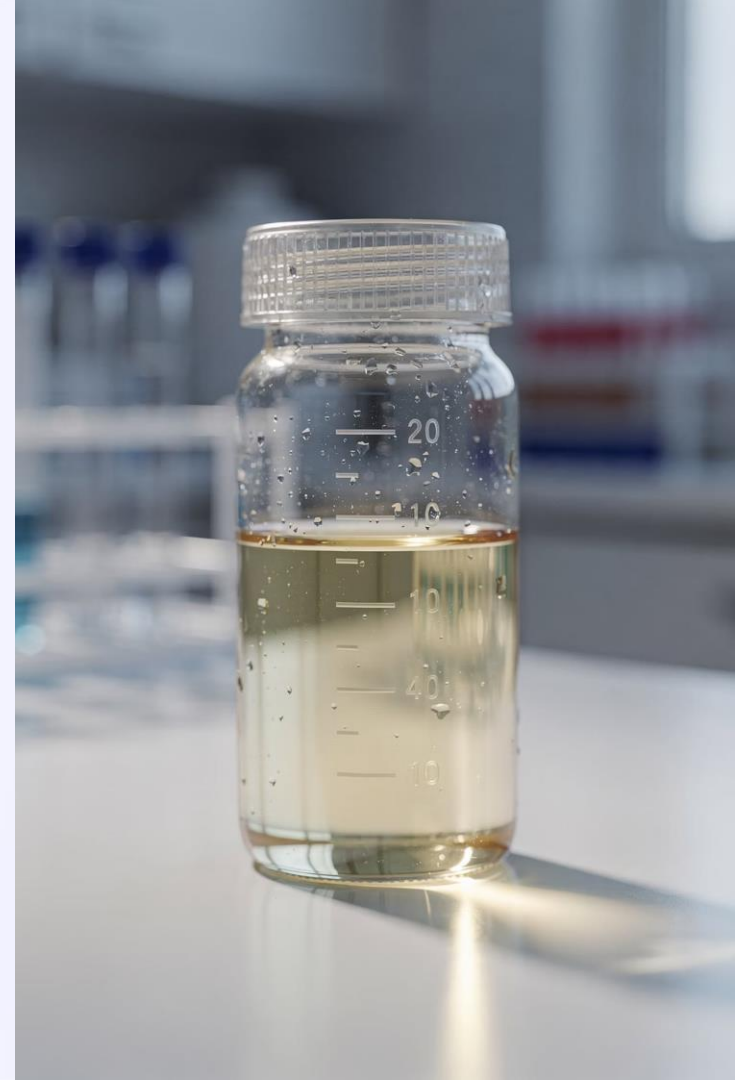


Hematuria in Children

Revision Sheet

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1. Definition

Hematuria is the presence of red blood cells (RBCs) in urine.

Types

Type	Definition
Microscopic hematuria	>5 RBCs/high-power field (HPF) on urine microscopy in at least 2 properly collected urine samples
Macroscopic (gross) hematuria	Visible red, brown, tea-colored, or cola-colored urine



Remember: Red urine is not always hematuria (foods, drugs, hemoglobinuria, myoglobinuria).

2. Clinical Presentation

A. History

Always ask:

Character of urine

- Bright red?
- Tea-colored?
- Cola-colored?
- Blood only at beginning/end of stream?

Associated symptoms

Symptom

Fever

Dysuria

Frequency

Flank pain

Severe colicky pain

Facial edema

Hypertension

Rash

Joint pain

Decreased urine output

Recent sore throat (1–3 weeks)

Recent URI (within days)

Suggests

UTI

Cystitis

UTI

Stones, pyelonephritis

Urolithiasis

Glomerulonephritis

Renal disease

IgA vasculitis, lupus

Systemic disease

Acute nephritis

Post-streptococcal GN

IgA nephropathy

Trauma?

- Falls
- Sports injury
- Motor vehicle accident

Exercise?

Exercise-induced hematuria usually resolves within 48–72 hours.

Family history

- Kidney disease
- Deafness (Alport syndrome)
- Kidney stones
- Polycystic kidney disease

Medications

- NSAIDs
- Cyclophosphamide
- Anticoagulants

B. Physical Examination

Always assess:

✓ Blood pressure

✓ Weight

✓ Growth

✓ Edema

✓ Hydration

✓ Abdominal masses

✓ Costovertebral angle
tenderness

✓ Skin rash

✓ Joint swelling

3. Diagnostic Approach

Step 1

Is it true hematuria?

Urine dipstick → positive for blood

↓

Confirm by urine microscopy.

Dipstick alone is insufficient.

Step 2

Determine source

Glomerular hematuria

Usually:

- Tea/cola-colored urine
- Proteinuria
- RBC casts
- Dysmorphic RBCs
- Hypertension
- Edema

Think:

- Post-streptococcal GN
- IgA nephropathy
- Lupus nephritis
- Alport syndrome

Non-glomerular hematuria

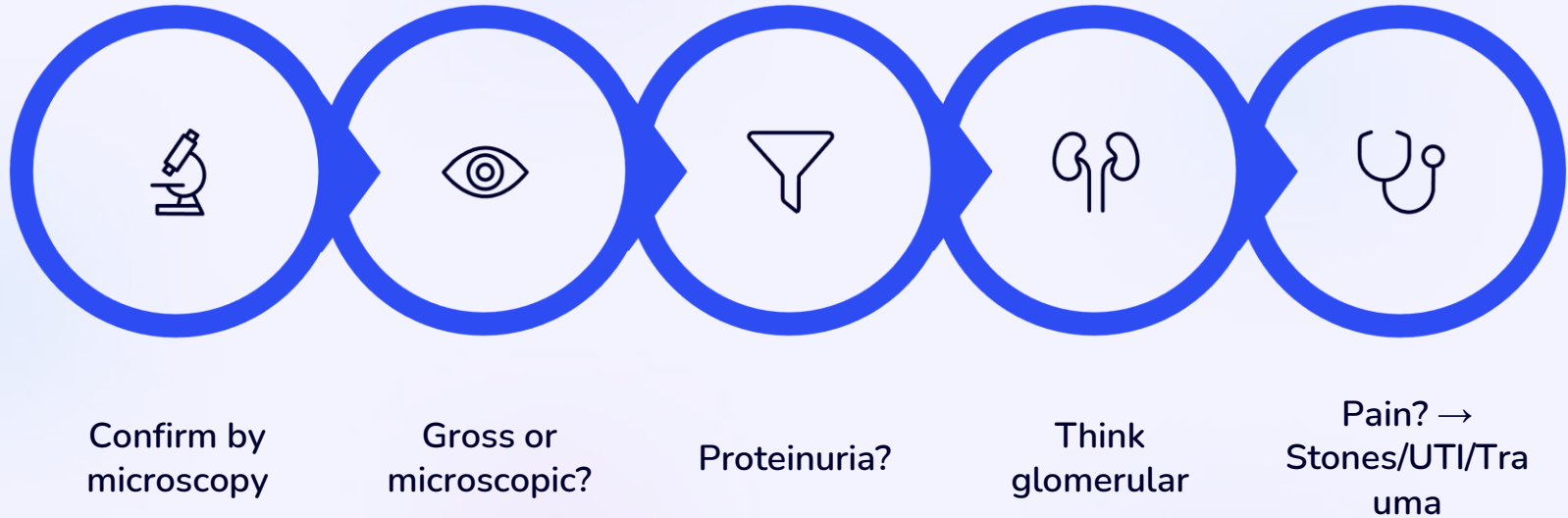
Usually:

- Bright red urine
- Normal RBC morphology
- No casts
- Pain common

Think:

- UTI
- Stones
- Trauma
- Tumor
- Hypercalciuria

Diagnostic Flowchart



Hematuria → Confirm by microscopy → Gross or microscopic? → Proteinuria? → Yes → Think glomerular disease → No → Pain? → Yes → Stones, UTI, trauma → No → Persistent? → Yes → Further nephrology/urology evaluation

4. Differential Diagnosis

Glomerular Causes

Disease	Typical Clues
Post-streptococcal GN	Tea-colored urine, edema, HTN
IgA nephropathy	Gross hematuria after URI
Lupus nephritis	Rash, arthritis
Alport syndrome	Hearing loss
Thin basement membrane disease	Family history

Non-glomerular Causes

Disease	Typical Features
UTI	Dysuria, fever
Hypercalciuria	Recurrent hematuria ± stones
Kidney stones	Severe flank pain
Trauma	History of injury
Structural anomalies	Recurrent symptoms
Tumors (Wilms, bladder)	Abdominal mass, persistent gross hematuria
Exercise-induced	Resolves in 72 h

5. Investigations

Essential First-Line Tests

Investigation

Urinalysis
Urine microscopy
Urine culture
Urine protein/creatinine ratio
Blood pressure
Serum creatinine
Electrolytes
CBC
Renal ultrasound

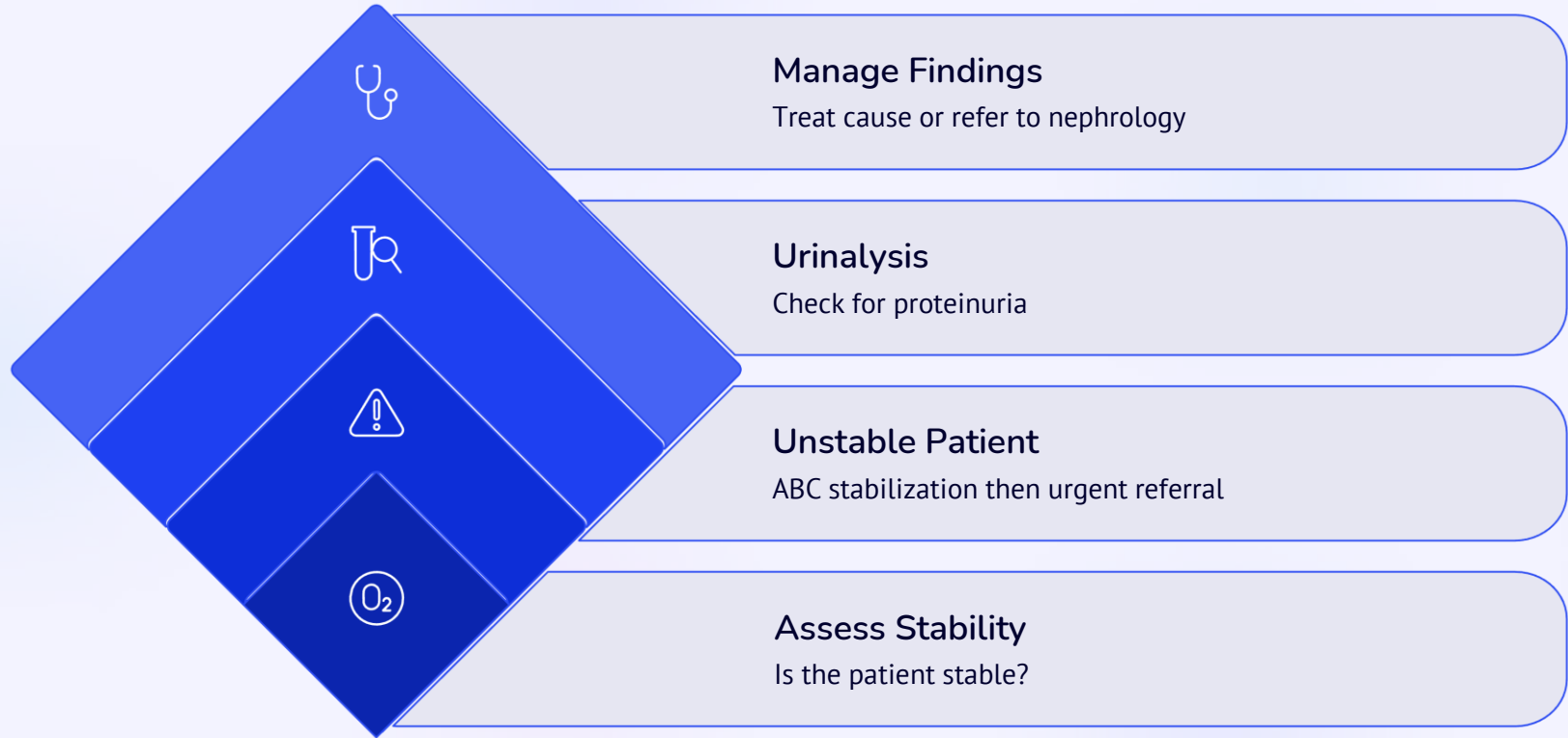
Purpose

Protein, blood, leukocytes
RBC morphology, casts
Suspected UTI
Quantify proteinuria
Essential
Kidney function
AKI assessment
Anemia/infection
Stones, obstruction, masses

Second-Line Tests (When Indicated)

- Complement C3/C4
- ASO titer
- ANA
- Anti-dsDNA
- ANCA
- Anti-GBM antibody
- Serum IgA
- Urine calcium/creatinine ratio
- Kidney biopsy (selected cases)

6. Management Algorithm



7. Drug Summary Table

Condition	First-line Treatment
UTI	Antibiotics according to local guideline/culture
Post-streptococcal GN	Supportive care ± antihypertensives ± diuretics
IgA nephropathy	Supportive care; ACE inhibitor if persistent proteinuria (specialist guidance)
Kidney stones	Hydration + analgesia
Hypercalciuria	Increased fluids; dietary sodium restriction; thiazides in selected patients (specialist)

Important Drug Doses

Drug	Dose
Paracetamol	10–15 mg/kg/dose every 4–6 h (max 75 mg/kg/day or 4 g/day)
Ibuprofen*	10 mg/kg/dose every 6–8 h (avoid if AKI/dehydration)
Furosemide	1 mg/kg IV/PO (for fluid overload under supervision)

8. Admission Criteria

Admit if:

Gross hematuria with clots causing urinary retention

Acute kidney injury

Severe hypertension

Significant edema

Nephritic syndrome

Suspected rapidly progressive glomerulonephritis

Trauma requiring monitoring

Sepsis

Inability to maintain hydration

Severe pain requiring IV analgesia

9. Referral Criteria

Pediatric Nephrology

Refer if:

- Persistent microscopic hematuria (>6 months)
- Gross hematuria without clear cause
- Proteinuria
- Hypertension
- Reduced GFR
- RBC casts
- Low complement
- Recurrent episodes
- Family history of inherited nephropathy

Pediatric Urology

Refer if:

- Stones
- Structural abnormalities
- Obstruction
- Persistent gross hematuria
- Bladder pathology
- Trauma

10. Follow-Up

Situation

Isolated microscopic hematuria

UTI

Post-streptococcal GN

Persistent hematuria

Follow-up

Repeat urinalysis in 1–2 months

Repeat only if clinically indicated

BP, urinalysis, renal function until resolution

Nephrology follow-up

11. Clinical Pearls

- ✓ Tea-colored urine usually indicates glomerular bleeding.
- ✓ Bright red urine usually suggests a lower urinary tract source.
- ✓ Always measure blood pressure in any child with hematuria.
- ✓ Hematuria plus proteinuria strongly suggests renal parenchymal disease.
- ✓ RBC casts are almost pathognomonic for glomerulonephritis.
- ✓ Microscopic hematuria after vigorous exercise should resolve within 48–72 hours.
- ✓ Persistent isolated microscopic hematuria often has a benign course but requires follow-up.

12. Common Mistakes in Exams and Clinical Practice

✗ Assuming every red urine sample represents hematuria.

✗ Forgetting urine microscopy after a positive dipstick.

✗ Missing hypertension.

✗ Ignoring proteinuria.

✗ Not asking about recent streptococcal infection.

✗ Missing family history of kidney disease or hearing loss.

✗ Treating asymptomatic microscopic hematuria with antibiotics without evidence of infection.

✗ Forgetting that trauma-associated hematuria may indicate significant renal injury.

13. Key Take-Home Messages

1. Confirm hematuria with urine microscopy, not dipstick alone.
2. Differentiate glomerular from non-glomerular hematuria using urine color, proteinuria, RBC morphology, and casts.
3. Blood pressure measurement is mandatory in every child with hematuria.
4. Hematuria with proteinuria, edema, hypertension, or renal impairment strongly suggests glomerular disease.
5. Common causes include UTI, post-streptococcal glomerulonephritis, IgA nephropathy, hypercalciuria, stones, and trauma.
6. Renal ultrasound is the preferred initial imaging study when structural disease is suspected.
7. Do not overlook systemic diseases such as lupus or vasculitis in children with hematuria and extra-renal symptoms.
8. Persistent microscopic hematuria (>6 months), recurrent gross hematuria, or hematuria with abnormal renal findings warrants pediatric nephrology referral.
9. Gross hematuria with clots, acute kidney injury, severe hypertension, or nephritic syndrome requires hospital admission.
10. Management focuses on identifying and treating the underlying cause rather than treating hematuria itself.

High-Yield Examination Tips

Finding

Tea-colored urine + edema + HTN + low C3

Gross hematuria during or shortly after URI

Dysuria + fever + positive leukocyte esterase/nitrites

Flank pain + microscopic hematuria

Persistent microscopic hematuria + hearing loss

Hematuria + purpuric rash + abdominal pain

Hematuria + proteinuria + RBC casts

Most Likely Diagnosis

Post-streptococcal glomerulonephritis

IgA nephropathy

UTI

Urolithiasis

Alport syndrome

IgA vasculitis

Glomerulonephritis until proven otherwise