

# **Fever without a focus**

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# Outline

- **Fever**
- **Fever without localizing signs (FWLS)**
- **Periodic fever**
  - **Familial Mediterranean fever**

# Fever

- Fever, a physiologic response characterized by an elevation of body temperature above normal daily variation.
- Normal range of body temperature is **36.6-37.9°C rectally**.
- Fever is defined as a rectal temperature  **$\geq 38^{\circ}\text{C}$**  (100.4°F).
- Hyperpyrexia = a value  **$> 40^{\circ}\text{C}$**  (104°F).

# Body temperature assessment

- Rectal: for 3 min  
Most accurate  
Measured reading - **0.5 °C**
- Oral: for 1 min
- Axillary: for 3 min  
Measured reading + **0.5 °C**
- Tympanic
- Skin



- Fever Without a Focus

- Refers to a rectal temperature of **38°C or higher as the only presenting feature** without other presenting S&S.
- There are 2 subcategories of fever without a focus:
  1. Fever without localizing signs (FWLS).
  2. Fever of unknown origin (FUO).



# Fever Without Localizing Signs (FWLS)

- **Fever of acute onset with duration of <1 wk and without localizing signs.** It's a common diagnostic dilemma in children <36 months of age.
- The etiology and evaluation depends on the age with 3 age groups considered:
  1. Neonates or infants to 1 mo of age.
  2. Infants >1 mo to 3 mo of age.
  3. Children >3 mo to 2/3 mo of age (2 yr)

**Table 177-1****Febrile Patients at Increased Risk for Serious Bacterial and Viral Infections****RISK GROUP****DIAGNOSTIC CONSIDERATIONS****IMMUNOCOMPETENT PATIENTS**

Neonates (<28 days)	Sepsis and meningitis caused by group B <i>Streptococcus</i> , <i>Escherichia coli</i> , <i>Listeria monocytogenes</i> ; neonatal herpes simplex virus infection, enteroviruses, parechovirus
Infants 1-3 mo	Serious bacterial disease in 5-15%, including bacteremia in 5%; urinary tract infection most common serious bacterial infection; <i>E. coli</i> most common pathogen; enterovirus, parechovirus, influenza
Infants and children 3-36 mo	Occult bacteremia in <0.5% of children immunized with both <i>Haemophilus influenzae</i> type b and pneumococcal conjugate vaccines; urinary tract infections
Hyperpyrexia (>40°C [104°F])	Meningitis, bacteremia, pneumonia, heatstroke, hemorrhagic shock-encephalopathy syndrome
Fever with petechiae	Bacteremia and meningitis caused by <i>Neisseria meningitidis</i> , <i>H. influenzae</i> type b, and <i>Streptococcus pneumoniae</i> Rickettsial disease Viral exanthem

**IMMUNOCOMPROMISED PATIENTS**

Sickle cell disease	Sepsis, pneumonia, and meningitis caused by <i>S. pneumoniae</i> , osteomyelitis caused by <i>Salmonella</i> and <i>Staphylococcus aureus</i>
Asplenia	Bacteremia and meningitis caused by <i>N. meningitidis</i> , <i>H. influenzae</i> type b, <i>S. pneumoniae</i> , and <i>Capnocytophaga</i> sp. Sepsis caused by <i>N. meningitidis</i>
Complement or properdin deficiency	
Agammaglobulinemia	Bacteremia, sinopulmonary infections
AIDS	<i>S. pneumoniae</i> , <i>H. influenzae</i> type b, and <i>Salmonella</i> infections
Congenital heart disease	Infective endocarditis; brain abscess with right-to-left shunting
Central venous line	<i>S. aureus</i> , coagulase-negative staphylococci, <i>Candida</i>
Malignancy	Bacteremia with gram-negative enteric bacteria, <i>S. aureus</i> , and coagulase-negative staphylococci; fungemia with <i>Candida</i> and <i>Aspergillus</i>



# Neonates

- Fever is significant in this age group, because they have an immature immune responses as well as that they display limited signs of infection.
- In general, neonates who have a fever and do not appear ill have a **7%** risk (and is heightened in the infant born prematurely) of having a serious bacterial infection (SBI) which include:

	UTI (MC)	
Bacteremia		Meningitis
Pneumonia		Enteritis
Osteomyelitis		Septic Arthritis



# Etiology

Common pathogens in this age group include:

1. **Bacterial:** GBS, E. coli & listeria monocytogenes.
2. Perinatally acquired HSV infection.



# Approach to febrile neonates

1. History and Physical examination

(unreliable physical signs)



2. Hospital admission

**All febrile neonates should be hospitalized.**



### 3. Investigations (Sepsis workup):

CBC with differential

Inflammatory markers (ESR/CRP)

Blood culture

Urine analysis & culture

LP (CSF analysis & culture)

Stool culture (in infants with diarrhea or stool containing blood or mucus)

CXR



CSF Analysis should include:

1. Cell counts
2. Glucose
3. Protein
4. Gram stain and culture
5. HSV and enterovirus PCR.

	Normal newborn	Bacterial meningitis
<b>WBC</b> (mm <sup>3</sup> )	0-30	>1000
<b>PMN</b> (%)	<b>2-3</b>	>50*
<b>Protein</b> (mg/dl)	20-150	>100
<b>Glucose</b> (mg/dl)	30-120	<30



## 4. Empirical intravenous Antibiotics

Combination antibiotics, such as ampicillin and cefotaxime or ampicillin and gentamicin, are recommended.

Acyclovir should be included if HSV infection is suspected.



**1-3 months of age**



The majority of cases are viral and they have seasonal variation.

- In winter → RSV and influenza A
- In summer and fall → enterovirus and parechovirus

## But always consider bacterial infections

- MCC of bacteremia in infants from 1-3 months:
- **E. coli, Group B Streptococcus followed by S. aureus**
- **Pyelonephritis** is the MC presentation especially in uncircumcised infant boys and infants with urinary tract anomalies.
- Other bacterial diseases in this age group:
  - UTI most common
  - otitis media
  - pneumonia
  - omphalitis
  - mastitis



# Ill-appearing (toxic) febrile infant

- hospitalization
- cultures of blood, urine, and CSF
- immediate parenteral antimicrobial therapy



❖ obtain urine studies (urine WBC, leukocyte esterase, nitrite, and culture) for

- all girls <24 mo

- all boys <6 mo old

- all uncircumcised boys <2 yr

- all children with recurrent urinary tract infection

## Investigations for ill looking baby (sepsis workup)

After History , physical examination and admission →

1- CBC , ESR, CRP .

2- blood, urine, and CSF culture (take the samples before giving antibiotics)

3- urinalysis. (Urinalysis may be negative in infants <2 mo. of age with pyelonephritis)

4- chest x-ray (if respiratory symptoms are present)

5- Stool study (if has diarrhea)

+viral diagnostic studies

# Management of Ill-appearing (toxic) febrile infant

## Immediate parenteral antimicrobial therapy

- Ampicillin (*L. monocytogenes* and *Enterococcus*) plus either ceftriaxone or cefotaxime.  
This regimen is effective against the usual bacterial pathogens causing sepsis, urinary tract infection, and enteritis in young infants.
- If meningitis is suspected, add vancomycin for possible penicillin-resistant *S. pneumoniae*

## If the infant looks well but has fever...

- ❖ use the **Rochester Criteria** or similar criteria is used to determine his risk for bacterial or viral infection as pyelonephritis may be seen in well-appearing infants who have fever without a focus.
- **Investigations:** CBC, with differential, CRP, Blood culture, Urinalysis and culture

<b>Rochester criteria</b>	<b>0-2 months (&lt;60 days)</b>
<b>History</b>	Term infants, no underlying diseases, no perinatal abx
<b>Physical examination</b>	Well appearing No focal infections <b>(including otitis media)</b> during head-toe examination
<b>Lab criteria</b>	<ul style="list-style-type: none"><li>• No leucocytosis (WBC &lt;15,000/mm<sup>3</sup>)</li><li>• Absolute band count &lt;1500/mm<sup>3</sup></li><li>• UA is negative (&lt;10 WBC/hpf)</li></ul>



3-36 months of age

- MCC are viral.

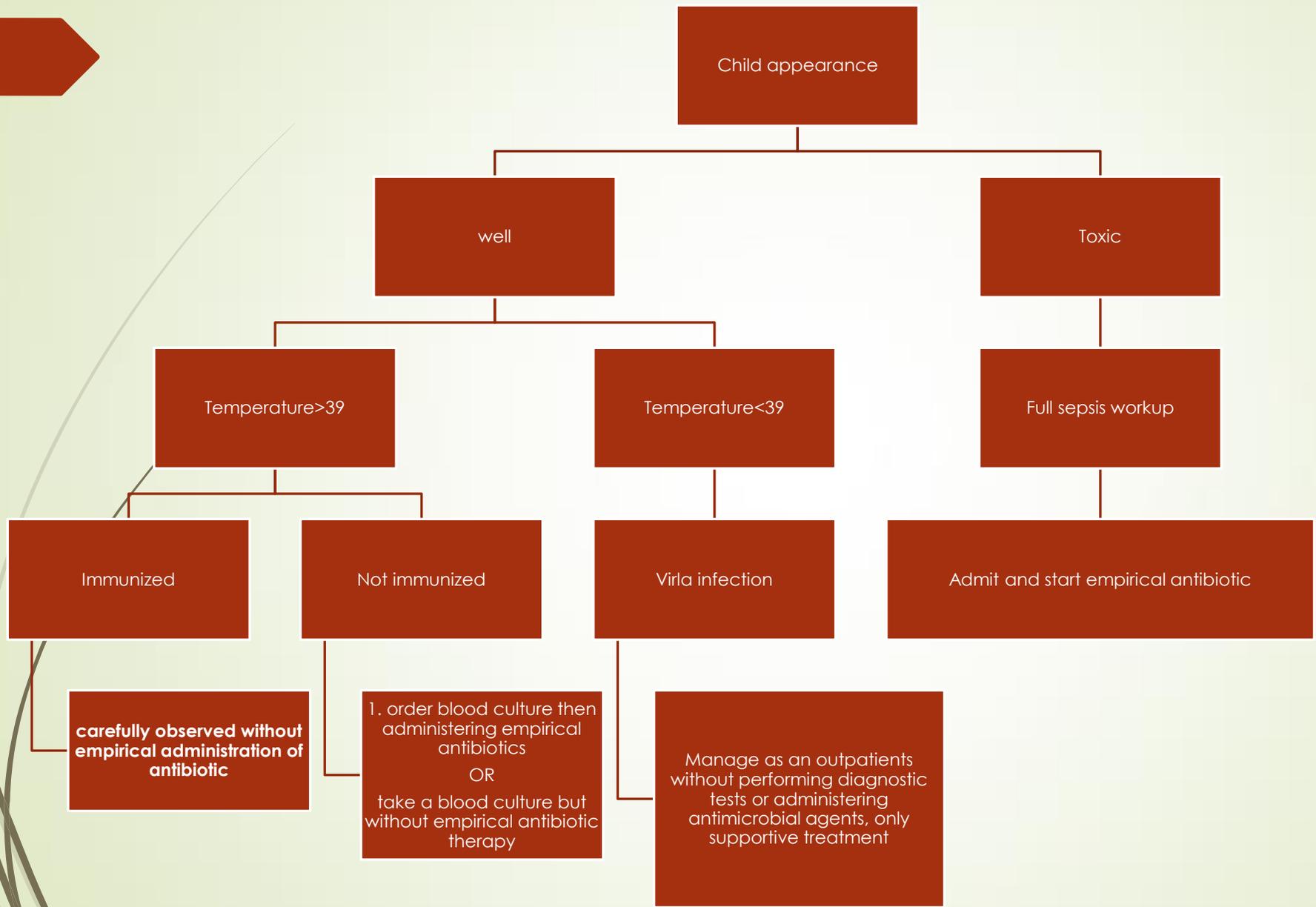
- Also serious bacterial infections do occur (except for the perinatally acquired infections.) ,MCC are S. pneumoniae, N. meningitidis, and Salmonella .

H. influenzae type b (not seen commonly due to vaccine).

- Important bacterial infections among children 3-36 months of age include otitis media, sinusitis, pneumonia, enteritis, urinary tract infection, osteomyelitis, and meningitis.

# What suggests it's a bacterial infection?

- 1) temperature  $\geq 39^{\circ}\text{C}$  ( $102.2^{\circ}\text{F}$ )
  - 2) WBC count  $\geq 15,000/\mu\text{L}$
  - 3) elevated absolute neutrophil count
  - 4) band count
  - 5) erythrocyte sedimentation rate (ESR) or C-reactive protein
- **The higher the  $T^{\circ}$  and WBC count the more it likely to be bacterial**





Thank you