high	≥90			
	G2	Mildly decreased	60-89			
	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.

Chronic Kidney Disease (CKD) Ambulatory Management Guide

Initiate the Following Interventions at All CKD Stages:

LIFESTYLE:
DASH or Mediterranean-type diet, exercise, smoking cessation.

MANAGE OTHER MEDICAL ISSUES IMPACTING CKD:
Hypertension, diabetes mellitus, CHF, Personal history of MI, revascularization, ischemic CVA or TIA, lupus, RA, etc.

MONITOR RENAL FUNCTION (eGFR & ACR):
Every 6 months or more frequently.

SCREEN FOR OTHER COMORBID DISEASES:
Diabetes: On diagnosis.
Hyperlipidemia: On diagnosis.
Hypertension: Q6 months.
Obesity: Q6 months.

PHARMACOTHERAPY:
Add minimum moderate-intensity STATIN therapy if ≥50 years old or if 18-49 years old & prior CVD, DM, or ACC risk >10%.

REFERRAL:
Consider Nephrology referral if clinically appropriate.

Initiate Additional CKD Stage Specific Interventions as Below:

	A1 (ACR < 30)	**A2** (ACR 30-300)	**A3** (ACR > 300)
G1 (GFR ≥ 90)		**PHARMACOTHERAPY:** • Add **RASi** • Add **SGLT2i** if uACR is ≥ 200 mg/g	**PHARMACOTHERAPY:** • Add **RASi** • Add **SGLT2i**
G2 (GFR 60-89)		**PHARMACOTHERAPY:** • Add **RASi** • Add **SGLT2i** if uACR is ≥ 200 mg/g	**PHARMACOTHERAPY:** • Add **RASi** • Add **SGLT2i**
G3a (GFR 45-59)	**SCREEN:** • **Anemia:** Annually • **DEXA:** Once in patients at risk **RENAL DOSING:** medications, herbals, supplements	**SCREEN:** • **Anemia:** Annually • **DEXA:** Once in patients at risk **RENAL DOSING:** medications, herbals, supplements **PHARMACOTHERAPY:** • Add **RASi** • Add **SGLT2i** if uACR is ≥ 200 mg/g	**SCREEN:** • **Anemia:** Annually • **DEXA:** Once in patients at risk **RENAL DOSING:** medications, herbals, supplements **PHARMACOTHERAPY:** • Add **RASi** • Add **SGLT2i** **NEPHROLOGY** referral
G3b (GFR 30-44)	**SCREEN:** • **Anemia:** Annually • **DEXA:** Once in patients at risk **RENAL DOSING:** medications, herbal, supplement **PHARMACOTHERAPY:** • Add **SGLT2i**	**SCREEN:** • **Anemia:** Annually • **DEXA:** Once in patients at risk **RENAL DOSING:** medications, herbal, supplement **PHARMACOTHERAPY:** • Add **RASi** • Add **SGLT2i** **NEPHROLOGY** referral	**SCREEN:** • **Anemia:** Annually • **DEXA:** Once in patients at risk **RENAL DOSING:** medications, herbals, supplements **PHARMACOTHERAPY:** • Add **RASi** • Add **SGLT2i** **NEPHROLOGY** referral

	A1 (ACR < 30)	**A2** (ACR 30-300)	**A3** (ACR > 300)
G4 (GFR 15-29)	**LIFESTYLE:** Limit protein intake to 0.8 g/kg/day **SCREEN:** • **Anemia:** Q6 months • **DEXA:** Once in patients at risk • **Malnutrition:** Q6 months • **PTH:** Annually • **Serum Ca and Phos:** Annually **RENAL DOSING:** medications, herbals, supplements **PHARMACOTHERAPY:** • Add **SGLT2i** If eGFR ≥ 20 mL/ minute /1.73 m2 **NEPHROLOGY** referral	**LIFESTYLE:** Limit protein intake to 0.8 g/kg/day **SCREEN:** • **Anemia:** Q6 months • **DEXA:** Once in patients at risk • **Malnutrition:** Q6 months • **PTH:** Annually • **Serum Ca and Phos:** Annually **RENAL DOSING:** medications, herbals, supplements **PHARMACOTHERAPY:** • Add **RASi** • Add **SGLT2i** If eGFR ≥ 20 mL/ minute /1.73 m2 **NEPHROLOGY** referral	**LIFESTYLE:** Limit protein intake to 0.8 g/kg/day **SCREEN:** • **Anemia:** Q6 months • **DEXA:** Once in patients at risk • **Malnutrition:** Q6 months • **PTH:** Annually • **Serum Ca and Phos:** Annually **RENAL DOSING:** medications, herbals, supplements **PHARMACOTHERAPY:** • Add **RASi** • Add **SGLT2i** If eGFR ≥ 20 mL/ minute /1.73 m2 **NEPHROLOGY** referral
G5 (GFR < 15)	**LIFESTYLE:** Limit protein intake to 0.8 g/kg/day **SCREEN:** • **Anemia:** Q6 months • **DEXA:** Once in patients at risk • **Malnutrition:** Q6 months • **PTH:** Q6 months • **Serum Ca and Phos:** Q6 months **RENAL DOSING:** medications, herbals, supplements **NEPHROLOGY** referral	**LIFESTYLE:** Limit protein intake to 0.8 g/kg/day **SCREEN:** • **Anemia:** Q6 months • **DEXA:** Once in patients at risk, then as indicated. • **Malnutrition:** Q6 months • **PTH:** Q6 months • **Serum Ca and Phos:** Q6 months **RENAL DOSING:** medications, herbals, supplements **PHARMACOTHERAPY:** • Consider **RASi** **NEPHROLOGY** referral	**LIFESTYLE:** Limit protein intake to 0.8 g/kg/day **SCREEN:** • **Anemia:** Q6 months • **DEXA:** Once in patients at risk, then as indicated. • **Malnutrition:** Q6 months • **PTH:** Q6 months • **Serum Ca and Phos:** Q6 months **RENAL DOSING:** medications, herbals, supplements **PHARMACOTHERAPY:** • Consider **RASi** **NEPHROLOGY** referral

Definitions:

ACR: Albumin-to-Creatinine Ratio (mg/g)
CKD: Chronic Kidney Disease
DEXA: Dual-energy X-ray absorptiometry
eGFR: Glomerular Filtration Rate (ml/min per 1.73 m^2)
PTH: Parathyroid Hormone
RASi: Renin Angiotensin System Inhibitor (WHILE MULTIPLE DRUG CLASSES inhibit the renin angiotensin system ACE or ARBs specifically referenced)
SGLT2i: Sodium Glucose Cotransporter-2 Inhibitor

References:

KDIGO: kdigo.org/guidelines/ckd-evaluation-and-management/
National Kidney Foundation: www.kidney.org/professionals/guidelines/guidelines_commentaries
USPSTF: www.uspreventiveservicestaskforce.org/uspstf/

This document is intended as a summary of the current AHPN-FL CKD management guidelines. As in all medical decision-making, healthcare providers should always consider the indication, benefit-risk profile, and potential side effects of all treatments while concurrently considering patient accessibility and treatment availability, local health policies, cultural practices, affordability, and patient preferences.

FIGURE 4

CKD: Renal Dosing of Common Medications & Herbals

DRUG CLASS	DRUG	CAUTIONARY NOTES FOR COMMON OUTPATIENT MEDICATIONS
Analgesics	NSAIDs	Prolonged therapy is not recommended when GFR <60 mL/min/1.73 m^2, Avoid when GFR <30 mL/min/1.73 m^2
	Opioids	Reduce dose of renally excreted agents (morphine, hydrocodone, codeine) when GFR <60 mL/min/1.73 m^2 Use with caution in patients with GFR <15 mL/min/1.73 m^2
Anticoagulants	Low-molecular-weight heparins	Reduce dose by 50% when GFR <30 mL/min/1.73 m^2
	Warfarin	Increased risk of bleeding when GFR <30 mL/min/1.73 m^2
	Direct Oral Anticoagulants	If GFR is <60 mL/min/1.73 m^2 , confirm correct dosing because recommended dose varies by indication and level of kidney function
Antihypertensives/ cardiac medications	RASi (ACE-I, ARB, aldosterone antagonist, direct renin inhibitor)	Start at lower dose in patients with GFR <45 mL/min/1.73 m^2 Consider temporarily holding during IV contrast administration, or any potential cause of volume depletion (bowel preparation prior to colonoscopy, acute illness, and surgery) Do not routinely discontinue when GFR <30 mL/min/1.73 m^2 because they may remain nephroprotective
	β-Blockers	Reduce dose of hydrophilic β-blockers (acebutolol, atenolol, bisoprolol, and nadolol) by 50% when GFR <30 mL/min/1.73 m^2
Antimicrobials	Macrolides	Reduce dose by 50% when GFR <30 mL/min/1.73 m^2
	Fluoroquinolones	Reduce dose by 50% when GFR <15 mL/min/1.73 m^2
	Antifungals	Reduce maintenance dose of fluconazole by 50% when GFR <45 mL/min/1.73 m^2
	Trimethoprim	Reduce dose by 50% when GFR <30 mL/min/1.73 m^2
Herbals *Many of these remedies are composed of natural compounds with complex active ingredients that have not been evaluated in people with CKD and/or that may lead to many different adverse effects.*	Chinese herbal medicines- Chinese yew, Hawthorn, Licorice, Ma Huang, etc.	Avoid due to high concentrations of aristolochic acids and alkaloid compounds
	Alfalfa, American Ginseng, Cat's Claw, Chicory leaf, Evening Primrose, Feverfew, Mugwort, etc.	Avoid because contains potassium or phosphorus

DRUG CLASS	DRUG	CAUTIONARY NOTES FOR COMMON OUTPATIENT MEDICATIONS
Hypoglycemics	Sulfonylureas	Avoid mainly renally excreted agents (e.g., glyburide, glimepiride)
	Insulin	Partly renally excreted and may need reduced dose when GFR <30 mL/min/1.73 m^2
	Metformin	Review use when GFR <45 mL/min/1.73 m^2 Avoid when GFR <30 mL/min/1.73 m^2, but consider risk-benefit if GFR is stable Hold in patients during acute illness or before intravenous radiocontrast
Lipid-lowering	Statins	Dose reduction/increased toxicity for GFR <30 mL/min/1.73 m^2 for lovastatin, pravastatin, and rosuvastatin
	Fenofibrate	Associated with elevations in serum creatinine without a true change in GFR
Miscellaneous	Bisphosphonates	Most are not recommended when GFR <30 mL/min/1.73 m^2
	Oral sodium phosphate-containing bowel preparations	Can cause AKI
	Gabapentin	Dose Adjustment Required for <50 mL/min/1.73 m^2
Proton Pump Inhibitors	Dexlansoprazole, Esomeprazole, Lansoprazole, Omeprazole, Pantoprazole, Rabeprazole	If a person no longer has an indication for a PPI, healthcare providers should recognize the opportunity to discontinue the medication

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CKD Clinical Care Pathway
Performance Monitoring Program

Federal anti-trust laws and regulations allow independent hospitals, physicians, and other providers to form clinical integration networks (CIN) that may negotiate prices with payers only when the CIN engages in the facilitation of interdependence and cooperation between providers to reduce low-value spend and improve clinical quality. The Federal Trade Commission (FTC) specifically requires CIN providers to create and support clinical guidelines that continually improve quality and that are utilized to measure network and individual provider performance.

In keeping with the above requirement, and following the recommendations made by the AHPN-FL CKD Focus Group and Medical Management Committee, the AHPN-FL Board of Managers has approved the creation of the ***AHPN-FL CKD Clinical Care Pathway Program***. The program is composed of two arms. The first is a summary of current best practice CKD treatment guidelines. The second programmatic arm is a performance monitoring assessment that highlights divergence between current CKD treatment regimens as compared to best practice CKD treatment protocols at a provider, provider group and network levels. Performance results will additionally reference AHPN-FL measure specific goals; and provider and provider group performance will additionally be ranked against peer performance.

The six CKD performance monitoring metrics below will be utilized to gauge adherence to best practice guidelines. They will be applied to all AHPN-FL patients with a diagnosis of CKD who are not enrolled in hospice or who have not received renal replacement therapy in the past 12 months. Metric performance will be assessed utilizing a claims-based analysis.

For further information, please contact your performance and enablement specialist.

If you do not know who your assigned performance and enablement specialist is, please email PHSO.Network.Support@adventhealth.com or call 800-741-4810.

CKD Clinical Care Pathway: Performance Monitoring Metrics

1. The percentage of patients with a diagnosis of CKD (unspecified or stage 1 through 5) who have a documented eGFR (estimated glomerular filtration rate) & ACR (urine albumin-to-creatinine ratio) in the past 6 months.
2. The percentage of patients with a diagnosis of CKD (unspecified or stage 1 through 5) who are receiving statin therapy in the past 6 months.
3. The percentage of patients with a diagnosis of CKD (stage 3 through 5) that have had a CBC in the past 6 months.
4. The percentage of patients with a diagnosis of CKD (unspecified or stage 1 through 5) who have a concurrent diabetes mellitus type 2 diagnosis and have had an A1c in the past 6 months.
5. The percentage of patients with a diagnosis of CKD (unspecified or stage 1 through 5) who have a concurrent diabetes mellitus type 2 diagnosis and are on a SGLT2i (sodium-glucose linked co-transporter 2 inhibitor) in the past 6 months.
6. The percentage of patients with a diagnosis of CKD (unspecified or stage 1 through 5) who have a concurrent hypertension diagnosis and who filled a prescription for a RASi (Renin Angiotensin inhibitor) in the past 6 months.

AHPN-FL CKD Clinical Care Pathway
Program Development and Approval

The AHPN-FL CKD Monitoring program is an amalgamation of National Kidney Foundation and the Kidney Disease Improving Global Outcomes 2024 Guidelines. These guidelines were approved at the 6/20/24 meeting of the AHPN-FL Board of Managers.

The PHSO clinical team heartfully thanks the following AHPN-FL providers and AdventHealth team members who participated in the creation of the CKD Clinical Care Pathway program.

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Notes


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