

# GUIDELINES & PROTOCOLS

## ADVISORY COMMITTEE

### Febrile Seizures

Effective Date: September 1, 2010

#### Scope

This guideline covers the investigation and management of febrile seizures in children in the Emergency Department (ED). Febrile seizures have been defined as “an event in infancy or childhood, usually occurring between 6 months and 5 years of age, associated with fever but without evidence of intracranial infection or defined cause”.<sup>1</sup>

#### KEY POINTS:

- 1. Febrile seizures (simple and complex) are almost always benign and generally are not associated with neurological consequences.*
- 2. The mainstay of investigation and treatment is to rule out bacterial infection.*
- 3. There are limited indications for investigations including blood work, neuroimaging or electroencephalography (EEG).*
- 4. Clear explanation to and reassurance of caregivers is key in the management of the child.*

#### Diagnosis

Febrile seizures are the most common type of seizure and occur in approximately 3 - 5% of children.<sup>2, 3, 4</sup> Seizures may occur prior to the onset of the fever or with only a mild fever, but usually the temperature is greater than 38.5°C. There is, however, a correlation between lower temperature and a shorter duration of fever before the initial febrile seizure and an increased risk of recurrence of febrile seizure.<sup>5</sup>

#### Classification:

A **Simple febrile seizure** in a child who is otherwise neurologically healthy and without neurological abnormality by examination or by developmental history is defined as:

- Fever in a child aged 6 months to 5 years;
- Single seizure which is generalized and lasts less than 15 minutes;
- Fever (and seizure) is not caused by meningitis, encephalitis, or other illness affecting the brain.

#### A **Complex febrile seizure**:

- Age, neurological status before the illness, and fever are the same as for simple febrile seizure;
- Seizure is either focal or prolonged (i.e. >15 min), or multiple seizures occur in close succession.

Further investigations for complex seizures are indicated in Appendix A

## Differential Diagnosis

Distinguish a febrile seizure from a seizure due to an acute infection such as bacterial meningitis that requires urgent investigation and treatment. A thorough history and physical exam by an experienced clinician is ideal to rule out bacterial meningitis, encephalitis, gastroenteritis due to *Shigella* Sp., ingestions (such as diphenhydramine, tricyclic antidepressants, amphetamines, and cocaine), electrolyte abnormalities, hypoglycemia, and head injury (both accidental and abusive).

## Investigations:

**Routine blood work is not indicated for simple febrile seizures.**<sup>7</sup> Laboratory investigations are dictated by the clinical condition of the child and by an appropriate clinical policy for children of that age presenting to the emergency department with fever.

### Urine

A urinalysis is recommended for patients with no obvious focus of infection.

### Lumbar Puncture (LP)

An LP is not recommended in children considered to be haemodynamically unstable.

Strongly consider LP if the child is less than 12 months and consider LP if the child is less than 18 months.

LP is recommended if:

- Child has received antibiotics prior to the seizure as partially treated meningitis could be present in children who were on antibiotics prior to the seizure, and in these cases consider an LP regardless of age. Even if an LP is performed and the results are negative, one may consider treatment of meningitis, as cerebrospinal fluid (CSF) may be normal in the early stages of meningitis.<sup>6</sup>
- Meningeal signs are present:  
Meningeal irritation is defined as presence of Brudzinski sign (flexion of the neck causes flexion of the patient's hips and knees), Kernig sign (pain elicited with 90 degree hip flexion and knee extension), or neck stiffness in children older than 1 year of age. In children 1 year or younger, signs of meningeal irritation are the signs mentioned herein or irritability during manipulation of head or legs by the physician and/or a bulging fontanel.<sup>8</sup> It should be stressed that clinical signs of meningitis are insensitive and if the clinician is suspicious that meningitis is present the LP should not be delayed while awaiting for these signs to develop.

### Imaging

Neuroimaging is not indicated after a simple febrile seizure,<sup>7</sup> but could be considered when there are clinical features of a neurological disorder, e.g. micro/macrocephaly, neurocutaneous abnormalities, pre-existing neurological deficit, postictal neurological deficit persisting for more than a few hours, or when there are recurrent complex febrile seizures, particularly where there is doubt whether the seizures are febrile.<sup>9</sup> Magnetic resonance imaging is more sensitive than computed tomography for brain disorders that may present with seizures.

### Electroencephalography (EEG)

EEG does not predict which children progress to a seizure disorder. Epileptiform abnormalities are relatively common in children with benign febrile seizures.<sup>10</sup> EEG has a low sensitivity in children under three years of age following an unprovoked seizure.<sup>11</sup>

EEG may have a limited role in the diagnosis of acute encephalopathic disorders if the child remains encephalopathic for longer than normal following a febrile seizure.<sup>12</sup>

### Treatment

Most febrile seizures are brief and the seizure has stopped prior to presentation in the ED. If the seizure has not stopped, treatment with intravenous diazepam or lorazepam is warranted.

**Table 1. Medications for use in febrile seizures.\***

Medication	Buccal	IV Dose	Rectal Dose
Midazolam	0.5 mg/kg to max 10 mg		
Diazepam		0.3 mg/kg at a rate of 2 mg/min (max 5 mg per dose for < 5 years; 10 mg for ≥ 5 years)	0.5 mg/kg (max 20 mg per dose) May be administered undiluted.
Lorazepam		0.05 – 0.1 mg/kg over 1-2 min (max 4 mg per dose)	0.1 mg/kg (max 4 mg per dose) Dilute 1:1 with water prior to administration.

\* Esau R, ed. 2006/2007 British Columbia's Children's Hospital Pediatric Drug Dosage Guidelines. 5<sup>th</sup> edition. Vancouver: Department of Pharmacy Children's and Women's Health Centre of British Columbia. 2006.

Lau E, ed. Drug Handbook and Formulary 2007-2008. Toronto: The Department of Pharmacy, The Hospital for Sick Children. 2007.

McEvoy, GK, ed. AHFS Drug Information 2009. Bethesda: American Society of Health-System Pharmacists, Inc., 2009.

Rectal diazepam (0.5 mg/kg) or lorazepam (0.1 mg/kg) should be administered if intravenous access cannot be established readily. Buccal midazolam (0.5 mg/kg; max dose 10 mg) was more effective than rectal diazepam for children.<sup>13</sup>

Intravenous lorazepam is at least as effective as intravenous diazepam and is associated with fewer adverse events (including respiratory depression) in the treatment of acute clonic tonic convulsions. Where intravenous access is unavailable, there is limited evidence from one trial that midazolam is the treatment of choice.<sup>14</sup>

See Appendix A for an algorithm describing management of febrile seizures.

### Admission

The decision to admit a patient with febrile seizure is mostly related to the source of the fever. In general, children with a simple febrile seizure can be discharged from the ED after explanation and reassurance of the caregivers. Indications for admission may include:

1. Undifferentiated infection;
2. Treatment of infections requiring hospitalization;
3. Significant caregiver anxiety and concerns of coping with a recurrent seizure at home.

### Patient and Family Education

An integral part of the management of a first febrile seizure is **helping the family to cope** with a frightening experience. Parents may believe that their child is dying during a first febrile seizure. The challenge is to help the family deal with the emotional trauma and to understand the excellent prognosis of febrile seizures. It is important that the family understand that there is no increased risk of intellectual delay or school difficulties and that febrile seizures less than 30 minutes do not result in brain damage.

Provide the family with information on the risk of recurrence during the same illness or in the future and how to deal with subsequent seizures. Inform the families about the low risk of developing epilepsy and the lack of benefit of using antiepileptic drug treatment in altering that risk. Discuss this information with the family when the child is seen at the time of the febrile seizure. Provide information to family (Parent Education and Resources) before leaving the ED.

### Recurrence

The risk of recurrence after the first febrile seizure is about 33%, and about 9% will have three or more episodes of a febrile seizure. Half of the children will have another febrile seizure during a febrile illness in the following year.<sup>15</sup>

Several factors increase the likelihood of recurrence and include: first febrile seizure at a young age; family history of febrile seizures; short duration of fever before the seizure or relatively low fever at the time of the initial seizure. There seems to be a genetic predisposition for febrile seizures. The risk for other siblings to

develop febrile seizures is about 10-20% and may be higher if the parents also have a history of febrile seizures themselves.<sup>16</sup>

There is no evidence that treatment of simple febrile seizures can prevent later development of epilepsy or that there is any structural damage or higher risk of subsequent cognitive decline as a result of a febrile seizure.<sup>17</sup>

A small proportion of children will have multiple febrile seizures. Continuous prophylaxis with antiepileptic medications is not recommended, and intermittent administration of antipyretics was not found to be effective. There is a lack of consensus regarding the efficacy of intermittent diazepam, and the efficacy of midazolam as an intermittent prophylactic agent needs further investigation.<sup>18</sup> Pending further research, intermittent prophylactic therapy to prevent recurrent febrile seizures cannot be recommended at this time. Instead, emphasis should be placed on parent education and reassurance, as febrile seizures are a frightening, stressful experience for the parent.

## References

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This guideline is based on scientific evidence current as of the Effective Date.

This guideline was developed by the BC Children’s Hospital, Child Health BC and the Guidelines and Protocols Advisory Committee, in collaboration with the Provincial Health Services Authority. The guideline was approved by the British Columbia Medical Association and adopted by the Medical Services Commission.

### List of Abbreviations

ED Emergency Department  
EEG Electroencephalography  
LP Lumbar Puncture

### Appendices

Appendix A – Emergency Management of Febrile Seizure in Children

### Associated Documents

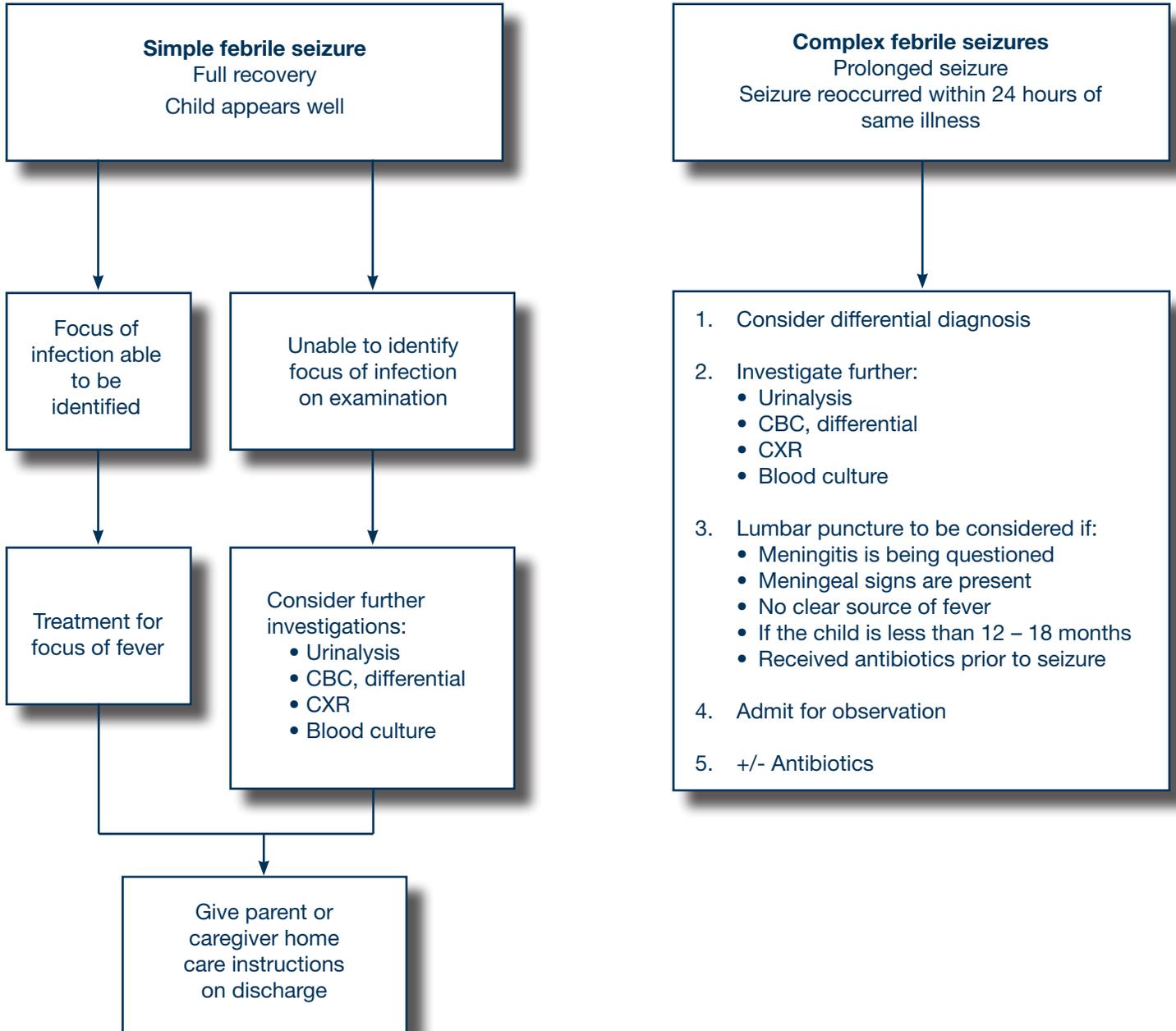
Parent Education and Resources

<p><b>The principles of the Guidelines and Protocols Advisory Committee are to:</b></p> <ul style="list-style-type: none"><li>• encourage appropriate responses to common medical situations</li><li>• recommend actions that are sufficient and efficient, neither excessive nor deficient</li><li>• permit exceptions when justified by clinical circumstances</li></ul>	<p><b>Contact Information</b></p> <p>Guidelines and Protocols Advisory Committee PO Box 9642 STN PROV GOVT Victoria BC V8W 9P1 Phone: 250 952-1347 Fax: 250 952-1417 E-mail: <a href="mailto:h1th.guidelines@gov.bc.ca">h1th.guidelines@gov.bc.ca</a> Web site: <a href="http://www.BCGuidelines.ca">www.BCGuidelines.ca</a></p>
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### DISCLAIMER

The Clinical Practice Guidelines (the “Guidelines”) have been developed by the Guidelines and Protocols Advisory Committee on behalf of the Medical Services Commission. The Guidelines are intended to give an understanding of a clinical problem, and outline one or more preferred approaches to the investigation and management of the problem. The Guidelines are not intended as a substitute for the advice or professional judgment of a health care professional, nor are they intended to be the only approach to the management of clinical problems.

## Emergency Management of Febrile Seizure in Children



### Active seizure treatment:

- Buccal midazolam 0.5mg/kg; max dose 10 mg
- Diazepam 0.5mg/kg per rectum; max dose 20 mg
- Lorazepam 0.1 mg/kg per rectum if no IV; max dose 4mg

# PARENT EDUCATION AND RESOURCES

## Febrile Seizure\*

- A febrile (fever) seizure is a seizure caused by a fever
- These seizures might appear scary but are rarely dangerous
- A fever seizure might look like: body stiffening; twitching of the face, arms and legs, or both; eye rolling; jerking of the arms and legs; staring; or loss of consciousness.
- Fever seizures generally last less than 1 minute but can last up to 15 minutes.
- Your child might appear not to be breathing, and the skin colour might become darker. If so, call 911 or emergency personnel and lay the child on the floor on his or her back and DO NOT place your fingers in the child's mouth.
- Simple fever seizures often occur in the first 24 hours of the illness and only occur once. If the seizure happens again, your child should be seen again.
- Fever seizures do not cause brain damage or paralysis.
- Fever seizures occur in 2% to 5% of all children between the ages of 6 months and 5 years.
- A child who has fever seizures has only a slightly increased risk of having a seizure problem compared with that of a child who has never had a febrile seizure.
- Fever seizures tend to run in families.
- Fever seizures can occur again with subsequent fever illnesses. Medicine is generally not given to prevent simple fever seizures.
- Use of medicines such as acetaminophen (Tylenol®) or ibuprofen (Advil®, Motrin®) for fevers have not been shown to prevent fever seizures.

\*Ann Emerg Med. 2003;41:215-222