Acute Fever Without Source: 3-36 Months

Background

1. Definition
   - Core body temp >102.2°F [39°C]
     - Some sources suggest 100.4°F [38°C]
   - No identifiable source by H&P
   - Duration of fever usually defined as 7 days or less
2. General information
   - Risk of serious dz, incr risk of:
     - Occult bacteremia
     - UTI
     - Pneumonia
     - Meningitis
     - Other serious bacterial infection
   - Impact of vaccines and vaccination status
     - Pneumococcal conjugate vaccine (PCV7) has significantly decr incidence of pneumococcal pneumonia and bacteremia
     - Hib conjugate vaccine has significantly decr incidence of Hib related illnesses and bacteremia
     - One study:
       - E. coli is now the most prevalent pathogen isolated in blood cultures

Pathophysiology

1. Pathology of disease
   - Pathophysiology/ mechanism of fever (brief)
     - Infection, inflammation, and trauma can all induce phagocytes to release cytokines into blood stream
     - These cytokines are then carried to anterior hypothalamus triggering an incr in synthesis of prostaglandins
     - Prostaglandins elevate set-point of hypothalamic thermostat
     - Result is an incr in body temp through elevated metabolic rate and muscle activity
   - Possible advantages of fever
     - Multiplication and survival of some bacteria and viruses is inhibited at temperatures of 104°F [40°C] or higher
     - Decr in serum iron
       - Some pathological bacteria need iron for multiplication
     - Incr lymphocyte and polymorphonuclear leukocyte activity
     - Incr interferon levels
   - Possible disadvantages of fever
     - Incr metabolic rate
     - Incr oxygen consumption
     - Incr carbon dioxide production
     - May precipitate febrile convulsions
     - Physical discomfort for pt
2. Incidence/ prevalence
   - Almost 1/3 of pediatric visits are for fever

- Almost all children will be evaluated for fever before their 3rd birthday
- From 0–2 yrs:
  - 65% of children visit a physician because of a febrile illness
  - In 75% of these visits, temperature is <102.2°F [39°C]
  - In 14%, fever has no apparent source

3. Morbidity/ mortality
   - Depends upon etiology of fever
   - Generally very low risk of morbidity/ mortality
     - Most illnesses viral or mild bacterial infections (i.e., AOM, sinusitis) that are self-limited

Diagnostics

1. History
   - Associated S/S
     - Nasal discharge
     - Cough
     - Dyspnea
     - HA
     - Ear pain
     - Sore throat
     - Diarrhea
     - Vomiting
     - Strong-smelling urine
     - Abdominal or flank pain
     - New onset urinary incontinence
     - Dysuria
     - Failure to thrive
     - Rash
   - Past medical hx
     - Previous urinary tract infections
     - Recurrent otitis media
     - Recurrent other infections/ immunodeficiency
   - Medications
     - Chronic medications
     - Antipyretic use
     - Note that response to antipyretics is not a reliable predictor of etiology or severity of illness
   - Family hx
   - Social hx
     - Exposures to known infective agents
     - Sick contacts
     - Pets in home
       - Dogs
       - Cats
       - Reptiles
       - Birds
       - Fish
     - Recent travel

- Immunization hx
  - Are immunizations up to date?
  - Unimmunized w/conjugate (Hib and Pneumococcus) vaccines incr risk of occult Hib and Pneumococcal bacteremia

2. Physical exam
   - Must be thorough
   - General (toxic vs. non-toxic)
     - Well vs. unwell appearing
     - Hydration status
     - Not able to elicit smile from pt
   - Temperature
     - Tympanic thermometry has very low sensitivity compared to rectal
   - VS: eval for
     - Tachycardia
     - Tachypnea
     - Pulse oximetry
       - Should be >95%
   - HEENT
     - Eye injection/ discharge
     - Nasal flaring
     - Appearance of tympanic membranes
     - Lesions in oropharynx
   - Neck
     - Palpable cervical lymph nodes
     - Position of trachea
     - Size of thyroid
   - Lungs
     - Intercostal retractions
     - Accessory muscle use
     - Decr breath sounds
     - Rales or rhonchi
   - Heart
     - Peripheral or central cyanosis
     - Cardiac murmurs
   - Abdomen
     - Distention
     - Visible hernias
     - Tenderness
     - Peritoneal signs such as guarding or rebound
   - GU
     - CVA tenderness
     - Urethral or vaginal discharge
     - Scrotal swelling or tenderness
   - Musculoskeletal
     - Joint tenderness, redness, or swelling
     - Bone tenderness or swelling

- Neuro
  - Lethargy
  - Uninterested in surroundings
  - Decr general tone
- Skin
  - Rash
  - Petechiae
  - Cellulitis

3. Diagnostic testing
   - CBC and blood culture
     - WBC >15,000: incr risk of occult bacteremia
       - CBC alone is not sensitive / specific enough to tell bacterial from viral infections
       - ANC has been proposed as a superior marker of serious bacterial infection
     - Manual differential results not highly sensitive or specific for serious bacterial infection
     - Waiting for cultures may delay tx
   - Urinalysis (UA) and urine culture
     - Bag specimen:
       - Ok for UA, but inadequate for urine culture
       - Often contaminated, such that specificity for UTI is poor
     - Cath specimen:
       - Preferred if clean catch is not possible
     - Suprapubic tap specimen:
       - If clean catch and catheterization are not possible
     - Normal UA:
       - Nitrite negative, WBC <10/hpf, RBC <10/hpf
     - Urine culture on all urine samples:
       - <2 yo
         - 15% of UTIs have normal UAs
       - For all abnormal UA results
       - When UTI is highly suspected
   - CSF studies
     - Consider if
       - <12–18 mos (meningeal exam not reliable at this age)
       - Meningeal signs present
       - Severe illness
     - Cultures
     - Gram stain
     - Cell count and differential
     - Protein
     - Glucose
   - Stool studies
     - Perform if bloody or chronic diarrhea
     - Can screen w/guaiac and fecal leukocytes
     - Consider culture, O&P, C. diff toxin, rotavirus Ag

- CRP
  - Not specific: thus generally not helpful
  - Elevates w/bacterial and viral infections
  - May help in evaluating progress of known dz
- Rapid Dx testing depending on clinical presentation and season
  - Influenza
  - Respiratory syncytial virus (RSV)
  - Enteroviruses
  - Severe bacterial infection is less likely if a viral etiology of fever is identified
- Procalcitonin
  - Rises more rapidly in bacterial infections than CRP
  - Clinical usefulness is currently uncertain and under investigation

4. Diagnostic imaging
   - Chest X-ray
     - Respiratory symptoms
     - Decr oximetry
     - Elevated WBC (esp. if WBC >20,000)
   - Sinus imaging (X-rays/ CT)
     - Sinus tenderness or discharge
     - Facial/ periorbital swelling
     - Significant purulent nasal discharge w/cough
     - Often unnecessary
   - Rarely, other imaging studies based upon clinical concern
     - Bone scan or MRI to assess for osteomyelitis
     - U/S or CT to assess for appendicitis

Differential Diagnosis

1. Key DDx
   - Bacterial
     - Streptococcal pharyngitis
     - Pneumonia
     - UTI
     - Meningitis
     - Bacteremia
   - Viral
     - Upper respiratory infection
     - Viral exanthems
     - Cytomegalovirus
     - Epstein-Barr virus
2. Extensive DDx
   - Infectious
     - Bacterial: generalized
       - Brucellosis
       - Cat scratch dz
       - Tuberculosis
       - Leptospirosis
       - Malaria
       - Salmonellosis

- Toxoplasmosis
- Tularemia

▪ Bacterial: localized
- Bone and joint infections
- Infective endocarditis
- Abdominal abscess/ appendicitis

▪ Viral
- Hepatitis viruses
- HIV
- Arbovirus

o Non-infectious

▪ Drug fever
- Allergic reaction
- Atropine
- Phenothiazines
- Anticholinergics
- Epinephrine

▪ Malignancy/ neoplasm
▪ Inflammatory bowel dz
▪ Juvenile rheumatoid arthritis
▪ CNS dysfunction
- Brain damage

▪ Factitious fever
- Absence of S/S w/high temperature
- Extreme temps
- No diaphoresis as fever resolves
- Failure of normal diurnal variation
- Discrepancies in reported vs. measured
- Consider measuring temp of freshly voided urine

▪ Diabetes insipidus
▪ Familial dysautonomia
▪ Infantile cortical hyperostosis

Therapeutics

1. Acute Tx

o Low risk

▪ Well appearing
▪ No co-morbid conditions
▪ Stable social situation
▪ Fully immunized
▪ WBC <15,000, normal UA, normal CXR if obtained
- If WBC >15, 000, consider
  - Parenteral ceftriaxone, or
  - PO high-dose amoxicillin or clindamycin or macrolide

▪ Recheck in 24 hrs

o High risk

▪ Ill appearing
▪ Co-morbid conditions
▪ Unstable social situation

        - Incompletely immunized
        - Consider admission to hospital, supportive care
        - Parenteral ceftriaxone
    2. Further mgmt (24 hrs)
        - Watch for
            - Lethargy
            - Incr fever
            - Decr appetite
            - Tachycardia
            - Tachypnea
        - Follow pending cultures daily
        - Consider admission to hospital if sx persist or worsen

Follow-Up

1. Return to office
    - 24 hrs after initial eval
    - Every one to three days thereafter until resolution
        - Depending on clinical progress
    - Ensure parents'
        - Telephone number is accurate
        - Know after hrs access options
        - Know worrisome S/S
    - Return sooner or go to ED if worsening of Sx:
        - VS
        - Appetite
        - Activity
2. Refer to specialist
    - Depends upon comfort level of PCP and capabilities of tx facility
3. Admit to hospital
    - Toxic appearance
    - Dehydration
    - Lethargy
    - Significant tachycardia or tachypnea
    - Positive culture w/o significant clinical improvement

Prognosis

1. Generally excellent w/close follow-up and appropriate interventions

References

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Evidence-Based Inquiry

1. How accurate is ear thermometry for diagnosing fever in children?
2. Can you differentiate bacterial from viral pediatric infections based on the CBC?

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