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# Dynamic Practice Guidelines for Emergency General Surgery

Committee on Acute Care Surgery, Canadian Association of General Surgeons

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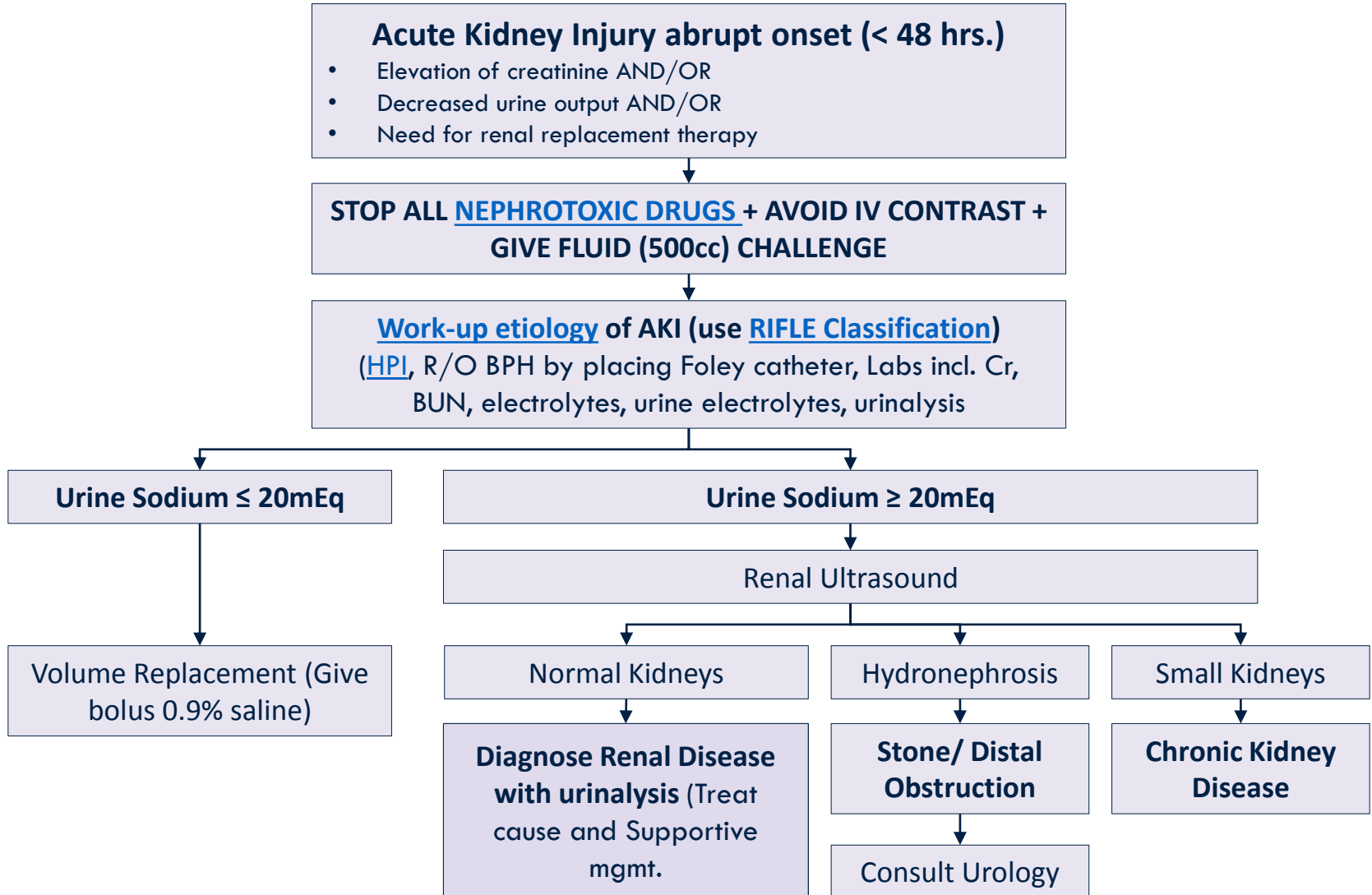
# ACUTE KIDNEY INJURY

Dynamic Practice Guidelines for Emergency General Surgery

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Committee on Acute Care Surgery, Canadian Association of General Surgeons

# ACUTE KIDNEY INJURY



## Epidemiology

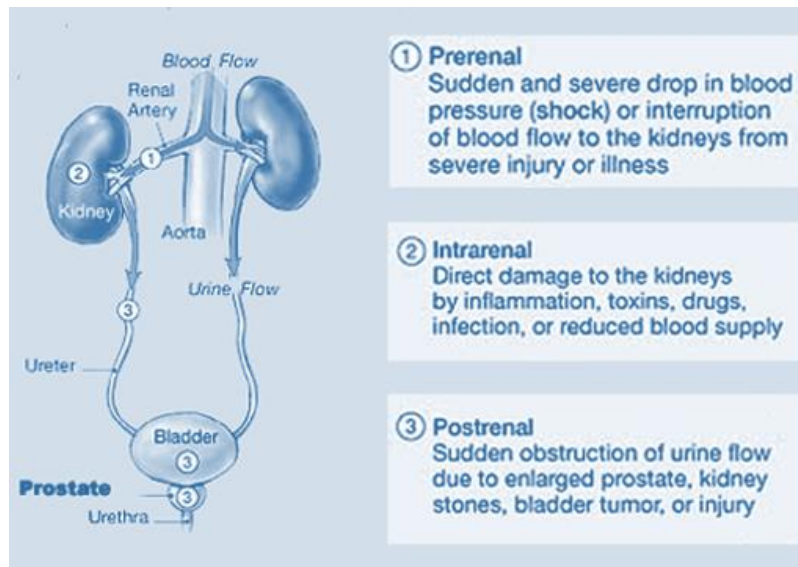
- Common in hospitalized patients: 4.9-7%<sup>1</sup>
- Risk Factors:
  - Patient-Related
    - Chronic kidney disease, age > 55, hypertension, diabetes, congestive heart failure, and peripheral vascular disease.
  - Surgical-Related
    - Emergency surgery, intra-peritoneal, and longer procedures.
- The higher the RIFLE Criteria Stage, the higher the mortality
- Consequences of AKI
  - Increased costs
  - Longer length of stay
  - Elevated mortality rates (25-90%)

## Classification of AKI

### RIFLE Criteria

| RIFLE Criteria      | Creatinine  | Urine Output                              | RR of Mortality |
|---------------------|---|---|-----------------|
| Risk (Stage I)      | Increase by 150%                                  | <0.5cc/kg/h x6h                           | 2.40            |
| Injury (Stage II)   | Increase by 200%                                  | <0.5cc/kg/h x12h                          | 4.15            |
| Failure (Stage III) | Increase by 300% or any renal replacement therapy | <0.3cc/kg/h x24h<br><u>OR</u> anuria x12h | 6.37            |
| Loss (Stage IV)     | Loss of renal function > 1 month                  |   |                 |
| End Stage (Stage V) | Loss of renal function > 3months                  |   |                 |

## Pathophysiology/ Etiology



- **Pre-Renal: decrease in intravascular volume (60%)**
  - Bleeding, diarrhea, inadequate intake, third-spacing
- **Infra-renal: intrinsic failure (30%)**
  - Glomerular: Immunologic or thrombotic
  - Tubular: Shock/ Sepsis - most common cause in critically ill pts.
  - Interstitial: Allergic (medication) or idiopathic
- **Post-Renal: obstruction from tubules to urethra (10%)**
  - Tubules: Uric acid crystals, protein casts, drugs
  - Urethra/ Bladder: malignancy (bladder cancer), benign prostatic hypertrophy

## History of Presenting Illness and Lab Findings

Table 2—Urinary Findings in AKI

|  | Prerenal  | Acute Tubular Necrosis                          | Acute Glomerulonephritis                          | Acute Interstitial Nephritis    | Postrenal |
|--|-----------|---|---|---------------------------------|-----------|
| BUN:creatinine                                     | >20:1     | 10:1  | >20:1   | 10:1                            | 10:1      |
| Urine sodium                                       | <10 mEq/L | >20 mEq/L                                       | <10 mEq/L   | >20 mEq/L                       | >20 mEq/L |
| Fractional excretion of sodium (FENa) <sup>a</sup> | <1%       | >1%   | <1%   | >1%                             | >1%       |
| Urine osmolality                                   | >500      | ~300  | >500  | ~300                            | Variable  |
| Urinalysis   | Bland     | Renal tubular cells; muddy brown granular casts | Dysmorphic red cells; proteinuria; red cell casts | WBCs; WBC casts; eosinophiluria | Bland     |

<sup>a</sup> (FENa) = (Serum creatinine × Urine sodium)/(Serum sodium × Urine creatinine).

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## Nephrotoxic Agents

| Class of Drug      | Medication              |
|--------------------|-------------------------|
| Antibiotics        | Vancomycin              |
|                    | Aminoglycosides         |
|                    | Amphotericin B          |
|                    | Penicillin              |
| Analgesics         | NSAIDs                  |
| Anti-hypertensives | ACE-inhibitors (-prils) |
|                    | ARBs (-sartans)         |
| Diuretics          | Hydrochlorothiazide     |
|                    | Lasix                   |
| Other              | Cisplatin               |
|                    | Lithium                 |



## Indications for Dialysis

- Refractory hyperkalemia
    - Stop all sources of potassium
    - Temporizing measures (potassium shifted intracellularly): Calcium gluconate 10cc 10% solution, Insulin 10units IV (add glucose bolus 50cc 50%), Ventolin neb 5mg/cc/10min
    - Increase potassium excretion: Lasix 20-40mg IV, Kayexalate 30g PO (NOT in post-operative bowel resection patients)
  - Refractory acidosis
  - Uremia
  - Volume overload
  - Toxin removal
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