Pediatric Fever

Overview

Parental and caregiver education is central to care of the febrile child. Many parents fear even a moderately increased temperature. “Fever phobia,” with or without accompanying signs or symptoms of serious illness, is one of the most common reasons that parents seek medical attention for their children.

Although a normal body temperature is generally defined as 37.0°C (98.6°F), the accepted normal body temperature range in pediatrics is between 36.2°C (97.2°F) and 38.0°C (100.4°F). This range takes into account many variables including the time of day, excessive clothing, physical activity, hot weather, and ovulation.

The focused history and assessment for a child presenting with fever is aimed at identifying seriously ill children or those at risk for serious illness. Children less than 36 months of age and children with chronic medical conditions are at risk for more serious infections. Evidence-based practice shows that fever as a symptom does not necessarily require treatment, but goals of care are to discover the cause of fever, treat underlying illness, and increase comfort.

The child over 3 months of age who has received recommended vaccinations for age has decreased risk for serious bacterial infection (SBI).

The purpose of this topic brief is to assist emergency nurses in educating caregivers regarding misconceptions surrounding fever and fear of severe side effects (i.e. brain damage and seizure disorders), which can lead to unnecessary clinic visits, laboratory testing, and antipyretic and antimicrobial therapy. Providing education on correct temperature measurement, appropriate antipyretic use, specific dosing regimens, and recognition of the signs of serious illness may help allay these fears and misconceptions.

Temperature Measurement

Temperature measurement is one component of pediatric assessment. When measuring temperatures in the pediatric patient, every effort should be made to
use the most accurate and least invasive route; however, not all routes may result in a consistent or accurate reading.\textsuperscript{4} In addition, selection of the appropriate route depends on the reason for temperature measurement (i.e. screening vs documentation of fever), patient age/developmental level, presence of comorbidities.\textsuperscript{5} Rectal temperature measurement has been considered the “gold standard” and less invasive when compared to temperature measurements via the pulmonary artery, esophagus, and bladder.\textsuperscript{4} Rectal temperatures are indicated when an accurate temperature reading as close to core temperature as possible is needed. Disadvantages of this route include injury to the rectum, transmission of stool-borne pathogens, discomfort, and added distress for both the patient and caregivers. Contraindications include immunocompromised patients with a history of thrombocytopenia or neutropenia. Alternative routes are encouraged for children < 1 month old and those with rectal surgery/trauma or diarrhea.\textsuperscript{4,6}

Oral temperatures, along with the temporal artery route, are considered the next most accurate and least invasive route.\textsuperscript{6} Oral temperatures are indicated for patients (typically 4 to 5 years of age) who are able to hold a thermometer under their tongue and cooperate during the measurement. The accuracy can be affected by oxygen administration, mouth breathing, and recent oral intake.\textsuperscript{4,6}

Temporal artery temperature measurement is quick, non-invasive, and produces accurate results with correct technique, even when compared to bladder, rectal, and axillary. This route is not recommended in infants < 3 months old who are thought to be febrile, as research is inconclusive as to accuracy in smaller infants.\textsuperscript{4,6}

Axillary temperature measurements are non-invasive but produce inconsistent results.\textsuperscript{6} This method of temperature measurement is indicated for screening purposes in infants < 1 month old and for those patients in whom the rectal route is contraindicated.\textsuperscript{4}

Tympanic temperature measurements are non-invasive and provide rapid results, but those results are inconsistent, especially when screening for a fever. Accuracy can be affected by otitis media, presence of cerumen, ear tubes, improper technique, ambient temperature and anatomy of the ear canal.\textsuperscript{4}

**Treatment with Antipyretics**

The goal when administering antipyretics to children should be to promote the child’s comfort and well-being and not to normalize temperature.\textsuperscript{7,8} Most parents and caregivers give antipyretics due to a fear of fever and febrile seizures. Many parents have reported that they gave antipyretics when the child’s temperature was less than 100.4°F, and some gave the medication when there was no fever.\textsuperscript{8} The possible long-term effects of giving medications when not necessary far outweigh the benefits of those medications when no underlying illness is present.\textsuperscript{8}
The American Academy of Pediatrics (AAP) has specific recommendations as to dosage and frequency when administering acetaminophen and ibuprofen. Some evidence supports administering alternating dosages of acetaminophen and ibuprofen to reduce fever and provide comfort. While either is effective, consultation with the child’s healthcare practitioner should be obtained prior to giving either medication when underlying health conditions are present.

### Antipyretic Information

<table>
<thead>
<tr>
<th>Variable</th>
<th>Acetaminophen</th>
<th>Ibuprofen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration of effect</td>
<td>4–6 hours</td>
<td>6–8 hours</td>
</tr>
<tr>
<td>Dose</td>
<td>10–15 mg/kg every 4 hours</td>
<td>10 mg/kg every 6 hours</td>
</tr>
<tr>
<td>Maximum daily pediatric dose&lt;sup&gt;a&lt;/sup&gt;</td>
<td>90 mg/kg</td>
<td>40 mg/kg</td>
</tr>
<tr>
<td>Lower age limit&lt;sup&gt;b&lt;/sup&gt;</td>
<td>3 months</td>
<td>6 months</td>
</tr>
</tbody>
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<sup>a</sup> Label is for 75 mg/kg; 90 mg/kg per day should be limited to less than 3 consecutive days.

<sup>b</sup> Unless specifically recommended by a health care provider

(Adapted from Sullivan & Farrar, 2011)

### Febrile Seizures

Febrile seizures are a benign, common occurrence in early childhood and are the most common convulsive event in children younger than 60 months of age. Two to five percent of all children are affected by febrile seizures. Such events are often terrifying for parents and caregivers, leading to frequent visits to the emergency department. The most commonly reported concern among caregivers and healthcare providers related to high fever is that if left untreated, the consequences may include febrile seizures and more serious conditions, such as brain damage and even death. Despite these concerns, febrile seizures in children are not associated with brain damage or increased mortality.

**Definition**

A febrile seizure is defined by AAP as “a seizure accompanied by fever (temperature ≥ 100.4°F or 38°C by any method), without central nervous system infection, that occurs in infants and children 6 through 60 months of age.” Febrile seizures can further be classified as simple or complex febrile seizures. Simple febrile seizures (SFS) are generalized seizures that last less than 15 minutes and do not recur within 24 hours. Complex febrile seizures (CFS) are prolonged (≥15 minutes), focal, and/or recur within 24 hours. Simple febrile seizures account for 65–91% of febrile seizures.
Etiology

The exact cause of febrile seizures remains unclear, yet febrile seizures are age-specific (young children) and the development of febrile seizures include environmental (fever) factors and genetic influences, such as a familial history of febrile seizures (especially in first-degree relatives, including siblings).14,15 The primary risk associated with SFS is recurrence. One-third of children with SFS will be affected,12 especially those younger than 15 months of age.14 Of those children experiencing recurrence, half will occur within the first year and 90% within two years.14

Evidence suggests that there is a rare but increased risk of febrile seizures following administration of live attenuated vaccination, especially within the first three days.15 Notably, there is no current evidence to indicate an increased risk of subsequent febrile seizures or neurodevelopmental sequelae.15,16 The benefits of vaccination outweigh the risks in most instances.17

Recent studies indicate that prophylactic administration of antipyretics affects immune responses to vaccinations and no significant decrease in febrile seizures has been documented. This practice should be carefully considered before recommending.18,19

Assessment

The assessment priorities for any patient with a seizure include airway, breathing and circulation. Children presenting to the emergency department following febrile seizure experience various alterations in level of alertness. In most cases, however, a gradual return to a normal level of alertness occurs within one hour without focal deficits.14

Necessary information for medical history includes duration of fever, potential exposure to illness, and recent antibiotic use. Additionally, the emergency nurse should consider a prior history of seizures, neurodevelopmental delay, metabolic disturbance, trauma, accidental or intentional ingestion, or other causes of seizures.14

Diagnostics

All efforts are aimed at identifying the source of the fever rather than routine laboratory studies and neuro-diagnostics, such as imaging and electroencephalography.13 Children with SFS are at low risk for serious bacterial illness.10 The incidence of bacterial meningitis when the patient presents solely with fever and seizure is between 0 and 0.6%;13 however, some children are at increased risk for SBI.

A lumbar puncture and work-up should be completed on any child with fever and seizure and who has meningeal signs and symptoms or in any child whose history or examination suggests the presence of meningitis or intracranial infection.12 A lumbar puncture is an option in infants aged 6 to 12 months who present with fever and seizure if the immunization status cannot be determined and there is an increased risk of bacterial meningitis or lack of vaccination against Haemophilus influenzae type b (Hib) or Streptococcus pneumoniae.12 Similarly, a lumbar puncture may be
warranted in the child who presents with fever and seizure while undergoing antibiotic therapy, which may mask clinical manifestations of meningitis.\textsuperscript{12}

**Treatment**

In the event of a febrile seizure, the emergency nurse or caregiver should ensure safety of the patient and place the child in the recovery or lateral recumbent position.\textsuperscript{20} There currently are no national practice guidelines regarding complex febrile seizures, but general interventions include maintenance of airway, supplemental oxygen administration, supportive care, and administration of anticonvulsants.\textsuperscript{14}

There is no evidence to support the claim that antipyretics decrease the incidence of recurrent seizures.\textsuperscript{7} Due to complications related to inappropriate dosing, toxicity of aggressive antipyretic administration and a complete lack of evidence for the efficacy of this practice,\textsuperscript{20} emergency nurses should educate caregivers to avoid the administration of antipyretics with the intent to prevent febrile seizures.\textsuperscript{7,20}

**Complications**

Ninety-seven percent of children with febrile seizures will never develop epilepsy.\textsuperscript{14} Although febrile seizures do increase the risk of developing epilepsy, the incidence rates remain low with SFS at 1–2.4% and CFS at 4–6%, compared to the general population risk of developing epilepsy at 0.5%.\textsuperscript{14} Complicated febrile seizure and febrile status epilepticus are more commonly associated with meningitis than simple febrile seizures.\textsuperscript{14}

The risks associated with some vaccinations, such as the increased likelihood of fever and febrile seizures, is significantly outweighed by the risk of the disease.\textsuperscript{16,21}

**Discharge Teaching for Caregivers**

Parents and caregivers for any sick child, especially one who is febrile, may become very anxious and rely on culture, tradition, the media, and teaching from healthcare providers to care for the child. This confluence of information, which is not always accurate, increases the risk of harm and should be evaluated and mitigated prior to discharging the child from the ED.

It is important to assess for health literacy and numeracy during interactions with the caregiver(s) and especially important prior to discharge. Comprehensive care of the child after leaving the ED relies on both factors for medication calculation, reading medication labels and discharge instructions, measuring medication, and reading a thermometer.\textsuperscript{22}

The AAP states that “nearly half of all American adults—90 million people”\textsuperscript{23} struggle with health literacy, which in turn impacts the child’s health. While not within the scope of this topic brief to comprehensively address health
literacy, speaking slowing and focusing on the content of the instructions that produce outcomes will enhance retention. This can be done by concentrating on a few need-to-know points using the teach-back method. Additionally, use of graphics and pictures, such as in an infographic format, may be helpful for promoting understanding and compliance.24

Review the correct procedure for temperature measurement with the caregiver according to the best method for obtaining the temperature for that child (see the section on temperature measurement in this topic brief). If necessary, assist the caregiver in obtaining the appropriate thermometer. Demonstrate for the caregiver how to accurately perform, interpret, and document the temperature, including how often it is to be done and with what interventions, encouraging the teach-back method to assure comprehension.4

Prior to discharge, parents should be taught appropriate dosing and uses of antipyretics and antibiotic administration. General instructions include proper use of a bulb syringe, indications for use of a humidifier, minimizing over-the-counter cough/cold medications, encouraging fluid intake, and environmental control such as avoiding overdressing or underdressing9 and regulating home temperature. Cultural beliefs such as alcohol baths25 and tepid water baths26 should be discouraged as not only having little effect on temperature but also potential harmful effects such as crying, goose bumps, shivering, and alcohol toxicity.

Specific instructions for parents and caregivers of a child experiencing a seizure include the following14:

- Remain calm
- Place the child on his/her side to prevent choking
- Remember not to put anything in the child’s mouth or attempt to restrain their extremities
- Contact primary care provider
- Call 911 if another seizure occurs in less than 24 hours, the seizure lasts longer than 5 minutes, the child fails to return to normal status, or there are other concerns

**Conclusion**

Having a deeper understanding of pediatric fever will help to both manage the febrile child in the emergency department and enable enhanced counseling of the parent or caregiver about fever. Careful explanation about causes of febrile illness, appropriate use of antipyretics, and assessment of readiness to understand discharge instructions will promote best outcomes and help to reduce fever phobia in the parent or caregiver.
**Definitions of Terms**

**Febrile seizure:** A benign, common occurrence in early childhood, and the most common convulsive event in children younger than 60 months of age

**Simple febrile seizure (SFS):** Generalized seizures lasting less than 15 minutes and no recurrence within 24 hours

**Complex febrile seizure (CFS):** Prolonged seizure lasting ≥ 15 minutes, focal, and/or recurrence within 24 hours

**Normal body temperature:** Defined as 37.0°C (98.6°F). The accepted normal body temperature range in pediatrics is between 36.2°C (97.2°F) and 38.0°C (100.4°F)²⁴

**Serious bacterial infection (SBI):** An illness that, if untreated, could result in significant morbidity or mortality

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References

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