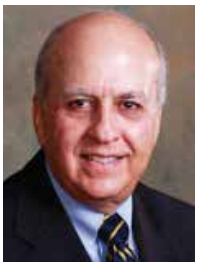

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POINTS TO REMEMBER: PRACTICAL CLINICAL PEARLS FOR THE PRACTICING CLINICIAN

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STRATEGIES TO PREVENT ACUTE KIDNEY INJURY

Chronic kidney disease (CKD) affects a large number of the population and represents a major risk factor for postoperative acute kidney injury, which adversely affects outcomes and increases costs. Herein are 20 practical points that every clinician should know.

1. CKD affects >20 million Americans.
2. Arteriolo nephrosclerosis is the most common etiology resulting in decreased glomerular filtration rate (GFR) in patients above age 65.
3. Pre-existing CKD is the single most accurate risk factor to predict post-op AKI.
4. Post-op AKI increases morbidity and mortality and results in increased costs.
5. Serum creatinine as a marker of kidney function is affected by muscle mass (↓ muscle mass = falsely low serum creatinine).
6. After age 40, there is an estimated loss of kidney function of approximately 10% per decade.
7. The Modification of Diet in Renal Disease formula (MDRD) includes age, gender, race, BUN, creatinine, and albumin — all important factors in measuring kidney function (GFR) and all automatically printed in lab reports.
8. Prevention of AKI begins before hospitalization by obtaining a nephrology consultation preoperatively in patients with CKD 3, CKD 4, and CKD 5.

STAGE	DESCRIPTION	GFR (ml/min/1.73 m2)
1	Kidney damage with normal or increased GFR	>90
2	Kidney damage with mildly decreased GFR	60–89
3	Moderate decreased GFR	30–59
4	Severely decreased GFR	15–29
5	Kidney failure (dialysis or transplantation indicated)	<15

9. ACEIs and ARBs could result in a 25% "permissible" increment of baseline serum creatinine and should not become an indication to stop these families of drugs.
10. A persistent upward trend of serum creatinine while on ACEIs and ARBs should be an alert to the possibility of bilateral renal artery stenosis or renal artery stenosis in a solitary functioning kidney.
11. Discontinuation of diuretics/ACEIs/ARBs starting 24 hours before contrast exposure is highly recommended, as is discontinuation of metformin if major surgery is planned.
12. Clonidine 0.1 mg may be used orally 2–3 times a day for systolic blood pressure greater than 170 or diastolic blood pressure greater than 100; if heart rate <55, may use hydralazine 25 mg orally 2–3 times a day provided that patient is not at significant risk for reflex tachycardia, which aggravates angina.
13. For nephroprotective therapy, unless contraindicated (congestive heart failure/volume overload), use normal saline (NS) or a combination of ½ NS and 75 mEq/L sodium bicarbonate for a total of 10 mL/kg over 5 hours; if patient is hospitalized, do a 12-hour intravenous infusion at 50 cc/hour.
14. In high-risk patients who are CKD 3, CKD 4, CKD 5, >65 years of age, or type 1 or type 2 diabetics, postpone elective surgery until 10 days after contrast exposure.
15. Postpone surgery until kidney function returns to baseline or at least stabilizes at a different level.
16. Modify doses of medications according to estimated glomerular filtration rate.
17. Any patient receiving diuretics should automatically have total fluid restricted to less than 48 oz (1500 cc) per day and total sodium restricted to less than 2 gm per day.
18. Use aldosterone receptor blocker (spironolactone) to:
    a. enhance loop diuretic effect
    b. preserve potassium
    c. serve as cardioprotection
    d. serve as nephroprotection
    e. do not use in patients with CKD 4
19. Stop all diuretics/ACEIs/ARBs if diarrhea develops.
20. Watch for hyperkalemia while taking simultaneous ACEI or ARB/spironolactone in patients with CKD.