



## EM CASES SUMMARY

### Episode 48 – Pediatric Fever

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### Pediatric Fever

Fever in a child is a common emergency department presentation. About 20% will have fever without an identifiable source, and a small but significant number of these children will have an occult, **serious bacterial infection (SBI)** (1). UTIs are the most common occult SBI (2), especially in children <2 years of age, but other causes include pneumonia, early meningitis, and septicemia.

#### What is a fever?

Technically, an oral temperature  $>38^{\circ}\text{C}$ , or rectal temperature  $>38^{\circ}\text{C}$ . Take a rectal temperature in toddlers, infants and neonates; axillary and tympanic temperatures are less accurate for core temperature.

#### Is fever dangerous? Do we need to treat it?

Fever itself is the natural body's response to fighting infection, and does not in itself cause harm. However, fever causes dehydration; treat kids to help them feel better and stay hydrated.

The precise *height* of the fever is not as important as the *duration* in predicting bacteremia. Children with infection as a cause for their fever almost never mount a fever high enough to be dangerous ( $>41.5^{\circ}\text{C}$ ); these very high temperatures are typically only seen in non-infectious causes of hyperthermia.

The value of treating the fever in the emergency department besides patient comfort and minimizing dehydration, is so that the child can be re-examined when afebrile to help risk stratify for SBI and to counsel the parents. If the child's vital signs and clinical picture continue to be worrisome after their fever has been corrected, then SBI should be suspected. However, if, after normalizing the temperature, the child has normal vital signs and is clinically 'well', then SBI is less likely and the parents can be reassured that the fever itself is not dangerous.

#### Temperature Corrected Heart Rate and Respiratory Rate:

Heart Rate increases by approx 10 beats/min and Respiratory Rate by 5 breaths/min for every Celcius degree (1.8 degree of Fahrenheit) of fever  $>38^{\circ}\text{C}$ .

For example, if the temperature is  $40^{\circ}\text{C}$  and HR = 144  $\rightarrow$  subtract  $2 \times 10 \rightarrow$  corrected HR = 124

If the child has tachycardia after being corrected for fever, consider other contributors (pain, crying, early compensated shock). Check perfusion, ask about urine output, and have a high degree of suspicion for dehydration and sepsis.

### **Acetaminophen vs Ibuprofen for Fever Reduction**

Studies suggest that ibuprofen may be superior to acetaminophen for treating pain and fever in children. Using both acetaminophen and ibuprofen in combination in an alternating pattern may be more effective than either alone, however the complex dosing increases potential for errors. A dosing handout can help - prompt parents to record times and dosages given.

Recommend no more than 3 doses of 10mg/kg of ibuprofen/24h and 4 doses of 15mg/kg of acetaminophen/24h, and emphasize keeping the child hydrated, to reduce risk of drug toxicity. Some experts suggest only giving antipyretics on a prn basis for fever, rather than on a schedule, so as to minimize potential complications with scheduled dosing (liver complications have been reported in children on q4h acetaminophen, and renal complications have been reported in children on q6h ibuprofen). There is no good evidence that these medications prevent febrile seizure.

### **Is the Parent's Touch Accurate at Predicting Fever?**

The parent's touch has been shown to be fairly accurate for identifying fever, therefore a child without a measured fever at home but brought in for "tactile fever" should still receive the same

history and physical assessment as the febrile child, even if they are afebrile in the ED.

Particularly important, is whether antipyretics were given, and the duration of fever. If the child is <3 months of age and is afebrile in the ED, observe them for several hours to document normal feeding and a normal exam, repeating the rectal temperature to verify that it remains normal. Educate the parents how to do this at home, and to come back if a fever is measured after they leave.

## **Pediatric Fever Without a Source**

### **Fever without a source:**

Child <3 years old who after an initial history and physical does not have an identified cause of their fever. Approx 5% are likely to have a bacterial infection (usually a UTI).

### **As apposed to Fever of unknown origin:**

Fever for 2 to 3 weeks, without a known cause after initial investigations. These fevers may be caused by more unusual illnesses (rheumatologic, oncologic). However, the cause is still usually infection, most often viral.

### **Key questions to ask in the history in children with fever without an apparent source:**

- Duration of fever
- Recent surgeries and underlying medical diseases

- Previous infections
- Immunization status (especially the first two doses, i.e. at 2 and 4 months, of Hib and Pneumococcal vaccines).

### Physical examination for fever without a source:

Watch behaviour and mental status; watch them walk (for septic arthritis/osteomyelitis); and examine the skin, joints, and abdomen very carefully.

### 5 Sources of Bacterial Infection to Look for in Fever Without A Source

1. Urine - UTI #1
2. Skin - cellulitis
3. Abdomen - appendicitis, abscess etc.
4. Joints - septic arthritis
5. Meningitis

## Pediatric Urinary Tract Infections

### What are the risk factors for UTI in children?

- History of previous UTI
- Temp  $>39^{\circ}\text{C}$ , and without an apparent source,  $>24\text{h}$
- Ill appearance
- Supra-pubic tenderness, (or dysuria/frequency/low-back pain or new-onset incontinence in children old enough)
- Females, uncircumcised boys and non-black race

### Who to test (see JAMA guideline article 3):

**< 3 months:** check urine in all babies with fever without source

**3-24 month:** check all girls, and boys if  $>1$  risk factor, or if circumcised and  $>2$  risk factors

**>24 months:** check all girls, all symptomatic uncircumcised boys, and circumcised boy who had several symptoms suggesting UTI

Consider checking the urine even in children who have had another source for their illness identified; in children  $<60$  days old with bronchiolitis, many will also have a UTI! (4)

### How to get the urine?

**<2 months:** obtain a sample by catheterization (and send every sample for culture as the urinalysis may be normal in the presence of true infection)

**>2 months of age to toilet trained:** bag urine okay to screen by microscopy, however if it is positive ( $>10\text{-}20$  white cells), a sterile culture needs to be obtained by catheter

**Toilet-trained kids:** obtain midstream urine.

### Which children with UTI require admission?

Generally children  $<2$  months should be admitted.

Well appearing children >2 months can usually be discharged home on antibiotics with good follow up, unless they are dehydrated or parents are unreliable.

### Treatment of UTI:

Antibiotic options depend on local antibiotic resistance patterns, however, in our experts' catchment area,

**In hospital:** IV ampicillin and gentamicin

**Oral:** cephalexin for most, or cefixime for infants 2-6 months old, or those you are worried have a complicated UTI or urinary tract abnormalities.

### Do all children with a first-time UTI need a renal ultrasound and voiding cystourethrography (VCUG)?

All need an ultrasound, and then only VCUG if there is hydronephrosis found on the ultrasound.

## Which children need further investigations for Fever Without a Source?

### Indications for CXR in Pediatric Fever Without a Source?

- Fever >5 days,
- or cough >10 days,
- if the temperature is persistently high (>40), or if a white count >20 with no other explanation

**Remember:** Examine patients carefully for "quiet tachypnea" beyond what is expected for the height of fever.

### Indications for Bloodwork and Blood Cultures in Pediatric Fever Without a Source?

A well-appearing, immunized child with a fever typically does not need blood work or cultures (6).

CRP and Pro-calcitonin might be helpful in risk-stratifying patients with fever without a source, it hasn't become standard of practice or available in most centres.

### Guidelines by age for fever and the septic workup:

Our experts recommend using chronological age (how many days since the child's birth, rather than adjusted gestational age) to help guide decision making for septic workup. \*However premature

infants with a complex hospital course are already high-risk patients, so these babies usually require more thorough investigations.

**A full septic workup including LP is recommended for babies under 28 days**, because they have the highest risk of SBI. This includes routine blood work and culture, urinalysis and culture, and lumbar puncture (cell count, protein, glucose, culture, gram stain and culture, and viral studies).

**Which infants should receive acyclovir for meningitis?** If you suspect meningitis based on physical, or LP results (especially in <14 days), start acyclovir. HSV also causes pneumonitis and hepatitis, so also check for these if you are suspicious of HSV meningitis.

**For infants 29 days to 90 days**, use the low-risk criteria (see below for American Academy of Pediatrics Fever Without a Source Guidelines). If they are well appearing, with no obvious source of infection, no complex past medical history, normal laboratory criteria (WBC count, normal urinalysis, and normal stool white count if diarrhea is present), they can usually be sent home if they have reliable parents and good availability for follow up in 24h. These infants have a chance of SBI of about 1.5%, usually UTI, so make sure urine is sent also for culture.

#### **SORT: KEY RECOMMENDATIONS FOR PRACTICE**

<i>Clinical recommendation</i>	<i>Evidence rating</i>	<i>References</i>
Any child younger than 29 days and any child with a toxic appearance, regardless of age, should undergo a complete sepsis work-up and be admitted for observation until culture results are obtained or the source of the fever is found and treated.	A	5, 6, 14, 16, 29, 38, 40
Observation only with close follow-up is recommended for nontoxic infants three to 36 months of age who have a fever lower than 102.2°F (39°C).	B	15, 38
Nontoxic-appearing children 29 to 90 days of age who have a negative screening laboratory analysis (including a complete blood cell count with differential and a urinalysis) can be sent home with a follow-up in 24 hours and detailed return precautions, and given either no antibiotics or ceftriaxone (Rocephin) 50 mg per kg intramuscularly.	B	15, 29

A = consistent, good-quality patient-oriented evidence; B = inconsistent or limited-quality patient-oriented evidence; C = consensus, disease-oriented evidence, usual practice, expert opinion, or case series. For information about the SORT evidence rating system, see page 1754 or <http://www.aafp.org/afpsort.xml>.

#### **References:**

- 1) Baraff, L. Management of Infants and Young Children with Fever without Source. *Pediatr Ann.* 2008;37:673-9. [PDF](#)
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- 4) Levine, D. Risk of Serious Bacterial Infection in Young Febrile Infants with Respiratory Syncytial Virus Infections. *Pediatrics.* 2004;113:1728. [Full Text](#)
- 5) Urinary Tract Infection: Clinical Practice Guideline for the Diagnosis and Management of the Initial UTI in Febrile Infants and Children 2 to 24 Months. *Pediatrics.* 2011;128:595-610. [PDF](#)
- 6) Wilkinson, M. et al. Prevalence of occult bacteremia in children aged 3 to 36 months presenting to the emergency department with fever in the postpneumococcal conjugate vaccine era. *Acad Emerg Med.* 2009;16:220-225. [PDF](#)
- 7) Sur, DK and Bukont EL. Evaluating Fever of Unidentifiable Source in Young Children. *Am Fam Physician.* 2007 Jun 15;75:1805-1811. [PDF](#)