

The child with fever: when to refer?

Andy Prendergast

Professor of Paediatric Infection and Immunology

Fever in children

- Three most important questions
 - Does the child look well or unwell?
 - Is there a focus of infection?
 - What do the parents say?
- Basic observations are important – HR, RR, AVPU
 - However, temperature elevates heart rate and respiratory rate
- NICE referral guidelines – high-risk features

Table 3 Risk stratification tool for children aged under 5 years with suspected sepsis

Category	Age	High risk criteria	Moderate to high risk criteria	Low risk criteria
Behaviour	Any	No response to social cues Appears ill to a healthcare professional Does not wake, or if roused does not stay awake Weak high-pitched or continuous cry	Not responding normally to social cues No smile Wakes only with prolonged stimulation Decreased activity Parent or carer concern that child is behaving differently from usual	Responds normally to social cues Content or smiles Stays awake or awakens quickly Strong normal cry or not crying
Respiratory	Any	Grunting Apnoea Oxygen saturation of less than 90% in air or increased oxygen requirement over baseline	Oxygen saturation of less than 92% in air or increased oxygen requirement over baseline Nasal flaring	No high risk or moderate to high risk criteria met
	Under 1 year	Raised respiratory rate: 60 breaths per minute or more	Raised respiratory rate: 50–59 breaths per minute	
	1–2 years	Raised respiratory rate: 50 breaths per minute or more	Raised respiratory rate: 40–49 breaths per minute	
	3–4 years	Raised respiratory rate: 40 breaths per minute or more	Raised respiratory rate: 35–39 breaths per minute	
Circulation and hydration	Any	Bradycardia: heart rate less than 60 beats per minute	Capillary refill time of 3 seconds or more Reduced urine output For catheterised patients, passed less than 1 ml/kg of urine per hour	No high risk or moderate to high risk criteria met
	Under 1 year	Rapid heart rate: 160 beats per minute or more	Rapid heart rate: 150–159 beats per minute	
	1–2 years	Rapid heart rate: 150 beats per minute or more	Rapid heart rate: 140–149 beats per minute	

Fevers in young infants (<3 months old)

- Challenges:
 - Largely unvaccinated
 - Bacterial infections are more common than at older ages
 - Range of pathogens is different
 - Group B strep, *E coli*, Listeria
 - Viruses: HSV, enterovirus, parechovirus
 - Disease progression is more rapid with serious bacterial infections
 - Presentation is more non-specific
 - Infants “compartmentalize” infections less well
- Refer all with fever >38C to paediatrics
 - Full septic screen including lumbar puncture

Recurrent fevers

- Mostly recurrent viral illnesses (associated cough and coryza)
 - 10 URTI per year normal in children under 5 years old
- “Recurrent pneumonia” often episodic viral wheeze
 - Consider unsafe swallow/recurrent aspiration
 - If truly recurrent pneumonia, would investigate ≥ 2 episodes
- Recurrent UTI – test all with urinalysis before treating
 - Not a sign of immunodeficiency
 - Underlying structural problems

Recurrent fevers

- How immunodeficiency presents:
 - SPUR infections
 - **S**evere infections
 - **P**ersistent infections
 - **U**nusual infections
 - **R**ecurrent infections
 - Immune dysregulation
 - Lymphadenopathy, hepatosplenomegaly, cytopenias, IBD-like

Recurrent fevers

- How immunodeficiency presents:
 - SPUR infections
 - Severe infections
 - Persistent infections
 - Unusual infections
 - Recurrent infections
 - Immune dysregulation
 - Lymphadenopathy, hepatosplenomegaly, cytopenias, IBD-like
- Four flags for when to refer:
 - Family history of primary immunodeficiency
 - Ask about sibling death and parental consanguinity
 - Need for intravenous antibiotics
 - Failure to thrive – always look at growth!
 - Recurrent deep-seated infections

Autoinflammatory syndromes

- Rare but usually present in childhood
- Presentation
 - Periodic fevers (can last 1-3 days, or several weeks)
 - Fever and (often painful) inflammation: abdominal pain, pleuritic pain, muscle and joint pain, rash
- Refer to paediatrics for work-up
 - Usually organize bloods during flare-ups to assess inflammatory response
 - Targeted molecular testing based on ethnic group and presentation

Prolonged fevers

- Causes – infection (just over 50%), inflammation/rheumatological (10-20%), malignancy/other (10-20%), no diagnosis (10-20%)
- Conditions not to miss
 - Kawasaki disease (versus PIMS-TS)
 - Bone and joint infections
 - Other hidden sites
- Work-up for prolonged fevers in hospital
 - First, second and third line tests
 - PUO: No diagnosis reached after 1 week of inpatient investigations

Fever in children with immunodeficiency

- Haematology/oncology patients
 - Generally contact Clinical Nurse Specialists
 - Often have protocols in their treatment plans
 - Febrile neutropenia protocol
- Immunology/post-bone marrow transplant patients
 - Generally contact CNS for advice
 - May be on prophylaxis
 - Often have rescue antibiotics
 - In general, start antibiotics earlier and treat for longer
 - Typically 2 weeks of co-amoxiclav
 - Try to get cough swab/other samples to amend treatment if needed

Fever in returning travellers

- 50% tropical, 50% cosmopolitan infections
- Fever + anything = think of malaria, if travelled to malarial area
 - *Even absence of fever does not exclude malaria in a sick child with travel history*
 - Can be misdiagnosed as flu/URTI (cough common) and gastroenteritis
- Most common imported diagnoses – malaria, typhoid, hepatitis A
- Remember incubation periods can be long
 - Typhoid 2-3 weeks
 - Falciparum malaria *usually* present within 1 month (but can be longer)
 - Hepatitis A 2-6 weeks
- Challenge: imported diseases are difficult to distinguish clinically
- Coinfections are relatively common
- In general, likely to refer to paediatrics

Malaria

- 5 species
 - Most commonly *P. falciparum*, and *P. vivax*
 - *P. knowlesi* – zoonosis from macaques in Asia-Pacific region
- Falciparum malaria most dangerous and most common
 - Diagnosis: At least 2 blood films (or RDTs)
 - Follow UK malaria guidelines (Lalloo et al, J Infect, 2016)
 - Uncomplicated: artemether-lumefantrine (Riamet)
 - Complicated: IV artesunate (+ broad-spectrum antibiotics)
- Non-falciparum malaria
 - Can still present with severe disease
 - Treat with artemisinin combination therapy, or chloroquine
 - Hypnozoites in liver lead to relapse (vivax and ovale) – primaquine (if no G6PD deficiency)
- Always refer suspected and confirmed malaria cases
- We would always admit falciparum malaria overnight, even if uncomplicated

Prevention of travel-related infections

- NaTHNaC website useful – travel risk-assessment
- Typhoid
 - Typhim polysaccharide vaccine (IM), above 2 years – single dose
 - Live attenuated oral vaccine, above 5 years – three doses
 - (Inactivated conjugate vaccine, not licensed in UK)
- Hepatitis A
 - Above 1 yr old
 - 2 dose schedule for long-term protection
- Other
 - ACWY meningococcal vaccine – can be given at any age
 - Tick-borne encephalitis vaccine – spring/summer hiking, forests (>1 yr old)
 - Yellow fever (>9mo old, risk assess, certificate) / Japanese encephalitis (endemic areas, especially travel more than 4 weeks; >2 months old)

Malaria prevention

- **ACMP guidelines from UKHSA**
 - **Awareness of risk**
 - Downloadable leaflets in several languages
 - **Bite prevention**
 - Cover up at dusk, 50% DEET (probably avoid in infants <2 months and pregnancy) and ITN
 - **Chemoprophylaxis**
 - Country-specific guidance from ACMP
 - Good child dosing tables on NaTHNaC website – based on weight, not age
 - Atovaquone/proguanil (Malarone, Maloff) can be given from 5kg
 - Continue for 7 days after leaving area
 - **Diagnose promptly**

Summary of key messages

- Use NICE high-risk criteria to assess fever in children
- Always refer children <3 months old
- Distinguish recurrent coughs and colds from more worrying presentations needing referral
 - Remember failure to thrive, family history
 - Recurrent deep seated infections, need for IV antibiotics
- Ask about travel in recent *months*
 - Consider malaria screen in all unwell or febrile children who have travelled to malarial region in past months
 - Advice for travel; secondary prevention if acquired infection overseas