Haematuria

Definition / Supporting Information

Urine that contains blood or erythrocytes

- Microscopic
  - > 5 erythrocytes per high-power field seen on microscopy of centrifuged urine
- Macroscopic (or gross)
  - Red or brown (cola-coloured) urine with erythrocytes seen on microscopy

Keywords / also known as: blood in urine

Essential History

Ask about:

- Change in the colour of a child's urine
  - Brown (tea- or cola-) coloured urine may indicate a renal or glomerular cause of haematuria.
  - Red or pink urine may indicate haematuria of lower tract origin, particularly if bleeding occurs only with the onset of micturition.
  - Turbid urine may indicate the presence of cells, seen in glomerular disease or infection.
- Menstruation, if appropriate
- Blood on a nappy or underwear
- Blood clots
- Timing of the bleeding
  - If bleeding occurs only at the onset or end of micturition, rather than throughout the stream, the source of the bleeding is likely to be in the lower tract.
- Drugs and foods that can discolour urine to give it the appearance of haematuria:
  - Rifampicin
  - Iron supplements eg, ferrous sulfate
  - Nitrofurantoin
  - Beetroot
  - Blackberries
  - Senna
  - Metronidazole
  - Ketamine (used as recreational drug)

  - Chemotherapy drugs (eg, daunorubicin and doxorubicin)
- Pain on passing urine (dysuria) / frequency / urgency / enuresis
  - May indicate urinary tract infection (UTI)
- Upper respiratory infection symptoms and / or preceding infections (eg, group A streptococcal throat infection)
  - May indicate post-infectious glomerulonephritis
- Previous episodes of haematuria
- History of trauma
- Other illnesses, such as the presence of sickle cell trait or sickle cell disease
- Fever / malaise / weight loss / alopecia / rash / joint pains
  - May indicate multisystem disease
- Family history
  - Other family members with haematuria or kidney or joint disease
- Any history of deafness, which may occur with Alport's syndrome
- Faltering growth

'Red Flag' Symptoms and Signs

Ask about:

- Evidence of swelling / puffiness (oedema), especially of extremities / around eyes
- Blurred vision or headaches suggestive of hypertension (see Hypertensive Emergencies)
- Rash
- Oliguria

Look for:

- Abdominal or costovertebral angle tenderness
- Abdominal mass
  - Tumour / cystic kidney (see Suspected cancer recognition and referral [NICE guideline NG12])
- Evidence of local trauma to the genitourinary tract
  - Consider child maltreatment (see Child maltreatment: when to suspect maltreatment in under 18s [NICE clinical guideline 89, section 1] and Child abuse and neglect [NICE guideline 76]).
- Periorbital, genital, or extremity oedema
- Evidence of hypertension on blood pressure measurement
- Rash
  - Look for non-blanching rash (petechiae / purpura)
- Redness / swelling of joints

Differential Diagnosis / Conditions

- Menstruation
- Urinary tract infection
- Local trauma / irritation
- Child maltreatment (see Child maltreatment: when to suspect maltreatment in under 18s [NICE clinical guideline 89, section 1] and Child abuse and neglect [NICE guideline 76]).
- Thin basement membrane disease (TBMD)
  - Persistent microscopic haematuria with occasional episodes of macroscopic haematuria
  - Autosomal dominant
- Glomerulonephritis
  - Post-infectious glomerulonephritis (especially in association with oedema and / or hypertension)
  - IgA nephropathy
  - Membranoproliferative glomerulonephritis (MPGN)
  - Alport's syndrome
  - Anti-glomerular basement membrane (GBM) disease
- Bleeding disorders (eg, haemophilia)
- Sickle cell anaemia
- Vasculitis
  - Henoch–Schönlein purpura
    - Abdominal pains
    - Arthralgia
    - Palpable purpura
  - Anti-neutrophil cytoplasmic antibody (ANCA) positive vasculitis
  - Systemic lupus erythematosus (SLE)
- Hypercalciuria
  - Children with haematuria and underlying hypercalciuria are at risk for nephrolithiasis.
- Pelvi-ureteric junction dysfunction
- Loin pain-haematuria syndrome
- Rhabdomyolysis
  - May be induced by exercise or infection (eg, mycoplasma, influenza)
- Bladder / renal tumour

Investigations

To be undertaken by non-specialist practitioners (eg, General Practitioner (GP) Team), or specialist practitioners (eg, Emergency Department / General Paediatric / Paediatric Nephrology / Paediatric Urology Team(s)):

- Urinalysis (see Urinary tract infection in children: Diagnosis, treatment and long-term management [NICE clinical guideline 54])
  - Nitrite positivity suggests UTI
  - Urine sample for urgent microscopy and culture (in infants < 3 months)
  - Dipstick testing for infants and children > 3 months but < 3 years
  - Urine dipstick positive for blood but < 5 erythrocytes on microscopy suggests haemoglobinuria or myoglobinuria rather than haematuria
    - Note that a delay in undertaking microscopy may result in red cells lysis with misleading results
  - Repeat urinalysis at least once before further evaluation if asymptomatic, normotensive child with isolated microscopic haematuria
  - Persistent microscopic haematuria may represent an early presentation of a progressive glomerular disease.
    - Periodic urinalysis should be done to monitor for the development of significant proteinuria. The presence of any proteinuria on dipstick urinalysis should prompt urine protein:creatinine ratio and / or urine albumin:creatinine ratio, to be performed on an early morning urine sample.
- Urine culture if (urgent if < 3 months, routine if > 3 months but < 3 years):
  - Urinary symptoms
  - Unexplained fever or sepsis
  - Nitrite / leukocyte positivity on urine dipstick
- Urine protein:creatinine ratio / urine albumin:creatinine ratio
  - Indicates glomerular pathology if raised

To be undertaken by specialist practitioners (eg, Emergency Department / General Paediatric / Paediatric Nephrology / Paediatric Urology Team(s)):

- Urine calcium:creatinine ratio
- Urine oxalate / glycolate / cysteine
- Serum urea and electrolytes
- Calcium and phosphorus
- Liver function tests
- Antinuclear antibody test
- Complement studies (C3, C4, and total complement)
  - Low C3 in post-infectious glomerulonephritis / MPGN / SLE
- Full blood count with differential

- Anti DNAase B and antistreptolysin O titres
- Throat swab
  - If history of sore throat
- Creatine kinase if suspicion of rhabdomyolysis
- Imaging
  - Every child with macroscopic haematuria should have renal ultrasonography to rule out:
    - Nephrolithiasis
    - Tumour
    - Obstructive uropathy
- Diagnostic procedures
  - Renal biopsy may be performed for:
    - Proteinuria in association with haematuria
    - Deterioration of renal function

Treatment Approach

To be undertaken by non-specialist practitioners (eg, GP Team) or specialist practitioners (eg, Emergency Department / General Paediatric / Paediatric Nephrology / Paediatric Urology Team(s)):

- Treat urinary tract infections with an appropriate antimicrobial regimen (see Urinary tract infection in children: Diagnosis, treatment and long-term management [NICE clinical guideline 54])
- Treat skin or throat streptococcal infections with phenoxymethylpenicillin
- Note that microscopic haematuria without any other signs and symptoms:
  - Often is benign
  - Resolves spontaneously in many cases (transient haematuria)
- Suspect child maltreatment if a child has lacerations, abrasions, or scars in the genital area and the explanation is unsuitable (see Child maltreatment: when to suspect maltreatment in under 18s [NICE clinical guideline 89, section 1] and Child abuse and neglect [NICE guideline 76])

To be undertaken by specialist practitioners (eg, Emergency Department / General Paediatric / Paediatric Nephrology / Paediatric Urology Team(s)) if not already done:

- Patients with glomerulonephritis need to be monitored for hypertension, fluid balance, and evidence of renal dysfunction and may require treatment with antihypertensive and / or immunosuppressive medications.
  - Post-infectious glomerulonephritis
    - Low C3 levels (transiently, between 8 and 20 weeks) and elevated streptolysin O antibody titres are characteristic
    - Typically self-limited
    - Good prognosis for long-term renal function

When to Refer

Refer to specialist practitioners (eg, Emergency Department / General Paediatric / Paediatric Nephrology Team(s)) if:

- Macroscopic haematuria
- Associated proteinuria
- Hypertension
- Hearing loss
- Family history of renal disease or deafness
- Nephrolithiasis (or Paediatric Urologist)

Refer to a paediatric specialist (Paediatric Urologist) if:

- Obstructive uropathy
- Trauma
- Tumours
  - See Suspected cancer: recognition and referral [NICE clinical guideline NG12]

Consider admission to hospital if:

- Sickle cell disease or sickle cell trait and macroscopic haematuria from papillary necrosis
- Acute kidney injury
- Anasarca (generalised oedema)
- Acute hypertension

‘Safety Netting’ Advice

- School-aged children with microscopic haematuria may be observed for up to 2 years before more extensive testing is undertaken.
  - Haematuria should be monitored by periodic urine analysis.
  - Periodic urinalysis should be done to monitor for the development of proteinuria. The presence of any proteinuria on dipstick urinalysis should prompt urine protein:creatinine ratio and / or urine albumin:creatinine ratio, to be performed on an early morning urine sample.
- Monitor patients for hypertension
  - Refer to a paediatric specialist (Paediatrician / Paediatric Nephrologist) if hypertension and / or proteinuria develops.
- Monitor growth (height)
- Undertake urine dipstick in parents if haematuria is persistent in child

Patient / Carer Information

Please note: whilst these resources have been developed to a high standard they may not be specific to children.

- Haematuria (Web page), infoKID
- Blood in urine (haematuria) (Web page), the NHS website

Resources

National Clinical Guidance

Acute Kidney Injury: Prevention, detection and management of acute kidney injury up to the point of renal replacement therapy (Web page), NICE clinical guideline CG169, National Institute for Health and Care Excellence.

Child abuse and neglect (Web page), NICE guideline NG76, National Institute for Health and Care Excellence.

Urinary tract infection in children: Diagnosis, treatment and long-term management (Web page), NICE clinical guideline CG54, National Institute for Health and Care Excellence.

Child maltreatment: when to suspect maltreatment in under 18s (Web page), NICE clinical guideline CG89, National Institute for Health and Care Excellence.

Suspected cancer: recognition and referral (Web page), NICE clinical guidance NG12, National Institute for Health and Care Excellence.

Medical Decision Support

Child Sexual Abuse (Web page), RCPCH Child Protection Companion

Suggested Resources

**Please note: these resources include links to external websites. These resources may not have national accreditation and therefore PCO UK cannot guarantee the accuracy of the content.*

Nitrofurantoin for urinary tract infections (Web page), Medicines for Children

Ranitidine for acid reflux (Web page), Medicines for Children

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