Approach to fever in children
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Fever is a common problem in children

- 65% of children <2years will visit a physician for fever.
- Fever is 60-80% of clinical encounters.
- Most commonly due to self limited viral illness, but sometimes due to serious illness.

What is a fever?

- A fever is a rise in internal temperature above the normal (37.5o).
- Why temp. increase with infections:
- Fever helps the body to fight infections by stimulating the body's natural defences.

Temperature varies according toSit of measurement

- 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.

Is the fever beneficial? YES

- 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 immunoglobulin synthesis.
- The mobility, phagocytosis and killing of bacteria by polymorphonuclear leukocytes are significantly greater at temp. >40 c .

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** α-β, **IL-6, IL-11, IFN** α-β, **TNF** α-β, **Oncostatin M.**

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

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

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 regulation by hypothalamus.

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

Ask about Which method the family

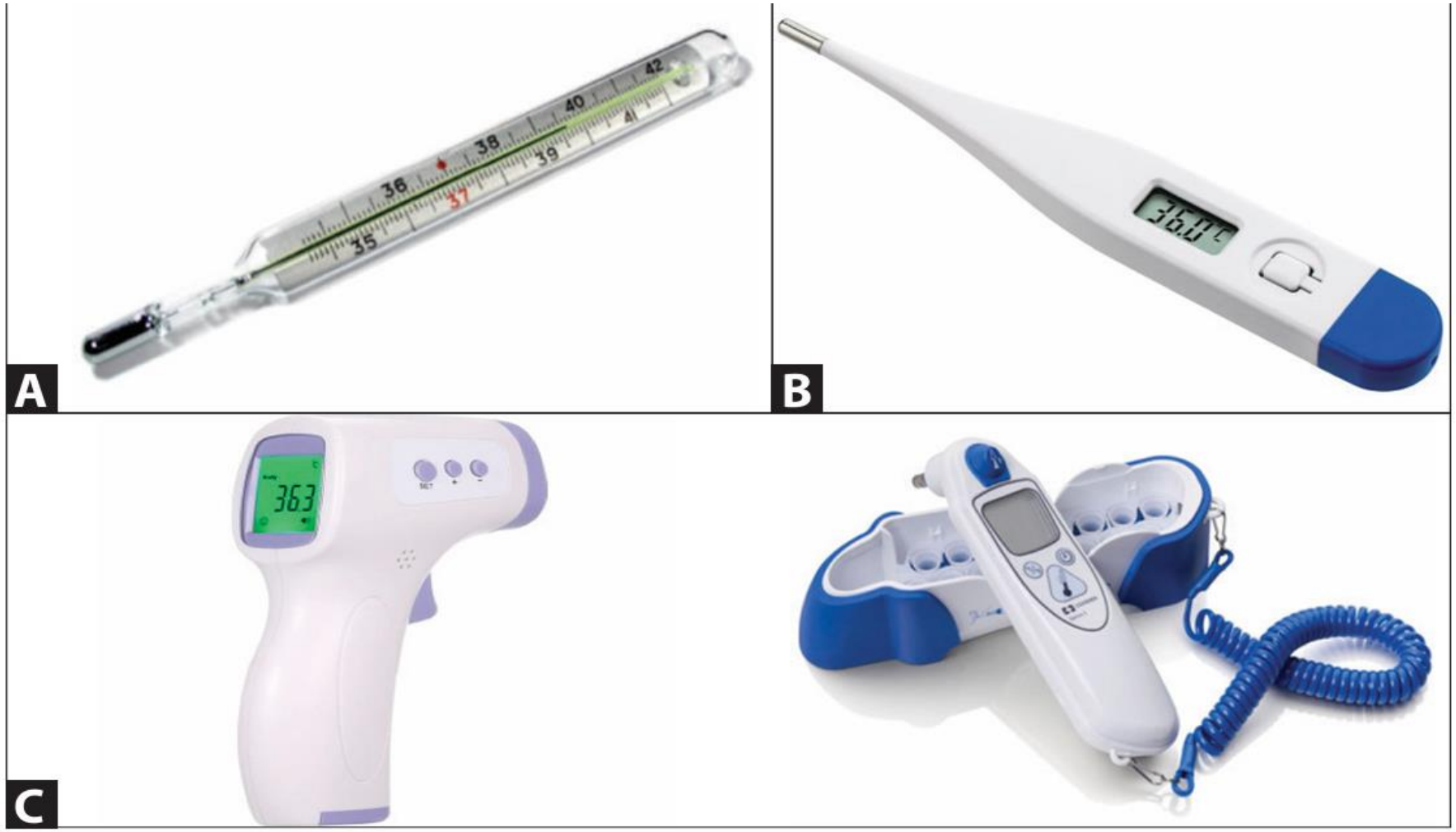


Figure 2. Thermometers.

A. Mercury glass thermometer. B. Electronic thermometer. C. Infrared thermometers.

- **Quick emergency questions**

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

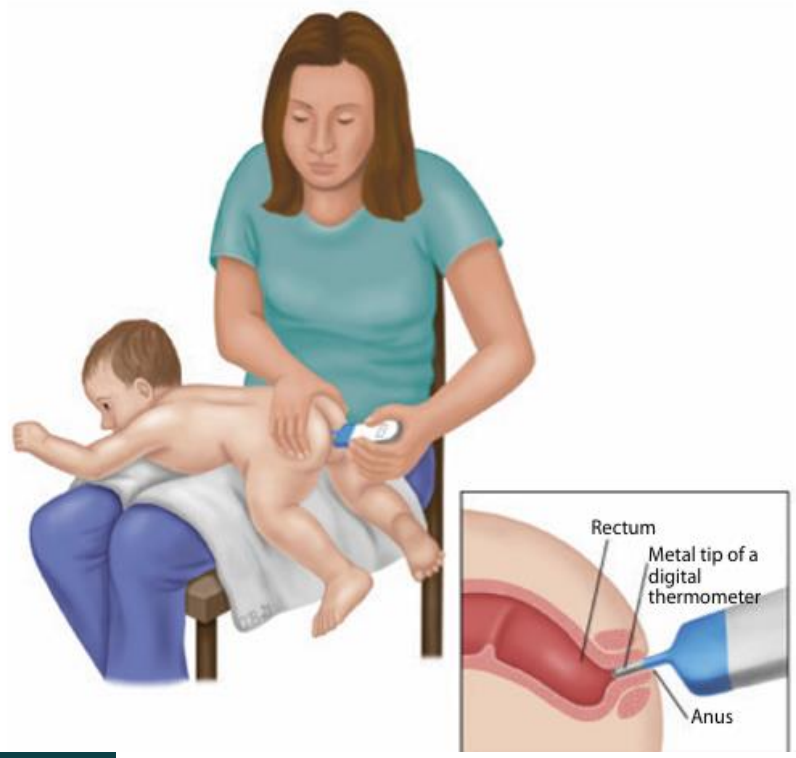
ASK about convulsion: meningitis.

Ability to swallow: Tonsillitis, pharyngitis.

Vomiting: increase intracranial pressure.

Other GIT symptoms.

Re- check Temperature



Detailed History:

- Localizing symptoms : cough, headache, photophobia, diarrhoea, vomiting, abdominal pain, musculoskeletal pain, rash
- Travel
- Sick contacts
- Immunizations history.
- 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.

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.

Factors suggest serious infection

- Age younger than one month,
- Poor Arous ability.
- Petechial rash.
- Delayed capillary refill.
- Increased respiratory effort,.
- And above all: 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 (SaO2), 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 srep:

From Birth canal. (not likeolder children group A).

Admission and approperiat antibiotics.

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/minute.
- children 2-12 months: >50 /minute.
- Children >12 months: >40 /minute.

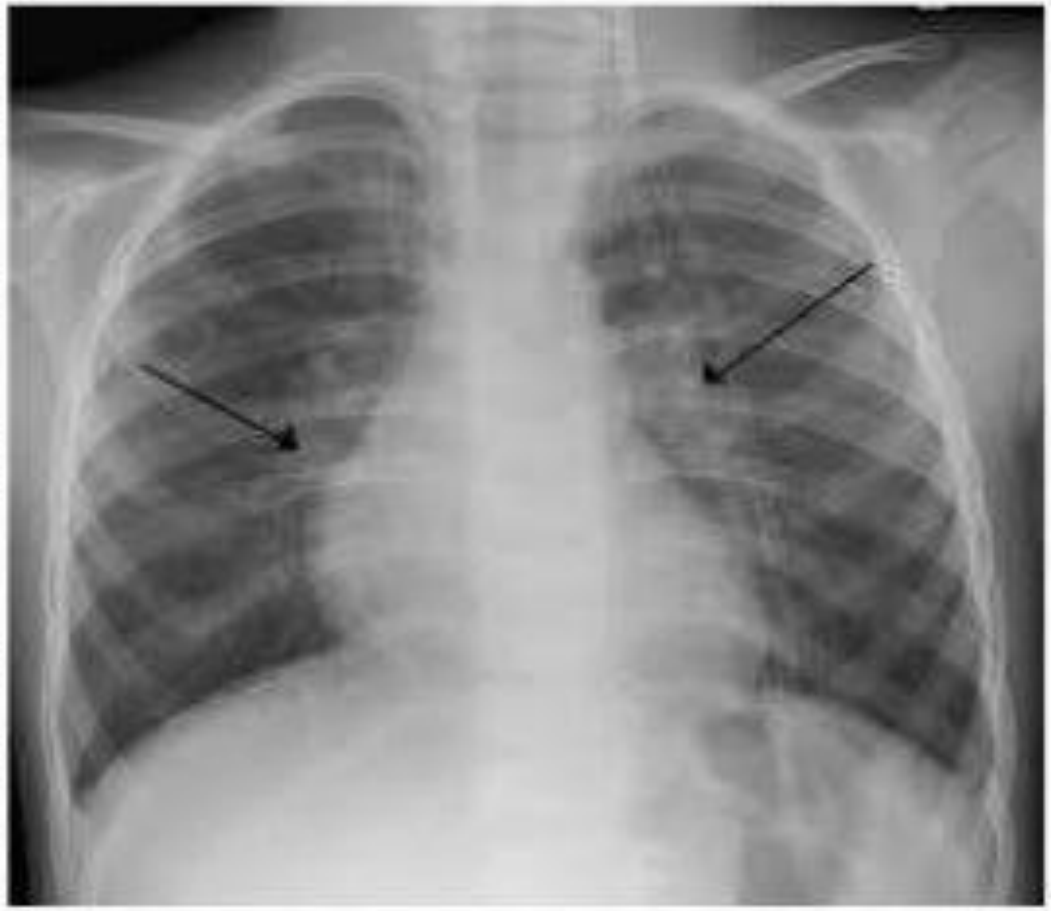
CXR Viral VS Bacterial:

- 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),

Pneumonia: Viral vs Bacterial Clinical Judjment

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

Viral vs Bacterial Pneumonia



Viral

Bacterial

Viral versus bacterial infections.

	Normal	Acute otitis media
Anatomy		
Otoscopic examination		

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

- Age <3 months, temperature ≥38°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**

Acute phase reactants are many like:

1- ESR.

2- CRP.

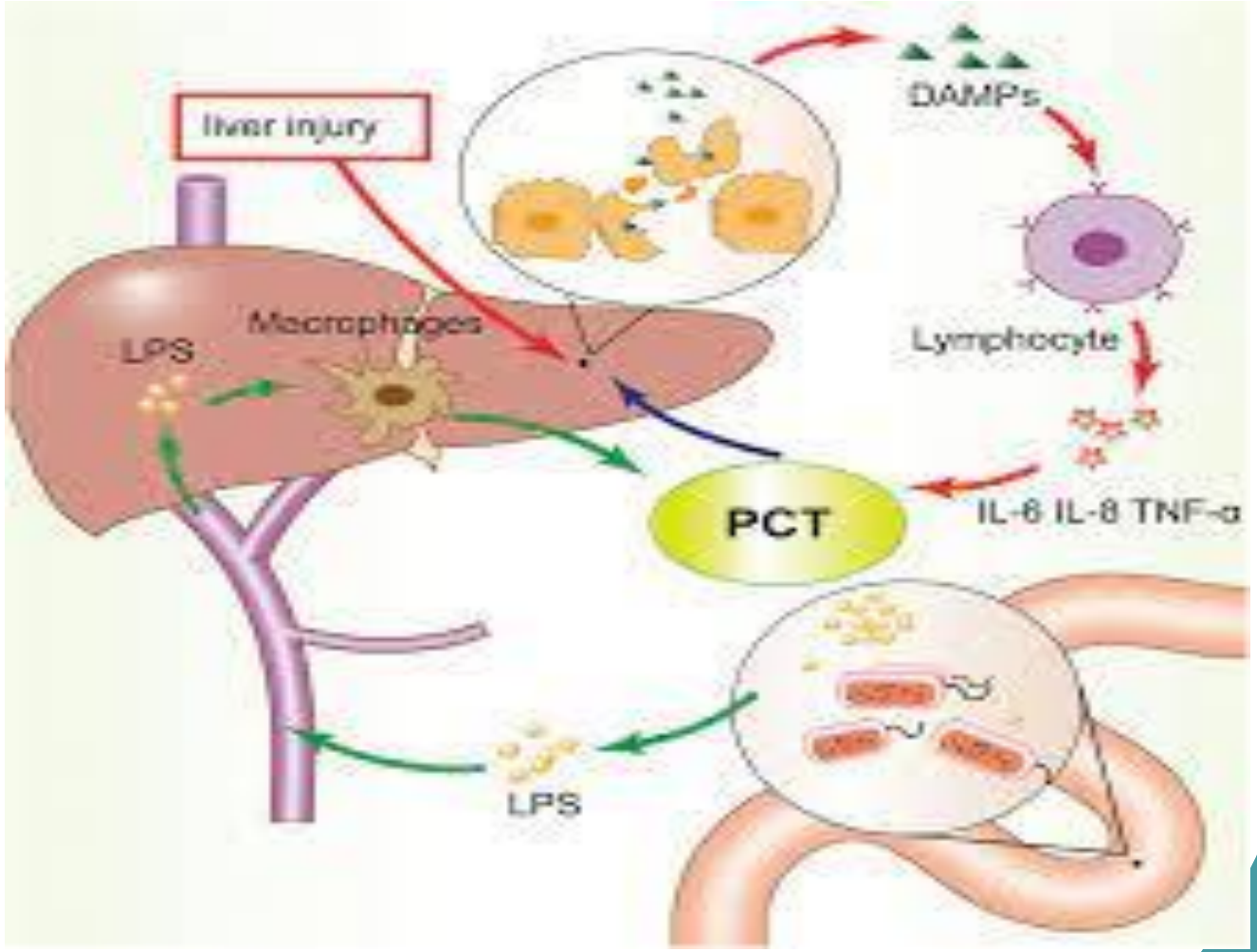
3- Procalcitonin.

4- Fibrinogen.

5- Serum ferritin.

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

	disease
first	measles
second	scarlet fever
third	rubella
fourth	duke's disease
fifth	erythema infectiosum
sixth	rubeola

FEVER AND SKIN RASH (EXANTHEM)

- **R**eally **S**ick **C**hildren **M**ust **E**at **T**omato
- 1st disease : Rubella
  2nd disease : Scarlet fever
  3rd disease : Chickenpox
  4th disease : Measles
  5th disease : Erythema infectiousum (Slapped cheek)
  6th disease : Typhoid fever(rose spot)

Look for the rash of specific diseases:

Roseola infantum

- Infants and young children.
- Exanthem subitum (which means “sudden rash”).
- High fever lasting 1-5 days, well child
- Insufficient findings to explain the fever.
- primarily by human herpesvirus 6, less commonly by human herpesvirus 7 .
- 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 (6th 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 .[affects children between five and 15 years of age

Measels (4th disease)

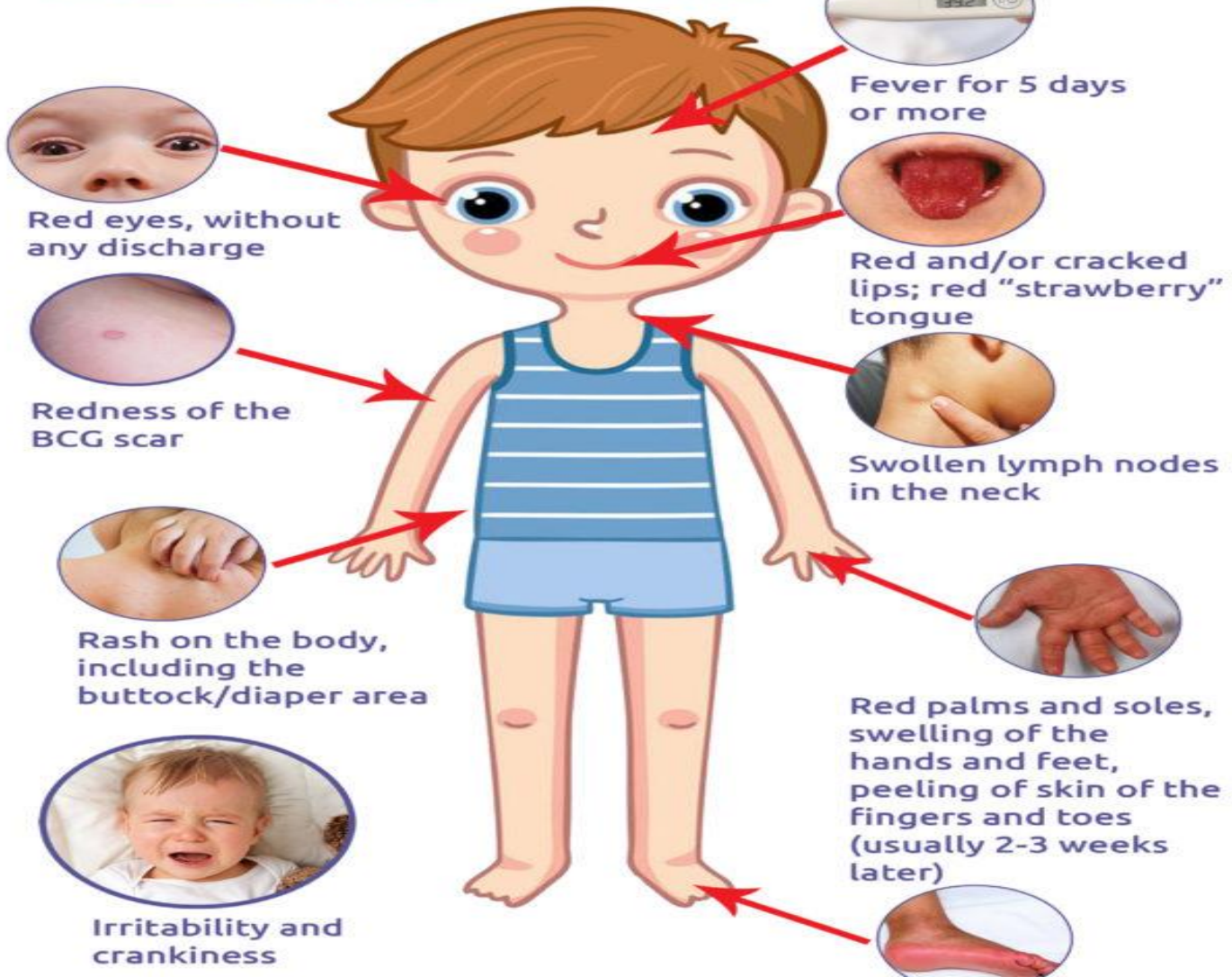
Koplik spots

- 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.



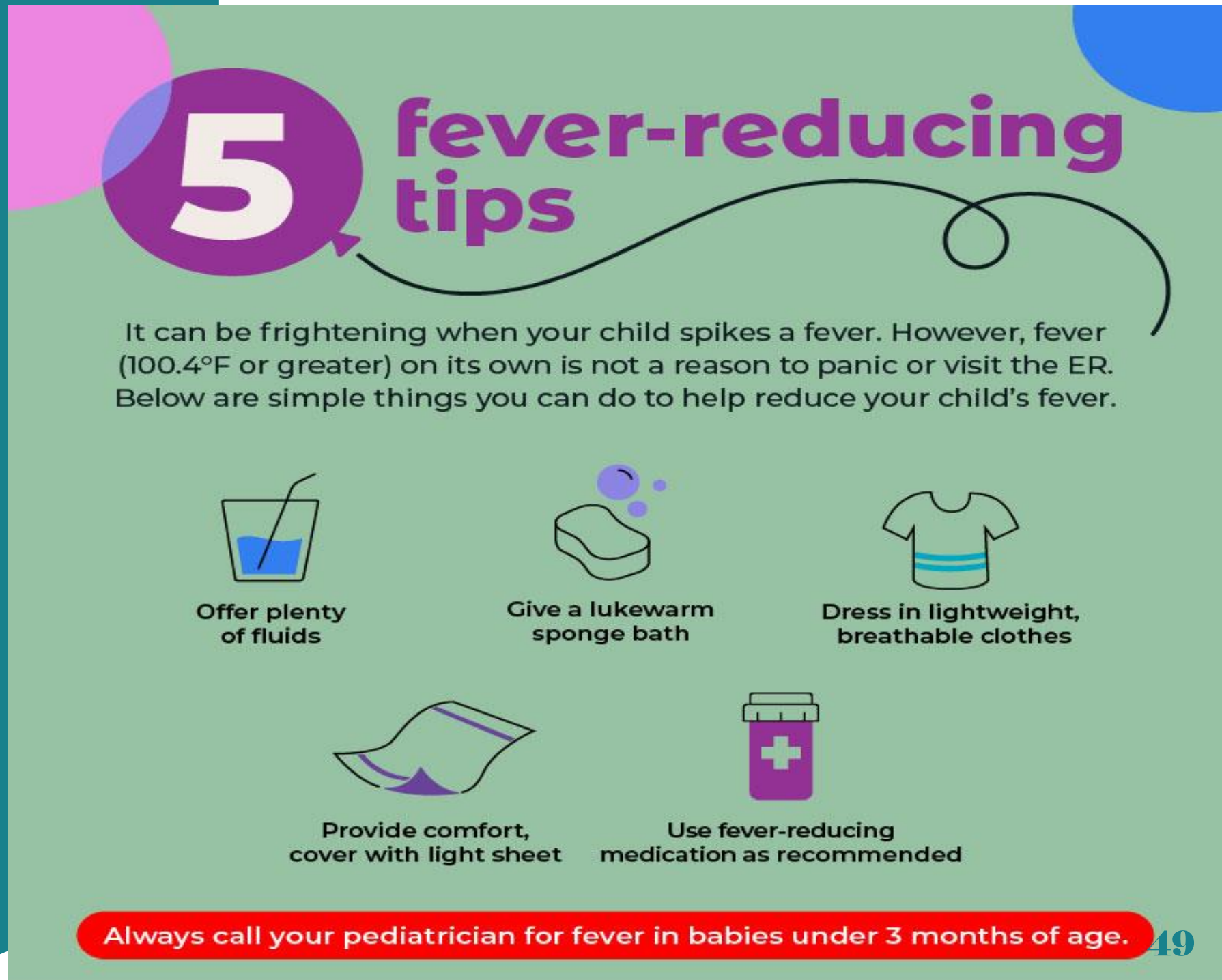
Diagnostic criteria for Kawasaki disease

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 ≥4 of the above criteria are present, a diagnosis of KD can be made on day 4 of illness.

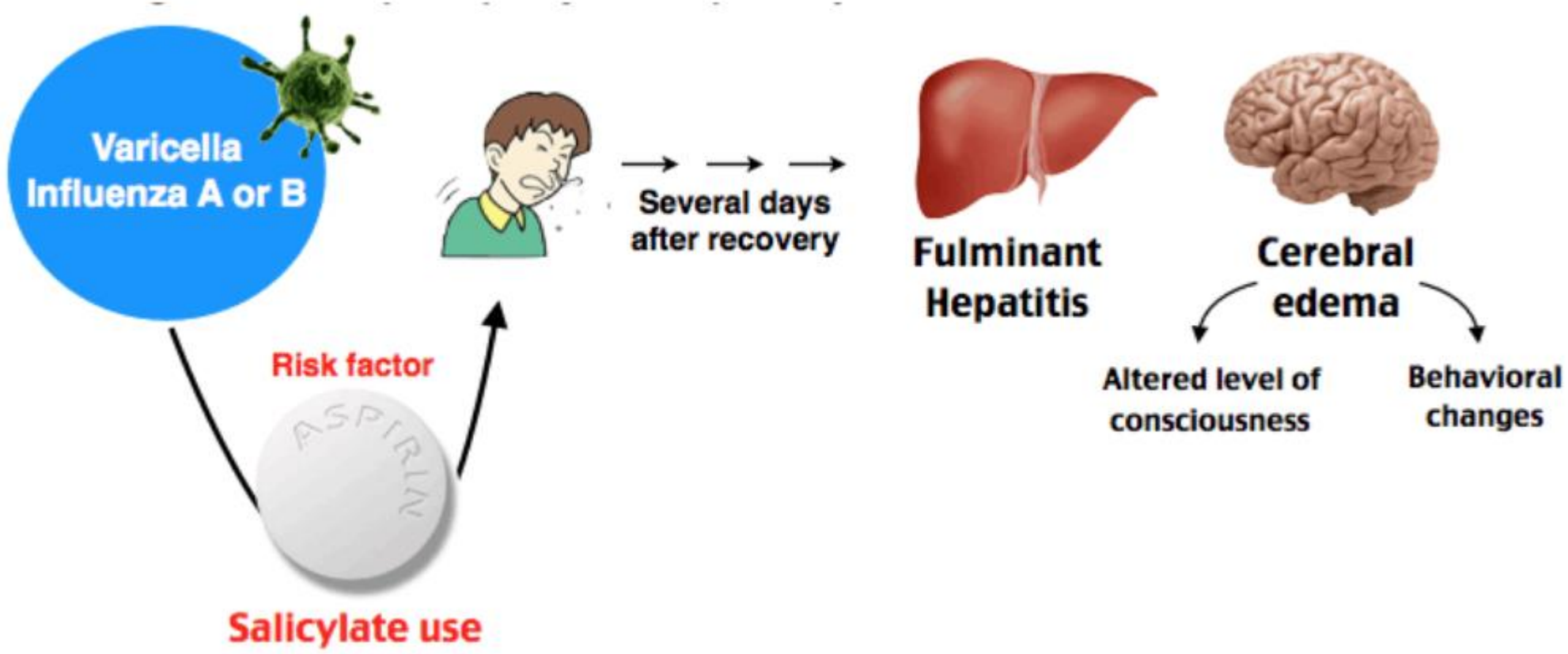
Advice to family



Tempetrature redusing agents:

- Tepid sponging
- Removing excess clothing.
- Giving ibuprofen
- C. Giving Paracetamol.
- Aspirin: should be avoided, it causes Rays syndrome.

VIRAL INFECTION &SALICYLATE USE.



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