Febrile Seizure
Emergency Department

Nationwide Children's — When your child needs a hospital, everything matters.

Center for Clinical Excellence

Inclusion Criteria:
- Age ≥ 6 to ≤ 60 months
- Seizure and fever ≥ 38C or by parental report within 24 hours

Exclusion Criteria:
- Known epilepsy or seizure disorders
- Trauma
- Potential intracranial infection
- Children with atypical development
- Patients with intracranial shunts
- Patients with history of bleeding disorders/coagulopathy

Discuss with Neurology if:
- Suspicion of subclinical status epilepticus
- Focal seizure
- Patient not progressing to baseline
- ED provider has additional concerns

ED Discharge Criteria:
- Seizure resolved
- Appropriate return to or progression toward baseline mental status
- Appropriate support system (e.g. PCP; caregiver/family)
- See Discharge Criteria and Planning

Complex or Simple febrile seizure within the past 24 hours

Concern for ongoing seizure activity? — Yes → **Off Pathway** Treat according to accepted practice.

No

New prolonged focal neurologic deficit? — Yes → Off Pathway. Follow Sudden Neurologic Deterioration protocol

No

Patient with high risk history? — Yes →
- Strongly consider alternate diagnosis
- Discuss with relevant care team (e.g. Complex Care, Infectious Disease, Neurosurgery)

No

Signs & symptoms of:
- Neurologic infection
- Elevated intracranial pressure
- Hemodynamic instability

— Yes → **Off Pathway** Treat according to accepted practice.

No

Lab testing, as indicated, for source of fever or for patients not returning to baseline within 30-60 minutes

Requires discussion with Neurology? — Yes → **Page Neurology**

No

Meets 1 or more Febrile Seizure Admission Criteria? — Yes → **Admit Patient to HP6 (preferred) or HP or ID**

No

Requires admission for underlying febrile illness? — Yes → **Admit Patient to Appropriate Service**

No

Discharge Patient
- Febrile Seizure Helping Hands
- PCP follow-up within 3 days
- See Discharge Criteria and Planning
- Consider rescue medications (see Seizure Rescue Medication Dosing Guide)

Inclusion & Exclusion Criteria

- Inclusion criteria:
  - Age ≥6 to ≤60 months
  - Seizure and fever ≥38C or caregiver report of fever within 24 hours
- Exclusion criteria:
  - Known epilepsy
  - Trauma
  - Probable intracranial infection
  - Intracranial shunt
  - History of bleeding disorders/ coagulopathy
  - Children with atypical development

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Diagnosis & Definition

- A seizure that occurs in a child 6 to 60 months of age with history of or a temperature ≥ 38C within 24 hours of event without signs of central nervous system infection.
- Simple Febrile Seizure
  - Single seizure in 24 hour period
  - Generalized
  - Lasting <15 minutes
- Complex Febrile Seizure (any of the following)
  - Multiple seizures in 24 hour period
  - Focal seizure
  - Seizure lasting >15 minutes

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Signs of Ongoing Seizure Activity

Signs of ongoing seizure:

- Unresponsive to painful stimuli in all four extremities and centrally (trapezius).
- Does not blink to threat.
- Fixed eye deviation. Check oculocephalic (left/right doll's eyes) reflex if no concern for neck injury.
- Non-suppressible twitching or stiffening in extremities. Beware of subtle movements such as rhythmic finger or facial twitching.
- Unexplained vital sign instability (persistent tachycardia or hypoxia).

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High Risk History

- Caution should be used when evaluating patients with high risk medical history:
  - History of meningitis
  - Cochlear implants
  - Lack of age-appropriate vaccinations
  - Primary immunodeficiency
  - Malignancy
  - Bone marrow transplant
  - Solid organ transplant
  - Active immunosuppressive therapy
  - Prolonged use of steroids
  - History of HIV/AIDS

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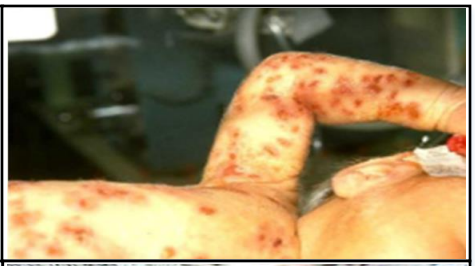
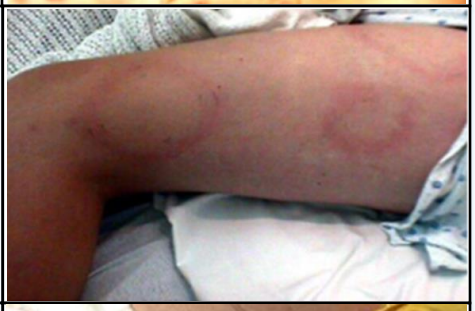
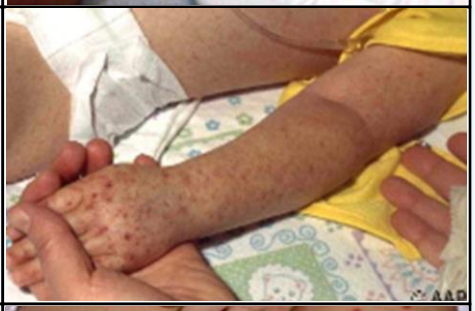
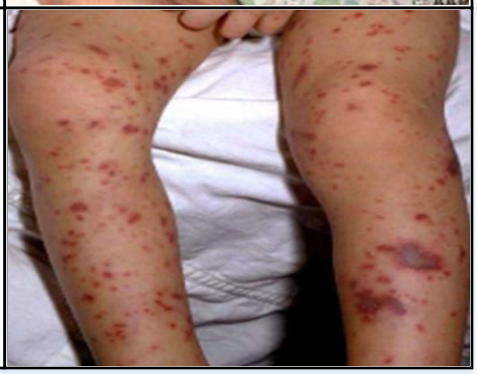
Differential Diagnosis

- Signs & Symptoms of Neurologic Infection:
  - Meningismus
  - Typical meningococcemia rash, or other rashes that could indicate concurrent CNS infectious etiologies (see below; all pictures from AAP Red Book online, 2018 edition)

HSV (Herpes simplex virus - 1,2)	Grouped vesicles on erythematous base (at the site of inoculation)	
Lyme disease (Borrelia burgdorferi)	Erythematous macule or papule, enlarging to form an annular lesion with a distinct red border and central clearing at the bite site (Erythema migrans, single or multiple)	
Rickettsial infections (Rocky Mountain Spotted Fever, Rickettsia rickettsii)	Small, pink papules that evolve into erythematous, non-blanching hemorrhagic macules and papules, initially on extremities and palms/ soles, which spread centripetally to trunk and face.	
Fulminant meningococcemia (Neisseria meningitidis)	Petechiae on trunk/ extremities coalescing into hemorrhagic bullae, necrosis and ulceration, which can rapidly progress with DIC and tissue ischemia.	

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Differential Diagnosis

  - Toxic appearance
  - Failure to return to baseline after seizure
  - Focal neurologic change & headache
- Sepsis
  - Typical Meningococcal rash (or other rashes discussed in earlier section)
  - **Vital signs of sepsis**
- Intra-cranial hemorrhage or mass
  - Persistent focal neurological deficits
- Central venous thrombosis
  - Persistent focal neurological deficits
  - Failure to return to baseline
  - History of clotting disorders or severe dehydration
- Non-Accidental Trauma
  - Young age (<12 months)
  - Presence of persistent vomiting prior to event
  - Additional physical exam findings concerning for NAT
- Ingestion
  - History of exposure
  - Toxidrome present

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Testing

- As indicated for source of fever
- If concern for intracranial pressure, meningitis or intracranial bleed the patient is off pathway. Consider for evaluation:
  - CT
  - Lumbar puncture, especially for under-vaccinated children (Haemophilus influenzae or Streptococcus pneumoniae) or when immunization status cannot be determined; or children pre-treated with antibiotics depending on clinical picture
  - Labs: CBC, blood culture, glucose
  - Treat with antibiotics and acyclovir. See Antimicrobial Stewardship Guidelines for Empiric Antimicrobial Therapy.
  - Infectious Diseases consultation

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Severity Assessment

- Low risk
  - Simple seizure
  - Returning toward baseline
  - No focal neurologic findings
- High risk
  - Suspicion of subclinical status epilepticus
  - Seizure duration > 30 minutes
  - Failure to trend toward baseline within 2 hours
  - Focal neurologic findings
  - Requiring seizure rescue medication

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Febrile Seizure Admission Criteria

- Resolved febrile seizure that lasted longer than 30 minutes
- Needed multiple anti-seizure medications to stop febrile seizure
- Lack of appropriate progress towards baseline within 30-60 minutes
- Parent or provider concern for subsequent seizures unable to be managed at home
- Concern for loss to follow up due to insufficient support or resources
- Consider admission for multiple seizures within 24 hours

Neurology does not need to be called or consulted to admit a patient for a febrile seizure

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Neurology Discussion Criteria

Discuss with Neurology if:

- Suspicion of subclinical status epilepticus
- Focal Seizure
- Patient not progressing to baseline
- Family request for reassurance/education from Neurology
- ED provider has additional concerns

Not all patients who are discussed with Neurology will need to be seen by Neurology in the ED

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Assessment & Monitoring

- Physical exam
- Laboratory tests, if needed, to determine source of fever
- Observation in emergency department for return to baseline

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Recommended Treatments

- Follow NCH protocol for convulsive status epilepticus if actively seizing
- Observation and supportive care as child returns to baseline

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Testing & Treatments Not Routinely Recommended

- Routine analysis of serum electrolytes, calcium, phosphorus, complete blood count and blood glucose not recommended unless indicated by a suspicious history or physical exam findings
- Routine EEG or neuroimaging
- Routine neurology consult or referral to neurology for simple febrile seizures
- Anti-seizure medications except rescue medications at discharge if deemed necessary

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Deterioration & Escalation of Care

- Identification of Deterioration
- Escalation of Care Protocol:
  - Worsening mental status
  - Recurrent seizures
  - Persistent fevers (that warrant further work up for source of fever/ appropriate treatment plans)
  - Abnormal labs or imaging studies, if performed (that require inpatient level care evaluation/ treatment plans)
  - Development of new symptoms or physical exam findings (that may warrant further evaluation)

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Discharge Criteria & Planning

- Seizure resolved
- Patient has returned to or is progressing towards baseline mental status
- Appropriate follow up and support system
- Seizure education provided
- Follow Up: Primary Care Physician follow up within 3 days

Considerations for Rescue Medications at Discharge (see Seizure Rescue and Medication Dosing):

- Family distance from medical facility
- Rescue medication was required during patient visit
- Family request/anxiety
- Seizure was >5 minutes
- Co-morbid medical diagnosis suggests greater risk for future seizure
- Family amenable to medication education

Consider recommending PCP follow up for non-urgent, outpatient Neurology consultation for:

- Patients with complex febrile seizure AND other risk factors for epilepsy
- Family history of epilepsy
- Previous traumatic brain injury or central nervous system infection
- Evidence of neurocutaneous syndrome (neurofibromatosis, tuberous sclerosis, etc)

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Seizure Rescue Medication Dosing Guide

Intranasal Midazolam (Versed®) Dosing Recommendations (by weight)	
Recommended dose = 0.2-0.4 mg/kg for all ages	
Weight (kg)	**Dose (mg)**
< 5	0.3 mg/kg minimum
> 5 to 10	2 mg (0.2 mL each nostril)
> 10 to 18	4 mg (0.4 mL each nostril)
> 18 to 25	5 mg (0.5 mL each nostril)
≥ 25	10 mg (1 mL each nostril)

Brand name Nayzilam (intranasal midazolam) is available and preferred for some insurance companies. This may be an option for patients requiring 5 mg and 10 mg doses only.

Intranasal midazolam is not readily available at all community pharmacies. Please send these prescriptions to the Blue Pharmacy; may be limited by Blue Pharmacy hours.

Diazepam Rectal Gel (Diastat® AcuDial ™) Dosing Recommendations (by age and weight)					
Recommended dose by age 2 to 5 years = 0.5 mg/kg*		Recommended dose by age 6 to 11 years = 0.3 mg/kg		Recommended dose by age ≥12 years = 0.2 mg/kg	
Weight (kg)	**Dose (mg)**	**Weight (kg)**	**Dose (mg)**	**Weight (kg)**	**Dose (mg)**
6 to 10	5	10 to 16	5	14 to 25	5
11 to 15	7.5	17 to 25	7.5	26 to 37	7.5
16 to 20	10	26 to 33	10	38 to 50	10
21 to 25	12.5	34 to 41	12.5	51 to 62	12.5
26 to 30	15	42 to 50	15	63 to 75	15
31 to 35	17.5	51 to 58	17.5	76 to 87	17.5
36 to 44	20	59 to 74	20	88 to 111	20

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Patient & Caregiver Education

- Education on
  - **Febrile Seizure Helping Hands**
  - Seizure safety
  - Rescue medication use

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Risk Awareness & Zero Hero

- Seizure Precautions – seizures can lead to injury; patients and families should be counselled in appropriate precautions to take at home.

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References

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3. Hardasmalani MD, Saber M. Yield of diagnostic studies in children presenting with complex febrile seizures. *Pediatr Emerg Care*. 2012;28(8):789-791. doi:10.1097/PEC.0b013e31826b2564.
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6. Shinnar S, Bello JA, Chan S, et al. MRI abnormalities following febrile status epilepticus in children: The FEBSTAT study. *Neurology*. 2012;79(9):871-877. doi:10.1212/WNL.0b013e318266fcc5.

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Quality Measures

- Outcome Measures:
  - Prevent unnecessary admissions from ED
  - Decrease unnecessary Neurology consults in ED
  - Decrease unnecessary Laboratory and Imaging testing in ED
- Process Measures:
  - Order set use
  - % patients receiving education materials
- Balance Measures:
  - 7-day return to ED/readmissions (all cause and febrile seizure)
  - 30-day return to ED/readmissions (all cause and febrile seizure)

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Pathway Team & Process

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Clinical Pathway Development

This clinical pathway was developed using the process described in the NCH Clinical Pathway Development Manual Version 6, 2022. Clinical Pathways at Nationwide Children's Hospital (NCH) are standards which provide general guidance to clinicians. Patient choice, clinician judgment, and other relevant factors in diagnosing and treating patients remain central to the selection of diagnostic tests and therapy. The ordering provider assumes all risks associates with care decisions. NCH assumes no responsibility for any adverse consequences, errors, or omissions that may arise from the use or reliance on these guidelines. NCH's clinical pathways are reviewed periodically for consistency with new evidence; however, new developments may not be represented, and NCH makes no guarantees, representations, or warranties with respect to the information provided in this clinical pathway.

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