

# **Approach to fever in children**

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# Fever: a common problem in children

## **Fever in children:**

- 65% of children <2 years will visit a physician for an acute febrile illness
- 60-80% of encounters in clinical practice
- Most commonly caused by self-limited viral illness and localized bacterial infection, but may be presenting feature of something more serious infection e.g. meningitis

# What is a fever?

- A fever is a rise in internal temperature above the normal (37.5o).
- Fever helps the body to fight infections by stimulating the body's natural defences.
- By increasing the body's temperature, a fever makes it harder for the bacteria and viruses that cause infections to survive.

# Fever pathogenesis.

## **Exogenous pyrogens:**

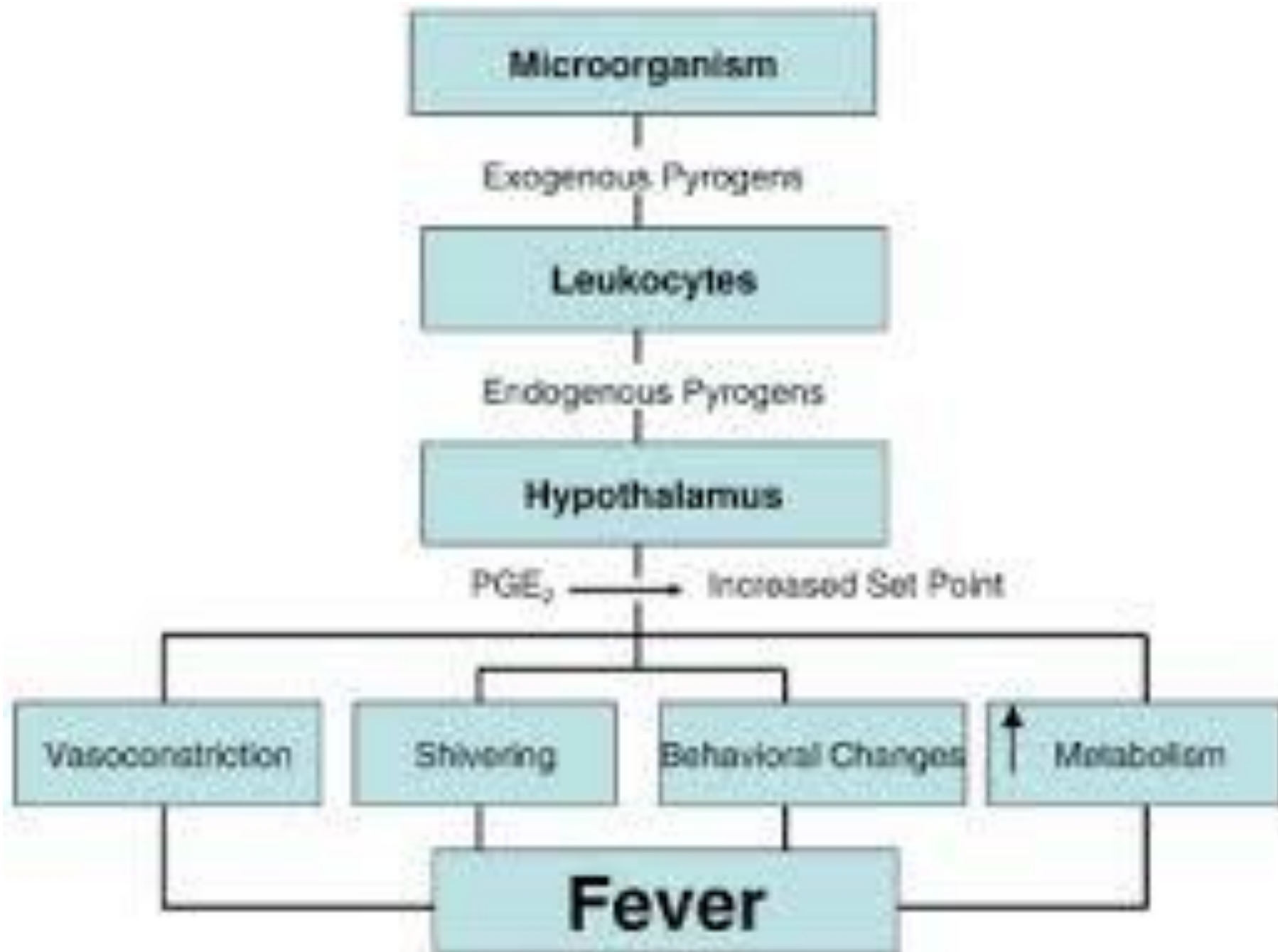
**Micro-organisms, Ag-Ab complex**, foreign proteins, bacterial toxins (Endotoxin, Enterotoxin, TSS toxin, Erythrogenic toxin), capsule polysaccharides, drugs, pyrogenic steroids Peptidoglycan, IL-1, IL-2, TNF, IFN⇒

Monocytes, macrophages, neutrophils, lymphocytes, glial cell⇒

**Endogenous pyrogens:** ⇒ **IL-1  $\alpha$ - $\beta$ , IL-6, IL-11, IFN  $\alpha$ - $\beta$ , TNF  $\alpha$ - $\beta$ , Oncostatin M.**

Increase in PGE2 synthesis and  
CAMP level ⇒ **TRC**  
affected

⇒ Increased heat production,  
reduction in heat loss ⇒ **FEVER**



## Sit of measurement influences normal temperature

- Feel warm is unreliable and inaccurate:
- Axillary reading is 35.97 degree C.
- Oral is 36.5 degrees C.
- Tympanic is 36.6 degrees C.
- Rectal is 37.0 degrees C.

## Fever and hyperthermia definition:

- Fever: increase in the 'set-point' temperature by the hypothalamus, enabling the body to maintain a controlled increase in the core temperature and general functionality of all organ systems.
- Hyperthermia: the rise in the body's core temperature is beyond the set-point temperature and regulation of the hypothalamus...

# Is the fever beneficial?

- Fever inhibits the growth of bacteria & replication of viruses.
- It enhances immunological processes, including activity of IL-1, T-helper cell, cytolytic T-cells, B- cell and Igs synthesis.
- The mobility, phagocytosis and killing of bacteria by polymorphonuclear leukocytes are significantly greater at temp.  $>40^{\circ}\text{C}$ .

# APPROACH TO FEVER

- **Details History:**

- Time
- Grade
- Duration
- Diurnal variation

- **Associated Symptoms**

- **Drug History:**

- **Past history: PMH & PSH**

- **Family History:**

- **Travel History**

- **Physical Examination:**

- Vital Signs
- Neurological Exam.
- Skin Lesions, Mucous Membrane
- Eyes
- ENT
- Lymphadenopathy
- Lungs and Heart
- Abdominal Region (Hepatomegaly, Splenomegaly)
- Musculoskeletal



- **Quick emergency questions**

**Recent vaccine: DPT : fever after 24hr.  
MMR: after 5-7 days.**

**ASK about convulsion: meningitis.**

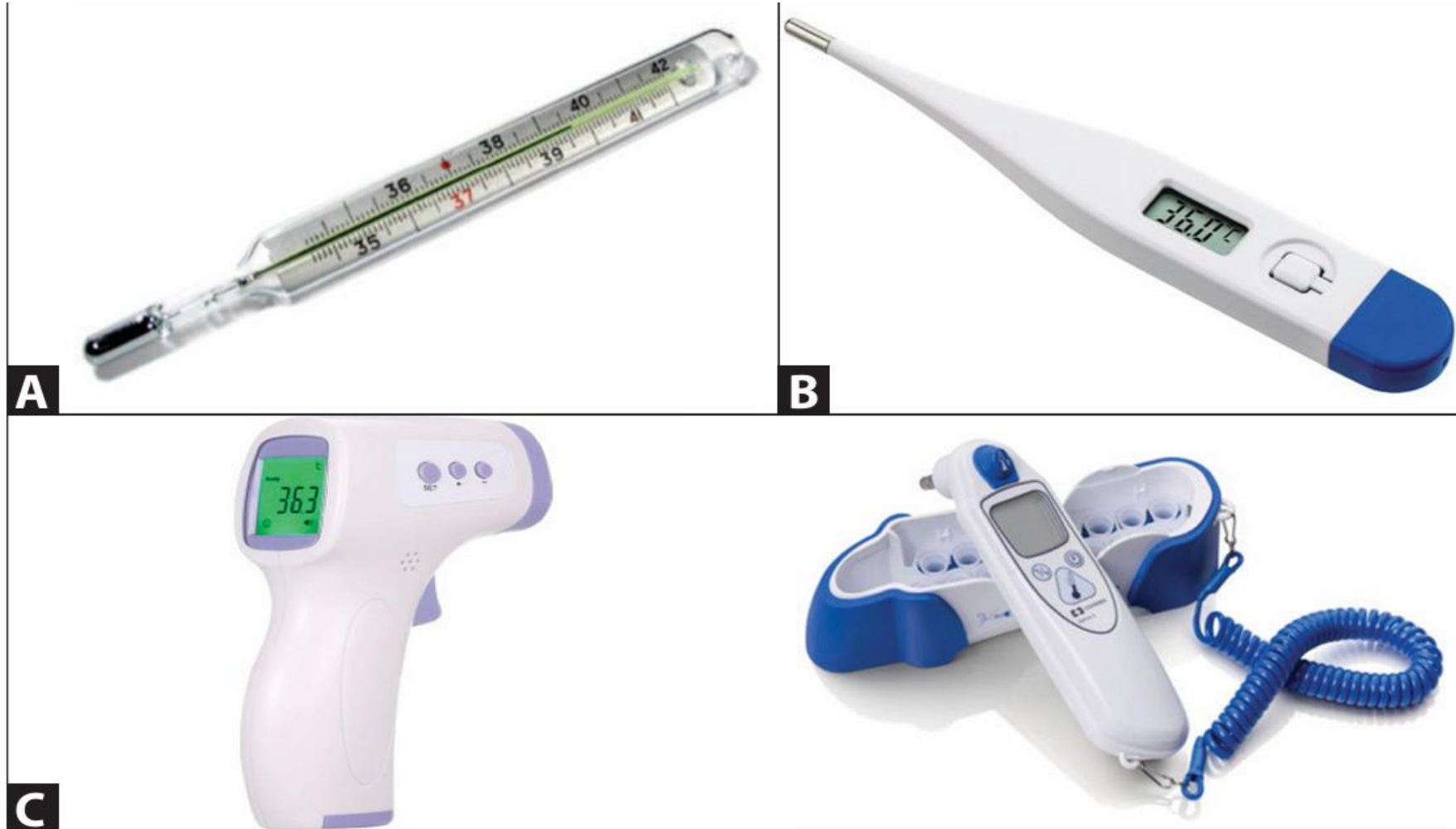
**Ability to swallow: Tonsillitis, pharyngitis.**

**Vomiting: increase intracranial pressure.**

**Other GIT symptoms.**

# Thermometers: many types

## Which method the family use



**Figure 2.** Thermometers.

**A** Mercury glass thermometer **B** Electronic thermometer **C** Infrared thermometer **D** Electronic thermometer with cable

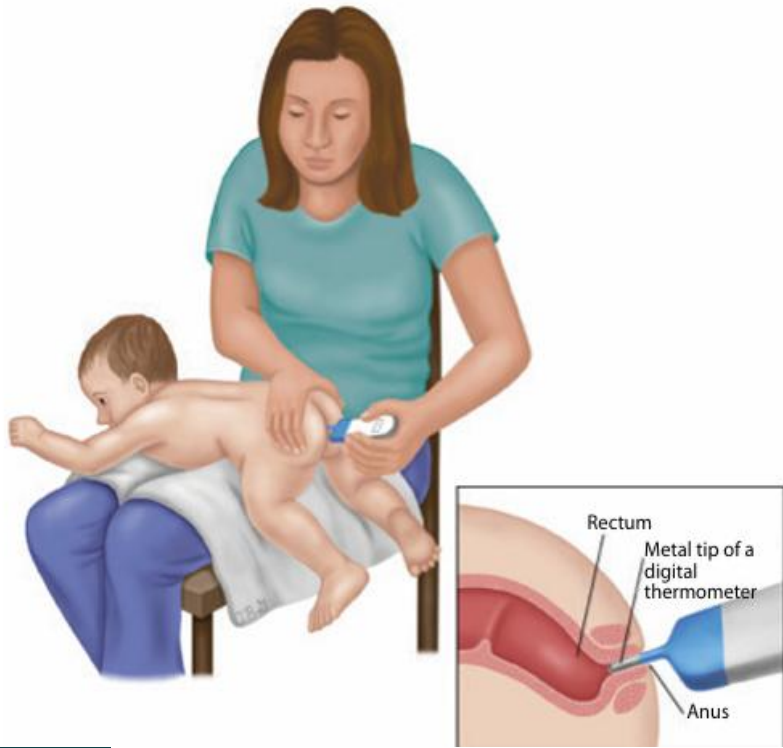
# Detailed History:

- Localising symptoms : cough, headache, photophobia, diarrhoea, vomiting, abdominal pain, musculoskeletal pain, rash
- Travel
- Sick contacts
- Immunisation: children <6 months age or with incomplete immunization
- Medication: prior treatment with antibiotics may mask signs of a bacterial infection
- High risk: prematurity, immunosuppression/oncological conditions central line in situ, chronic lung disease, congenital heart disease, previous invasive bacterial infections,


# Important to know

- Teething does not cause fever
- Vaccination: Post vaccination fever is common, with a typical onset within 24 hours of immunization and duration up to 2-3 days; however, in an unwell child, fever should not be attributed to vaccination alone.

# Re- check Temperature



# How to categorize fever

- **Low-grade:** 37.3 to 38.0 C.
  - **Moderate-grade:** 38.1 to 39.0 C.
  - **High-grade:** 39.1 to 41 C.
  - **Hyperthermia:** Greater than 41 C.
- 
- A teal-colored decorative curve is located in the bottom right corner of the slide, starting from the bottom edge and curving upwards and to the left.

# Factors suggest serious infection

- Age younger than one month,
- Poor Arous ability.
- Petechial rash.
- Delayed capillary refill.
- Increased respiratory effort,.
- And physician assessment.

# Neck rigidity and bulging fontanell



# **For The Ill Febrile child Vital signs**

- CheckTemp.: check for fever or hypothermia.
  - Check heart rate: tachycardic may be bradycardic
  - RR: Tachypnea, hypopnea or apnea.
  - BP : Initially normal but later hypotension.
  - appearing ill do :Pulse oximetry (SaO<sub>2</sub>), Capillary re fill time (< 2 Sec)
- Blood glucose ( > 40mg/dl in newborn, > 60 mg/dl in children)

## **For The Ill Febrile child: check for**

- - Level of consciousness and activity.
- Presence of Respiratory distress.
- Abnormal Color (Central cyanosis, pallor, Jaundice)
- Poor perfusion (mottling, Delayed pulses)
- Hydration status (Skin turgor, sunken eyes, depressed fontanel, absent tears and no sweat, urine output)

**Serious infections age < 2m includes.**

Neonatal Sepses, severe pneumonia, meningitis, bone & joint infections, UTI , and enterocolitis.

Bacterial pathogen in this age: group B beta strep.

# The causes of fever **2m- 5y.**

- Respiratory: Nasopharyngitis, Otitis media, pneumonia.
- GI infection: GE.
- CNS infections: meningitis, encephalitis.
- UTI: pyelonephritis, cystitis.
- Connective tissue diseases.

## Age 2 m- 5y: if patient looks sick:

- Complete sepsis work-up & IV. antibiotics.
- Blood and urine culture.
- Stool culture if there is blood or mucus in the stool.

# Respiratory symptoms: Pneumonia

- If the patient has respiratory signs and symptoms , consider the diagnosis of pneumonia,
- Tachypnea defined by WHO:
- In children <2 M: >60 breaths/minute.
- children 2-12 months: >50 breaths/minute.
- Children >12 months: >40 breaths/minute.

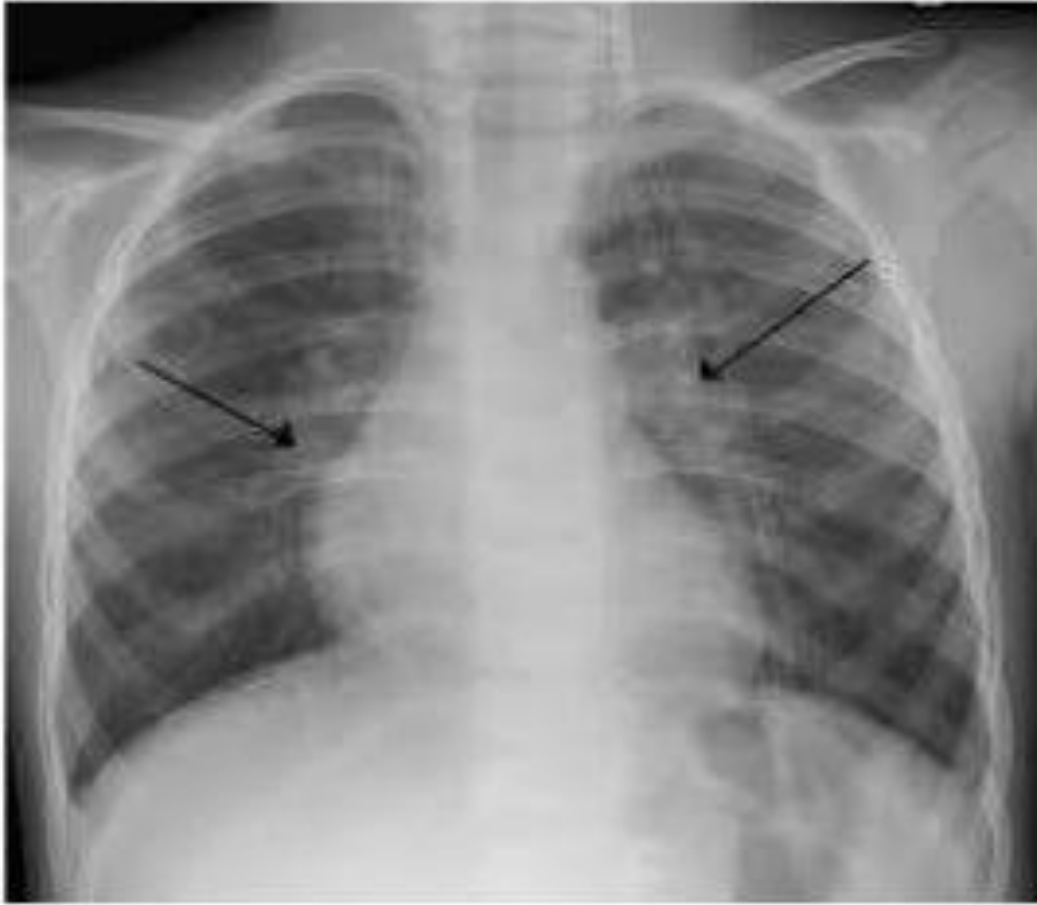
# Pneumonia: Viral vs Bacterial Clinical Judgment

- The best guide to distinguishing bacterial from viral pneumonia is clinical judgment.
- Give antibiotics if bacteria infection suspected.

# CXR Viral VS Bacterial:

- Viral pneumonia: starts gradually with general malaise, wheezing, and watery cough, affecting both lungs diffusely.
- Bacterial pneumonia: usually start suddenly with high fever, chills, and productive cough (pus/blood), causing localized lung consolidation.
- Key differences lie in onset (slow vs. fast), symptoms (flu-like vs. severe/localized), sputum (watery vs. purulent),

## Viral vs Bacterial Pneumonia



**Viral**



**Bacterial**

# **Fever of unknown etiology (FUO)**

## **Definition**

- Documented fever of more than one week duration.
- Fever documented in the hospital.
- No apparent diagnosis after an investigation for one week in the hospital.

- **FUO causes : Most of FUO result**

1-from common diseases that may be atypical in their presentations.

2- most causes tends to be infectious and collagen vascular diseases: Like Juvenile Rheumatoid arthritis and Systemic Lupus Erythromatosis (SLE).

# Clinical assessment of fever

## Traffic light system

- Check for any immediately life-threatening features.
- Use traffic light system to check for symptoms and signs that predict the risk of serious illness.
- Look for a source of fever and check symptoms and signs associated with specific diseases.
- Measure and record temperature, heart rate, respiratory rate, capillary refill time and assess for dehydration.

# RED



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- Age <3 months, temperature  $\geq 38^{\circ}\text{C}$
- Non-blanching rash
- Bulging fontanelle
- Neck stiffness
- Status epilepticus
- Focal neurological signs
- Focal seizures

- Pale/mottled/ashen/blue
- 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
- Grunting
- Tachypnoea: RR >60 breaths/minute
- Moderate or severe chest indrawing
- Reduced skin turgor

# Do Lab testes(work up):

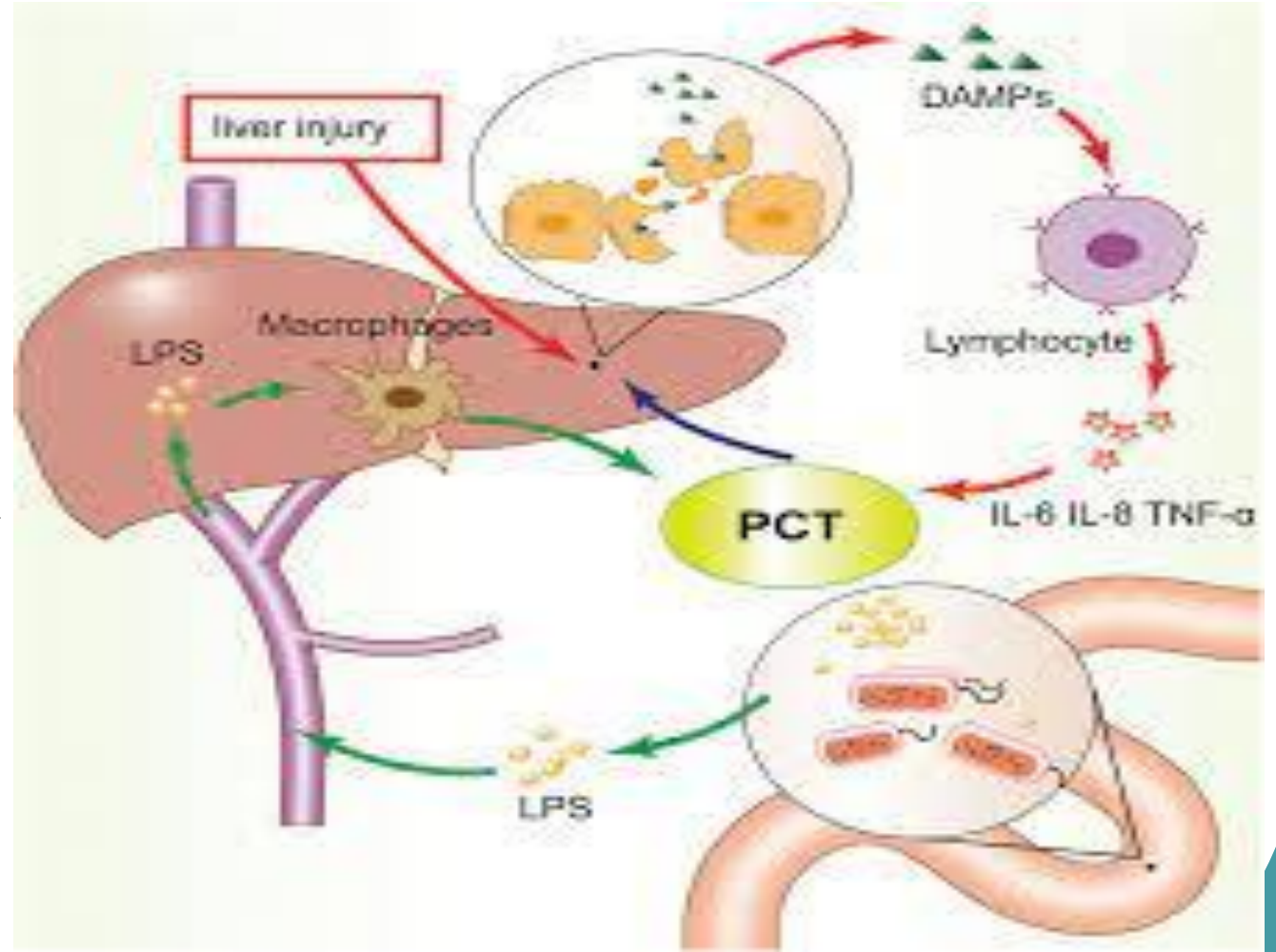
- **White blood cell and absolute neutrophil counts.**
- **Procalcitonin and other biomarkers**

**PCT levels rise in response to bacterial infections more rapidly than other markers, such as C-reactive protein and ANC. PCT is more specific than WBC count.**

- **Cultures: Blood, Urine, CSF, Sputum, any other body fluids**

## Procalcitonin:

procalcitonin (PCT) has developed into a promising new biomarker for the early detection of systemic bacterial infections, **not elevated in viral infections.**



# Febrile illness with rash is common

first

second

third

fourth

fifth

sixth

diseases

measles

scarlet fever

rubella

duke's disease

erythema infectiosum

rubeola



# FEVER AND SKIN RASH (EXANTHEM)

- o Really Sick Children Must Eat Tomato
- o 1st disease : Rubella
- o 2nd disease : Scarlet fever
- o 3rd disease : Chickenpox
- o 4th disease : Measles
- o 5th disease : Erythema infectiousum (Slapped cheek)
- o 6th disease : Typhoid fever(rose spot)



# Look for the rash of specific diseases:

## Roseola infantum

- Probably viral.
- Infants and young children.
- High fever lasting 1-5 days.
- Insufficient findings to explain the fever.
- Abrupt drop of temperature and appearance of generalized rash which disappears quickly, DIAGNOSTIC FOR ROSEOLA .



# Erythema infectiosum (Fifth Disease)

- It's the fifth illness described with similar rash.
- Affect school age children.
- Low grade fever followed by a rash. Slapped cheek appearance
- Rash fades with central clearing giving reticulated appearance.



## **Rose spots in typhoid fever (6<sup>th</sup> disease)**



# Scarlet fever (Second disease)

The first signs of scarlet fever can be flu-like symptoms, including a high temperature, a sore throat and swollen neck glands (a large lump on the side of your neck).

A rash appears 12 to 48 hours later. It looks like small, raised bumps and starts on the chest and tummy, then spreads. The rash makes skin feel rough, like sandpaper.

caused by Group A streptococcus.<sup>1</sup> affects children between five and 15 years of age



# Measels (4<sup>th</sup> disease)



# Koplik spots



- Vesicular rash: may be caused by
- chickenpox or shingles



# Shingles (Herpes zoster)



# SYMPTOMS OF KAWASAKI DISEASE

*If your child has a fever and shows 4 of these symptoms, they could have Kawasaki disease. Consult your doctor immediately.*



A



B



C



D



E



F



Red eyes, without any discharge



Redness of the BCG scar



Rash on the body, including the buttock/diaper area



Irritability and crankiness



Fever for 5 days or more



Red and/or cracked lips; red "strawberry" tongue



Swollen lymph nodes in the neck



Red palms and soles, swelling of the hands and feet, peeling of skin of the fingers and toes (usually 2-3 weeks later)



## Diagnostic criteria for Kawasaki disease

The diagnosis of KD requires the presence of fever lasting at least 5 days\* without any other explanation combined with at least 4 of the 5 following criteria. A significant proportion of children with KD have a concurrent infection; therefore, ascribing the fever to such an infection or to KD requires clinical judgment.

Bilateral bulbar conjunctival injection

Oral mucous membrane changes, including injected or fissured lips, injected pharynx, or strawberry tongue

Peripheral extremity changes, including erythema of palms or soles, edema of hands or feet (acute phase), and periungual desquamation (convalescent phase)

Polymorphous rash

Cervical lymphadenopathy (at least 1 lymph node >1.5 cm in diameter)

KD: Kawasaki disease.

\* If  $\geq 4$  of the above criteria are present, a diagnosis of KD can be made on day 4 of illness.

# Advice to family

# 5

## fever-reducing tips

It can be frightening when your child spikes a fever. However, fever (100.4°F or greater) on its own is not a reason to panic or visit the ER. Below are simple things you can do to help reduce your child's fever.



Offer plenty of fluids



Give a lukewarm sponge bath



Dress in lightweight, breathable clothes



Provide comfort, cover with light sheet



Use fever-reducing medication as recommended

Always call your pediatrician for fever in babies under 3 months of age.

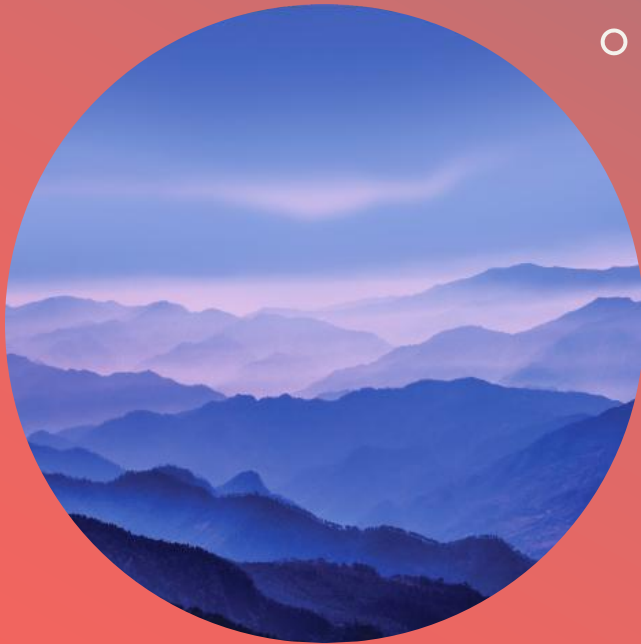
# Antibiotics

- Limit prescription of antibiotics to bacterial infections only or when its highly suspected.
- Liberal use of antibiotics promote antibiotic resistance.

**Our aim is Allert doctors taking care of  
children not to miss serious illness.**

**Thank You.**

# THANK YOU



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