

Chronic Kidney Disease: Know the Risks of Medications and Imaging Studies

Medications

Many commonly prescribed medications or their metabolites are excreted by the kidneys. Several can cause acute kidney injury (AKI), which can initiate or accelerate chronic kidney disease (CKD) progression.

Consider Kidney Function

- Consider the level of kidney function when prescribing medication
- Adjust dosage based on GFR to avoid complications
- Consider discontinuing medications that may cause AKI (RAAS blockers, NSAIDs, diuretics) or may cause complications during conditions which predispose to volume depletion and AKI (radio contrast studies, colonoscopy preparations, major surgery, or acute illness)
- Refer to the “Cautionary Notes” chart on the flip side of this card

Gadolinium-Containing Contrast

Gadolinium can put patients with severe CKD at risk for nephrogenic systemic fibrosis (NSF). A black box warning has been issued for gadolinium when GFR <30 ml/min/1.73 m².

Avoid Gadolinium

- Avoid gadolinium in patients with severe CKD
- When gadolinium is felt to be critical in patients with eGFR values of 15-30 ml/min/1.73 m² :
 - Consider lowest-dose macrocyclic compounds, as they have less association with NSF
 - Consider dialysis after gadolinium administration because it may help reduce NSF in patients with eGFR <15 ml/min/1.73 m² not yet on dialysis

Iodinated Radiocontrast

Use of iodinated radiocontrast media has been associated with AKI.

Balance the Risk of AKI

- Balance risk of AKI against diagnostic value and therapeutic implications.
- Recognize risk factors:
 - CKD (includes all stages, but especially people with GFR <30 ml/min/1.73 m²)
 - Age >70 years
 - Diabetes
 - Congestive heart failure
 - Volume depletion
 - Intra-arterial procedures
- Incorporate prevention:
 - Use of lowest dose of contrast
 - Volume repletion with intravenous saline or bicarbonate
 - Potential withdrawal of medications that could increase risk of AKI or complications (See “Cautionary Notes” chart on reverse.)
 - Check serum creatinine 48-96 hours after the procedure, since AKI occurs 48-72 hours after contrast

Oral Sodium Phosphate

Use of oral sodium phosphate-containing preparations in bowel preparations can put CKD patients at risk for acute phosphate nephropathy.

Avoid Oral Phosphate

- Avoid oral phosphate bowel pill preparations in patients with a GFR <60 mL/min per 1.73 m²

Antihypertensives/cardiac medications

RAAS antagonists (ACE-I, ARB, aldosterone antagonist, direct renin inhibitor)	<ul style="list-style-type: none"> Use with caution in patients with renal artery stenosis Start at lower dose in patients with GFR <45 ml/min/1.73 m² Assess GFR and serum potassium a week after starting or escalating dose Consider temporarily holding during IV contrast administration, or any potential cause of volume depletion (bowel preparation prior to colonoscopy, or acute illness) Do not routinely discontinue when GFR <30 ml/min/1.73 m² as they remain nephroprotective
Beta-blockers	<ul style="list-style-type: none"> Reduce dose of hydrophilic beta-blockers (acebutolol, atenolol, bisoprolol, and nadolol) by 50% when GFR <30 ml/min/1.73m²
Digoxin	<ul style="list-style-type: none"> Reduce dose based on plasma

Analgesics

NSAIDS	<ul style="list-style-type: none"> Avoid when GFR <30 ml/min/1.73 m² Prolonged therapy is not recommended when GFR <60 ml/min/1.73 m² Avoid when taking RAAS blocking agents or lithium
Opioids	<ul style="list-style-type: none"> Reduce dose if GFR < 60 ml/min/1.73m² Use with caution in patients with GFR <15 ml/min/1.73 m²

Antimicrobials

Macrolides	<ul style="list-style-type: none"> Reduce dose by 50% when GFR <30 ml/min/1.73 m²
Fluoroquinolones	<ul style="list-style-type: none"> Reduce dose by 50% when GFR <15 ml/min/1.73 m²
Tetracyclines	<ul style="list-style-type: none"> Reduce dose when GFR <45 ml/min/1.73 m²; can exacerbate uremia
Antifungals	<ul style="list-style-type: none"> Reduce maintenance dose of fluconazole by 50% when GFR <45 ml/min/1.73 m² Reduce dose of flucytosine when GFR <60 ml/min/1.73 m²
Trimethoprim	<ul style="list-style-type: none"> Reduce dose by 50% when GFR <30 ml/min/1.73 m² Risk factors for hyperkalemia include high doses, the elderly, CKD, or with ACE-I and/or NSAIDs

Anticoagulants

Low-molecular-weight heparins	<ul style="list-style-type: none"> Reduce dose by 50% when GFR <30 ml/min/1.73 m² Consider switch to conventional heparin or monitor plasma anti-factor Xa in those at high risk for bleeding
Warfarin	<ul style="list-style-type: none"> Increased risk of bleeding when GFR <30 ml/min/1.73 m²

Hypoglycemics

Sulfonylureas	<ul style="list-style-type: none"> Avoid mainly renally excreted agents (eg, glyburide/glibenclamide) Agents mainly metabolized by the liver may need reduced dose when GFR <30 ml/min/1.73 m² (eg, gliclazide, gliquidone)
Insulin	<ul style="list-style-type: none"> Partly renally excreted and may need reduced dose when GFR <30 ml/min/1.73 m²
Metformin	<ul style="list-style-type: none"> Avoid when GFR <30 ml/min/1.73 m², but consider risk-benefit if GFR is stable Review use when GFR <45 ml/min/1.73 m² Hold in patients during acute illness or prior to intravenous radiocontrast

Lipid-lowering

Statins	<ul style="list-style-type: none"> No increased toxicity for simvastatin 20 mg/day when GFR <30 ml/min/1.73 m² or on dialysis Dose reduction/increased toxicity for GFR <30 ml/min/1.73m² for lovastatin, rosuvastatin, and pravastatin
Fenofibrate	<ul style="list-style-type: none"> Associated with AKI

Miscellaneous

Lithium	<ul style="list-style-type: none"> Nephrotoxic and may cause diabetes insipidus with prolonged use Monitor GFR, electrolytes, and lithium levels every 6 months or more frequently if the dose increases or the patient is acutely ill Avoid using NSAIDs Maintain hydration during acute illness
Bisphosphonates	<ul style="list-style-type: none"> Most are not recommended when GFR <30 ml/min/1.73 m² Refer to bone specialist if GFR <30 ml/min/1.73 m² and no evidence of CKD-MBD (calcium, phosphate, alkaline phosphatase, and intact PTH normal)
Oral sodium phosphate-containing bowel preparations	<ul style="list-style-type: none"> Can cause AKI by phosphate crystal deposition and volume depletion Risk factors are CKD, >60 years of age, female gender, HTN, diabetes, CHF, volume depletion, active colitis, and medications that may predispose to AKI (RAAS blockers, diuretics, lithium, and NSAIDs)
Gabapentin	<ul style="list-style-type: none"> Altered mental status, myoclonus and asterixis with severe CKD GFR 30-59 ml/min/1.73m²: 200-700 mg bid, GFR 15-29 ml/min/1.73m²: 200-700 mg qd, GFR <15 ml/min/1.73m²: 300 every 2 d. Extended release: GFR 30-59 ml/min/1.73m² : 600-1800 mg qd, GFR <30 ml/min/1.73m² — not recommended