CKD ASSESSMENT ALGORITHM

Is patient at risk for CKD?
- Susceptibility: Age > 60 years, Family history of CKD, Racial/ethnic minority
- Direct Risk Factors: Diabetes, High blood pressure, Autoimmune diseases, Lower urine tract obstruction, Hx acute renal failure
- Herbal remedies, Metabolic syndrome, Systemic infections, Urinary tract infection, Urinary stones, Drug toxicity, Exposure drugs/procedures
- Progressive Risk Factors: High levels proteinuria, Malignant hypertension, Poor glycemic control, Smoking, Hyperlipidemia, Drug use

Yes → Perform routine screening for CKD patients at increased risk
- Serum creatinine to determine estimated GFR
- Microalbumin test
- Urinalysis for presence of white and red blood cells

Does patient have abnormal GFR > 3 months?

Yes → Determine Stage of CKD
- Stage 1: GFR > 90 (Kidney damage)
- Stage 2: GFR 60-89
- Stage 3: GFR 30-59
- Stage 4: GFR 15-29
- Stage 5: GFR < 15

No → Does patient have elevated albumin to creatinine ratio?
- Diabetes: >30mg albumin/lg creatinine
- Non-diabetes: >300mg albumin/lg creatinine

Yes → Identify risks associated with CKD
- Consider type of kidney disease
- Evaluate complications of kidney disease: anemia, hypertension, malnutrition, bone disease, metabolic acidosis, congestive heart failure, hyperkalemia, edema determined to be fluid overload, neuropathy
- Evaluate risk for loss of kidney function
- Evaluate comorbid conditions
- Evaluate risk for cardiovascular disease

No → Review medication usage at follow-up visits
- Evaluate for necessary dose adjustments based on level of kidney function
- Evaluate for adverse effects of medications on kidney functions (NSAIDs, IV contrast)
- Evaluate for drug interactions
- Counsel patient to avoid nephrotoxic drugs and IV contrast
- Evaluate appropriateness for ARB/ACE inhibitor with diagnosis of hypertension
- Evaluate need for therapeutic drug monitoring

Consult/refer to nephrologist
- Consult nephrologist at Stage 1 if hematuria or significant proteinuria present
- Consult nephrologist at Stage 2 if GFR declines > 4mL/min/yr
- Consult nephrologist at Stage 3 for all patients with CKD
- Refer patient to nephrologist for evaluation when GFR < 30 mL/min/1.73²

No → Consult nephrologist at Stage 1 if hematuria or significant proteinuria present

Yes → Consult nephrologist at Stage 2 if GFR declines > 4mL/min/yr

No → Consult nephrologist at Stage 3 for all patients with CKD

Yes → Refer patient to nephrologist for evaluation when GFR < 30 mL/min/1.73²

Does patient have abnormal GFR > 3 months?

Yes → Begin CKD Treatment: develop clinical action plan
- Collaborate with nephrologist to develop action plan to include:
  - Evaluate type of kidney disease
  - Evaluate and manage comorbid conditions (Primary care, all stages)
  - Slow the loss of kidney function (Co-management, all stages)
  - Prevent and treat cardiovascular disease (Primary care, all stages)
  - Prepare for kidney failure and replacement therapy (Nephrology, stage 4)
  - Replace kidney function (Nephrology, stage 5)
- Consult nephrologist if action plan cannot be performed or carried out when GFR < 60.

No → Identify risks associated with CKD

Consult nephrologist at Stage 1 if hematuria or significant proteinuria present

Consult nephrologist at Stage 2 if GFR declines > 4mL/min/yr

Consult nephrologist at Stage 3 for all patients with CKD

Refer patient to nephrologist for evaluation when GFR < 30 mL/min/1.73²

Assess barriers to treatment adherence
- Family and social support
- Depression
- Income and unemployment concerns
- Stress and coping mechanisms
- Perceptions of illness and treatment
- Limited access to medications and/or care

Monitor CKD Progression
- Annual microalbumin test
- Track decline in GFR

Does patient have abnormal GFR > 3 months?
**CKD TREATMENT ALGORITHM**

### CKD Stage 1
- **GFR > 90 mL/min/1.73m²**
- **Primary Care**
  - Assess Complications
  - Labs
    - BP monitoring q 6 mo.
    - GFR q 12 mo.
    - Urinalysis q 12 mo. to assess hematuria, proteinuria, microalbuminuria
    - Lipids q 12 mo.
    - If diabetic, Hgb A1C and microalbuminuria q 12 mo.
  - Risk Assessment
    - Avoidance of nephrotoxic agents and dyes
  - Immunizations
    - Flu vaccine q 12 mo.
    - Pneumovax, as indicated
    - Hep B vaccine, as indicated
  - Education
    - Cardiovascular risk
    - Medications to avoid
    - Immunizations

### CKD Stage 2
- **GFR 60–89 mL/min/1.73m²**
- **Primary Care**
  - Assess Complications
  - Labs
    - BP monitoring q 3-12 mo.
    - GFR q 12 mo.
    - Urinalysis q 3-12 mo. to assess hematuria, proteinuria, microalbuminuria
    - Lipids q 12 mo.
    - If diabetic, Hgb A1C and microalbuminuria q 12 mo.
    - Hgb q 12 mo. if > 11 gm/dL
  - Risk Assessment
    - Avoidance of nephrotoxic agents and dyes
  - Immunizations
    - Flu vaccine q 12 mo.
    - Pneumovax, as indicated
    - Hep B vaccine, as indicated
  - Assess cardiovascular risk:
    - Smoking cessation
    - Physical activity
  - Education
    - Cardiovascular risk
    - Medications to avoid
    - Immunizations

### CKD Stage 3
- **GFR 30–59 mL/min/1.73m²**
- **Co-Management**
  - Assess Complications
  - Labs
    - BP monitoring q 3-12 mo.
    - GFR q 3-12 mo.
    - Urinalysis q 6-12 mo. to assess hematuria, proteinuria, microalbuminuria
    - Lipids q 2 mo.
    - If diabetic, Hgb A1C and microalbuminuria q 12 mo.
    - Hgb > 11 q 3-6 mo.
    - Hgb < 11 q 1-3 mo.
    - Lytes and glucose q 12 mo.
    - PTH, Ca, & P q 3-12 mo.
    - Measure 25 (OH)D
  - Risk Assessment
    - Avoidance of nephrotoxic agents and dyes
  - Immunizations
    - Flu vaccine q 12 mo.
    - Pneumovax, as indicated
    - Hep B vaccine, as indicated
  - Assess cardiovascular risk:
    - Smoking cessation
    - Physical activity
  - Education
    - Cardiovascular risk
    - Medications to avoid
    - Immunizations

### CKD Stage 4
- **GFR 15–29 mL/min/1.73m²**
- **Nephrology**
  - Assess Complications
  - Labs
    - BP monitoring q 3-6 mo.
    - GFR q 3-6 mo.
    - Lipids q 12 mo.
    - If diabetic, Hgb A1C and spot urine for protein creatinine ratio q 3-6 mo.
    - Hgb q 3-6 mo., monthly if on ESA therapy
    - PTH, Ca, P q 3-6 mo.
    - Measure 25 (OH)D
  - Risk Assessment
    - Avoidance of nephrotoxic agents and dyes
  - Immunizations
    - Flu vaccine q 12 mo.
    - Pneumovax, as indicated
    - Hep B vaccine, as indicated
  - Assess cardiovascular risk:
    - Smoking cessation
    - Physical activity
  - Education
    - Cardiovascular risk
    - Medications to avoid
    - Immunizations
  - Nutrition:
    - Advise diet low in salt and potassium
  - Renal bone disease
  - Anemia
  - Vascular access monitoring
  - Modality options
  - Evaluation for kidney transplant
  - Referrals
    - Surgeon for vascular access intervention, as needed
    - Transplant center for eval

### CKD Stage 5
- **GFR < 15 mL/min/1.73m²**
- **Nephrology**
  - Assess Complications
  - Labs
    - GFR q 1-3 mo.
    - Lipids q 12 mo.
    - If diabetic, Hgb A1C and spot urine for protein creatinine ratio q 3-6 mo.
    - Hgb monthly
    - PTH, Ca, P q 1-3 mo.
    - Measure 25 (OH)D
    - HBV titer
  - Risk Assessment
    - Avoidance of nephrotoxic agents and dyes
  - Immunizations
    - Flu vaccine q 12 mo.
    - Pneumovax, as indicated
    - Hep B vaccine, as indicated
  - Assess cardiovascular risk:
    - Smoking cessation
    - Physical activity
  - Education
    - Cardiovascular risk
    - Medications to avoid
    - Immunizations
  - Nutrition:
    - Advise diet low in fluids, salt, phos, and potassium
  - Renal bone disease
  - Anemia
  - Vascular access monitoring
  - Modality options
  - Evaluation for kidney transplant
  - Referrals
    - Surgeon for vascular access intervention, as needed
    - Transplant center for eval

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