

Guidelines for management of

Acute Renal failure in newborn

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DISCLAIMER: These guidelines were produced in good faith by the authors reviewing available evidence/opinion. They are neither policies nor protocols but are intended to serve only as guidelines. They are not intended to replace clinical judgment or dictate care of individual patients. Responsibility and decision-making (including checking drug doses) for a specific patient lie with the physician and staff caring for that particular patient.

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Acute Renal failure in newborn

Introduction:

Acute renal failure is seen in 8 % of NICU admissions. Anticipation and prompt recognition of impending renal impairment is crucially important to prevent long-term damage to the renal system.

Definition:

Defined as persistent rise in serum Creatinine $>100 \mu\text{mol/l}$ at 48 hours of age. Can be oliguric or non-oliguric.

Note: Serum Creatinine in first 24- 48 hours reflects maternal levels.

Pre-renal failure	Intrinsic renal failure	Post-renal failure
1. Hypoxia/ asphyxia 2. Hypovolemia (Fluid loss, haemorrhage, GIT losses) 3. Hypotension 4. Shock 5. Sepsis	1. Persistent pre-renal failure 2. Acute tubular necrosis (HIE) 3. Renal artery/ vein thrombosis dt umbilical lines 4. Nephrotoxicity 5. Congenital renal abn (PCKD, agensis, dysplasia)	1. PUJ obstruction 2. VUJ obstruction 3. Bil post urethral valves 4. Bladder dysfunction (cloacal abn, ureterocoele, neurogenic bladder with spinal abn)

Nephrotoxic medications

1. Antibiotics: Aminoglycosides, Amphoterecin, Acyclovir, Methicillin, Ceftazidime
2. Loop diuretics: Frusemide, Thiazides
3. NSAIDs: Indomethacin, Ibuprofen
4. Radio contrast agents

Symptoms	Signs
<ul style="list-style-type: none"> • Oliguria/anuria • Intolerance to feeds • Lethargy, Irritability • Seizures • Fluid overload • Progressive Wt gain 	<ul style="list-style-type: none"> • Dysmorphism- Potter's facies, prune belly • Palpable bladder, Poor urine stream • Weight gain/ oedema • Hypotension/ poor perfusion/ tachycardia • Hypertension • E/o cardiac Dysfunction

Initial Management

1. Identify and anticipate ARF (e.g. HIE, Sepsis, VLBW, PDA, post-op)
2. Baseline bloods- U & Es, LFTs, Bone profile, FBC, Coagulation, fractional excretion of sodium
3. Urine electrolytes, C & S
4. Continuous ECG monitoring
5. BP monitoring (? arterial line)
6. USS abdomen with renal vessel Dopplers
7. Cardiac Echo

General principles

1. Optimise ventilation, glycaemia, anaemia and coagulopathy.
2. Fluid challenge 10-20 mls/kg (pre-renal), if response, consider liberalising fluids.
3. Prevent ongoing losses- consider humidity, GIT losses
4. Check Potassium, sodium and phosphate content of IV infusions / TPN
5. Review potential nephrotoxic drugs i.e. Indomethacin, antibiotics
6. Monitor 4-6 hourly fluid balances, daily weight
7. Blood: Blood gases as required, 12-24 hourly U & Es, FBC
8. Urine: - Dipstick each urine sample
- 12-24 hourly urine output (? bladder catheterisation)
- 24 hourly urinary electrolytes

Electrolyte disturbances needing treatment

1. Hyponatremia (Rx if Na < 120 mmol/l)
2. Acidosis (pH < 7.2)
3. Hypocalcemia (Ca < 1.7, ionised Ca < 0.7 mmol/l)
4. Hyperkalemia (venous/ arterial potassium > 6 on 2 occasions, arrhythmias)

Intrinsic renal failure:

1. Identify at risk babies (HIE, sepsis, sick neonates, fluid overload)
2. Fluid restriction; avoid fluid boluses beyond 40 mls/kg
4. Early treatment of hypotension with inotropes
5. Minimise drug infusions (consider double/ quadruple strength)
6. Stop nephrotoxic drugs
7. Frusemide 1-3 mg/kg stat for persistent oliguria with fluid overload

Post-renal failure/ Obstructive uropathy:

1. Inform paediatric urologists/ nephrologists
2. Antibiotic prophylaxis
3. Radiological investigations i.e. USS/ MCUG/ DMSA (guided by paed urology)
4. Monitor twice daily BP (hypertension)
5. Venous blood samples (S. Potassium)
6. Bladder catheterisation

Reno-vascular hypertension:

1. Renal vessel thrombosis due to umbilical line thrombo-embolism
2. Congenital – PCKD, severe ATN, cortical necrosis, interstitial nephritis U-P obstruction
3. Abdominal masses (Wilm's tumour, neuroblastoma)
4. Iatrogenic (steroids in BPD)

Treatment: Hydralazine IV infusion or Labetelol

(Treat hypertension if persistently BP > 30 % above normal limits)

References:

Avery's textbook of Paediatric nephrology
Diseases of kidney and urinary tract; Robert Schrier
Guidelines for management of acute renal failure, hypertension, renal unit, Glasgow
Cataldi et al; ADC; 2005; Risk factors for acute renal failure in newborn