Approach to Acute Kidney Injury

RENAL & VOLUME STATUS

89%

KEY DECISION RULE
FEUrea ≤35% (pre-renal AKI)[3,12]
sensitivity on diuretics (24/27); later study: specificity 33%

Creatinine rising or urine output falling → KDIGO: Cr ↑≥26.5 µmol/L (0.3 mg/dL) in 48 h, ≥1.5× in 7 d, or UOP <0.5 mL/kg/h ×6 h; stage 1–3[1] → K, VBG, ECG; volume; hold nephrotoxins; bladder scan; UA, sediment; urine Na, Cr, urea[1,11] → **Any renal emergency?**

Yes →

Renal emergency: treat now; call nephrology[2,11]

- ECG change, K ≥6.0 mmol/L, or rising fast
- Refractory pulmonary edema
- pH <7.1 despite bicarbonate
- Uremia: pericarditis, confusion
- Lithium or toxic alcohol
- RPGN: hemoptysis, RBC casts[10,11]

→ **ECG change: Ca gluconate; K ≥6.5: shift K; dialyze if refractory**[2,8,11]

If not: where is the injury?

	Pre-renal commonest	**Tubulointerstitial** intrinsic	**Glomerular & vascular** intrinsic	**Post-renal** quick to fix
CAUSES	• Volume loss: GI, bleeding, diuretics • Low EABV: heart failure, cirrhosis, sepsis • NSAIDs, ACEi/ARB	• ATN: ischemia, sepsis, contrast • AIN: β-lactams, PPIs, NSAIDs • **Rhabdomyolysis; crystals (TLS)**	• **RPGN: anti-GBM, ANCA vasculitis** • Lupus, IgA, post-infectious GN • **TTP/HUS, scleroderma crisis, atheroemboli**	• **Bladder outlet: BPH, anticholinergics** • Blocked urinary catheter • Bilateral stones, pelvic mass
CLUES	• Orthostasis, dry mucosa; or congestion • Bland sediment, hyaline casts[11]	• Muddy brown casts, tubular cells: ATN[4] • New drug; fever, rash, sterile pyuria • Heme+ dipstick, no RBCs: rhabdo[11]	• RBC casts, dysmorphic RBCs • Hemoptysis, rash, sinusitis • Schistocytes, low platelets, high LDH	• Anuria; palpable bladder • Prostatism, recurrent UTIs[6]
WORKUP	• FENa <1% if off diuretics[3,12] • FEUrea ≤35% on diuretics: weak[3,12]	• Fresh urine microscopy[4] • CK; urate, phosphate, LDH if TLS • Skip urine eosinophils (LR ~1)[5]	• ANCA, anti-GBM, C3/C4, ANA[10] • Smear, LDH, haptoglobin, ADAMTS13 if TMA • Biopsy if it will change treatment[10]	• Bladder scan for retention • Renal US: hydronephrosis[6]
MANAGE	• Dry: balanced crystalloid; hold diuretics[7,11] • HF congestion: diurese; Cr rise OK[11] • Cirrhosis: stop diuretics; albumin challenge[11]	• ATN: supportive; avoid nephrotoxins[1] • AIN: stop drug; steroids per nephrology • Rhabdo: early isotonic fluids; watch K[9]	• RPGN: steroids ± PLEX, nephrology today[10,11] • TTP: hematology, PLEX[11] • Scleroderma crisis: captopril[11]	• Foley; flush or replace blocked catheter • Fever + hydro: urgent decompression[11] • Watch for post-obstructive diuresis

Stethopedia
stethopedia.ca/approach/acute-kidney-injury

Evidence [1] Kellum 2013, Crit Care (KDIGO) [2] James 2013, Am J Kidney Dis (CSN) [3] Carvounis 2002, Kidney Int [4] Perazella 2008, Clin J Am Soc Nephrol [5] Muriithi 2013, Clin J Am Soc Nephrol [6] Licurse 2010, Arch Intern Med [7] Semler 2018, N Engl J Med [8] STARRT-AKI 2020, N Engl J Med [9] Bosch 2009, N Engl J Med [10] Rovin 2021, Kidney Int (KDIGO GN) [11] Manual 2024–25, pp. 94, 96–97, 101, 108, 142 [12] Pépin 2007, Am J Kidney Dis