

Rational Therapy of Fever in Children: Special Emphasis on Hydrotherapy

Piyush Gupta, MD, MAMS, FIAP
Visiting Fellow, RCPCH, UK
Professor of Pediatrics,
University College of Medical Sciences,
Delhi

Myths

- Fevers are bad for children.
- Temperatures between 98.7-100° F are low grade fever.
- Fevers over 104°F are dangerous.
- The exact temperature is very important.
- If the fever is high, cause is serious.

Myths

- All fevers need to be treated.
- With treatment, fever should come down to normal.
- Without treatment, fever will keep on going higher.
- Chances of febrile seizures are high in children.

Normal Body Temperature

- Average temperature 98.6°F (37°C) PO
- Fluctuates normally (0.5°C) during day.
- Physiological increase (1-1.5°C) by
 - exercise, excessive clothing, hot bath, hot weather, warm food/drink within 30 min.
- Temperature > 38.5°C (101.3°F) is not physiological.

What is Fever ?

- Rectal temperature > 100.4°F(38.0°C)
- Oral temperature > 99.5°F(37.5°C)
- Axillary temperature > 99.0°F(37.2°C)
- Ear temperature > 37.5 - 38 °C
- Pacifier temperature > 37.5 °C

Clinical Policy on Febrile Children 1993.

American College of Emergency Physicians

Why Fever Occurs ?

- Fever is a symptom, not a disease.
- Caused by
 - rise in hypothalamic set point
- Heat production is more in malignant hyperthermia.
- Heat gain exceeds the losses in heat hyperpyrexia.
- Heat loss mechanisms are defective in ectodermal dysplasia.

Pyrogens

- Endogenous:
 - Interleukins, tumor necrosis factor, interferons, leukemia inhibitory factor, ciliary neurotropic factor, oncostatin M
- Exogenous:
 - enterotoxins and exotoxins
 - lipopolysaccharides

How long has been the fever

- Most short duration fevers are infective. Localizing signs may not be present.
- Long duration fever (> 2 weeks) causes could be non infective.
 - Malignancies
 - Connective tissue disorders
 - Hematological and Immune deficiency
 - Metabolic
 - Neurological
 - Miscellaneous

Grading of Fever

- Low grade fever 100-102°F (37.8-39°C)
- Moderate fever 102-104°F (39-40°C)
- High fever > 104°F (> 40 °C)
- Hyperpyrexia > 107°F (> 41.7°C)

Brain damage can only be caused by hyperpyrexia

Fever is beneficial !

- Usual fevers 100-104F (37.8-40C) are not harmful.
- Increases host defense mechanism.
- Augments immunological functions.
- Suppresses microbial growth.
- Need not be suppressed ?

ABCD of Serious Fever

- **A**: arousal, alertness, activity
- **B**: breathing difficulty
- **C**: circulatory impairment
- **D**: decreased drinking, decreased output

Absence of these signs do not exclude a serious illness

How to Measure Temperature-1

- Glass thermometers:
 - accurate & inexpensive
 - hard to read
 - best for rectal and oral; least accurate in axilla
 - leave in place for
 - 2 min : rectal
 - 3 min : oral
 - 5-6 min: axillary

How to Measure Temperature-2

- Digital thermometer
 - measures quickly, accurate as glass ones
- Tympanic thermometer
 - as accurate as rectal temp
 - used for > 6 months
- Liquid crystal display
 - applied to forehead, inaccurate, may miss fever

Indications for Seeing Immediately

Child <3 months old

Difficult to awaken

Spots on skin

Unable to swallow

Crying inconsolably

Acts or looks sick

Fever > 40.6C

Got a stiff neck

Difficult breathing

Convulsed

Cries on moving

See within 24 hours

- Age 3-6 mo old (not induced by DPT)
- Fever $> 40^{\circ}\text{C}$
- Burning or pain during micturition
- Fever of > 24 hrs with no identifiable infection
- Fever subsided for > 24 hrs and returned
- Fever present for > 72 hrs

Management of Fever

- Non Pharmacological
 - Environmental
 - Physical methods
 - Fluids
- Pharmacological
 - Antipyretics

Non Pharmacological Management of Fever-1

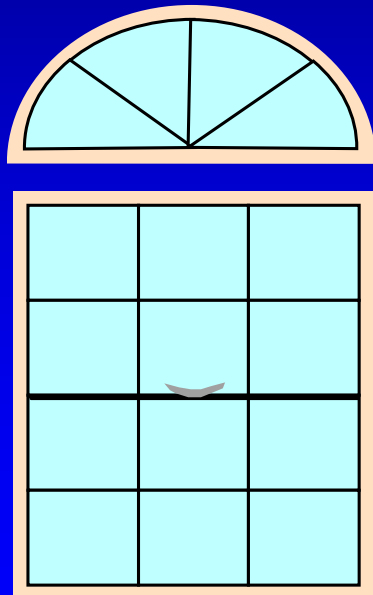
Extra Fluids



- Add 12% per °C increase in temperature
- Do not correct for 38°C
- Provide 24% extra for 39°C

Non Pharmacological Management of Fever-2

Environment



- Place the child in a cool and airy environment
- Dress in only one layer of light clothing
- Massage the body gently to dilate cutaneous vessels and dissipate heat

Non Pharmacological Management of Fever-3

Hydrotherapy/ Sponging

What do you mean by this ?

Hydrotherapy: The Questions

- How does it act ?
- How should it be done ?
- Water temperature ?
- Comparison with
 - Pharmacological
 - Combination therapy
- Indications?

Mechanism of Hydrotherapy

- Conduction
- Convection
- Evaporation
- Factors affecting heat loss
 - Environment
 - Clothing
 - Body surface area

Method

- Wipe the whole body
- Keep the fan on
- Continuous process

Water Temperature

- Cold (< 20)
 - Induces vasoconstriction
 - Shivering
 - Metabolic heat production
- Tepid (28-30C)
 - Less discomforting
 - Less crying, irritability, resistance
 - More physiological

The Choice -1

- Hydrotherapy alone
 - Ill sustained effect
 - discomforting
- Antipyretics alone
 - Delayed effect
 - Sustained effect
 - Not discomforting

Antipyretics + Hydrotherapy

- Advantage

- Early and sustained effect

- Disadvantage

- Discomfort present
- Advantage of 0.3 0- 0.5C

Non Pharmacological Management of Fever-3

Sponging



- Indications
 - Fever > 41.1°C(106°F)
 - febrile delirium
 - febrile seizure
- Give paracetamol 30 min before
- Sponge with lukewarm water 29-32°C
- Never use alcohol.

Drug Treatment for Fever-1

- Drugs are indicated for fever $> 39^{\circ}\text{C}$ (102°F) rectal.
- Paracetamol 15 mg/kg/dose is the drug of choice.
- Paracetamol will reduce fever by $1\text{-}2^{\circ}\text{C}$ ($2\text{-}3^{\circ}\text{F}$) after 2 hours.
- Effect of paracetamol lasts for 4-6 hours.
- Paracetamol can be repeated after 4 hours.

Drug Treatment for Fever-2

- Ibuprofen is similar in safety and efficacy to reduce fever.
- Effect of Ibuprofen lasts longer i.e. 6-8 hrs.

Drug Treatment for Fever-3

Paracetamol and Ibuprofen Combinations

- not recommended
 - no added benefit to single drug used alone
 - combining can cause confusion, dosage errors, and poisoning.
 - You don't need to control the fever this closely

Drug Treatment for Fever-4

Avoid Nimesulide

- **Limited data < 6 months age**
- **Caution in hepato-toxic disease or co-administration with potential hepato-toxic drug**
- **May result in Hypothermia**

Drug Treatment for Fever-6

Medicines do not bring down the temperature to normal unless the temperature was not very elevated before the medicine was given

Parental Education-1



- Fever helps fight the infection
- Use medicine only when needed
- Do not give aspirin
- Have your child drink a lot of cold fluids
- Have your child wear as little as possible

Parental Education-2



- Fever in an infant < 3 months should be brought to notice immediately
- 4% children may develop febrile seizures
- Children with past history of febrile seizure should be closely monitored
- Watch closely for danger signs

**More research
needed on
newer antipyretics
?**

Do we need any antipyretics at all ?

- No positive effect on Fever clearance time
- No change in the incidence of Febrile seizures
 - Cochrane Review 2002
 - Kramer et al, Lancet
- **Gupta et al. Indian Pediatrics; 2005.** Paracetamol reduces fever without increasing fever clearance time