Guideline

Petechiae and Purpura: Emergency Management in Children

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Applicable to	Emergency staff managing patients with petechiae and or purpura				
Authorisation	Executive Director Clinical Services				

Purpose

This clinical practice guideline aims to guide clinicians in the emergency management of the child presenting with petechiae and/or purpura.

Scope

This guideline applies to all staff involved in the care and management of the child presenting with petechiae and/or purpura.

Related documents

Procedures, Guidelines, Protocols and Parent Handouts

- CHQ-GDL-01202 - CHQ Paediatric Antibiocard: Empirical Antibiotic Guidelines
- CHQ-GDL-60010 - Sepsis: Recognition and Early Management in Children
  - Queensland Paediatric Sepsis pathway
- CHQ-GDL-60006 - Febrile Illness – Emergency Management in Children
- CHQ-GDL-60008 - Meningitis – Emergency Management in Children
- CHQ-GDL-02923 - Newly Diagnosed Immune Thrombocytopenia (ND-ITP) in Children
- CHQ-PROC-63314 - Meningococcal Disease: Management of Health Care Worker Exposure
- Fact sheet: Henoch-Schonlein Purpura (HSP)

Introduction

Petechiae are pinpoint, non-blanching, reddish-purple lesions of less than 2mm in diameter; whereas purpura are larger confluent lesions measuring between 2mm – 1cm in diameter[1].

These lesions can occur as a result of:

- disruption of vessel integrity - secondary to trauma, infection or vasculitis.
- abnormalities in haemostasis - deficiency or abnormal function of platelets or clotting factors[2].

The evaluation of the child presenting with a petechial rash, particularly in the context of a fever, is a contentious area and it is well recognised that significant differences in practice exist between individual clinicians[3]. The differential diagnosis when presented with a child with a petechial rash is broad and ranges from the trivial to the life threatening.

ALERT

Petechiae and/or purpura can be a sign of life-threatening illness.

All children presenting with petechiae and/or purpura should be reviewed by a senior doctor.

This guideline aims to guide clinicians in the evaluation and management of the child presenting with petechiae and/or purpura based on the best available evidence but should not replace clinical judgement.

Clinical Assessment

Differential Diagnosis:

Careful evaluation is required of any child presenting with petechiae and/or purpura, with the aim of excluding several key diagnoses. In most children presenting with fever and petechiae no cause is identified[4].

Table 1: Differential diagnoses in children presenting with petechiae/purpura. Adapted from Thomas et al[5].

Clinical status	Differential diagnoses
Acutely unwell patients	Acute bacterial sepsis including invasive Meningococcal disease (MCD) Haematological malignancy Haemolytic Uraemic Syndrome (HUS)
All other patients	
Viral Illnesses	Viral illnesses including adenovirus, enterovirus, influenza and varicella
Mechanical	Trauma or Non-Accidental Injury (NAI) Raised Superior Vena Cava (SVC) pressure (e.g. vomiting / coughing)
Other	Vasculitis including Henoch-Schonlein Purpura (HSP; also known as IgA vasculitis) Rheumatological aetiologies (other vasculitides and collagen disorders) Thrombocytopenia including Immune Thrombocytopenia (ITP) Bone marrow failure Congenital bleeding disorders

Assessment:

A thorough clinical assessment (history and examination) should be undertaken, addressing the key components in Table 2.

Table 2: Key components of history and examination in a child presenting with petechiae/purpura

History	Examination
Patient demographics Time course of illness Associated symptoms • Fever • Abdominal pain • Bleeding • Joint or bone pain • Lethargy Recent viral illness or immunisation History of trauma Prior bleeding history Past medical history Medication history Family history of bleeding disorder	General appearance Observations including blood pressure Skin • Distribution of rash • Subcutaneous oedema • Bruising/bleeding Abdominal exam • Hepatosplenomegaly • Evidence of acute abdomen Lymphadenopathy Joints • Inflammation • Haemarthroses

Key Diagnoses for Investigation & Management

Decisions regarding investigation, management and disposition can be guided by risk stratifying for serious illness. The use of a tailored approach to investigation and management (as described below) is supported by evidence and has been shown to have excellent sensitivity in identifying cases of invasive bacterial infection[6].

The majority of children can be classified into one of the following groups for investigation and management:

1. Acutely unwell children or those with purpura not typical for HSP (IgA vasculitis).
2. Well children with a petechial rash of unclear cause.
3. Children with a petechial rash secondary to a traumatic/mechanical cause or those with lesions in the distribution of the SVC alone (NAI excluded).
4. Vasculitides including children with suspected HSP (IgA vasculitis).

ALERT

If there is any doubt regarding the diagnosis, treat as potential sepsis and seek senior clinician review.

1. Acutely unwell children or those with purpura not typical for HSP

Acute Bacterial Sepsis (including Meningococcal disease (MCD))

It is well recognised that invasive infections and sepsis (including *Neisseria meningitidis*) may cause purpura[5].

Whilst the incidence of MCD is declining, purpura can also be seen in acute bacterial sepsis secondary to infections such as *Group A Streptococcus, Staphylococcus aureus, Streptococcus pneumoniae and Haemophilus influenzae*[2,4]. It is vital to maintain a high index of suspicion as mortality rates can be as high as 17%[7,8].

Early sepsis can present a diagnostic challenge. The classic petechia and/or purpura of MCD may be absent in up to 20% of cases or present initially as a maculopapular rash in 38%[7,9]. Fever at presentation also has a low sensitivity for MCD[9]. The diagnosis therefore still needs to be excluded in the afebrile child presenting with purpura.

ALERT

All SICK children with purpura not typical for HSP should be investigated and treated for potential meningococcal disease. In WELL children, consider rheumatological aetiologies

Haematological Malignancy

Acute leukaemia can present with petechiae secondary to thrombocytopenia from bone marrow failure. This is typically diagnosed on a full blood count and a blood film demonstrating the presence of blasts.

Investigations of acutely unwell children or those with purpura not typical for HSP:

Where possible bloods should be taken promptly and sent for:

- Blood culture
- Full blood count and blood film
- Coagulation studies
- CRP
- *N. meningitidis* PCR.

Blood cultures should be taken prior to antibiotics, however antibiotics should not be delayed if a sample is unable to be promptly obtained.

ALERT

Do not delay antibiotic therapy in this group.

Antibiotics should be administered as soon as the diagnosis is suspected.

If there are difficulties obtaining IV access, consider early intramuscular (IM) or intraosseous (IO) antibiotics.

Treatment:

These children should all be treated as having potential sepsis and should be initiated on the Queensland Paediatric Sepsis pathway. The acute resuscitation treatment bundle (reproduced below) should be commenced.

- Inform the Emergency Senior Medical Officer
- Maintain oxygen saturation greater than 94%
- Commence antibiotic therapy (IV, IM or IO) as per the CHQ Paediatric Empirical Antibiotic Guidelines and Queensland Paediatric sepsis pathway
- Commence fluid resuscitation
- Consider and prepare inotropic support
- Refer for admission, with consideration of the need for Paediatric Intensive Care Unit (PICU) admission +/- retrieval to QCH

Reference:

- Queensland Paediatric Sepsis pathway
- CHQ-GDL-60010 - Sepsis: Recognition and Early Management in Children

- CHQ-GDL-60006 - Febrile Illness – Emergency Management in Children

Disposition:

All children who fall into this category should be admitted for close observation and ongoing IV antibiotic therapy. Consider the need for PICU admission and/or retrieval to QCH.

Public Health:

All suspected or confirmed cases of MCD require mandatory notification to Public Health. Local Public Health Units will conduct contact tracing and provide advice regarding the need for chemoprophylaxis for family members and close contacts in accordance with national guidelines.

Staff management is guided by the CHQ Meningococcal Disease Health Care Worker Procedure. Chemoprophylaxis for health care workers is rarely needed unless exposed to respiratory secretions (for example those intubating without appropriate PPE).

CHQ-PROC-63314 - Meningococcal Disease: Management of Health Care Worker Exposure

2. Well children with a petechial rash of unclear cause

The aims when investigating this group of children are to further risk stratify for sepsis and identify those with thrombocytopenia, clotting disorders, rheumatological disease or underlying haematological malignancy.

Investigations:

Blood should be sent for:

- Blood culture
- Full blood count and blood film
- Coagulation studies
- CRP

An ESR should also be sent when a rheumatological diagnosis is being considered.

Table 3: Interpretation of results in well children with petechial rash of unclear cause

Abnormal platelet count or coagulation studies	These children should be further investigated and managed in consultation with the general paediatric and/or haematology teams. Whilst the definition of thrombocytopenia varies, platelet counts usually need to be very low before they are of clinical significance or require treatment (typically <20, although there are exceptions to this)[10.] It is important to recognise that thrombocytopenia is not a diagnosis and that the underlying cause needs to be determined. The management of Newly Diagnosed Immune Thrombocytopenia (ND-ITP) is discussed further in the CHQ guideline: CHQ-GDL-02923 - Newly Diagnosed Immune Thrombocytopenia (ND-ITP) in Children

WCC 5-15 and CRP <8	Research demonstrates that well appearing children with a white cell count of between 5 and 15 and a CRP <8 are at low risk of sepsis[7,11,12,13]. It is recognised however that a small group of children with sepsis (particularly those presenting within 12 hours of disease onset) will have bloods that fall between these values on presentation[11]. This group should therefore be observed for 4 hours in the emergency department (or short term treatment area) with half hourly skin checks (looking for progression of the petechiae) and observations (which should include a blood pressure measurement and full CEWT score). If there is progression of the rash or abnormal observations during this period, the child should be treated for potential sepsis as above. The child who remains well during this observation period can be discharged with advice and GP review within 24 hours. Parents/carers should be given clear instructions of when to return.
WCC <5 or >15 or CRP >8	Children with white cell counts <5 or >15 or CRP values >8 remain at risk of sepsis and should therefore be admitted under the local paediatric team[7,11,12]. The decision whether to commence IV antibiotics should be discussed with the admitting team, however if there are any delays to consultation, doubts regarding the diagnosis or acute clinical changes the child should be promptly treated as above.

Children treated with prior antibiotics

Children treated with prior antibiotics can be managed as per this guideline, although the potential for a partially treated serious bacterial infection must be considered[4].

Immune Thrombocytopenia (ITP)

Immune Thrombocytopenia (previously referred to as Idiopathic Thrombocytopenic Purpura) is an isolated thrombocytopenia due to immune mediated destruction of otherwise normal platelets at a rate that exceeds production. It often occurs in the absence of identifiable precipitants (Primary ITP) or may occur in conjunction with other defined autoimmune disorders or immunodeficiency (e.g. systemic lupus erythematosus or common variable immunodeficiency).

Further information regarding investigation, diagnosis and management can be found in the CHQ guideline:

CHQ-GDL-02923 - Newly Diagnosed Immune Thrombocytopenia (ND-ITP) in Children. Information for families can be found here Immune Thrombocytopenia (ITP) in Children.

3. Children with a petechial rash secondary to a traumatic or mechanical cause

Traumatic/mechanical cause including those with lesions in the distribution of the superior vena cava (SVC) alone (NAI excluded)

Trauma is the most common cause of petechiae in children[2]. Children who are well and have a clear history of a mechanical cause for their petechiae are unlikely to have a diagnosis of sepsis[1].

Common mechanical causes include vomiting or coughing causing petechiae in the SVC distribution (above the nipple line) and local physical pressure including the use of tourniquets and the straps of baby carriers and car seats.

These children do not need investigation and may be discharged with GP review within 24 hours if the treating clinician is confident that NAI has been excluded.

If there is any doubt about the aetiology of the petechiae the child should be managed as petechiae of unclear cause.

Non-Accidental Injury

It is important to always consider non-accidental injury, particularly in the presence of petechiae that are unaccountable, unusually distributed or those located away from bony prominences. It is recommended that health professionals consult with Senior Medical Officers with considerable experience in Paediatrics and/or your local Child Protection Liaison service.

If you have formed a reasonable suspicion that a child has suffered, is suffering or is likely to suffer significant harm and may not have a parent able and willing to protect them, then it is mandatory to report these concerns to Child Safety Services. Further information can be found in the relevant guideline.

Clinical Management of Possible Non-Accidental Injuries

QLD Government Guide: Reporting and Referring Child Protection Concerns

This site provides a means of reporting child protection concerns to the Department of Child Safety, Youth and Women: Make a report to Child Safety.

4. Vasculitides, including children with suspected HSP

Henoch-Schonlein Purpura (IgA vasculitis)

HSP (also known as IgA vasculitis) is typically seen in children of 2-8 years and is the most common vasculitis of childhood[14,15].

It is characterised by the presence of palpable purpura with arthritis/arthralgia (typically affecting the knees or ankles), abdominal pain and/or renal involvement (haematuria, proteinuria and/or hypertension)[14,15]. It typically develops over days to weeks, with the rash being the presenting complaint in only 75% of cases[14,16].

The purpura of HSP are classically symmetrical and in gravity or pressure dependent areas (such as the buttocks, legs and extensor surfaces of arms)[14,15]. Children with HSP often develop painful, non-pitting oedema as a result of vasculitis of the dermal vessels[15,16].

Although HSP usually follows a self- limiting course, it is associated with several uncommon but significant complications including very rare but life threatening pulmonary or neurological disease[14].

Table 4: Complications of HSP

System	Complications
Renal	Proteinuria Haematuria Hypertension Nephrotic syndrome Nephritic syndrome Renal impairment and failure
Gastrointestinal/genitourinary	Intussusception GI haemorrhage Bowel ischaemia/necrosis/perforation Protein losing enteropathy Pancreatitis Orchitis
Respiratory	Diffuse alveolar haemorrhage
Neurological	Encephalopathy Intracranial haemorrhage

Figure 1: European League Against Rheumatism (EULAR) diagnostic criteria for HSP[18]

Purpura or petechiae with lower limb predominance (not related to thrombocytopenia) and at least one of:

- Abdominal pain
- Arthritis or arthralgia
- Renal involvement
- Typical histopathology (rarely required in paediatric patients)

These criteria have 100% sensitivity and 87% specificity for HSP.

Investigations:

All children with suspected HSP should have a blood pressure measurement and urinalysis (dipstick / ward test urine).

Hypertension in children is defined as a BP >95th centile. Tables or online calculators should be used to determine this threshold value for the individual patient (based on their gender, age and height). These can be found at:

- Tables
- Online calculator

If there is evidence of hypertension, proteinuria or frank haematuria the urine should be sent for microscopy and protein-creatinine ratio. Bloods should also be taken in this group to assess renal function and serum albumin level[14,19].

Other investigations in children with suspected HSP should be directed by clinical examination and aimed at identifying potential complications[14,19].

Treatment and Disposition:

Pain Management:

Mild Pain:	Children with mild pain and either negative urinalysis or microscopic haematuria alone, can be treated with simple analgesia (paracetamol +/- short course of Non-Steroidal Anti-Inflammatories (NSAIDs), bed rest and elevation of the lower limbs[14].
Moderate - Severe Pain:	Children with moderate to severe pain and negative urinalysis or microscopic haematuria only, should be managed with titrated analgesia and the decision whether to commence steroid therapy discussed with the local paediatric service[14]. Many of these children can still be managed in an outpatient setting.

Steroid therapy:

There is evidence that treatment with steroids reduces the duration of abdominal and joint pain but does not prevent renal complications[14,15,17,19,20,21]. A typical regimen is oral prednisolone 1 to 2 mg/kg once daily (maximum 60 mg/day) whilst symptoms persist. Once symptoms resolve an appropriate weaning regimen should be used[14]. Steroids should only be prescribed after discussion with the local paediatric service.

Indications for Admission:

Children with severe pain, serious abdominal complications, renal involvement (nephritis, nephrotic syndrome, hypertension or renal failure) or pulmonary/neurological disease should be referred for admission[14].

Discharge Advice:

Parents should be advised that the first episode of HSP usually resolves within 4 weeks[14,17,22]. Abdominal and joint pains usually resolve within 72 hours[17].

Up to 35% of children will experience a recurrence of disease, usually within 4 months of diagnosis. These episodes tend to be milder and shorter in duration[14,16].

Follow Up:

Children diagnosed with HSP (regardless of severity) require follow up for a minimum of 6-12 months to exclude developing renal complications[14,19].

This involves an early morning urine dipstick and blood pressure measurement performed weekly for the first month, fortnightly for weeks 5-12 and then at 6 and 12months[14,19]. This can be performed by a local GP.

If the child has a recurrence of disease or develops hypertension, proteinuria or macroscopic haematuria at any stage, they should return to weekly assessments[16], Where there is evidence of hypertension, proteinuria or macroscopic haematuria the child should also be referred for prompt paediatric review and investigation[14,19].

A paediatric nephrologist should also be consulted if[19]:

- Hypertension
- Abnormal renal function
- Macroscopic haematuria – present for 5 days
- Nephrotic syndrome

- Acute nephritic syndrome
- Persistent proteinuria:
    - Urine protein/creatinine ratio >250mg/mmol for 4 weeks
    - Urine protein/creatinine ratio >100mg/mmol for 3 months
    - Urine protein/creatinine ratio >50mg/mmol for 6 months

Children with normal urinalysis at 12 months and no evidence of significant renal involvement require no further follow up[14,19].

A parent handout which enables tracking of follow up screening has been developed and can be found here.

Rheumatological Aetiologies (other vasculitides and collagen disorders)

HSP is typically seen in children who are 2-8 years of age and is the most common vasculitis of childhood[14,15]. In children who are clinical stable and without features of typical HSP, it is important that other rheumatological diseases are considered.

Clinical features which may suggest an alternative rheumatological disease include:

- Age below 2 years or greater than 8 years in a child with or without characteristic distribution of HSP purpura or petechiae.
- Co-existent blanching erythematous rashes (i.e. malar rash).
- Increasing fatigue.
- Weight loss.
- Hair loss.

Children presenting with these clinical features should be discussed with a Rheumatologist to guide further diagnostic investigation and should have an ESR sent as part of their work up.

Consultation

Key stakeholders who reviewed this version:

- Emergency Department SMO, CHQ
- Paediatric Medicine SMO, CHQ
- Renal Medicine SMO, CHQ
- Infectious Diseases SMO, CHQ
- Haematology SMO, CHQ
- Rheumatology SMO, CHQ
- Pharmacist Advanced, Antimicrobial stewardship, CHQ

Definition of terms

Term	Definition
BC	Blood culture
CHQ	Children's Health Queensland
Coag	Coagulation studies
CRT	Capillary refill time
DIC	Disseminated Intravascular Coagulation
HSP	Henoch-Schonlein Purpura
ICH	Intracranial Haemorrhage
ITP	Immune Thrombocytopenia
IO	Intraosseous
MCD	Meningococcal disease
NAI	Non-accidental injury
PICU	Paediatric Intensive Care Unit
PPE	Personal Protective Equipment
QCH	Queensland Children's Hospital
SVC	Superior Vena Cava

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Appendix 1

Flowchart: Investigation and management of the child presenting with petechiae and/or purpura: