

Management of Short Fever

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ABSTRACT

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Fever is perhaps the most common manifestation of ill health. It is an early and non-specific body response to many infectious and non-infectious etiological factors. In healthy individuals, normal body temperature varies from 98 to 99°F. Temperature is regulated by thermoregulatory centre in the hypothalamus, which receives information from cold and warm receptors of peripheral nerves and temperature of blood perfusing the area. Heat is produced by metabolic process and muscular activity. Temperature exceeding 41.60C most commonly occur in central nervous system hemorrhage (especially pontine) and occasionally in patients with severe infection, thyrotoxic crisis, heat stroke and Neuroleptic Malignant Syndrome produced by drugs like Phenothiazines.

Most short fevers are due to self-limiting viral infections.

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INTRODUCTION

Fever is perhaps the most common manifestation of ill health. It is an early and non-specific body response to many infectious and non-infectious etiological factors. In humans, metabolic processes are critically temperature dependent. In a healthy individual, body temperature is kept constant in a very small range despite larger difference in surrounding temperature.

Recording of Temperature

In all conscious, co-operative adults and older children - oral temperature is ideal. Equilibrium time with mercury in glass thermometer is a minimum of 90 seconds. Axillary temperatures are notoriously unreliable - on an average 0.5 to 1°F less than oral. It may be used in unconscious / non-co-operative patients. In young children, thermometer may be placed in the fold of groin and thigh flexed on the abdomen. Temperature of the inner tissues and viscera (core temperature) is about 1°F higher than oral temperature. Rectal temperature is 0.5 to 1°F higher than oral and may be used in unconscious patients, but is not commonly practiced.

Normal temperature

In healthy individuals, normal body temperature varies from 98 to 99°F. The normal diurnal variation is approximately 1°F with maximum between 4.00 PM and 8.00 PM and minimum between 2.00 AM and 6.00

AM. In old age, body temperature may be lower due to low metabolic rate. Women in the reproductive period show elevation of body temperature 24 to 48 hours after ovulation due to increased progesterone level. Temperature may also increase after exercise. Definitions*

Normal temperature	-	98 to 99°F
Fever	-	> 99°F
Hyperpyrexia	-	>107°F
Subnormal temperature	-	< 98°F
Hypothermia	-	< 95°F

*Fahrenheit preferred here to avoid decimals.

Regulation of body temperature

Temperature is regulated by thermoregulatory centre in the hypothalamus, which receives information from cold and warm receptors of peripheral nerves and temperature of blood perfusing the area. Heat is produced by metabolic process and muscular activity. Normal heat production by metabolic process is in excess than is necessary to maintain body temperature and the same is maintained by heat loss through lungs and skin.

Fever

Defined as elevation of body temperature above normal – occurs in conjunction with an increase in hypothalamic “set point”. Once hypothalamic set point is

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raised neurons in vasomotor centre is stimulated leading to peripheral vasoconstriction especially in the limbs leading to decrease in heat loss from the skin and the person feels cold. Metabolic process being slow, serve to elevate body temperature gradually, but steadily. If there is need for rapid increase in temperature, shivering occurs due to vigorous muscle contraction with rapid heat production. When hypothalamic set point is reset downwards (either by reduction in pyrogen concentration or by antipyretics) heat loss occurs by vasodilatation and sweating. Behavioural changes in the form of removal of insulating clothing also helps in loss of heat. In the vast majority of febrile states, temperature does not exceed 104 to 105°F.

Hyperpyrexia

Temperature exceeding 41.6°C (107°F) most commonly occur in central nervous system hemorrhage (especially pontine) and occasionally in patients with severe infection, thyrotoxic crisis, heat stroke and Neuroleptic Malignant Syndrome produced by drugs like Phenothiazines.

Fever as a defense adaptation

There is suggestive evidence that, for some microorganisms at least, a febrile host response may assist in curtailing infection and speedy recovery. Experimental data support the notion that raised body temperature interferes with growth and / or virulence factors of some bacterial and viral pathogens. Conversely suppression of fever by antipyretics may increase viral shedding and incidence of complication in infections caused by Influenza, Measles and Rhinoviruses. Fever slightly increases immune reaction – increases chemotactic, phagocytic and bactericidal activity of Polymorphonuclear leucocytes. In debilitated and very old persons, even severe infection may fail to evoke fever due to defective body defense mechanism. Such persons are at greater risk of succumbing to the infection.

Effects of fever in the Individual

- Increase in metabolic rate - 1°C increase in temperature above 37°C increases oxygen consumption by 13%. Hence fever may aggravate / precipitate pre-existing cardiac, cerebrovascular or pulmonary insufficiency.
- Increase in heart rate – average 10 beats /minute for 1°F rise in body temperature. In some fevers like Pneumonia and Rheumatic Fever, pulse rate may be disproportionately high (rapid pulse fever).

In Typhoid, some viral infections, Meningitis, Brucellosis, Drug induced fever and many cases of Leptospirosis; pulse rate may be disproportionately slow (slow pulse fever).

- BP may increase during the period of increase in fever because of vasoconstriction. BP may decrease during the period of decrease in fever because of vasodilatation.
- Fluid loss by increased evaporation and sweating – average 200 ml excess fluid requirement / 24 hours for 1°F rise in temperature.
- Increase in respiratory rate
- Chills – in the initial phase because of peripheral vasoconstriction
- Rigors – due to vigorous muscle contraction when there is need for rapid increase in temperature – fever due to any etiology may produce rigor. However, repeated occurrence of rigor is most commonly seen in Malaria, Filariasis (fever is produced by secondary bacterial infection), and Urinary Tract Infection, abscess formation anywhere in the body. Rigors may be induced by overuse of antipyretics, which rapidly bring down the temperature.
- Headache – may accompany fever due to any etiology. Severe headache and photophobia is characteristic of Meningitis, but may accompany Pyelonephritis, Pneumonia or Bacterial Enteritis.
- Delirium – mental confusion during fever is more common in the very young and very old. Fever may induce mental changes in those with Organic Brain Syndrome. It is postulated that TNF μ and IL-1 cause release of endorphins in the brain that may participate in mental changes.
- Excessive sweating – night sweats are characteristic of Tuberculosis and Lymphoma, but sweating from any cause may be worse at night. Non-infectious causes of excessive sweating include alcohol misuse, anxiety, Thyrotoxicosis and Diabetes Mellitus.
- Muscle pain – Myalgia is characteristic of viral infections such as Influenza, Enterovirus infections, Dengue Fever etc, but may accompany septicaemic illness. Severe myalgia is a feature of Leptospirosis.
- Herpes Labialis - Fever may activate latent virus of Herpes Simplex. Most commonly it accompany pyrogenic bacterial infections like Pneumococcal Pneumonia, but may accompany any febrile
- Feeling hot (Feverish feeling) – patients who

complain of feeling hot do not necessarily have fever. It is wise to obtain objective evidence of raised body temperature.

Approach to a patient with fever

In the diagnosis of etiology of fever, science and art of Medicine come together. History is most important. History of travel to a Malaria endemic area may give a clue. Presence of nasal symptoms and sore throat suggest viral etiology. Severe myalgia may suggest Influenza, Dengue Fever or Leptospirosis. Eye congestion, Subconjunctival hemorrhage and Muscle tenderness may suggest Leptospirosis. Erythematous blanching rash indicate viral exanthematous Fever as the most likely cause. Palatal petechiae along with posterior cervical lymphadenopathy and grey white tonsillar exudate suggest Infectious Mononucleosis. Enlarged tender tonsillar lymphnodes with a tonsillar exudate and neutrophilic leucocytosis suggest Streptococcal Tonsillitis (commonest cause of throat pain is Viral Pharyngitis). Koplik's spot in the cheek mucosa may indicate measles. Dysuria, Loin pain with tenderness suggests Pyelonephritis – to be confirmed by urine examination. Fever of more than 5 to 7 days with GI symptoms with or without malena and just palpable soft spleen may suggest Typhoid Fever. Onset may be abrupt in infections like Pneumonia or may show a step-ladder type of rise in Typhoid. Fever with clubbing, splinter hemorrhage in a patient with congenital or rheumatic valvular heart disease may suggest Infective Endocarditis. When the high temperature falls to normal within few hours, it is called Fall by Crisis, and when the temperature reaches normal slowly over several days, it is called Fall by Lysis.

Investigations

Most short fevers are due to self-limiting viral infections. If history, epidemiological situation and physical examination suggest a simple viral infection or Streptococcal Pharyngitis, lab investigations is not mandatory or may be limited to routine blood examination.

Neutrophilic Leucocytosis - and presence of juvenile / band forms of neutrophils and toxic granulations in neutrophils usually suggest bacterial infections.

Neutropenia- mild to moderate usually seen in many viral infections, Typhoid (only about 25 %), Brucellosis, SLE and Bone Marrow Infiltration with Leukemia, Lymphoma, Tuberculosis or Histoplasmosis.

Atypical lymphocytes – seen in many viral

infections especially infection with Epstein–Bar virus, Cytomegalo virus, HIV, Dengue, Rubella, Viral Hepatitis, Varicella, Serum Sickness and Toxoplasmosis.

Monocytosis – commonly seen in Typhoid, Tuberculosis and Lymphoma.

Eosinophilia – commonly seen in Hodgkin's Disease, Parasitic Infections, Hypersensitivity to drug and Adrenal insufficiency.

Urine microscopy for pus cells indicated when UTI is suspected. Serum creatinine routine urine serum bilirubin & SGPT may be done leptospirosis is suspected. Urine bile, serum bilirubin & SGPT to be done when early viral hepatitis is suspected. Imaging is needed only in the very few. Further investigations indicated only in minority depending upon the individual merit of the case.

Most Common Conditions Presenting with short fever

1. Conventional viral fever
2. Dengue fever
3. Leptospirosis
4. Chikungunya
5. Others like UTI, Malaria, Typhoid, Pneumonia

Conventional viral fever

Presence of nasal symptoms, throat pain with congestion and cough support the diagnosis. Headache, myalgia and eye congestion common. Sub conjunctival hemorrhage uncommon. URTI may progress to viral bronchitis with wheeze. Total WBC count normal or reduced. Mild to moderate thrombocytopenia may occur in some. Treatment is symptomatic only.

Dengue Fever

Subclinical infection without symptoms common. May present with undifferentiated short fever lasting for one to three days is common especially in young children. Classical dengue fever syndrome seen most commonly in older children and young adults presenting as sudden onset of fever with head ache, retro orbital pain, back pain, pain in muscles, bones and joints (break bone fever). In 80% maculo popular rash is seen. Symptoms lasts usually for 4-10 days with complete recovery. Thrombocytopenia and leucopenia common. Dengue hemorrhagic fever and dengue shock syndrome occur only with recurrence of dengue fever due to a different sero type.

Leptospirosis

4 types of presentations:

- a. Subclinical infection
- b. Self limiting anicteric febrile illness
- c. Moderate illness with jaundice, mild to moderate renal failure with complete recovery following conventional therapy
- d. Potentially fatal disease: hemorrhage, ARDS, Myocarditis, renal failure & severe jaundice sometimes with liver failure.

Clinical clues to suspect leptospirosis

Fever with severe body pain

Muscle tenderness dominantly calf & thighs Marked eye congestion, subconjunctival hemorrhage & jaundice.

Urinary abnormalities- Alb, WBC, RBC + Casts Neutrophilic leucocytosis (not in all) + high ESR Increased serum bilirubin, moderate increase in SGOT & SGPT, increased serum creatinine.

Short fever- leptospirosis suspected- How to treat? (Mild case without organ dysfunction)

- Oral penicillin
- Doxycycline
- Injection CP if hospitalized.

Chikungunya

Fever with severe arthralgia/ arthritis, tenosynovitis. Rash may be present. Crippling arthralgia may appear with fever or after fever, classically involving small joints of hands and feet, but may involve larger joints also. Joint swelling mainly due to periarticular inflammation. Usually resolves in 1-2 weeks but may persist weeks / months / years. Treatment is symptomatic only.

Treatment for Fever

Antipyretics.

Paracetamol is the safest. Antipyretics need not be given if fever is tolerated by patient and no significant somatic symptoms like headache, body ache because;

- Diagnostic clues from the pattern of fever is lost
- Possible beneficial effect of fever in infections is lost
- Response to specific treatment cannot be assessed.

- May induce rigors with return of fever-once antipyretic effect is over.
- Excessive sweating- fluid loss & occasionally hypotension.

NSAIDs (Non Steroidal Anti Inflammatory Drugs)

Shows potent antipyretic effect, but not recommended for routine use because of significant side effects.

1. **Gastritis is common-** may lead to vomiting, & anorexia, requiring hospitalization, sometimes IV fluids increasing the cost of treatment and inconvenience to patients and family members. Occasionally hemorrhagic gastritis may occur which can even be fatal.
2. **Antiplatelet effect-** Many viral infections especially Dengue Fever, Leptospirosis, Malaria and Sepsis may be associated with thrombocytopenia in which case NSAIDs and Aspirin may produce detrimental effect because of their antiplatelet effect.
3. **Hepatic toxicity-** Many short febrile illnesses like Leptospirosis, Dengue Fever, Infectious Mononucleosis and Malaria may be associated with hepatic involvement and NSAIDs may aggravate hepatic damage. Viral hepatitis may present with fever before development of jaundice and NSAID use can be dangerous. Fatal hepatocellular damage has been documented with Nimesulide, which has got potent antipyretic effect and is used indiscriminately by many including Pediatric practice.
4. **Nephrotoxicity-** Renal involvement is common in Dengue Fever, Leptospirosis, Falciparum Malaria and Sepsis- use of NSAIDs in these situations to be avoided as NSAIDs are nephrotoxic.

Definite Indications for Antipyretics

- Significant somatic symptoms like headache, body ache.
- Co-existing symptomatic Coronary Artery Disease and Cardiac Failure.
- Cerebro Vascular Disease, Nervous System dysfunction and head injury
- Epileptic patients
- Young children with history of febrile convulsions.
- Preferable to use in pregnancy
- Preferable to use in patients with psychiatric illness.

Antibiotics

Fever is to be treated with antipyretics and not with antibiotic. It is a common practice to give trial of empirical antibiotics in Short febrile Illness. Responds does not indicate bacterial infections as most short febrile illness are due to viral infections, which are self limiting. In general, antibiotics to be used only if there is clinical or investigation evidence of bacterial infection. No indication for prophylactic antibiotics. Undesirable side effects due to indiscriminate use of antibiotics include drug toxicity, development of drug resistance, super infection with resistant strains and increase in cost of treatment.

“Short Gun Mixtures of Antibiotics and Steroids are to be condemn d, because they usually solve nothing, confuse the clinical picture and are not without hazards.”

Glucocorticoids show good antipyretic action by

1. Reduce PGE - 2 syntheses by inhibiting Phospholipase A2, which is needed to release arachidonic Acid from cell membrane.
2. Block transcription of mRNA for the pyrogenic cytokines.

Not to be used in the treatment of fever.

Drug Induced Fever

Of the medication that cause fever, antibiotics are most frequent – especially Penicillins and Cephalosporins. Sulfonamides, Nitrofurantoin, Anti Tuberculous

agent and Anti epileptic drugs (Especially Phenytoin) are also known to cause fever. Drug induced fever does not have specific characteristics features. Most often, it occurs 5 to 10 days after starting drug, but occurs right after the first dose.

“Many patients are placed in PUO category, because the attending Physician over look, disregard or reject an obvious clue”.

“Physicians who care for fever need to talk to them, observe them, and think about them. There are no substitutes for these simple clinical principles”.

END NOTE

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