

EXCLUSIONS:

- Age < 6 mo or > 5 years
- Ill-appearing/toxic
- Pre-existing neurological disorder, underlying developmental delay or syndrome associated with epilepsy (e.g. fetal alcohol syndrome, autism, history of anoxic brain injury)
- CNS shunt in place
- Suspected CNS infection (e.g. signs of meningismus, focal neurological deficit)
- Persistent focal neurological deficit
- Recent CNS trauma or surgery
- Immunocompromised hosts or those with congenital heart disease.

Aim: To standardize the evaluation and management of children presenting with febrile seizures

Patient presents with both fever and seizure within 24 hours of presentation

Is patient actively seizing?

Yes

See [“Seizure and Status Epilepticus”](#) Guideline

No

Complete a detailed History and Physical (see Note 1)

Consider differential diagnosis for fever history and seizure (see Note 2)

Is the patient's seizure presentation consistent with the definition of a “febrile seizure”? (i.e. seizure in a child 6 months -5 years old with history of a temperature ≥ 100.4 within 24 hours AND no CNS infection or other known etiology of the seizure)

No

Off Guideline

Yes

Was the patient's febrile seizure “simple”, defined as:

Lasting <15 minutes (and no abortive medication utilized) AND only one in 24 hours AND generalized

No

No

Is patient back to neurologic baseline within 2 hours of seizure?

Yes

Routine labs, neuroimaging and EEG are **NOT** indicated for well-appearing patients after a **simple febrile seizure** and a non-focal neuro exam

Does the patient require admission for inpatient management of their fever source? (i.e. oxygen for pneumonia, IV fluids for gastroenteritis)

No

Admit to Inpatient

If complex febrile seizure and Neurology recommending EEG, select hospital that can provide continuous EEG (e.g. Minneapolis Children's); otherwise can admit to either campus.
See p.2 for Inpatient Management

Yes

Discharge Patient Home

1. Provide Febrile Seizure Anticipatory Guidance (Note 6)
2. Follow-up with PCP as needed (e.g. if persistent fevers, clinical worsening)
3. If patient has had ≥ 3 lifetime febrile seizures or if recommended by Neurology: follow-up with Neurology within 3-6 months and provide family with rescue benzodiazepine (Note 8)

Yes

No

Does the patient require admission?

Seizure defined as “complex”

If outpatient, call Neurology (if patient stable) or send to ED

ED MANAGEMENT**1. Consult Neurology**

- St Paul Children's ED or floor: consult Noran (unless known MEG patient)
- Mpls Children's ED or floor: consult Minnesota Epilepsy Group (unless known Noran patient)
- PICU admission: consult Noran (unless known MEG patient)

2. Labs: BMP, age-appropriate fever evaluation (e.g. may include covid/flu/rsv, Urinalysis/UCx, hepatic panel, CBC, BCx), consider LP (see Note 3), consider Toxicology evaluation (see Note 4)

3. Imaging: consider head CT w/o contrast or brain MRI (see Note 5)

Aim: To standardize the evaluation and management of children presenting with febrile seizures

Patient presented with a febrile seizure within the past 24 hours and requires admission

1. **Consult Neuro if indicated** (see Note 7)
 - St Paul Children's ED or floor: consult Noran (unless known MEG patient)
 - Mpls Children's ED or floor: consult Minnesota Epilepsy Group (unless known Noran patient)
 - PICU admission: consult Noran (unless known MEG patient)
2. **Labs, if not obtained yet:**
 - Age-appropriate fever evaluation may include covid/flu/rsv, Urinalysis/UCx, hepatic panel, CBC, BCx. *The causes of fever in children with and without febrile seizures are similar (i.e. simple febrile seizures do not increase a child's risk for a serious bacterial infection)*
 - BMP if patient had a complex febrile seizure or has not yet returned to baseline mental status
 - Consider LP (see Note 3)
 - Consider Toxicology evaluation (see Note 4)
 - Consider evaluation for iron deficiency anemia which can be associated with risk for febrile seizures
3. **Imaging if not yet performed:** consider head CT w/o contrast or brain MRI (see Note 5)
4. **EEG, if recommended by neurology**
5. **Medications/fluids:**
 - A prn "rescue" benzodiazepine (Note 8) should be ordered for all patients who had a complex febrile seizure or who have not yet returned to their neurological baseline
 - Consider scheduling antipyretics for 24 hours if child is still febrile (Note 9)
 - Avoid hypotonic fluids - children with febrile seizures are at risk for developing hyponatremia

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Does the patient meet all the following discharge criteria?

- Cleared by Neurology (if they were involved in patient's care)
- Returned to neurological baseline
- Well-appearing, meeting hydration needs with oral intake
- Inpatient evaluation and treatment for source of fever has been completed

Yes

Discharge Patient Home

1. Provide Febrile Seizure anticipatory guidance (Note 6)
2. Follow-up with PCP as needed (e.g. if persistent fevers, clinical worsening)
3. If patient has had ≥ 3 lifetime febrile seizures: follow-up with Neurology within 3-6 months
4. Provide family with rescue benzodiazepine (Note 8) if:
 - Recommended by Neurology
 - Seizure was >15 minutes long or required an abortive medication
 - Patient had ≥ 3 seizures within 24 hrs
 - Patient had ≥ 3 lifetime febrile seizures
 - May consider for patients with difficulties accessing prompt healthcare after a future seizure (e.g. financial or geographic barrier)

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Note 1: History and Physical

- Thorough history should include:
 - Seizure: characteristics of the seizure (“*what did the seizure look like?*”), duration, number of seizures (if more than one, time between the seizures), behavior after the seizure, any focal features, any abortive medications given
 - Fever: duration and height, any other associated symptoms of illness (e.g. cough, vomiting, tugging on ears, malodorous urine), recent antibiotic use
 - Risks: medications/toxins in the home, developmental history (e.g. meeting milestones), recent head trauma, immunization history, previous febrile seizure, family history of seizures or epilepsy, history of neurological disease or immunosuppression, history of prematurity or NICU admission
- Thorough exam should include:
 - Full neurological exam including *mental status and trend of mental status trajectory*. If patient is post-ictal, they will likely require frequent follow-up exams to ensure they return to baseline.
 - Assess for signs of meningitis or other CNS infection (e.g. extreme irritability, bulging fontanelle in infant, depressed sensorium, nuchal rigidity, lethargy, neck stiffness, Kernig and/or Brudzinski sign). In very young children, signs of meningitis may be subtle and non-specific. *If concern for meningitis, patient is off guideline and refer to [febrile infant guideline](#) or [meningitis guideline](#) based on age.*
 - Detailed exam for fever source (e.g. tympanic membranes, skin, oropharynx)
 - Evaluate for signs of trauma or abuse

Note 2: Differential Diagnosis - particularly important to broaden differential in patients with recent international travel.

Differential diagnosis for a patient presenting with recent fever and seizure includes, but is not limited to: febrile seizure, toxin exposure, meningitis/encephalitis, intracranial abscess, cerebral malaria, neurocysticercosis, septic embolic, venous sinus thrombosis, febrile illness precipitating a metabolic derangement (e.g. hyponatremia, hypoglycemia) and primary epilepsy.

Note 3: Lumbar Puncture (LP) in patients with fever and seizure. *If evaluating for meningitis, patient is off guideline and refer to [febrile infant guideline](#) or [meningitis guideline](#) based on age for testing and treatment considerations.*

- Recommended LP in patients with any history or physical exam findings concerning for meningitis (e.g. extreme irritability, bulging fontanelle in infant, depressed sensorium, nuchal rigidity, lethargy, neck stiffness, Kernig and/or Brudzinski sign)
- Consider LP in the following patients:
 - Patient presented in febrile status epilepticus (i.e. seizure >30 minutes)
 - Age 6-12 months and not adequately immunized against Haemophilus Influenza B or Pneumococcus
 - Patients currently receiving a course of antibiotics
- If Lumbar Puncture is performed, a blood culture and serum glucose should also be obtained
- Recommended CSF studies: CSF glucose, protein, gram stain, culture, PCR meningitis/encephalitis panel.
- If performing a lumbar puncture, consider using elements of the “**Pediatric Encephalitis Testing Powerplan**” for some of lab orders.

Note 4: Consider Toxicology Consultation If:

- Patient is not returning to neurological baseline within 4 hours of seizure
- History concerning for potential toxin exposures

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Note 5: Imaging Considerations in patients who present with fever and seizure

- Order Brain MRI w/o contrast if:
 - Recommended by Neurology
 - Persistent focal deficit on neurological exam
 - Patient has not returned to their neurological baseline within 4 hours after seizure
 - History of significant developmental delay and no prior imaging obtained
 - Patient presented in status epilepticus (i.e. seizure >30 minutes)
 - *If the patient has a suspected CNS infection, they are OFF GUIDELINE and MRI w/wo contrast may be preferred imaging.*
- “Full Brain MRI” is ideal, but if the need for brain MRI is urgent (e.g. persistent focal deficit in the ED, imaging required prior to LP), can order a “Limited Brain MRI”
- Order head CT w/o contrast if:
 - Any concern for CNS trauma

Note 6: Anticipatory Guidance for families after a patient has been diagnosed with a febrile seizure - key points:

- **Prevalence:** Febrile seizure occurs in 2-5% of children
- **Risk of future febrile seizures after one occurrence:** ~30% chance of recurrence. Most children will outgrow febrile seizures by age 5.
 - Risk factors for recurrence include age <18 months old at time of first febrile seizure, febrile seizure within 1 hour of fever onset, low grade fever at time of seizure, family history of febrile seizure
- **Neurocognitive outcomes:** simple febrile seizures are NOT associated with future decreased IQ, poor academic performance, or behavioral issues
- **Risk of developing epilepsy:** After a simple febrile seizure, a child is at slightly increased risk of developing epilepsy compared to general population (1-2% vs 0.5%). After a complex febrile seizure, a patient has a higher risk (5-10%) of developing epilepsy later in life.
 - Risk factors for development of epilepsy include complex febrile seizure, family history of epilepsy, febrile seizure within 1 hour of fever onset, age >3 years old at time of first febrile seizure, and pre-existing neurological abnormality
- **Febrile seizure and vaccines:** While febrile seizures can be associated with recent vaccination, it is NOT a contraindication to future vaccination
- **Return precautions:** Seek medical attention if the patient has a second febrile seizure within 24 hours, has a prolonged seizure (>15 minutes), or a febrile seizure followed by lack of return to neurological baseline within 2 hours
- Children's MN Febrile Seizure Patient Information can be found on Star Net in English and Spanish

Note 7: Indications to consult Neurology:

- Patient has a history of recurrent febrile seizures (i.e. ≥ 3 life-time febrile seizures)
- Patient had a “complex” febrile seizure (>15 minutes duration OR focal seizure OR ≥ 2 seizures in 24 hrs)
- Patient has not returned to neurological baseline within 2 hours of seizure
- Consider calling Neurology for any patients who meet the “exclusion criteria” on this guideline

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Note 8: Dosing options for benzodiazepine (as needed for a seizure lasting >5 minutes):

For inpatient use, please utilize "Seizure Rescue Medications" Powerplan.

Medication	Route	Dose	Comments
Diazepam	Buccal	Liquid: 6 months - 6 years: 0.5 mg/kg (Max 20 mg) 6-12 years: 0.3 mg/kg (Max 20 mg) > 12 years: 0.2 mg/kg (Max 20 mg)	
	Intranasal (Valtoco®)	6-11 years of age: 10-18 kg: 5 mg 19-37 kg: 10 mg 38-55 kg: 15 mg 56-74 kg: 20 mg 12 years and older: 14-27 kg: 5 mg 28-50 kg: 10 mg 51-75 kg: 15 mg 76+ kg: 20 mg	Outpatient only For 6 years and older only May not be covered by insurance
	Rectal (Diastat®)	6 months to 6 years: 0.5 mg/kg (Max 20 mg) 6-12 years: 0.3 mg/kg (Max 20 mg) > 12 years: 0.2 mg/kg (Max 20 mg)	
Lorazepam	Intravenous only	0.1 mg/kg (Max 4 mg)	ED/Inpatient Only
Midazolam	Buccal	0.2 mg/kg (Max 10 mg)	
	Intramuscular	0.2 mg/kg (Max 10 mg)	ED/Inpatient only
	Intranasal (Nayzilam®)	5 mg	Outpatient only For 12 years and older only May not be covered by insurance

Disclaimer: This guideline is designed for general use with most patients; each clinician should use their own independent judgment to meet the needs of each individual patient. This guideline is not a substitute for professional medical advice, diagnosis or treatment.

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Note 9: The Utility of Antipyretics

- After a febrile seizure has occurred, scheduling antipyretics for 24 hours after the seizure, if the fever is persistent, may prevent febrile seizure recurrence during that same febrile illness
- For future febrile illnesses, there is no evidence that febrile seizures can be prevented by antipyretics, so they should only be used for patient comfort

References

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- 2) Byung Ok Kwak, et al, "Relationship between iron deficiency anemia and febrile seizures in children: A systematic review and meta-analysis," *Seizure*, Volume 52, 2017, Pages 27-34
- 3) Eilbert W, Chan C. Febrile seizures: A review. *J Am Coll Emerg Physicians Open*. 2022 Aug 23;3(4):e12769.
- 4) Hashimoto, R., Suto, M., Tsuji, M. *et al*. Use of antipyretics for preventing febrile seizure recurrence in children: a systematic review and meta-analysis. *Eur J Pediatr* **180**, 987–997 (2021)
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