

# Febrile Seizure v.1: ED Management

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## Inclusion Criteria

- Patients age 6-60 months with seizure AND fever  $\geq 38^{\circ}\text{C}$  or parental report of fever within 24 hours

## Exclusion Criteria

- Known epilepsy, probable intracranial infection, intracranial shunt, immunodeficiency, cardiac right-to-left shunt, or oncology patients

## PHASE I (E.D.)

If **Actively Seizing**, Use ED Seizure (Status Epilepticus) Orderset

**Signs and Symptoms of Meningitis or Intracranial Infection**

No

### Assess Risk for Meningitis or Intracranial Infection

#### History

- >3 days duration of illness
- Seen by primary MD in previous 24 hours
- Drowsiness or vomiting at home
- Infant 6-12 months old deficient in Hib or pneumococcal vaccines or immunization status cannot be determined
- Pretreated with antibiotics

#### Physical Signs

- Petechiae
- Questionable nuchal rigidity
- Drowsiness
- Convulsing on examination
- Weakness or neurological deficit on examination
- Signs of infection of head or neck with potential for intracranial extension (such as mastoiditis, sinusitis, etc.)
- Bulging fontanelle

#### Complex Features

- Focal seizures
- Seizure duration >15 minutes
- Multiple seizures in 24 hours

#### Meningitis Less Likely

- Prior febrile seizure
- Pre-existing neurological findings

Yes

Clinical judgement of low risk

Clinical judgement of significant risk

### Acute Evaluation

- Lab testing should focus on finding the cause of the patient's fever
- Routine analysis of serum electrolytes, calcium, phosphorus, complete blood count and blood glucose are not recommended, unless they are indicated by a suspicious history or physical findings.
- If vomiting and/or diarrhea, refer to [Acute Gastroenteritis Pathway](#)
- Blood glucose level and urine drug screen may be considered useful if the child does not return to baseline mental status or regain consciousness after the seizure.
- Consider neurology consultation if new prolonged focal neurologic deficit with suspicion of subclinical status epilepticus or seizure duration > 30 minutes
- [EEG or neuroimaging not recommended for routine evaluation](#)

### Evaluate for Meningitis or Intracranial Infection

- Consider CT if concern for increased intracranial pressure
- Lumbar Puncture
- Labs: CBC, blood culture, glucose
- Treat with empiric antibiotics

No meningitis

Meningitis present

Off Pathway

Assess admit and discharge criteria

### ED Discharge Criteria

- Cause of fever does not require inpatient admission
- Patient appears non-toxic and returns to neurological baseline
- If complex febrile seizure: observe  $\geq 2$  hours after seizure
- Parental anxiety addressed
- Parental education provided
- Appropriate outpatient follow-up is identified
- Safe transport home arranged

### Admit Criteria

- Unstable clinical status and/or clinical infection requiring inpatient stay or
- Disabling parental anxiety or
- Uncertain home situation or
- Barriers to safe return to home

Discharge

Admit

### Parental Education

- [ED Febrile Seizure discharge instructions](#)
- Follow-up with primary MD

Phase Change

# Febrile Seizure v.1: Inpatient Management

## PHASE II: INPATIENT

### Febrile Seizure Admit Orders

- Use Febrile Seizure Admit Orderset
- RN Teaching: [Seizures From a Fever](#)
- Seizure Precaution
- Order seizure rescue plan (Acute Seizure Management Orderset) if
  - Complex febrile seizures or
  - Concern for intracranial infection

If Actively Seizing, Use Acute Seizure Management Orderset

### Signs and Symptoms of Meningitis or Intracranial Infection

No

### Assess Risk for Meningitis or Intracranial Infection

#### History

- >3 days duration of illness
- Seen by primary MD in previous 24 hours
- Drowsiness or vomiting at home
- Infant 6-12 months old deficient in Hib or pneumococcal vaccines or immunization status cannot be determined
- Pretreated with antibiotics

#### Physical Signs

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#### Complex Features

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#### Meningitis Less Likely

- Prior febrile seizure
- Pre-existing neurological findings

Yes

Clinical judgement of low risk

Clinical judgement of significant risk

### Acute Evaluation

- Lab testing should focus on finding the cause of the patient's fever
- Routine analysis of serum electrolytes, calcium, phosphorus, complete blood count and blood glucose are not recommended, unless they are indicated by a suspicious history or physical findings.
- If vomiting and/or diarrhea, refer to [Acute Gastroenteritis Pathway](#)
- Blood glucose level and urine drug screen may be considered useful if the child does not return to baseline mental status or regain consciousness after the seizure.
- Consider neurology consultation if new prolonged focal neurologic deficit with suspicion of subclinical status epilepticus or seizure duration > 30 minutes
- [EEG or neuroimaging not recommended for routine evaluation](#)

### Evaluate for Meningitis or Intracranial Infection

- Consider CT if concern for increased intracranial pressure
- Lumbar Puncture
- Labs: CBC, blood culture, glucose
- Treat with empiric antibiotics

No meningitis

Meningitis present

Off Pathway

Consider outpatient f/u

### Consider Non-Urgent Outpatient Follow-up

- When to consider neuro consult, outpatient EEG, outpatient MRI

Assess discharge criteria

### Discharge Criteria

- Patient appears non-toxic and returns to neurological baseline
- Parental anxiety addressed
- Parental education provided
- Appropriate outpatient follow-up is identified

Discharge

### Parental Education

- Discharge nursing instructions
- [Pamphlet PE265 Febrile Seizures](#)
- Follow-up with primary MD

## Inclusion and Exclusion Criteria

Patients who meet the following criteria should be placed on the *febrile seizure pathway* through the use of the febrile seizure admit orderset.

### Inclusion Criteria

- Patients age 6-60 months with seizure AND fever  $\geq 38^{\circ}\text{C}$  or parental report of fever within 24 hours

### Exclusion Criteria

- Known afebrile seizure disorder
- Probable intracranial infection
- Intracranial shunt
- Immunodeficiency
- Cardiac right-to-left shunt
- Oncology patients

### Inclusion Criteria

- Patients age 6-60 months with seizure AND fever  $\geq 38^{\circ}\text{C}$  or parental report of fever within 24 hours

### Exclusion Criteria

- Known epilepsy, probable intracranial infection, intracranial shunt, immunodeficiency, cardiac right-to-left shunt, or oncology patients



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# Actively Seizing

ED patients:

If [Actively Seizing](#), Use ED Seizure (Status Epilepticus) Orderset

Inpatients:

If [Actively Seizing](#), Use Acute Seizure Management Orderset

“Actively seizing” means convulsive seizures or partial seizures with clear ictal motor activity for longer than 5 minutes. Not shivering, shuddering or tremor due to fever!

- **Give rescue anti-epileptic drug if seizing for more than 5 minutes.** [Expert opinion] (Shinnar, 2008)
- **Intranasal midazolam and buccal midazolam are efficacious and safe, and may serve as first-line in the treatment of prolonged seizures. Both IV midazolam and valproate are equally effective to IV diazepam.** [High quality](Sofou, 2008 )
- **Consider obtaining bedside blood glucose.** [Expert opinion](Baumer, 2004)



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## Evaluate for Signs/ Symptoms of Meningitis or Intracranial Infection

### Signs and Symptoms of Meningitis or Intracranial Infection

- *The 2011 AAP febrile seizure guideline states, "A lumbar puncture should be performed in any child who presents with a seizure and a fever and has meningeal signs and symptoms (e.g., neck stiffness, Kernig and/or Brudzinski signs)..."* (AAP, 2011)
- **This part of the AAP Guideline is quite clear - *PATIENTS WITH MENINGEAL SIGNS SHOULD BE EVALUATED FOR MENINGITIS PROMPTLY.*** [Low quality] (AAP, 2011; Baumer, 2004)



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# Assess Risk of Meningitis or Intracranial Infection

## Assess Risk for Meningitis or Intracranial Infection

### History

- >3 days duration of illness
- Seen by primary MD in previous 24 hours
- Drowsiness or vomiting at home
- Infant 6-12 months old deficient in Hib or pneumococcal vaccines or immunization status cannot be determined
- Pretreated with antibiotics

### Physical Signs

- Petechiae
- Questionable nuchal rigidity
- Drowsiness
- Convulsing on examination
- Weakness or neurological deficit on examination
- Signs of infection of head or neck with potential for intracranial extension (such as mastoiditis, sinusitis, etc.)
- Bulging fontanelle

### Complex Features

- Focal seizures
- Seizure duration >15 minutes
- Multiple seizures in 24 hours

### Meningitis Less Likely

- Prior febrile seizure
- Pre-existing neurological findings

- *The AAP guideline continues, “A lumbar puncture should be performed ... in any child whose history or examination suggests the presence of meningitis or intracranial infection.” (AAP, 2011)*
- This part of the AAP Guideline is more subjective, and requires that the practitioner use historical and physical findings to assess the risk for meningitis or intracranial infection. Specific aspects of the history or exam that might suggest meningitis or intracranial infection are discussed in the following slides.

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## Assess Risk of Meningitis or Intracranial Infection

Children with the following HISTORICAL features have an increased risk of meningitis and lumbar puncture should be CONSIDERED:

• *A child with at least three days of illness, seen by GP in previous 24 hours, with drowsiness at home, or vomiting at home. [Low quality](Baumer, 2004)*

• *An infant between 6 and 12 months of age who is considered deficient in Haemophilus influenzae type b (Hib) or Streptococcus pneumoniae immunizations (i.e., has not received scheduled immunizations as recommended) or when immunization status cannot be determined because of an increased risk of bacterial meningitis. [Expert opinion](AAP, 2011)*

• *A child who is pretreated with antibiotics, because antibiotic treatment can mask the signs and symptoms of meningitis. [Expert opinion](AAP, 2011)*

### History

- >3 days duration of illness
- Seen by primary MD in previous 24 hours
- Drowsiness or vomiting at home
- Infant 6-12 months old deficient in Hib or pneumococcal vaccines or immunization status cannot be determined
- Pretreated with antibiotics



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# Assess Risk of Meningitis or Intracranial Infection

Children with the following **PHYSICAL EXAM** features have an increased risk of meningitis and lumbar puncture should be **CONSIDERED**:

• *Children with petechiae, questionable nuchal rigidity, drowsiness, convulsing on examination, weakness on examination, bulging fontanel.* [Low quality](Baumer, 2004)

• *Some studies have suggested that abnormal neurological or mental status examinations are most predictive of meningitis/intracranial infection: patients are described as obtunded, comatose, unresponsive, lethargic, drowsy, prolonged post-ictal state, agitated, combative, irritable, cranky, clingy, moaning, toxic.* [Low quality] (Selz, 2009; Kimia, 2010; Batra, 2011; AAP 2011)

• *Signs of infection of the head or neck with potential for intracranial extension (such as mastoiditis, sinusitis, etc.)* [Local expert opinion]

• *No evidence was found to support the suggestion that children below a certain age do not exhibit the signs of meningitis.* (Baumer, 2004)

## Physical Signs

- Petechiae
- Questionable nuchal rigidity
- Drowsiness
- Convulsing on examination
- Weakness or neurological deficit on examination
- Signs of infection of head or neck with potential for intracranial extension (such as mastoiditis, sinusitis, etc.)
- Bulging fontanelle

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## Assess Risk of Meningitis or Intracranial Infection

Children with **COMPLEX FEBRILE SEIZURES** may have an increased risk of meningitis and lumbar puncture should be **CONSIDERED**

*There is some inconsistency in the literature regarding the approach to patients with complex febrile seizures (CFS).*

*Two guidelines state that LP should be **CONSIDERED** in children with CFS. [Low quality] (Baumer, 2004; Fetveit, 2008) One guideline **RECOMMENDS** lumbar puncture for all patients with CFS. [Expert opinion] (Boyle, 2011) And one guideline makes no distinction between children with CFS and children with simple febrile seizures (SFS) when assessing their risk of meningitis/intracranial infection. [Expert opinion] (BC Guideline, 2011)*

*The PAERG systematic review looked at 4 studies from 1981 -92, and found that the historic pooled rate for meningitis following febrile seizure was 2.9% overall, with a rate of 2% in SFS and 9.1% in CFS. [Low quality] (PAERG, 2002)*

*However, recent studies in the age of Hib and Pneumococcal vaccines have shown the rate of meningitis CFS to be very low at <1%, [Low quality] (Selz, 2009; Kimia, 2010) and similar to the rate for SFS. [Low quality] (Trainor, 2001)*

### Complex Features

- Focal seizures
- Seizure duration >15 minutes
- Multiple seizures in 24 hours

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# Assess Risk of Meningitis or Intracranial Infection

***Children with a previous history of febrile seizures or history of pre-existing neurological abnormality may be less likely to have meningitis or intracranial infection associated with subsequent febrile seizures.***

*[Local expert opinion]*

## **Meningitis Less Likely**

- Prior febrile seizure
- Pre-existing neurological findings

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# Evaluate for Meningitis or Intracranial Infection

A lumbar puncture should be performed in any child with febrile seizure who presents with DEFINITE signs or symptoms of meningitis/intracranial infection or who is felt to be at SIGNIFICANT RISK for meningitis/intracranial infection.

**•Consider obtaining head CT prior to lumbar puncture if there are signs of increased intracranial pressure or concerns of intracranial mass.**

*[Local expert opinion]*

**•Blood culture and serum glucose testing should be performed concurrent to LP to increase the sensitivity for detecting bacteria and to determine if there is hypoglycorrhachia characteristic of bacterial meningitis.** *[Expert opinion] (AAP, 2011)*

**•Strongly consider starting empiric antibiotics while awaiting results of lumbar puncture.** *[Local expert opinion]*

## Evaluate for Meningitis or Intracranial Infection

- Consider CT if concern for increased intracranial pressure
- Lumbar Puncture
- Labs: CBC, blood culture, glucose
- Treat with empiric antibiotics

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## Meningitis Patients are Off-Pathway

Patients with meningitis or intracranial infection are **OFF THE PATHWAY**

•Further evaluation and treatment should be based on meningitis guidelines and/or Infectious Disease recommendations.



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## Acute Evaluation

### Acute Evaluation

- Lab testing should focus on finding the cause of the patient's fever
- Routine analysis of serum electrolytes, calcium, phosphorus, complete blood count and blood glucose are not recommended, unless they are indicated by a suspicious history or physical findings.
- If vomiting and/or diarrhea, refer to [Acute Gastroenteritis Pathway](#)
- Blood glucose level and urine drug screen may be considered useful if the child does not return to baseline mental status or regain consciousness after the seizure.
- Consider neurology consultation if new prolonged focal neurologic deficit with suspicion of subclinical status epilepticus or seizure duration > 30 minutes
- [EEG or neuroimaging not recommended for routine evaluation](#)

- ***[Routine inpatient lab testing, EEG, neuroimaging, and neurology consultation are generally not indicated following a febrile seizure.](#)***  
*[Low quality] (AAP,2011; Baumer, 2004; BC, 2010; Fetveit, 2008)*



## Acute Evaluation

- ***[Children felt to be at low risk of meningitis, and those with negative results from lumbar puncture, should undergo evaluation focusing on finding the cause of their fever.](#)*** *[Low quality] (AAP, 2011; BC, 2010; Fetveit, 2008)*
- ***[Lab testing may be indicated based on the patient's underlying condition, or disease-specific guidelines \(e.g., lytes for patient with known diabetes insipidus\).](#)*** *[Local expert opinion]*
- ***[Children with febrile seizures are at similar risk for occult bacteremia as those with fever alone.](#)*** *[Low quality] (Trainor, 2001; Shah, 2002)*
- ***[Consider obtaining blood glucose level](#)*** *[Expert opinion] (Baumer, 2004; Fetveit, 2008)* ***[and urine drug screen](#)*** *[Local expert opinion]* ***[if child does not return to baseline mental status.](#)***



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## Acute Evaluation

***Emergent /urgent EEG and neurology consult may have a limited role in the diagnosis of acute status epilepticus. These patients may present with very prolonged neurological deficits / encephalopathy following a febrile seizure, or with very prolonged seizures.*** [Very low quality] (Shinnar, 2008; Maytal, 2000); [Expert opinion] (BC, 2010; Boyle, 2011)

***In one multicenter prospective study, one third of febrile status epilepticus was not recognized in the emergency department.*** [Low quality] (Shinnar, 2008)



## Acute Evaluation

- ***Emergent/urgent neuroimaging is unnecessary for well-appearing children.*** [Very low quality] (AAP, 2011; Boyl, 2011; Millichap, 2008; Hesdorffer, 2008; Teng, 2006; Maytal, 2000; Yucel, 2004)
- ***Consider emergent/urgent CT for children with:***
  - ***New prolonged focal neurological deficits***
  - ***Patients who are obtunded***
  - ***First complex febrile seizure AND one of the following:***
    - ***Concern for increased intracranial pressure***
    - ***Concern for localized intracranial infection***
    - ***Concern for intracranial mass***
    - ***Trauma***

[Local expert opinion]



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## Planning Outpatient Follow-up: Neurology Consultation, Outpatient EEG, or MRI

### Consider Non-Urgent Outpatient Follow-up

- When to consider [neuro consult, outpatient EEG, outpatient MRI](#)
- **Not recommended for simple febrile seizure.** [Low quality] (AAP, 2011)
- **Consider non-urgent outpatient neurology consultation, EEG, and MRI for patients with complex febrile seizure AND other risk factors for epilepsy:** [Local expert opinion]
  - Family history of epilepsy
  - Previous traumatic brain injury or central nervous system infection
  - Previous or current episode(s) of status epilepticus (seizure duration >30 minutes)
  - Baseline neurodevelopmental or neurological deficits/abnormalities (cerebral palsy, developmental delay, macro/microcephaly)
  - Evidence of neurocutaneous syndrome (neurofibromatosis, tuberous sclerosis, etc)



## Planning Outpatient Follow-up: Outpatient EEG

- **EEGs are not typically indicated following a first episode single simple or complex febrile seizure.** [Low quality] (AAP, 2011; Maytal, 2000)
- **Providers may consider obtaining an EEG at least 7 days after a single complex febrile seizure if the child has other risk factors for epilepsy.** [Very low quality] (Joshi, 2005; Boyle, 2011)
- **However, an abnormal EEG following a single simple or complex febrile seizure is unlikely to change management.** [Very low quality] (Maytal, 2000; Joshi, 2005)



To Non-Urgent  
Follow up Pg2

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## Planning Outpatient Follow-up: Outpatient MRI

- **Neuroimaging is not typically indicated following a first episode single simple or complex febrile seizure.** [Very low quality] (AAP,2011; Boyle, 2011; Hesdorffer, 2008; Teng, 2006; Yucel, 2004)
- **If neuroimaging is done, MRI is more sensitive than CT.** [Expert opinion] (Boyle, 2011; BC, 2010; Prince, 2009)
- **Providers may consider obtaining a non-urgent MRI for:**
  - **recurrent complex febrile seizures.** [Expert opinion] (BC, 2010)
  - **a single complex febrile seizure if the child has other risk factors for epilepsy.** [Expert opinion] (BC, 2010; Boyle, 2011)



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# Criteria for Inpatient Admission

## Admit Criteria

- Unstable clinical status and/or clinical infection requiring inpatient stay or
- Disabling parental anxiety or
- Uncertain home situation or
- Barriers to safe return to home

• **Children who are clinically unstable neurologically (e.g., not returning to baseline, very somnolent following doses of anti-seizure medications) should be admitted for observation and support.** [Expert opinion] (Fetveit, 2008; Baumer, 2004)

• **Children who present with an underlying infection requiring inpatient stay (e.g., severe pneumonia, infection requiring intravenous antibiotics) should be admitted.** [Expert opinion] (BC, 2010)

• **Children whose parents have "disabling" anxiety following the seizure episode may require admission for observation and further parental education and reassurance.** [Expert opinion] (BC, 2010; Fetveit, 2008)

• **Children that lack a safe home or safe transportation home require admission and may require social work consultation.** [Expert opinion] (Fetveit, 2008)



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## Inpatient Admission

### Febrile Seizure Admit Orders

Use Febrile Seizure Admit Orderset

RN Teaching: [Seizures From a Fever](#)

Seizure Precaution

Order seizure rescue plan (Acute Seizure Management Orderset) if

Complex febrile seizures or

Concern for intracranial infection

Use the "Febrile Seizure Admit Orderset". The orderset helps ensure that key items such as parental education and seizure precautions are considered, and allows for tracking of febrile seizure patients for outcomes measures.

*Patients admitted following a single simple febrile seizure do not require a seizure rescue plan. A seizure rescue plan should be ordered (using the "Acute Seizure Management Orderset") for patients with complex febrile seizures. [Local expert opinion]*



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# Discharge Criteria

## ED patients

### ED Discharge Criteria

Cause of fever does not require inpatient admission  
Patient appears non-toxic and returns to neurological baseline  
If complex febrile seizure: observe  $\geq 2$  hours after seizure  
Parental anxiety addressed  
Parental education provided  
Appropriate outpatient followup is identified  
Safe transport home arranged

or

## Inpatients

### Discharge Criteria

Patient appears non-toxic and returns to neurological baseline  
Parental anxiety addressed  
Parental education provided  
Appropriate outpatient followup is identified

*Children who appear non-toxic and are at their neurologic baseline following a febrile seizure may be safely discharged home. [Expert opinion] (Baumer, 2004; BC, 2011)*

*Children who present with a complex febrile seizure should be observed for a minimum of 2 hours, and then may be discharged home if they appear non-toxic and have returned to their neurological baseline. [Expert opinion] (Baumer, 2004)*

*Addressing parental anxiety and providing parental education are often the key tasks of the medical team following a febrile seizure. [Expert opinion] (Baumer, 2004; BC, 2010; Boyle, 2011)*



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# Discharge from the Emergency Department

The vast majority of febrile seizure patients can be directly discharged home from the ED.

Upon discharge from the emergency department, the child's caregiver should be provided with:

- The ED Febrile Seizure discharge instructions.
- Plan to follow-up with the child's primary care provider.

## Parental Education

- ED Febrile Seizure discharge instructions
- Follow-up with primary MD



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# Discharge from the Hospital

A small number of patients will require inpatient admission.

Upon discharge from the hospital, the child's caregiver should be provided with:

- Discharge Nursing Instructions.
- Parent education sheet about “Seizures from a Fever” (#PE265).
- Plan to follow-up with the child's primary care provider.

## Parental Education

Discharge nursing instructions

[Pamphlet PE265 Febrile Seizures](#)

Follow-up with primary MD



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## Objective

Improve quality and safety of care for children with febrile seizures by reducing waste and cost in the evaluation and management of these patients. Specifically:

- Reduce neurology consultations in patients seen in Emergency Department and inpatient with febrile seizures by 10% in 1 year from implementation
- Reduce Emergency Department length of stay in patients with febrile seizures by 10% in 1 year from implementation
- Reduce Admission Rate from Emergency Department in patients with febrile seizures by 10% in 1 year from implementation
- Reduce inpatient length of stay in patients with febrile seizures by 10% in 1 year from implementation
- Maintain current rates of lumbar punctures and CT scans in patients with febrile seizures in Emergency Department and inpatient settings

## Recommendations

1. Lumbar puncture, neuroimaging, routine laboratory tests, EEG, and neurology consult are not necessary for a child who is well-appearing after a simple or complex febrile seizure.
2. Further evaluation is indicated in a small subset of children with febrile seizures and is outlined in the Febrile Seizure Pathway.

## Rationale

- Safety will be improved through ordering of fewer unnecessary invasive tests.
- Costs will be reduced by reducing length of stay as a result of standardized care.
- Delivery of care will be improved by expediting patient flow through the emergency department and inpatient setting.
- Quality of care will improve by standardizing patient education, clinical evaluation, and treatment.
- Engagement is grounded in the fact that the pathway was developed by an interdisciplinary team including inpatient, Neurology, and Emergency Department nurses and physicians.
- Patient/Family Satisfaction will be improved by consistent messaging from the provider team.

## Evidence

Primary studies, systematic reviews, and guidelines from the past 10 years were searched to determine which patients with simple or complex febrile seizures need neuroimaging, laboratory testing, EEG, and lumbar puncture.

## Implementation

- Created two algorithms for inpatient and Emergency Department with Learning Center Training Module for the management of febrile seizures
- Developed two ordersets: ED Febrile Seizure Orderset and Febrile Seizure Admit Orderset
- Revised pamphlet PE265 Seizures From A Fever

## Metrics Plan

1. Count of Inpatient/obs discharges
2. Median Length of Stay
3. % of patients with any of the specified orderset
  - a. discharges meeting population criteria
4. Average charges per case
5. Readmission
6. Length of stay in ED
7. Admission rate from ED
8. ED and inpatient orderables (electrolytes, LP, CT, EEG, MRI)
9. ED and inpatient neurology consults

## PDCA Plan

The CSW owner and committee will follow metrics, continue to review medical literature, and make alterations to the pathway as needed.

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# Self-Assessment

- If you are taking this self-assessment as a part of required departmental training, you will need to logon to the [Learning Center](#) to receive credit. Completion also qualifies you for 1 hour of Category II CME credit.
1. Which of the following is NOT an exclusion criterion for being on the SCH Febrile Seizure Pathway?
    - a. Known epilepsy
    - b. Meningitis
    - c. Cerebral palsy
    - d. Immunodeficiency
  2. For the patient that is actively seizing, anti-seizure drugs should be administered after:
    - a. 2 minutes
    - b. 5 minutes
    - c. 10 minutes
    - d. 15 minutes
  3. When assessing a child with febrile seizures, which of the following historical features is NOT associated with an increased risk of meningitis?
    - a. Greater than 3 days of illness
    - b. History of prior febrile seizure
    - c. 6-12 months of age with incomplete immunizations to Hib and pneumococcus
    - d. Pretreated with antibiotics
  4. Which of the following is a feature of a complex febrile seizure?
    - a. Focal seizures
    - b. Seizure lasting more than 15 minutes
    - c. Multiple seizures in 24 hours
    - d. All of the above
  5. Which of the following statements is NOT true about the acute evaluation of febrile seizures?
    - a. Routine lab testing, EEG, and neuroimaging are generally not indicated in well-appearing children following a febrile seizure.
    - b. Limited lab testing should focus on finding the cause of the patient's fever.
    - c. Children with febrile seizures are at an increased risk for occult bacteremia compared to children with fever alone.
    - d. Blood glucose level and urine drug screen may be considered in the child that does not return to baseline mental status following a febrile seizure.
  6. Emergent/urgent EEG may be indicated in the emergency department during evaluation for a febrile seizure when:
    - a. There is concern for increased intracranial pressure
    - b. There is concern that the patient may develop epilepsy in the future
    - c. There is a family history of febrile seizures
    - d. There is concern that the patient is in status epilepticus
  7. Following a simple febrile seizure, one of the key tasks at the time of discharge is to:
    - a. Address parental anxiety and provide parental education.
    - b. Provide instructions for round-the-clock acetaminophen administration with the next febrile illness to prevent further seizures.
    - c. Arrange outpatient EEG and neurology follow-up.
    - d. Arrange for MRI in 7 – 14 days.
  8. Which of the following does NOT meet criteria for inpatient admission following a febrile seizure?
    - a. The child that remains very somnolent following 2 doses of anti-seizure medications given in the ED.
    - b. The child with parents who state they were “scared to death” by the seizure, and despite reassurance in the ED, are refusing to take him home until they’re “sure he won’t seize again”.
    - c. The child with pneumonia and effusion, with a room air oxygen saturation of 86%.
    - d. All patients with complex febrile seizures.
  9. Non-urgent outpatient neurology consultation, EEG and MRI following a febrile seizure would be most appropriate for:
    - a. Patients following a simple febrile seizure
    - b. Patients following a complex febrile seizure
    - c. Patients with complex febrile seizures and other risk factors for epilepsy
    - d. Patients who underwent lumbar puncture as part of their evaluation
  10. Children that present with a complex febrile seizure should be observed for a minimum of 2 hours, and then may be discharged home if they appear non-toxic and have returned to their neurological baseline.
    - a. True
    - b. False

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[View Answers](#)

# Answer Key

1. c.  
Pre-existing neurological conditions, such as cerebral palsy, are NOT exclusion criteria for the febrile seizure pathway at SCH. The other listed conditions are exclusion criteria for the pathway.
2. b.  
Recent studies suggest that anti-seizure drugs should be administered when the seizure duration exceeds 5 minutes.
3. b.  
Children who present with a febrile seizure and have a previous history of febrile seizures or history of pre-existing neurological abnormality may have a decreased risk of meningitis or intracranial infection.
4. d.
5. c.  
Children with febrile seizures are at similar risk for occult bacteremia as those with fever alone. Choices a, b, and d are key recommendations regarding the acute evaluation of a febrile seizure.
6. d.  
Although emergent/urgent EEG is rarely indicated for febrile seizures, a STAT EEG should be considered when there is concern that a patient is in status epilepticus.
7. a.  
Addressing parental anxiety and providing parental education are key tasks for the medical team at the time of discharge. Antipyretics do NOT prevent febrile seizures. EEG and MRI are generally not indicated following a simple febrile seizure.
8. d.  
Most patients with complex febrile seizures can be safely sent home after being observed for 2 hours. The patient in (a) is unstable neurologically and should be admitted. The parents in (b) appear to have "disabling" anxiety following the seizure episode and require admission for observation and further parental education and reassurance. The patient in (c) has an underlying infection requiring inpatient stay (pneumonia with hypoxia).
9. c.  
Non-urgent outpatient neurology consultation, EEG and MRI following a febrile seizure would be most appropriate for a patient with complex febrile seizure AND other risk factors for epilepsy. Risk factors for epilepsy include: family history of epilepsy, previous traumatic brain injury or central nervous system infection, previous or current episode(s) of status epilepticus (seizure duration >30 minutes), baseline neurodevelopmental or neurological deficits/abnormalities (cerebral palsy, developmental delay, macro/microcephaly), and evidence of neurocutaneous syndrome (neurofibromatosis, tuberous sclerosis, etc). Non-urgent outpatient neurology consultation, EEG and MRI are not indicated for simple febrile seizures and most complex febrile seizures. Non-urgent outpatient neurology consultation, EEG and MRI are not indicated for most patients with negative lumbar puncture results.
10. a.

# Rating Evidence Quality

We used the GRADE method of rating evidence quality. Evidence is first assessed as to whether it is from randomized trials, or observational studies. The rating is then adjusted in the following manner:

Quality ratings are downgraded if studies

- have serious limitations
- have inconsistent results
- if evidence does not directly address clinical questions
- if estimates are imprecise OR
- if it is felt that there is substantial publication bias

Quality ratings can be upgraded if it is felt that

- the effect size is large
- if studies are designed in a way that confounding would likely underreport the magnitude of the effect OR
- if a dose-response gradient is evident

The quality of evidence is as follows:

High quality	A or ⊕⊕⊕⊕
Moderate quality	B or ⊕⊕⊕○
Low quality	C or ⊕⊕○○
Very low quality	D or ⊕○○○
Expert opinion	E



Guyatt G et al. J Clin Epi 2011:383-394.

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# Summary of Version Changes

- **Version 1 (11/15/2011):** Go live

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## Medical Disclaimer

- The enclosed policies, procedures, standards, guidelines, or other materials (including forms) are specifically for use at Seattle Children's Hospital. We are providing these materials to you for information-sharing only.
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# Bibliography

## Literature Search

Studies were identified by searching electronic databases using search strategies developed and executed by a medical librarian, Jamie Graham. Searches were performed on June 3rd & 6th, 2011 in the following databases: on the Ovid platform – Medline (1996 to date), Cochrane Database of Systematic Reviews (2005 – June 2011); elsewhere – National Guidelines Clearinghouse, Clinical Evidence, [DynaMed](#) and [TRIP](#). Retrieval was limited to English language, literature from 2000 forward, and children between the ages of 1 month and 5 years. Originally the publication limiters for the Scout Search were applied (Consensus Development Conference; Consensus Development Conference, NIH; Guideline; Meta Analysis; Practice Guideline); however, it yielded no results so they were removed. In Medline, appropriate Medical Subject Headings ([MeSH](#)) were used, along with adjacency and keyword searching, and the search strategy was adapted for other databases using their controlled vocabularies, where available, along with text words. Search terms are listed below. Given the limited scope of the literature a broader search for febrile seizures was run.

Terms: atypical, complex, seizures, febrile (exploded), fever, convulsion\$

Jamie Graham, MLS

November 2, 2011

### Identification

128 records identified through database searching

4 additional records identified through other sources

### Screening

130 records after duplicates removed

130 records screened

78 records excluded

### Eligibility

52 full-text articles assessed for eligibility

29 full-text articles excluded,  
15 did not answer clinical question  
14 did not meet quality threshold

### Included

23 articles included in pathway

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