

# Inclusion & Exclusion Criteria

- Inclusion criteria:
  - Age  $\geq 6$  to  $\leq 60$  months
  - Seizure and fever  $\geq 38^{\circ}\text{C}$  or caregiver report of fever within 24 hours
- 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
- 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  $\geq 38\text{C}$  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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# Differential Diagnosis

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

<p>HSV (Herpes simplex virus - 1,2)</p>	<p>Grouped vesicles on erythematous base (at the site of inoculation)</p>	
<p>Lyme disease (Borrelia burgdorferi)</p>	<p>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)</p>	
<p>Rickettsial infections (Rocky Mountain Spotted Fever, Rickettsia rickettsii)</p>	<p>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.</p>	
<p>Fulminant meningococemia (Neisseria meningitidis)</p>	<p>Petechiae on trunk/ extremities coalescing into hemorrhagic bullae, necrosis and ulceration, which can rapidly progress with DIC and tissue ischemia.</p>	

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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 influenza 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
  - 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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# Admission Criteria

- Status epilepticus
- Lack of appropriate progress towards baseline within 30-60 minutes
- Parent or provider concern for subsequent seizures unable to be managed at home
- Laboratory abnormalities warranting admission (e.g. CSF)
- Concern for loss to follow up due to insufficient support or resources
- Multiple seizures within 24 hours

Discuss with Neurology if:

- Suspicion of subclinical status epilepticus
- Seizure duration > 30 minutes
- Patient not progressing to baseline within 30-60 minutes
- Considering admission for febrile seizure

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# Assessment & Monitoring

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

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# Recommended Treatments

- Follow NCH protocol for convulsive status epilepticus if actively seizing
- 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)
- Observation as child returns to baseline
- Consider discussion with Neurology if
  - Focal Seizure
  - Focal deficits on neurological exam
  - Patient not progressing to baseline
  - Family request for reassurance/education from Neurology

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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

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# Deterioration & Escalation of Care

- Identification of Deterioration
- Escalation of Care Protocol:
  - Worsening mental status
  - Recurrent seizures
  - Persistent fevers (that warrants 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:

- 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
- Baseline neurodevelopmental or neurological deficits/abnormalities (cerebral palsy, developmental delay, macro/microcephaly)
- Evidence of neurocutaneous syndrome (neurofibromatosis, tuberous sclerosis, etc)

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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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# 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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# Team & Process

## Pathway Development Team

### Leader(s):

Neurology:

Dara Albert, DO, MEd  
Margie Ream, MD, PhD

### Members:

Emergency Medicine:

Anita Yalamanchi, DO  
Elizabeth Calland, RN, BSN

Fellow, Emergency Medicine:

Courtney Coyle, MD

Infectious Diseases:

Su Jin Joo, MD

Pharmacy:

Dan Rieck, PharmD

Fellow, Neurology:

Ezgi Saylam, MD

## Clinical Pathways Program:

Medical Director – Emergency Medicine:

Aarti Gaglani, MD

Medical Director – Associate Chief Quality Officer,  
Center for Clinical Excellence:

Ryan Bode, MD, MBOE

Medical Director – Clinical Informatics & Emergency  
Medicine:

Laura Rust, MD, MPH

Business & Development Manager:

Rekha Voruganti, MBOE, LSSBB

Program Coordinators:

Tahje Brown, MBA

Tara Dinh, BS

Clinical Pathway Approved

Medical Director – Associate Chief Medical Officer,  
Center for Clinical Excellence:

Ryan Bode, MD, MBOE

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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 associated 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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**For more information about our pathways and program please contact:  
[ClinicalPathwaysProgram@NationwideChildrens.org](mailto:ClinicalPathwaysProgram@NationwideChildrens.org)**

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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
< 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

## Valtoco® (diazepam nasal spray) 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 11	One 5 mg device (1 spray in 1 nostril)	10 to < 19	One 5 mg device (1 spray in 1 nostril)	14 to < 28	One 5 mg device (1 spray in 1 nostril)
12 to 22	One 10 mg device (1 spray in 1 nostril)	19 to < 38	One 10 mg device (1 spray in 1 nostril)	28 to < 51	One 10 mg device (1 spray in 1 nostril)
23 to 33	15 mg as two 7.5 mg devices (1 spray in each nostril)	38 to < 55	15 mg as two 7.5 mg devices (1 spray in each nostril)	51 to < 76	15 mg as two 7.5 mg devices (1 spray in each nostril)
≥ 34	20 mg as two 10 mg devices (1 spray in each nostril)	≥ 55	20 mg as two 10 mg devices (1 spray in each nostril)	≥ 76	20 mg as two 10 mg devices (1 spray in each nostril)

Cost: ~\$2300/kit (Only available in 5-dose kits. 5 mg and 10 mg kits contain 5 spray devices, and 15 mg and 20 mg kits contain 10 spray devices)

Availability: Most retail pharmacies (may need 24 hours to order in)

Quantity limits: usually up to 2 kits/fill

FDA labeled indications: **≥ 2 years of age** for cluster seizures-May repeat dose in 4 hours-do not exceed 2 doses in 24 hours, 1 episode every 5 days and 5 episodes per month

Managed Care Plans: Covered by all if ≥ 2 years old; PA required if <2 years old

Commercial Insurance: may be covered with PA, but may be a plan exclusion-co-pay varies with plan, co-pay assistance is available for patients ≥ 2 years old

\*off-label for patients < 2 years old

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