

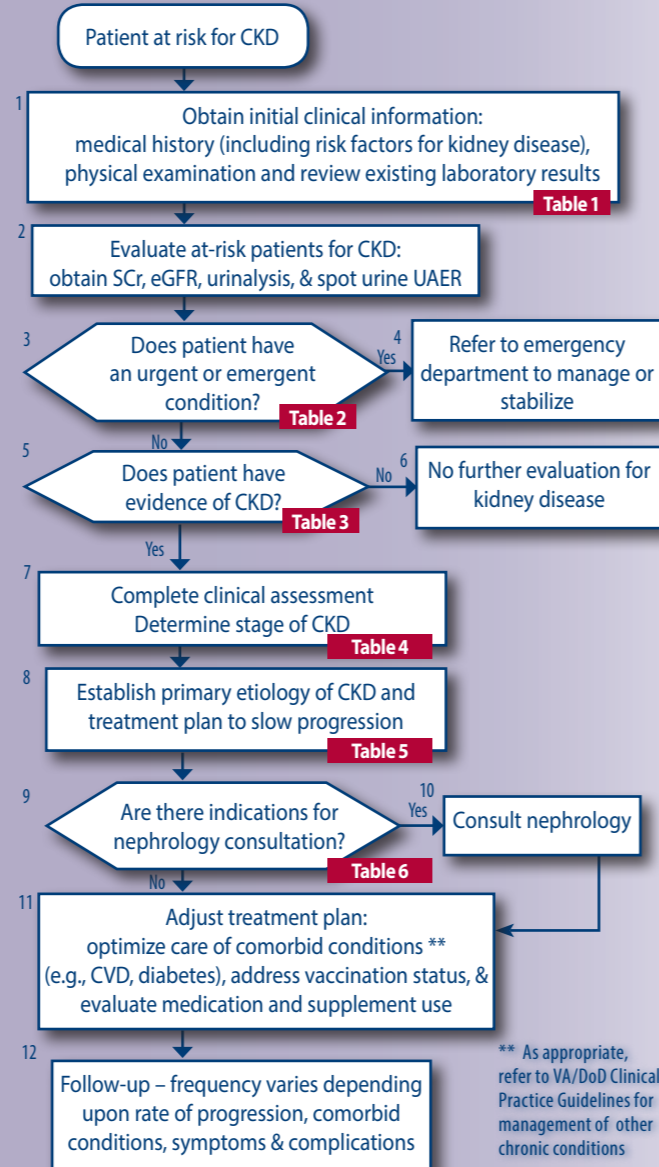
Management of Chronic Kidney Disease in Primary Care

KEY ELEMENTS OF THE CKD GUIDELINE

- » Diagnostic criteria and identification of early disease.
- » Identification of susceptibility factors (adult patients at increased risk for developing CKD).
- » Identification of progression factors (adult patients at high risk for worsening kidney damage and subsequent loss of kidney function).
- » Prevention of conditions that exacerbate chronic kidney disease
- » Evaluation of patients with kidney disease (estimate of GFR, blood pressure, and assessment of albuminuria as a marker of kidney damage).
- » Slowing the progression of CKD.
- » Management of comorbidities.
- » Indication for consultation and referral to a nephrologist.
- » Outline of patient education and preparation for kidney replacement therapy.



Algorithm: Management of CKD



** As appropriate, refer to VA/DoD Clinical Practice Guidelines for management of other chronic conditions

TABLE 1 At-Risk Population

- Diabetes, hypertension, other end organ disease (e.g., CHF), or personal or family history of kidney disease
- Systemic illness (e.g., human immunodeficiency virus (HIV), systemic lupus erythematosus, multiple myeloma)
- History of acute kidney injury (AKI) (e.g., acute tubular necrosis, urinary tract obstruction, interstitial nephritis)
- Elderly patients
- Races and ethnicities associated with increased risk (e.g., African Americans, Hispanics, Native Americans)

TABLE 2 Urgent/Emergent Conditions

- Acute unexplained decline in kidney function
- Heart failure/volume overload
- Hyperkalemia (potassium ≥ 6 mEq/L)
- Signs or symptoms of uremia

TABLE 3 Criteria for Confirmed CKD

CKD is defined as sustained abnormality for > 3 months of **either:**

- eGFR < 60 ml/min/1.73m²

OR any of the following:

- Albuminuria
- Urine sediment abnormality
- Abnormal renal histology
- Structural renal abnormality by imaging
- History of renal transplantation

ACEI=angiotensin-converting enzyme inhibitor, ARB= angiotensin II receptor blocker, CHF=chronic heart failure, CVD=cardiovascular disease, DM=diabetes mellitus, eGFR=estimated glomerular filtration rate, GFR=glomerular filtration rate; RAAS=renin-angiotensin-aldosterone system ; RRT=renal replacement therapy, SCr=serum creatinine, UAER=urinary albumin excretion rate

TABLE 4 Stages of CKD

Stages	eGFR (mL/min/1.73 m ²)	Description
G1	≥ 90	Kidney damage with normal or increased GFR
G2	60-89	Kidney damage with mildly decreased GFR
G3a	45-59	Mildly to moderately decreased GFR
G3b	30-44	Moderately to severely decreased GFR
G4	15-29	Severely decreased GFR
G5	<15 or dialysis	Kidney failure

Albuminuria

Category	Range (mg albumin/g creatinine)	Description
A1	<30 mg/g	Normal to mildly increased
A2	30-300 mg/g	Moderately increased
A3	>300 mg/g	Severely increased

TABLE 5 Strategies to Slow Progression

- Control of hypertension with preferential use of either an ACEI or an ARB in patients with proteinuria
- Individualized control of hyperglycemia
- Dietary protein restriction in patients with stage 3 and 4 CKD (consider consultation with nephrologist or renal dietitian)
- Correction of metabolic acidosis
- Avoid nephrotoxic agents

TABLE 6 Indications for Nephrology Consultation * †

- eGFR < 30 ml/min/1.73m²
- Rapid decline of eGFR (>5 ml/min/1.73m² per year)
- Complications of CKD (e.g., anemia, calcium or phosphorus abnormalities)
- Nephrotic range of proteinuria (>3.5 grams/24 hours)
- Underlying cause of CKD or proteinuria is unclear
- Patient's level of disease exceeds the level of comfort of the primary care provider

* Referral should be made following shared decision making with patient that ensures the referral focus is consistent with the patient values & preferences

† This list is not exhaustive, consult the discussion of Recommendation 16 in the full CPG for more information.

Table 7. Recommended Dosage for ACEIs and ARBs in patients with CKD ^{a,b}		
Drug	Usual Dose Range	Comments/Cautions
Angiotensin-Converting Enzyme Inhibitors (ACEIs)		
Benazepril	10-40 mg divided once or twice daily	<ul style="list-style-type: none"> Start with lower or less frequent doses in patients with CKD (except fosinopril as partial compensation by hepatobiliary elimination) or in patients currently being treated with a diuretic. Use with caution in patients with renal artery stenosis. Monitor potassium and kidney function (e.g., one-to-two weeks after initiation or dose adjustment) Concomitant therapy with potassium-sparing diuretics, potassium supplements, and/or additional RAAS blockers may result in hyperkalemia. Boxed Warning: due to the potential risk for fetal morbidity and mortality in patients taking an ACEI during pregnancy, it is recommended that therapy be discontinued as soon as a woman becomes pregnant; alternate therapy should be considered. Contraindicated in patients with a history of angioedema on an ACEI.
Captopril	25-150 mg divided 2-3 times daily <i>One hour before meals, on an empty stomach</i>	
Enalapril	5-40 mg divided once or twice daily	
Fosinopril	10-40 mg once daily	
Lisinopril	10-40 mg once daily	
Moexipril	7.5-30 mg divided once or twice daily <i>One hour before meals, on an empty stomach</i>	
Perindopril	4 - 8 mg divided once or twice daily	
Quinapril	10-40 mg divided once or twice daily	
Ramipril	2.5-20 mg divided once or twice daily	
Trandolapril	1 - 4 mg once daily	
Angiotensin II Receptor Blockers (ARBs)		
Azilsartan	80 mg once daily	<ul style="list-style-type: none"> Consider lower doses in patients with intravascular volume depletion (e.g., patients currently being treated with a diuretic). Use with caution in patients with renal artery stenosis. Monitor potassium and renal function after initiation. Concomitant therapy with potassium-sparing diuretics, potassium supplements, and/or additional RAAS blockers may result in hyperkalemia. Boxed Warning: due to the potential risk for fetal morbidity and mortality in patients taking an ARB during pregnancy, it is recommended that therapy be discontinued as soon as a woman becomes pregnant; alternate therapy should be considered. Use with caution in patients with a history of angioedema on an ACEI. An ARB may be considered in patients unable to tolerate an ACEI due to cough.
Candesartan	8-32 mg once daily	
Eprosartan	400-800 mg divided once or twice daily	
Irbesartan	150-300 mg once daily	
Losartan	25-100 mg divided once or twice daily	
Olmesartan	20-40 mg once daily	
Telmisartan	20-80 mg once daily	
Valsartan	80-320 mg once daily	

Refer to www.pbm.va.gov for a current list of medications on the VA National Formulary. a - Adapted from VA/DoD Clinical practice guideline for management of chronic kidney disease in primary care. (2008)

b - Facts & Comparisons® eAnswers <http://www.factsandcomparisons.com/online-products/>. Accessed 2014 Apr 25.

Table 8: Select Medications Requiring Dose Adjustments or to be Used with Caution in Patients with CKD* ^{1,2,3}		
<ul style="list-style-type: none"> Most antibiotics (macrolides, clindamycin, and metronidazole are exceptions) and antiviral agents Multiple anti-cancer therapies (cytotoxic drugs, targeted agents, biologics) Hypoglycemic agents <ul style="list-style-type: none"> Acarbose Miglitol Glyburide Chlorpropamide Insulin Metformin Exenatide Repaglinide Alogliptin Saxagliptin Sitagliptin Canagliflozin Dapagliflozin Empagliflozin Cardiovascular agents <ul style="list-style-type: none"> Atenolol Sotalol Digoxin Dofetilide Potassium-sparing diuretics 	<ul style="list-style-type: none"> RAAS blockers <ul style="list-style-type: none"> ACEIs ARBs Aliskiren Eplerenone, spironolactone Anticoagulants <ul style="list-style-type: none"> Apixaban Dabigatran Rivaroxaban Low Molecular Weight Heparins Opioid analgesics <ul style="list-style-type: none"> Codeine Fentanyl Hydrocodone Hydromorphone Meperidine Methadone Morphine Oxycodone Oxymorphone Tapentadol Tramadol Non-steroidal Anti-inflammatory Drugs (NSAIDs) Gabapentin Levetiracetam Lithium Memantine Risperidone, Paliperidone 	<ul style="list-style-type: none"> Antidepressants <ul style="list-style-type: none"> Bupropion Citalopram Desipramine Duloxetine Mirtazapine Paroxetine Venlafaxine Bisphosphonates Gout agents <ul style="list-style-type: none"> Allopurinol Colchicine H2-blockers PDE5 inhibitors <ul style="list-style-type: none"> Sildenafil Tadalafil Statins <ul style="list-style-type: none"> Fluvastatin Lovastatin Pitavastatin Pravastatin Rosuvastatin Simvastatin Fibric acid derivatives <ul style="list-style-type: none"> Fenofibrate Gemfibrozil
<p>*Note this is not a comprehensive list; consult individual product information or alternate sources on dosing and/or precautions in patients with kidney function impairment.</p> <p>¹ Lasser J, Bennett WM, Olyaei AJ. Drug dosing in elderly patients with chronic kidney disease. <i>Clin Geriatr Med.</i> Aug 2013;29(3):657-705.</p> <p>² Inker LA, Astor BC, Fox CH, et al. KDOQI US commentary on the 2012 KDIGO clinical practice guideline for the evaluation and management of CKD. <i>Am J Kidney Dis.</i> May 2014;63(5):713-735.</p> <p>³ Hedayati SS, Yalamanchili V, Finkelstein FO. A practical approach to the treatment of depression in patients with chronic kidney disease and end-stage renal disease. <i>Kidney Int.</i> Feb 2012;81(3):247-255.</p>		