

## Clinical Guideline

# HAEMATURIA IN CHILDREN

<b>SETTING</b>	Bristol Royal Hospital For Children
<b>FOR STAFF</b>	Medical staff caring for children with haematuria
<b>PATIENTS</b>	Children with haematuria

## Introduction

- Haematuria is defined as more than 5 RBC per high power field on microscopy
- Dipstick positive can be due to blood, haemoglobin or myoglobin

Haematuria can be divided into following groups:

- [Macroscopic \(gross\) haematuria](#)
- [Microscopic haematuria with clinical symptoms \(fever, abdominal pain, oedema, rash\)](#)
- [Asymptomatic microscopic haematuria with proteinuria](#)
- [Isolated asymptomatic microscopic haematuria](#)

## Evaluation of the child with macro- or microscopic haematuria:

### History – establish:

- Timing of macroscopic haematuria in relation to micturition:
  - Initial (urethral)
  - Total (kidney)
  - Terminal (posterior urethra/bladder)
- Fever, exercise/trauma/bladder catheterisation/menstruation – transient cause
- Incontinence, dysuria, frequency or urgency – consider urinary tract infection (UTI)
- Flank pain, fever, dysuria and frequency/urgency – consider acute pyelonephritis
- Flank pain with radiation to groin may suggest obstruction (clot/stone)
- Left flank/pelvic pain – nutcracker syndrome (left renal vein entrapment)
- Upper respiratory tract infection (URTI) or impetigo:
  - Haematuria 2 - 4 weeks after URTI/impetigo – consider post infectious glomerulonephritis
  - Haematuria with URTI – consider IgA nephropathy or adenoviral infection (less common)
- Drugs, food substances and toxins that give red urine (see [Table 1](#))
- Girl with recurrent gross haematuria – consider vaginal foreign body and abuse
- Positive family history for: haematuria, hearing loss, renal stones, sickle cell trait, haemophilia, chronic kidney disease, dialysis, renal transplant

### Physical Examination:

- Weight and height
- Blood pressure (see centile chart)
- Temperature
- Tenderness of renal angles
- Oedema
- Skin rash, joint swelling
- Abdominal masses
- Examination of the genitalia

Table 1: Causes of red urine

Dipstick positive	Dipstick negative
<ul style="list-style-type: none"> <li>➢ Haematuria</li> <li>➢ Haemoglobinuria</li> <li>➢ Myoglobinuria</li> </ul>	<p><i>Medication including</i></p> <ul style="list-style-type: none"> <li>➢ Chloroquine</li> <li>➢ Doxorubicin</li> <li>➢ Nitrofurantoin</li> <li>➢ Rifampicin</li> </ul> <p><i>Food dyes</i></p> <ul style="list-style-type: none"> <li>➢ Beets</li> <li>➢ Blackberries</li> </ul> <p><i>Metabolites</i></p> <ul style="list-style-type: none"> <li>➢ Bile pigments</li> <li>➢ Methemoglobin</li> <li>➢ Porphyrin</li> <li>➢ Tyrosinosis</li> <li>➢ Urates</li> </ul>

Table 2

### Principal causes of haematuria

- UTI – cystitis, pyelonephritis
- Glomerular cause:
  - Post infectious glomerulonephritis
  - IgA nephropathy
  - Haemolytic uremic syndrome (HUS)
  - Systemic lupus erythematosus
  - Henoch-Schönlein purpura
  - Others: ANCA positive glomerulonephritides
- Congenital anomalies of urinary system
- Calculi
- Hypercalciuria
- Lower urinary tract causes
  - Urethral trauma, urethritis
- Familial:
  - Thin basement disease,
  - Alport's syndrome
- Other rare causes
  - Renal tumour
  - Acute interstitial nephritis
  - Sickle cell disease
  - Coagulopathy
  - Drug induced – cyclophosphamide

Table 3

### Signs of glomerular bleeding

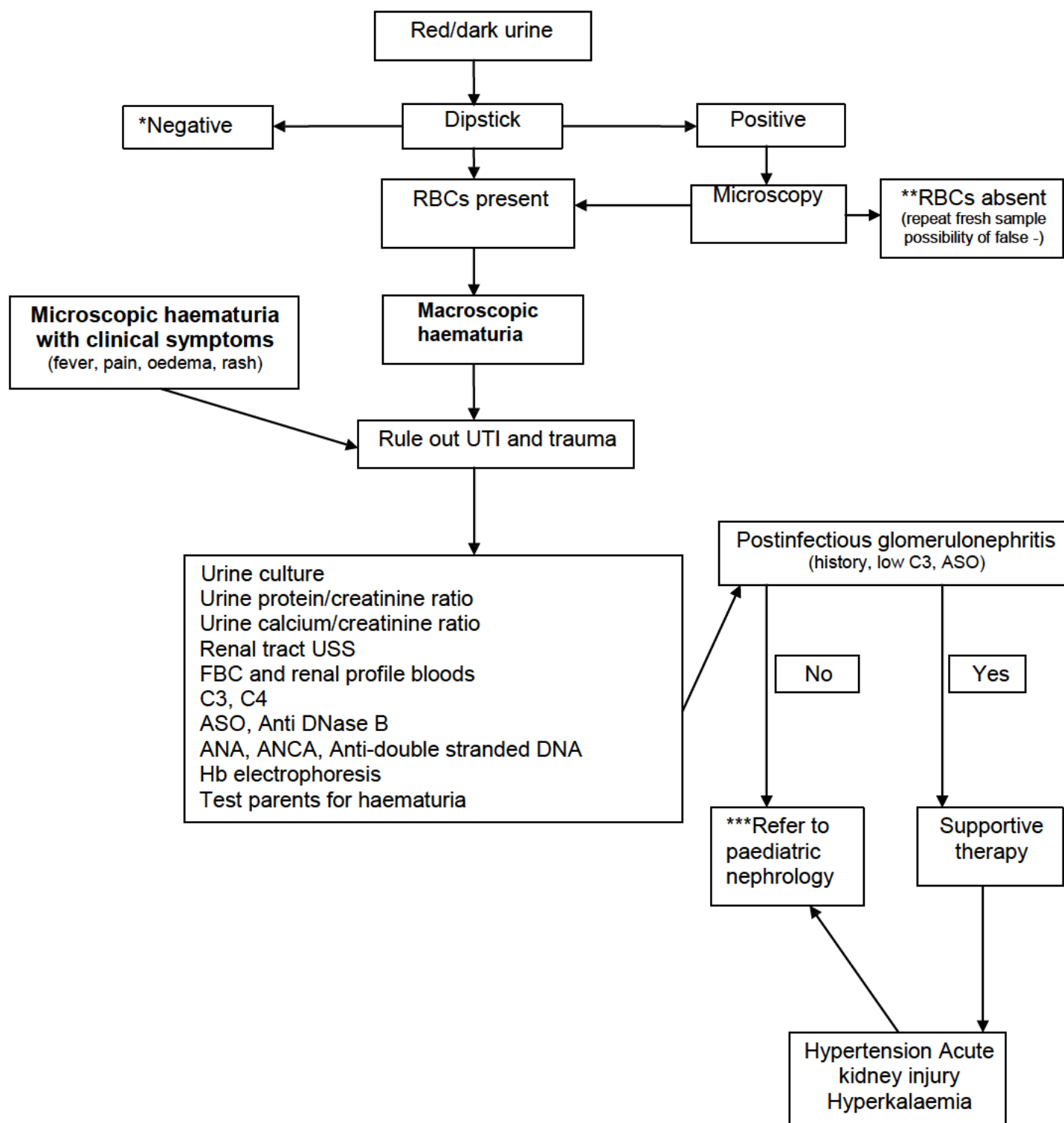
- Smoky brown, tea or cola coloured urine
- Proteinuria (>2+ on dip)
- RBC casts
- Dysmorphic RBCs

**Note:** absence of the above does not rule out glomerular cause

### Investigations (for details see page 3 and 4):

- Urine dipstick: as sensitive as microscopy but leads to more false positive results
- Urine microscopy: fresh sample, necessary after positive dipstick to confirm RBCs (repeat if negative, could be false negative or intermittent)
- Urine culture and sensitivity
- Urine protein/creatinine ratio if dipstick positive for protein – first sample of the day
- Urine calcium/creatinine ratio – second sample of the day, repeat twice
- Renal tract ultrasound
- FBC (and blood film if HUS suspected)
- Renal profile bloods (all electrolytes, urea, creatinine, albumine, protein, uric acid, ALT, ALP)
- If glomerular cause suspected:
  - Antistreptolysine-O (ASO) and Anti-DNase titre
  - Throat swab
  - C3, C4
  - ANA
  - ANCA
  - Anti-double stranded DNA
  - IgA
- Coagulation screen if history of bruises
- Formal hearing assessment if family history of hearing loss or haematuria persistent for 12 months
- Check urine of parents/siblings

## Approach to a child with macroscopic/microscopic haematuria with clinical symptoms

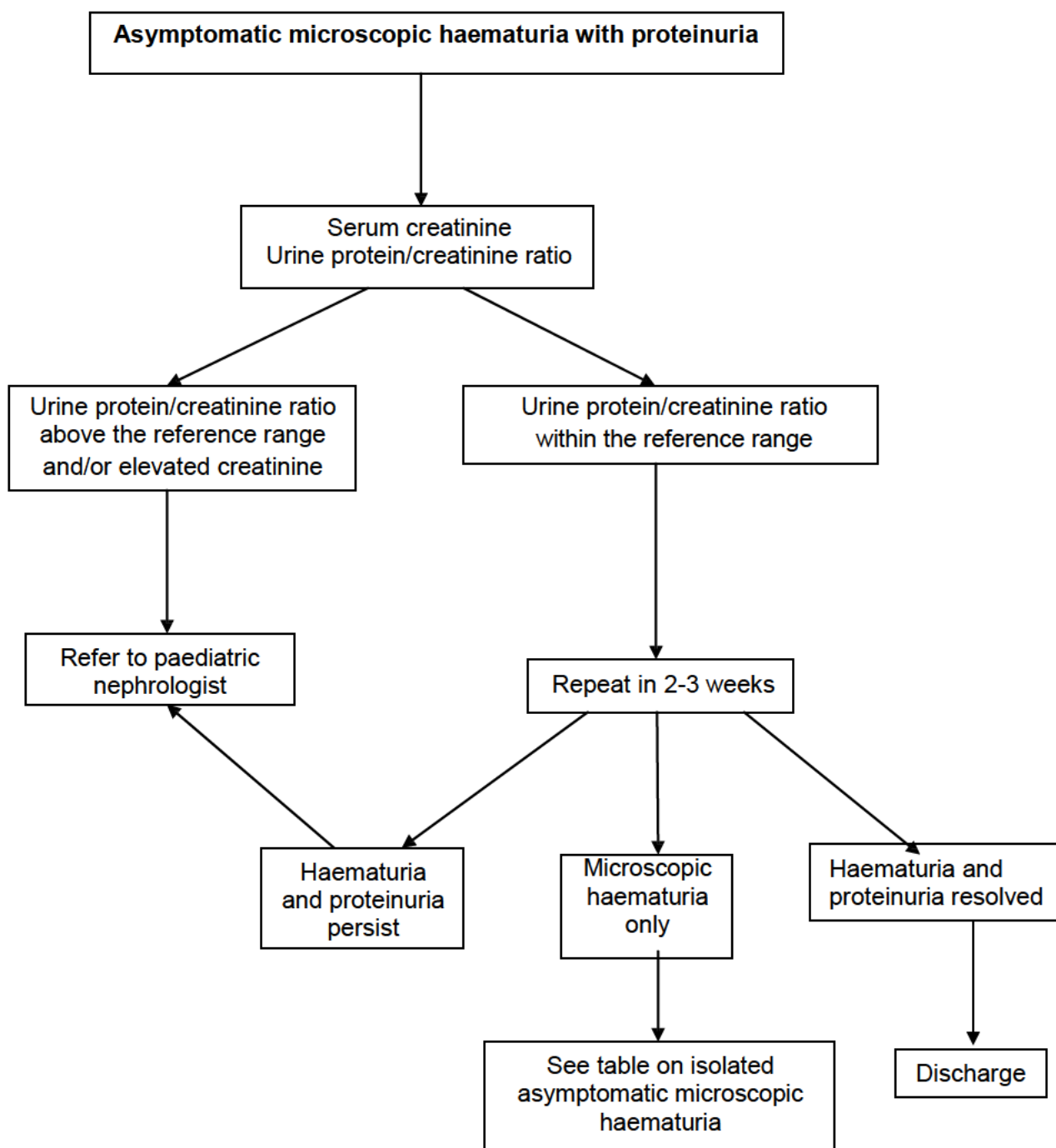


\* Refer to [Table 1](#)

\*\* Myoglobinuria (trauma/seizures/high CK) and haemoglobinuria (high LDH) – discuss with paediatric nephrologist

\*\*\* Consider other glomerular causes; discuss further treatment/follow-up with paediatric nephrologist

## Approach to a child with asymptomatic microscopic haematuria with proteinuria



### Isolated asymptomatic microscopic haematuria

- Repeat urinalysis twice one week apart (without exercise)
- If haematuria resolves, then discharge
- If haematuria persists, rule out UTI (dipstick, microscopy and culture)
- Check urine and blood pressure every 6 months in the 1<sup>st</sup> year
- Refer to paediatric nephrologist if:
  - Proteinuria and/or hypertension develops
  - Haematuria persists for 1 year (consider urine calcium/creatinine ratio and urinalysis of parents/siblings)

## Abbreviations

ALP – Alkaline Phosphate  
ALT – Alanine Transaminase  
ANA – Anti-nuclear antibody  
ANCA – Anti-neutrophil cytoplasmic antibodies  
CK – Creatine Kinase  
IgA – Immunoglobulin A  
LDH – Lactate dehydrogenase  
RBC – Red blood cells

## References:

1. Diven, S., C., Travis, L, B.: A practical primary care approach to haematuria in children. Paediatr Nephrol 2000, 14: 65 – 72.
2. Meyers, K., E., C.: Evaluation of haematuria in children. Urol Clin N Am 2004, 31: 559 – 573.
3. Evaluation of haematuria in children: [www.uptodate.com](http://www.uptodate.com)
4. Rees, L., Brogan, P., A., Bockenhauer, D., Webb, N., J., A.: The approach to the child with haematuria. In: Paediatric Nephrology, Oxford University Press 2012: 8 – 11.
5. Hegde, S., Krishnan, R.: Approach to a child with haematuria: [www.welshpaediatrics.org.uk](http://www.welshpaediatrics.org.uk)

**RELATED DOCUMENTS** None

**AUTHORISING BODY** Paediatric Renal Governance

**SAFETY** These guidelines were produced in good faith by the authors reviewing available evidence. They were designed for use by medical staff at the Bristol Royal Hospital for Children for children under their care. Responsibility for use of these guidelines lies with the individuals caring for the patients.

**QUERIES** Contact Paediatric Nephrology Consultant on-call via hospital switchboard.