EVALUATION OF A SICK CHILD WITH FEVER

Learning objectives

At the conclusion of this learning activity, participants should be able to;

- Discuss the different etiologies of acute illness in a child
- Identify the common causes of acute illness
- Rate the severity of illness
- Evaluate and manage a seriously ill child

Overview

The most common reason a sick child usually visits a physician is due to acute self-limited infection with fever. In such cases it is important that the physician is aware about the probable incidence of serious illness in a child presenting with fever, because one of the major objectives in such as case is to segregate those children who would require specific therapeutic intervention.

The etiology and risk of serious illness in a child presenting with fever varies with age.

Example,

- Infant's aged 1to 3 months are more susceptible to sepsis and meningitis caused by group B streptococci and gram-negative organisms.
- Urinary tract infections are more frequent in male infants whereas after infancy it is more common in females.
- After 3 months the bacterial pathogens commonly causing sepsis and meningitis are *S. pneumoniae, H. influenzae type b* and *N. meningitidis.*
- In children older than 36 months, pharyngitis caused by group A streptococci is a common bacterial infection.
- In children beyond 5 years of age pulmonary infiltrates due to *Mycoplasma pneumoniae* is common.

Various studies have shown different causes for an acutely ill child. The commonly occurring serious illnesses in children in the first 3 year of life presenting with fever are;

- ψ Bacterial meningitis
- ψ Aseptic meningitis
- ψ Pneumonia
- ψ Bacteremia
- ψ Focal soft tissue infection
- ψ Urinary tract infection
- ψ Bacterial diarrhea

In some studies, urinary tract infections are the most common cause of serious bacterial infections. It is important to consider noninfectious causes also like; midgut volvulus, appendicitis, intussusception, poisoning (salicylates), metabolic disorders (hypoglycemia, hyperammonemia), neurologic disorders (seizures, infant botulism), or inflammatory diseases (Kawasaki disease, juvenile rheumatoid arthritis).

How to identify an acutely ill child?

To identify a seriously ill child by;

- ψ Observation
- ψ Detailed history taking
- ψ Physical examination & laboratory tests

Observation

Observation is the key to identify important medical conditions.Example presence of grunting in a child may point to a lung infection such as pneumonia or sepsis, bulging fontanel may indicate rickets, bacterial meningitis or head trauma. It's important that a physician observes the child's response to certain important stimuli such as;

- ψ How does the child respond when called?
- ψ Is the child cranky or irritable?
- ψ What is the child's response to physician?
- ψ How does the crying child respond to the parents' comforting?
- ψ How quickly does the sleeping child awaken with a stimulus?

A keen observation is the key to identify important medical conditions in children

One can evaluate the seriousness of a child with the help of the observation items mentioned in table 1.

Table 1. Acute Illness Observation Scales
(check the appropriate boxes for each observation)

What to observe?	Normal		Moderate impairment		Severe impairment	
Quality of cry	Strong with normal tone Content & not crying	□ □	Whimpering Sobbing	□ □	Weak Moaning High pitched	□ □ □
Reaction (effect on crying, patted on back etc when stimulated by parents)	Cries briefly then stops Content & not crying	□ □	Cries on & off	□	Continuous cry Hardly responds	□ □
Variation in state (sleep to awake)	Stays awake If woken when asleep, wakes up quickly	□ □	Eyes closes briefly then awakens Awakens with prolonged stimulation	□ □	Will not arouse Falls to sleep	□ □
Color	Pink	□	Pale hands & feet Blue hands & feet	□ □	Pale Blue Ashen (gray)	□ □ □
Hydration status	Skin normal & moist mucus membranes	□	Eyes & skin normal & mouth slightly dry	□	Skin doughy, sunken eyes and dry mouth	□
Response (when held,	Smiles	□	Smiles briefly	□	Anxious	□

touched, hugged etc.)	Alerts	□	Alerts briefly	□	Expressionless Not alert	□ □

A normal finding is scored as 1, moderate impairment as 3, and severe impairment as 5. The best possible score is 6 and the worst score is 30. The chance of serious illness is 1–2% if the total score is ≤10; if the score is >10, the risk of serious illness increases by at least 10-fold.
This scale is not useful for infants between 1–3 months of age.

- Adapted from McCarthy PL et al. Pediatrics 1982;70:802

History

- History taking is complex and requires the art of asking specific questions to the parents.
- It is important to elicit specific symptoms, such as foul smelling stools, chest retraction while coughing, bloody diarrhea or cyanosis when coughing.
- One answer should lead to more questions to arrive at a clinical diagnosis. For example if the complaint is blood in the stool, additional questions can be asked about other evidence of bowel inflammation, such as watery stools, increased frequency of stools or presence of mucus.
- Questions should focus keeping all differential diagnosis in mind. For example the differential diagnosis of acute febrile childhood illnesses is mentioned above.
- As most acute illnesses in children are mostly caused by viral infections, it is important to ask questions about presence of similar illnesses in the family or if the child had other illness exposures.
- It is important to inquire about existing underlying chronic problems that can cause recurrent serious illness; for example, the child with sickle cell anemia, immunocompromised child or a child with AIDS is at increased risk for recurrent episodes of bacteremia.

Physical Exam

- Physical examination is important to confirm the observations and add further clinical details for diagnosis.
- It is essential that the child be made comfortable first by making him sit on the parent's lap or on the examination table in case of an older child.
- Assessing vital signs are valuable in critically ill children like the pulse, respiratory rate, heart rate, degree of fever etc.
- The child can be assessed based on the items shown in table 1.
- Respiratory system examination should include respiratory rate, evidence of wheeze, grunting, inspiratory stridor or coughing, retraction of intercostals muscles etc. As most acute infections are caused by viral infections, the presence of nasal discharge should be noted. Do not forget to open the mouth and see for enlarged adenoids or tonsillar infection.

- One should auscultate and assess the adequacy of bilateral air entry into the lungs and any evidence of adventitial breath sounds.
- Skin should be inspected for rashes which can be caused by viral infections, drug reactions or cellulitis.
- When the child is seated an assessment of fontanel tension can be completed to see if they are depressed, flat, or bulging.
- Childs mobility should be assessed. A child with meningitis will hold the neck stiffly and often cry if an attempt is made to flex it, whereas a child with cellulitis, osteomyelitis, or arthritis will resist movement of that limb. A child moving comfortably on the parent's lap is a reassuring sign of 'all is well'.
- In the cardiac examination the physician should look murmurs, abnormal heart sounds, pericardial friction rub which may indicate an infectious process
- The eyes are examined for any discharge or redness. Bacterial infection usually results in purulent drainage in case of superficial infection and if the infection is deep-seated swelling, and redness of the tissues surrounding the eye may be present.
- The neck should be evaluated for enlarged lymph nodes, other swellings, redness, or tenderness, as may be seen in cervical adenitis.
- Remove the diaper during abdominal examination. Look for distention, adequacy of bowel sounds, involuntary guarding and rebound tenderness. These may indicate a peritoneal infection or appendicitis.

Assessing vital signs are valuable in critically ill children like the pulse, respiratory rate, heart rate, degree of fever etc.

Risk Factors

- A carefully performed clinical assessment, observation, history, and physical examination can detect majority of seriously ill child. Important data to assists in the diagnosis of a child with acute febrile illness include age, body temperature, and the results of screening laboratory tests.
- In febrile children, the higher the fever, the greater the risk of serious illness.
- Screening laboratory tests may be helpful in identifying the febrile child at increased risk for selected serious illnesses. Urinalysis and urine culture must be considered when the source of fever is not apparent, especially in females and all males <1 year of age.

In a febrile child, higher the fever, the greater are the chances of a serious illness

Management

- If the child is febrile and >3 months and clinically appears well, a close observation is all that is needed.

- If the child is appearing ill and clinical examination suggests a serious illness, then appropriate laboratory tests are indicated (e.g., urinalysis in a child with fever of unknown origin or chest X-ray in a child with suspected pneumonia).
- In the child is febrile and <3 months a sepsis work-up including a complete blood count and blood culture should be done.
- A thorough follow-up examination should be done in all cases.

Suggested reading

- Paul L. McCarthy. Chapter 60 – Evaluation of the Sick Child in the Office and Clinic. Part VIII – The Acutely Ill Child. Kliegman: Nelson Textbook of Pediatrics, 18th ed. 2007.
- Pantell et al. Management and outcome of care of fever in early infancy. JAMA; 2004; 291:1203-1212.
- Baker and McCarthy, 2002. Baker MD, McCarthy PL: Fever and occult bacteremia in infants and young children. In: Jenson HB, Baltimore RS, ed. Pediatric Infectious Diseases: Principles and Practice, Philadelphia: WB Saunders; 2002.

Test questions

1. **Infant's aged 1to 3 months are more susceptible to sepsis and meningitis caused by____.**
   A. Group B streptococci
   B. Group A streptococci
   C. Staphylococci
   D. All the above

2. **In children >3 years the most common cause of pharyngitis is _____.**
   A. Group B streptococci
   B. Group A streptococci
   C. Group C streptococci
   D. Group D streptococci

3. **The acute illness observation scale incorporates the following observations except;**
   A. Quality of cry
   B. Reaction
   C. Hydration status
   D. Feeding

4. **Respiratory system examination should include;**
   A. Respiratory rate
   B. Evidence of wheeze
   C. Grunting
   D. All the above

5. Examination of neck should be done to evaluate for all except;

A. Enlarged lymph nodes
B. Other swellings
C. Thyroid swelling
D. Tenderness

1. A
2. B
3. D
4. D
5. C