### CARE GUIDE for Chronic Kidney Disease (CKD)

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| **Screening and Diagnosis for Chronic Kidney Disease**<sup>(1)</sup> | • Screen all individuals that have clinical or sociodemographic factors that put them at increased risk for development of chronic kidney disease  
• Urine protein dipstick test  
• Spot urine sample albumin-to-creatinine ratio test | • Risk susceptibility:  
➢ Old age  
➢ Family history  
➢ Smoking  
➢ Obesity  
➢ Substance abuse  
• Risk direct:  
➢ Diabetes  
➢ HTN  
➢ Autoimmune disease  
➢ Systemic infections  
➢ Urinary tract infections, stones or obstructions  
➢ Drug toxicity  
• Dipstick >1+  
• ≥ 2 positive quantitative tests (1-2 weeks apart) demonstrate persistent proteinuria and require further evaluation | • Test for markers of kidney damage  
• Positive screening, start management of chronic kidney disease per guidelines | • If normal, advise to decrease risk factor(s) and repeat evaluation annually  
• Dipstick >1+ should have a quantitative protein-to-creatinine ratio or albumin-to-creatinine ratio within three months |
| **Monitoring for Kidney Function**<sup>(1)</sup> | • Estimate level of GFR (eGFR) by using prediction equations*  
• Adults: Modification of Diet in Renal Disease (MDRD) or Cockroft-Gault  
• Children: Schwartz and Counahan-Barratt equations  
• Creatinine Clearance (CC) is useful in special situations (i.e. | • Stage 1: eGFR ≥ 90 ml/min/1.73 m²  
• Stage 2: eGFR 60 – 89 ml/min/1.73 m²  
• Stage 3: eGFR 30 – 59 ml/min/1.73 m²  
• Stage 4: eGFR 15 – 29 ml/min/1.73 m²  
• Stage 5: eGFR < 15 ml/min/1.73 m² | • Identification of modifiable risk factors and initiation of appropriate interventions  
• Identification of complications and initiation of appropriate interventions  
• Education and preparation to cope with the stress of chronic kidney disease | • At least annually, more frequently in patients with:  
➢ GFR < 60 ml/min/1.73 m²  
➢ Fast GFR decline in the past 2 months (>4 ml/min/1.73 m²)  
➢ Risk factors for faster progression  
➢ Ongoing treatment to slow progression  
➢ Exposure to risk factors for GFR decline  
• Smoking |
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| Blood Pressure Monitoring (1,3) | • Measurement at each visit | **Goal**  
• Adults < 130/80 with chronic kidney disease or diabetes | • Therapeutic lifestyle changes (TLC): Diet, weight reduction, exercise and decreased alcohol consumption  
• Encourage home BP-monitoring  
• If goal not reached add pharmacological intervention  
• CKD absence with or without proteinuria (diuretic, then ACE-I, ARB, BB or CCB)  
• CKD with proteinuria (ACE-I, ARB, then diuretics, CCB or BB)  
• Diabetes (ACE-I, ARB, then THIAZ, then BB or non-DCCB)  
• Post MI (BB, ACE-I, ARB)  
• Monitor serum potassium and creatinine if taking an ACE-I, ARB or diuretic  
• Assess BP goal each visit |
| Neuropathy(1) | • All patients with CKD  
• Neuropathy is directly related to the level of kidney function and/or co-morbid conditions (diabetes, lupus, hepatic failure, amyloidosis) | • Assess for signs/symptoms of central and peripheral neurologic involvement | • Symptoms or indices of neuropathy may be useful to determine need to initiate dialysis | • If normal, reassess periodically  
• If abnormal, consider appropriate neurological studies |
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| **Lipid Management** (6, 17) | • All adults with CKD should be considered in the "highest risk group" for cardiovascular disease and should be evaluated for dyslipidemias | **Goal** | • Initiate Therapeutic Lifestyle Changes (TLC) for all patients  
➢ reduce saturated fats and cholesterol  
➢ reduce/eliminate trans fats  
➢ increase fiber intake  
➢ Increase omega-3 fatty acids  
➢ daily physical activity  
➢ weight management  
➢ Drug therapy if LDL-C > 100 mg/dL  
➢ Use statins as first-line drug therapy for high LDL  
➢ If triglycerides > 500 mg/dL, treat with fibrate or niacin first | • At least annually  
• After drug therapy, measure LDL-C at 6 weeks. If goal not achieved, therapy can be intensified. Re-measure LDL-C at 12 weeks and every 4 to 6 months to assess response to therapy  
• Monitor liver function tests before treatment with statins and periodically thereafter to assess for drug toxicity  
• Check package insert for dosing of statins when GFR < 60 ml/min/ 1.73 m²  
• Repeat every 3 months until goal is reached, then annually (Stage 5)  
• Monitor CPK in patients with muscle discomfort |
| **Preventive/Surveillance:** | • Measure fasting lipid (lipoprotein) profile in adults with CKD at least annually, more frequently when not at target. For low risk lipid levels (LDL < 100), every two years is acceptable  
• Use diet, exercise and medications to achieve target lipid levels  
• Adjust treatment as necessary, at each visit until target lipid levels achieved | **LDL Cholesterol:** Primary goal is < 100 mg/dL | • Screen All CKD patients with Hb regardless of stage  
• Further evaluation should be done if:  
➢ Hb < 13.5 g/dL in adult males  
➢ Hb < 12 g/dL in adult females  
• Anemia work-up should include:  
➢ CBC | • Rule out other cause of anemia  
• If iron deficiency is identified, treat with iron supplements  
• Treat for other identified deficiencies  
• If anemia (Hb < 11 gm/dL) not corrected with iron supplementation, consider treatment with |
| **HDL Cholesterol** | | • For patients over 40 and/or with established CAD, reduce LDL 30-40%, regardless of initial LDL level | | |
| **Triglycerides:** | | • If TGs >200, non-HDL cholesterol should be <130 mg/dL | • Rule out other cause of anemia  
• If iron deficiency is identified, treat with iron supplements  
• Treat for other identified deficiencies  
• If anemia (Hb < 11 gm/dL) not corrected with iron supplementation, consider treatment with | |
| **Anemia Screening** (1, 8) | • Screen All CKD patients with Hb regardless of stage  
• Further evaluation should be done if:  
➢ Hb < 13.5 g/dL in adult males  
➢ Hb < 12 g/dL in adult females  
• Anemia work-up should include:  
➢ CBC | **Goal** | • Adults’ Hb should be > 11.0 g/dL  
• Please note Black Box Warning below ** | • Rule out other cause of anemia  
• If iron deficiency is identified, treat with iron supplements  
• Treat for other identified deficiencies  
• If anemia (Hb < 11 gm/dL) not corrected with iron supplementation, consider treatment with | • At least annually  
• Monitor blood pressure with each dose of ESAs  
• Monthly hemoglobin if on ESAs  
• Hb goal should be in the range of 11.0 to 12.0 g/dL in patients who are taking ESAs |
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| **Renal Bone Disease**<sup>(1,10)</sup> | • All adults with a GFR of < 60 ml/min/1.73 m² should be measured for disorders of calcium and phosphorus metabolism and parathyroid function  
• Check patients for signs/symptoms of hypocalcemia  
1. Serum Calcium  
2. Serum Phosphorus  
3. Serum PTH  
4. Serum Ca+ x PO<sub>4</sub> Product | Goal Adults  
• intant Parathyroid Hormone (iPTH) 35 - 70 pg/mL with a GFR of > 30 ml/min/1.73 m²  
• iPTH of 70 - 110 pg/mL with a GFR of ≤ 29 ml/min/1.73 m²  
• iPTH of 150 - 300 pg/mL with a GFR of ≤ 15 ml/min/1.73 m²  
• Serum phosphorus between 2.7 - 4.6 mg/dL in Stages 3 & 4  
• Serum 25-hydroxyvitamin D > 30 ng/mL  
• 1,25 vitamin D 15 - 75 pg/mL  
• Patients whose corrected serum total calcium levels are below the normal range for the laboratory used (< 8.4 mg/dL [2.10 mmol/L]) should receive therapy to increase-normalize serum calcium levels if signs/symptoms of hypocalcemia present  
Restrict dietary phosphorus (0.8 - 1 gm/day)  
• If serum PO<sub>4</sub> > 4.6 mg/dL or iPTH above target range in Stages 3 and 4  
• If serum PO<sub>4</sub> > 5.5 mg/dL in Stage 5  
• Initiate drug therapy with phosphate binders if unable to maintain target iPTH or PO<sub>4</sub> levels with diet restrictions if PO<sub>4</sub> > 4.6 mg/dL  
• Calcium-based binders may be used as the initial therapy  
• If PO<sub>4</sub> is > 4.6 mg/dL and serum vitamin D level is < 30 ng/dL and serum calcium level is < 9.5 mg/dL initiate supplementation with vitamin D and increase phosphate binder dosage  
• Consider referral to nephrologist for administration of a calcimimetic, sevelamer, or | • Monitor serum PO<sub>4</sub> every month while on restriction  
• Total elemental calcium intake should not exceed 2,000 mg/day (therapy + diet)  
• If serum vitamin D level is normal, repeat testing annually  
• Monitor serum calcium and phosphorus levels every month on initiation of vitamin D therapy and then every 3 months. If calcium level is ≥ 10.2 mg/dL, discontinue vitamin D therapy or calcium binder and re-check  
• Once repletion of vitamin D is complete, switch from a vitamin D to multi-vitamin preparation that contains vitamin D if 1, 25 vitamin D is normal, if low, consider 1, 25 vitamin D therapy |
or intact PTH is above target
  - Serum Calcium x Phosphorus product < 55 mg²/dL²

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<td>Selected Preventive Health Measures (^{(12,13,18)})</td>
<td>• Substance Abuse</td>
<td>• Document patient's use patterns</td>
<td>• Recommend appropriate lifestyle changes and/or referral to appropriate substance abuse program</td>
<td>• Re-evaluation each visit</td>
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<td>• Pneumococcal vaccination</td>
<td>• Document each patient has had a vaccination</td>
<td>• Administer pneumococcal vaccination at time of diagnosis and again at age 65; or to all patients with diabetes age ≥ 5 years</td>
<td>• Document for each patient</td>
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<tr>
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<td>• Influenza vaccination †</td>
<td>• Document patient has a vaccination each year and document if adverse event occurs</td>
<td>• Administer vaccination to all patients with diabetes age ≥ 6 months beginning each September</td>
<td>• Yearly</td>
</tr>
<tr>
<td></td>
<td>• Aspirin therapy</td>
<td>• Document appropriate patients on aspirin</td>
<td>• Administer aspirin in doses of 75-162 mg a day</td>
<td>• Yearly</td>
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<td>• Weight management</td>
<td>• Significant weight loss with an initial goal of 5-10% of body weight</td>
<td>• Prescribe weight management, diet, and physical activity programs</td>
<td>• Monitor progress at each visit</td>
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<tr>
<td></td>
<td></td>
<td>• Calculate BMI and</td>
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"lanthanum agent"
### SUGGESTED GUIDELINES

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| **Nutritional Evaluation**<sup>(1,14)</sup> | • Adults with a GFR of < 60 mL/min/1.73 m² should undergo assessment of dietary protein and energy intake and nutritional status | • Limited-protein diet to decrease urinary protein loss and slow progression of renal disease  
- 0.75 g/kg/d with eGFR > 30 ml/min/1.73 m²  
- 0.6 g/kg/d with eGFR < 30 ml/min/1.73 m² (restriction more liberal if protein malnourished)  
- DEI (Dietary Energy Intake) 30 - 35 | • Monitor serum albumin as a marker for protein energy malnutrition  
• Monitor nutritional status every 1-3 months if GFR < 30 ml/min/1.73 m²  
• Monitor nutritional status every 6 - 12 months if GFR is > 30 ml/min/1.73 m² |

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- Physical Activity
  - Goal is 150 minutes per week of moderate intensity exercise
- Hepatitis B Vaccine
  - Document Hepatitis B vaccination
  - Serologic testing recommended after 1-2 months to determine protective level of anti-HBs (≥ 10 mIU/mL)
  - Individuals on hemodialysis may require higher doses of the Hepatitis B vaccine or increased number of doses
  - Individuals may need to be revaccinated if anti-HBs levels are < 10 mIU/mL after the first antibody check
  - Boosters should be given when anti-HBs levels are < 10 mIU/mL
  - Those who do not respond to vaccination should be tested for HBsAg and have appropriate management

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- Monitor progress at each visit
- Individuals may need to be revaccinated if anti-HBs levels are < 10 mIU/mL after the first antibody check
- Boosters should be given when anti-HBs levels are < 10 mIU/mL

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- Measure waist:
  - BMI Target: 18.5-24.9 kg/m²
  - Waist Target: 35 inches for females, 40 inches for males (criteria varies for different ethnic groups)
- Goal is 150 minutes per week of moderate intensity exercise
- Document Hepatitis B vaccination
- Serologic testing recommended after 1-2 months to determine protective level of anti-HBs (≥ 10 mIU/mL)
- Individuals on hemodialysis may require higher doses of the Hepatitis B vaccine or increased number of doses
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- Monitor serum albumin as a marker for protein energy malnutrition
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- Monitor nutritional status every 6 - 12 months if GFR is > 30 ml/min/1.73 m²
### SUGGESTED GUIDELINES

#### PROCESS

**Consider Specialty Referral**
1. **Nephrology**

#### IMPORTANT FINDINGS, MEASUREMENTS AND VALUES

**When GFR ≤ 60 mL/min/1.73 m² for CKD patients with diabetes or if difficulties managing HTN or hyperkalemia**

**When GFR < 30 mL/min/1.73 m²**

#### INTERVENTIONS

- Quantitative renal function evaluation
- Follow suggested nephrology care plan
- Vein preservation strategies for access placement

#### SUGGESTED FOLLOW-UP

- As needed

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### Tobacco Use

**5A's**
- **Ask** about smoking
- **Advise** user to quit
- **Assess** willingness to quit
- **Assist** user to quit (i.e., refer to smoking cessation program and consider pharmacotherapy)
- **Arrange** follow-up

**Pharmacologic adjuvants**
- Nicotine replacement
- Anti-depressants
- Varenicline

**Call on quit date or within 72 hrs. to boost self-efficacy (can delegate to disease management or self care program)**

**Assess each visit: smoking status, weight gain, nicotine withdrawal symptoms**

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### Preserving Vascular Access

**Assess every vascular access site for the presence of infection, thrill/bruit.**

**Look, listen and feel the access. Observe for stenosis, poor maturation, infection or steal.**

**Refer immediately back to the surgeon or interventionalist for prompt evaluation and intervention if abnormalities are found.**

**Instruct individuals on physical limitations of the access arm, what to report about the site, what to instruct those unfamiliar with access.**

**Vascular surveillance at each visit starting at 6 weeks after placement with the proper referral to the interventionalist if needed, may result in an increased duration and survival of the Arteriovenous Fistula (AVF).**
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| Screening for Abnormal Glucose Metabolism (5) | • All CKD patients:  
  ➢ Screen for diabetes with a fasting glucose every 1-3 years | • Impaired Fasting Glucose (IFG):  
  ➢ FPG ≥ 100 mg/dL and ≤ 125 mg/dL  
  • Impaired Glucose Tolerance (IGT):  
  ➢ 2 hour oral glucose tolerance test (OGTT) ≥ 140 mg/dL and ≤ 199 mg/dL  
  • Criteria for diabetes ±:  
  ➢ FPG ≥ 126 mg/dL  
  ➢ Symptoms of DM and a casual glucose ≥ 200 mg/dL  
  ➢ Two-hour PG ≥ 200 mg/dL during a 75 gm OGTT. In the absence of unequivocal hyperglycemia with acute metabolic decompensation, these criteria should be confirmed by retesting on a different day  
  ➢ HbA1C ≥ 6.5% using a method that is NGSP certified and standardized to the DCCT assay | • If abnormal follow ADA guidelines | • If normal, repeat at least every 3 years  
• Repeat annually for high-risk patients |
| Depression Screening (15) | • Screen for depression | • Depression screening tool such as PHQ2/9  
• Mental health history/treatment | • Administer treatment and/or refer patients who meet criteria for depression to a  
• Screening is suggested at subsequent visits  
• Evaluate response to depression treatment with |
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| **Screen for CVD**<sup>(1)</sup> | • All adults with Stage 3 and 4 CKD | • Assess for signs/symptoms and risk for CVD | • Stress test if symptomatic or at high risk  
• Echocardiogram  
➢ At the initiation of dialysis  
➢ Once “dry weight” achieved  
➢ At 3 year intervals  
• Electrocardiogram  
➢ Annually after dialysis is initiated | • Refer for appropriate intervention |

**End of Life Issues** | • Set appointment specifically to discuss end of life issues | • None | • Discuss patient’s prognosis, end of life, palliative care, life supportive care, hospice, and advanced directives with patients while they are stable | • Update end of life conversations yearly or more frequently as appropriate |

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2. An FDA advisory in Nov. 2006 recommended that the dosing on ESAs be titrated to attain target Hb < 12 g/dL
3. Do not use live attenuated influenza vaccine
4. In the absence of hyperglycemia, the first 3 criteria should be confirmed by repeat testing
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<td>CDC 2006 Guidelines for Vaccinating Kidney Dialysis Patients and Patients with Chronic Kidney Disease.</td>
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