

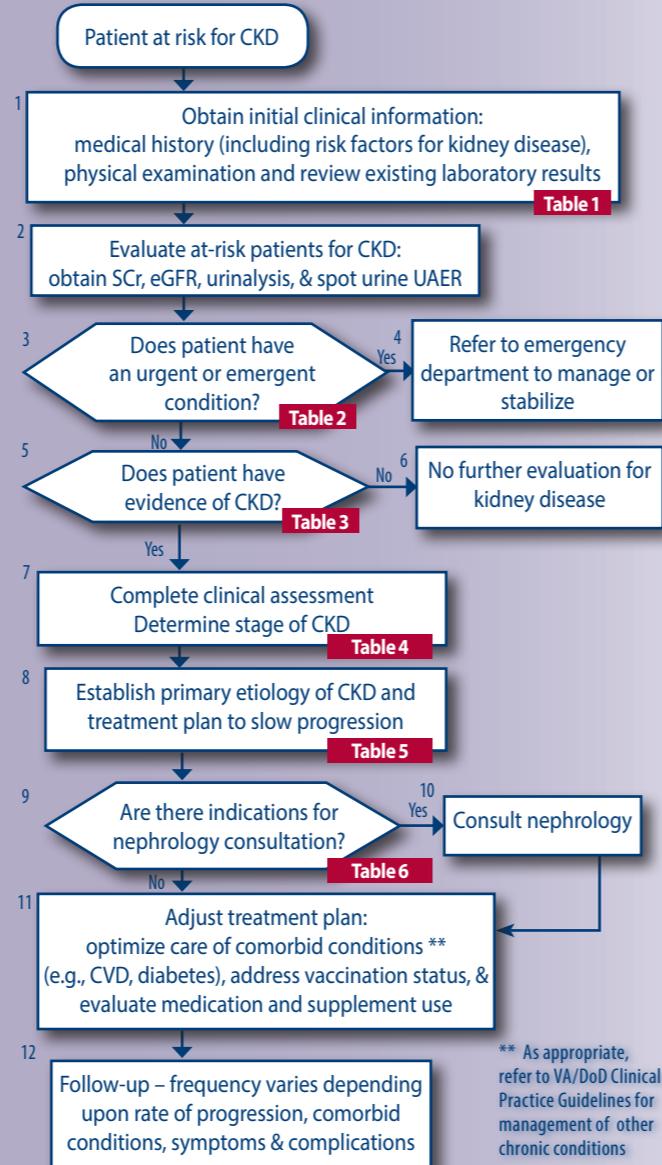
Management of Chronic Kidney Disease in Primary Care

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  $\geq 6$  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/1.73m<sup>2</sup>

**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 <sup>2</sup> ) | Description                                |
|--------|------------------------------------|--|
| G1     | $\geq 90$                          | 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/1.73m<sup>2</sup>
- Rapid decline of eGFR (>5 ml/min/1.73m<sup>2</sup> 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 <sup>a,b</sup> |  |  |
|--|--|--|
| Drug   | Usual Dose Range   | Comments/Cautions  |
| <b>Angiotensin-Converting Enzyme Inhibitors (ACEIs)</b>                            |  |  |
| <b>Benazepril</b>  | 10-40 mg divided once or twice daily   | <ul style="list-style-type: none"> <li>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.</li> <li>Use with caution in patients with renal artery stenosis.</li> <li>Monitor potassium and kidney function (e.g., one-to-two weeks after initiation or dose adjustment)</li> <li>Concomitant therapy with potassium-sparing diuretics, potassium supplements, and/or additional RAAS blockers may result in hyperkalemia.</li> <li>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.</li> <li>Contraindicated in patients with a history of angioedema on an ACEI.</li> </ul> |
| <b>Captopril</b>   | 25-150 mg divided 2-3 times daily<br><i>One hour before meals, on an empty stomach</i>     |  |
| <b>Enalapril</b>   | 5-40 mg divided once or twice daily  |  |
| <b>Fosinopril</b>  | 10-40 mg once daily  |  |
| <b>Lisinopril</b>  | 10-40 mg once daily  |  |
| <b>Moexipril</b>   | 7.5-30 mg divided once or twice daily<br><i>One hour before meals, on an empty stomach</i> |  |
| <b>Perindopril</b>   | 4 - 8 mg divided once or twice daily   |  |
| <b>Quinapril</b>   | 10-40 mg divided once or twice daily   |  |
| <b>Ramipril</b>  | 2.5-20 mg divided once or twice daily  |  |
| <b>Trandolapril</b>  | 1 - 4 mg once daily  |  |
| <b>Angiotensin II Receptor Blockers (ARBs)</b>                                     |  |  |
| <b>Azilsartan</b>  | 80 mg once daily   | <ul style="list-style-type: none"> <li>Consider lower doses in patients with intravascular volume depletion (e.g., patients currently being treated with a diuretic).</li> <li>Use with caution in patients with renal artery stenosis.</li> <li>Monitor potassium and renal function after initiation.</li> <li>Concomitant therapy with potassium-sparing diuretics, potassium supplements, and/or additional RAAS blockers may result in hyperkalemia.</li> <li>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.</li> <li>Use with caution in patients with a history of angioedema on an ACEI.</li> <li>An ARB may be considered in patients unable to tolerate an ACEI due to cough.</li> </ul>                     |
| <b>Candesartan</b>   | 8-32 mg once daily   |  |
| <b>Eprosartan</b>  | 400-800 mg divided once or twice daily   |  |
| <b>Irbesartan</b>  | 150-300 mg once daily  |  |
| <b>Losartan</b>  | 25-100 mg divided once or twice daily  |  |
| <b>Olmesartan</b>  | 20-40 mg once daily  |  |
| <b>Telmisartan</b>   | 20-80 mg once daily  |  |
| <b>Valsartan</b>   | 80-320 mg once daily   |  |

Refer to [www.pbm.va.gov](http://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* <sup>1,2,3</sup>  |  |  |
|---|--|--|
| <ul style="list-style-type: none"> <li>Most antibiotics (macrolides, clindamycin, and metronidazole are exceptions) and antiviral agents</li> <li>Multiple anti-cancer therapies (cytotoxic drugs, targeted agents, biologics)</li> <li>Hypoglycemic agents <ul style="list-style-type: none"> <li>Acarbose</li> <li>Miglitol</li> <li>Glyburide</li> <li>Chlorpropamide</li> <li>Insulin</li> <li>Metformin</li> <li>Exenatide</li> <li>Repaglinide</li> <li>Alogliptin</li> <li>Saxagliptin</li> <li>Sitagliptin</li> <li>Canagliflozin</li> <li>Dapagliflozin</li> <li>Empagliflozin</li> </ul> </li> <li>Cardiovascular agents <ul style="list-style-type: none"> <li>Atenolol</li> <li>Sotalol</li> <li>Digoxin</li> <li>Dofetilide</li> <li>Potassium-sparing diuretics</li> </ul> </li> </ul>            | <ul style="list-style-type: none"> <li>RAAS blockers <ul style="list-style-type: none"> <li>ACEIs</li> <li>ARBs</li> <li>Aliskiren</li> <li>Eplerenone, spironolactone</li> </ul> </li> <li>Anticoagulants <ul style="list-style-type: none"> <li>Apixaban</li> <li>Dabigatran</li> <li>Rivaroxaban</li> <li>Low Molecular Weight Heparins</li> </ul> </li> <li>Opioid analgesics <ul style="list-style-type: none"> <li>Codeine</li> <li>Fentanyl</li> <li>Hydrocodone</li> <li>Hydromorphone</li> <li>Meperidine</li> <li>Methadone</li> <li>Morphine</li> <li>Oxycodone</li> <li>Oxymorphone</li> <li>Tapentadol</li> <li>Tramadol</li> </ul> </li> <li>Non-steroidal Anti-inflammatory Drugs (NSAIDs)</li> <li>Gabapentin</li> <li>Levetiracetam</li> <li>Lithium</li> <li>Memantine</li> <li>Risperidone, Paliperidone</li> </ul> | <ul style="list-style-type: none"> <li>Antidepressants <ul style="list-style-type: none"> <li>Bupropion</li> <li>Citalopram</li> <li>Desipramine</li> <li>Duloxetine</li> <li>Mirtazapine</li> <li>Paroxetine</li> <li>Venlafaxine</li> </ul> </li> <li>Bisphosphonates</li> <li>Gout agents <ul style="list-style-type: none"> <li>Allopurinol</li> <li>Colchicine</li> </ul> </li> <li>H2-blockers</li> <li>PDE5 inhibitors <ul style="list-style-type: none"> <li>Sildenafil</li> <li>Tadalafil</li> </ul> </li> <li>Statins <ul style="list-style-type: none"> <li>Fluvastatin</li> <li>Lovastatin</li> <li>Pitavastatin</li> <li>Pravastatin</li> <li>Rosuvastatin</li> <li>Simvastatin</li> </ul> </li> <li>Fibric acid derivatives <ul style="list-style-type: none"> <li>Fenofibrate</li> <li>Gemfibrozil</li> </ul> </li> </ul> |
| <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><sup>1</sup> 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><sup>2</sup> 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><sup>3</sup> 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> |  |  |