

Seizures...Or Is It?

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Objectives

- Identify provoked vs unprovoked seizures
- Identify things that imitate seizures
- Describe when to refer for EEG
- Discuss how to reassure families
- Identify how to reach out for help on these decisions

Common Causes of Seizures by Age: Newborns

- Brain malformations
- Lack of oxygen during birth
- Low levels of electrolytes
- Inborn errors of metabolism
- Intracranial hemorrhage
- Maternal drug use

Common Causes of Seizures by Age: Infants and Children

- Fever (febrile seizures)
- Infections
- Brain tumor (rarely)

Common Causes of Seizures by Age: Children and Adolescent

- Head trauma
- Congenital conditions:
 - Down's syndrome
 - Angelman's syndrome
 - Tuberous Sclerosis
 - Neurofibromatosis
- Genetic factors
- Progressive brain disease (rare)

Seizure Definition

- Abnormal paroxysmal neuronal discharge.
- Clinically manifest: motor, sensory, autonomic or behavioral disturbances.
- Imbalance between excitatory and inhibitory neurotransmitter activities in the brain.

Definition of Epilepsy

- Historic Definition:
 - Child has 2 or more seizures without a proximal cause for the seizures.
 - Unprovoked seizures
- Newer Additions:
 - One unprovoked or reflex seizure plus a recurrence risk of at least 60% over the next 10 years.
 - A diagnosis of an epilepsy syndrome.

Seizure and Epilepsy

- Every year 25,000-40,000 US children have first unprovoked seizure.
 - Includes multiple seizures within 24 hrs
 - If child returns to baseline between
- Most of these children never experience a recurrence.
- **Only 1 percent of all children will develop epilepsy.**

Recurrence Risk for 2nd Seizure

- ~45%
 - 22% at 6 months
 - 29% at 12 months
 - 37% at 24 months
 - 43% at 60 months
 - 46% at 120 months
- Two seizures ~80% chance that you'll have more.
- ***Neonatal seizures are not considered part of this subject.

Children with “Remote Symptomatic”

- Recurrence risk at one year 37%
- 60% risk of having another seizure within 3 years.
- About 10 % of children will have 10 or more seizures despite therapy.

Presenting with Status

- 10 to 12% present with a seizure lasting ≥ 30 minutes.
- Recurrence risk no different from a brief first seizure.
- If seizure recurrence, more likely to be prolonged.

Why Treat?

- The risk of physical injury or death.
 - Rare event in a child
- Treatment may reduce the risk of a second seizure.
- But no evidence of a difference in achieving a 1-or 2-year seizure remission.

Next Question to Ask

Was this a seizure?

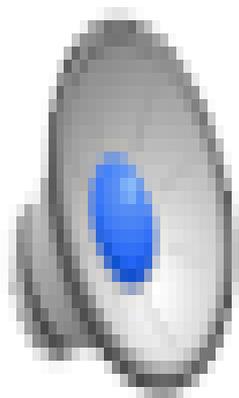
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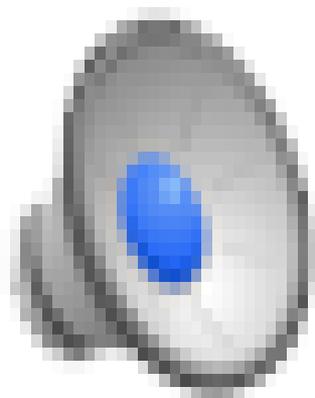
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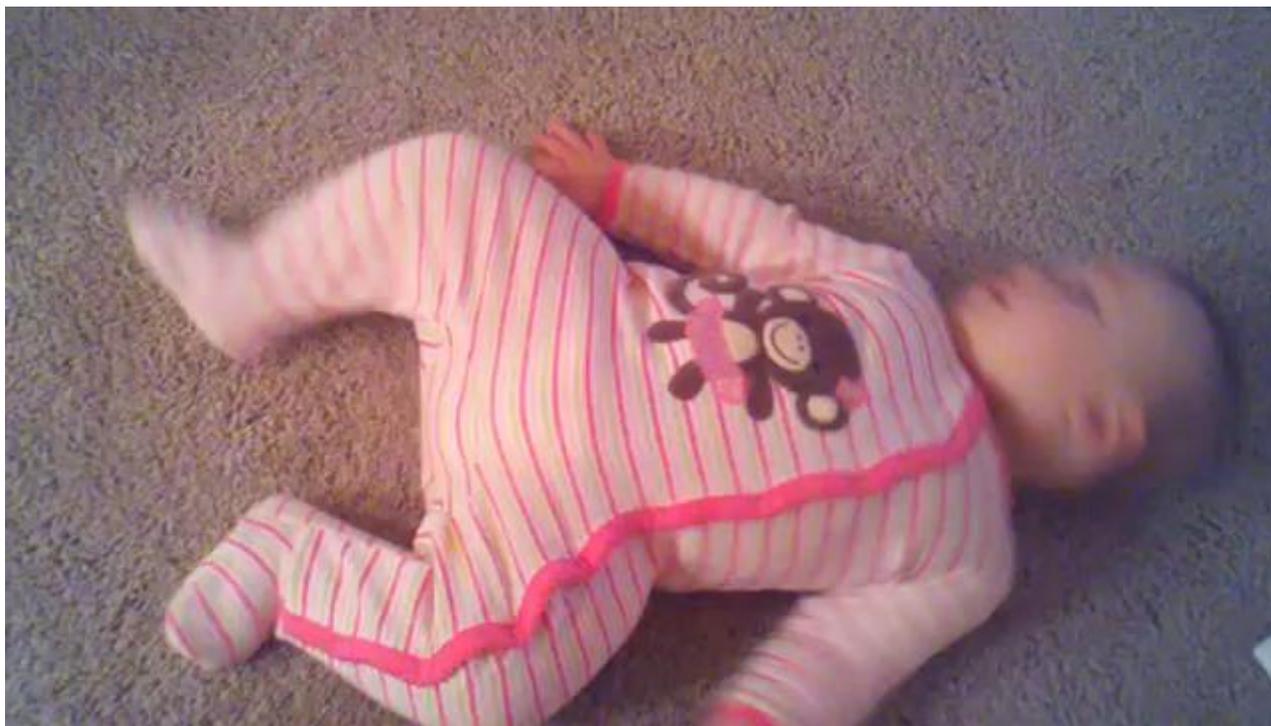
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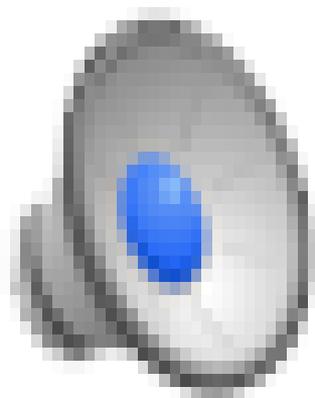
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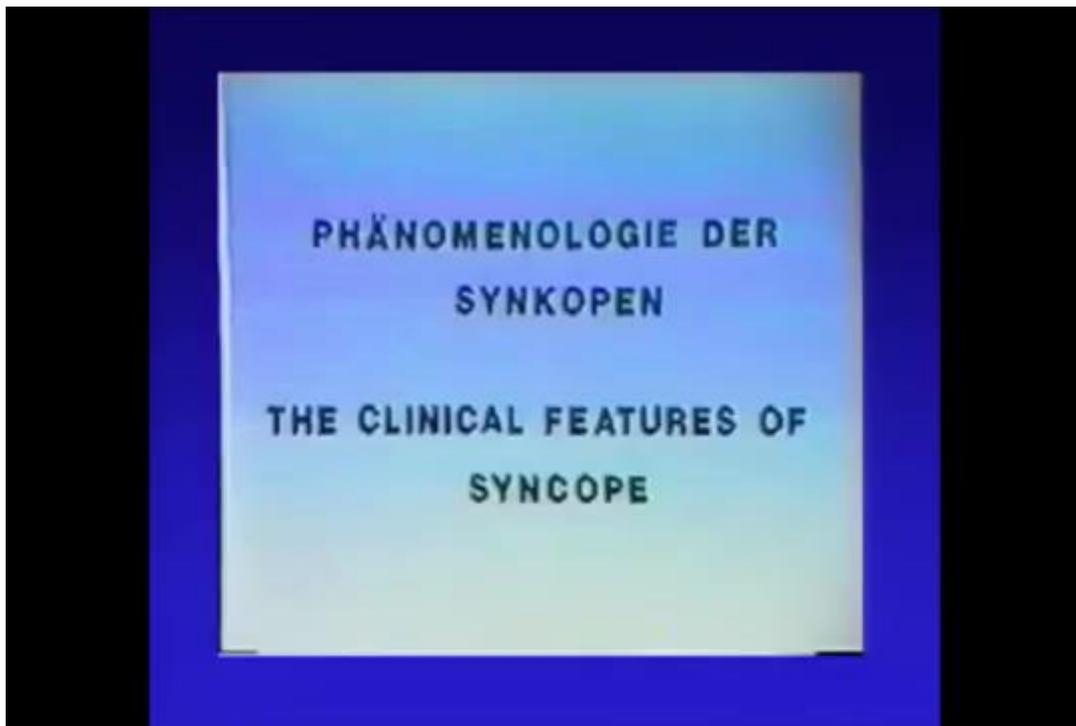
What is this?



What is this?



The Most Common Imitator



Imitators of Seizure

- Normal funny baby movements
- Reflux
- Breath holding spell
- Syncope(fainting) or Vertigo
- Hypoglycemia
- Hypoxia

Imitators of Seizure

- Migraine headache
- Movement disorder
- Sleep disorder
- PNES(Psychogenic non-epileptic seizures)

Key to Diagnosis of Seizure

1. History
2. History
3. History

4. Physical Exam
5. Blood tests (CBC with diff, CMP)
 1. +/- LP
6. EEG
7. +/- MRI, Genetic Testing

Provoked vs. Unprovoked

- Provoked -a specific trigger.
- Unprovoked- not associated with a precipitating cause.

Provoked(Symptomatic) Seizures

- Central nervous system infections
 - meningitis, encephalitis, and empyema
- Metabolic alterations
 - glucose, sodium, and calcium
 - medication or toxic exposures
- Head trauma
- Structural abnormalities
 - malformations, ischemic or hemorrhagic strokes, tumors or other mass lesions.

Unprovoked

- Idiopathic
- Cryptogenic
- **Genetic**
- **Unknown**

To EEG or Not to EEG?

- Class I evidence/ Standard
- EEG in all children in whom a non-febrile seizure has occurred.
 - To predict the risk of recurrence.
 - To classify the seizure type.
 - To classify epilepsy syndrome.
- May affect further management decisions.

When to EEG?

- Not clear optimal timing should be for obtaining an EEG.
- EEG done within 24 hours of seizure is most likely to show abnormalities.
- Abnormalities:
 - Postictal slowing seen 24-48 hours after seizure
 - May be transient
 - Must be interpreted with caution.

When to EEG?

- Early EEG not necessary.
- Patients with epilepsy have persistent EEG abnormalities.
- Yield can be increased by:
 - Including sleep
 - Do activating procedures: hyperventilation and photic stimulation.
- If high suspicion for a seizure disorder(with normal EEG):
 - Repeat EEG or
 - Get prolonged EEG

When to Refer?

- If suspicion for the first unprovoked seizure is high that it was not the first unprovoked seizure.
- If patient is experiencing auras.
- If the EEG is abnormal.
- If the recurrence risk is higher due to other factors.

How to Reassure Parents?

- Besides the previous recurrence risk information.
- Give them the ability to feel safe.
- Help them distinguish between spell and seizure.
- Let them know what to do if there is another seizure.
- And how to keep their children safe with increased risk of seizure.

Seizure vs Other?

- Some of the most challenging events to distinguish from seizure are staring spells.
- Absence seizures can consist of staring and unresponsiveness, but can be difficult to tell apart from daydreaming.

How to Tell Seizure vs. Other?

- Interruption of play:
 - Seizures can occur anytime and are associated with a sudden stopping of activity.
- Unresponsiveness:
 - Doing something that your child would typically respond to may help.
 - **Just calling their name may not be enough.**
- Associated movements:
 - Eyelid fluttering, eye rolling, lip smacking.
 - Jerking movements may also sometimes occur.

How to Tell Seizure vs. Other?

- The more of these your child has, the more likely it is to be a seizure.
- The fewer of the above, it is likely daydreaming.
- Keep an eye out on your child and tell us which you think it is **(film when able)**.
- If you are just not sure that is OK!!!!

Dealing with Risk:

- A seizure that ends after a minute or two is usually not hazardous to a child.
- Risks increase when the seizure happens near water, at heights, or near traffic.
- Parents naturally want to protect a child.
- Excessive concern about risk may isolate children from others and reduce social interaction

Swimming

- No child(regardless of seizures or not):
 - Should ever swim alone
 - Be on a boat or close to water (including backyard wading pools) .
 - Without a flotation device or life jacket.
- Carefully supervise children near water.

Swimming

- Make sure an adult is present who knows your child has had a seizure.
 - And is a good enough swimmer to help if your child has a seizure in the water.
- Tell lifeguards or swimming instructors at local pools or beaches that your child has had a seizure.

Water Safety

- Water can be a hazard to children with seizures:
 - Swimming pool
 - At the beach
 - Bathtub.
- Supervise young children closely during tub baths.
- Have older children take showers, not tub baths.

Water Safety

- Set water temperature low
 - So a child won't be scalded
- Hang bathroom doors
 - Open outwards
 - Remove locks.
- Make sure shower and bath drains run quickly and are unobstructed.

Other Sports

- Sports/exercise are as beneficial to a child with seizures/epilepsy as they are to any other child.
- School sports activities and gym should be open to all children.
 - Safety measures such as harnesses, shock absorbing mats and adult supervision.
- Coaches and other officials should be aware that a child has had a seizure.
- **Wearing safety helmets when riding a bicycle, or for sports where head injury is possible is a must.**

Seizure Safety and Precautions

(Any Type of Seizure)

- **Remain calm.**
- Reassure your child and others around.
- Leave your child where they are.
 - Unless they are in danger of falling or hurting themselves.
- Move any objects out of the way
 - So they don't get hurt accidentally.

Seizure Safety and Precautions

(Any Type of Seizure)

- If they are wearing glasses, remove them.
- Stay with your child and be aware of how long the seizure lasts.
 - **Time the seizure.**
- If the seizure lasts longer than five minutes, call an ambulance.

Seizure Safety and Precautions: Generalized Tonic-Clonic Seizure

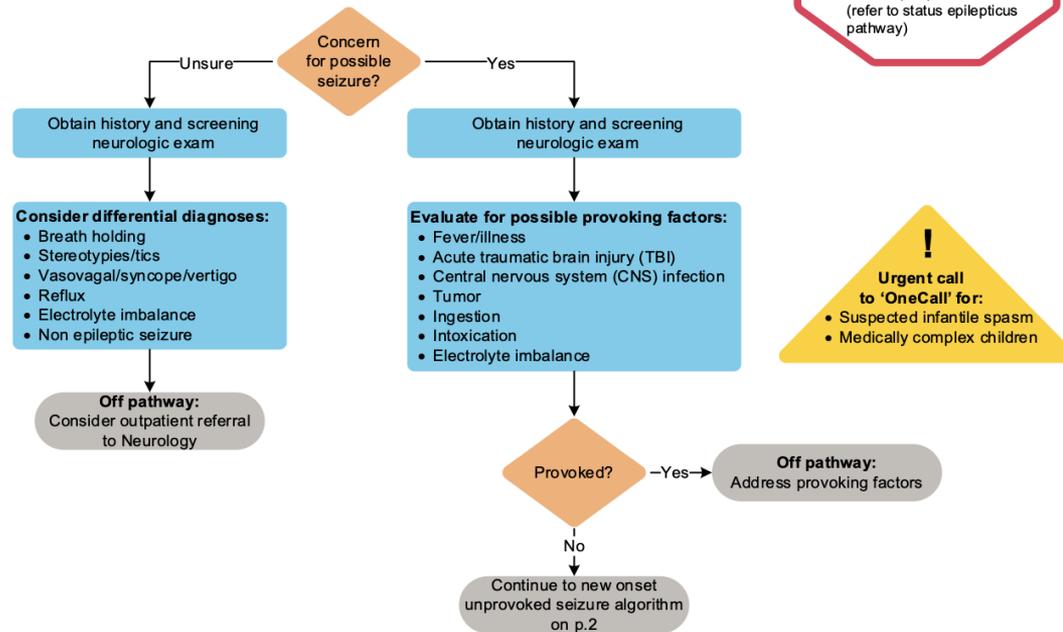
- Do not put any object into your child's mouth.
- Roll their head and if possible their body to the side.
- Do not attempt to take the food out as this may actually push it further in.
- Loosen any tight clothing, particularly around the neck.
- Do not give the child anything (food, drink, medicine) by mouth until they are fully alert.

More Information for Patients and Practitioners

- [Clinical pathways: new onset seizures](#)
- www.epilepsy.com
- www.cureepilepsy.org
- www.aesnet.org
- www.ilae-epilepsy.org
- www.childneurologyfoundation.org
- www.neurology.org

NEW ONSET SEIZURE

ALGORITHM 1. CONCERN FOR POSSIBLE SEIZURE

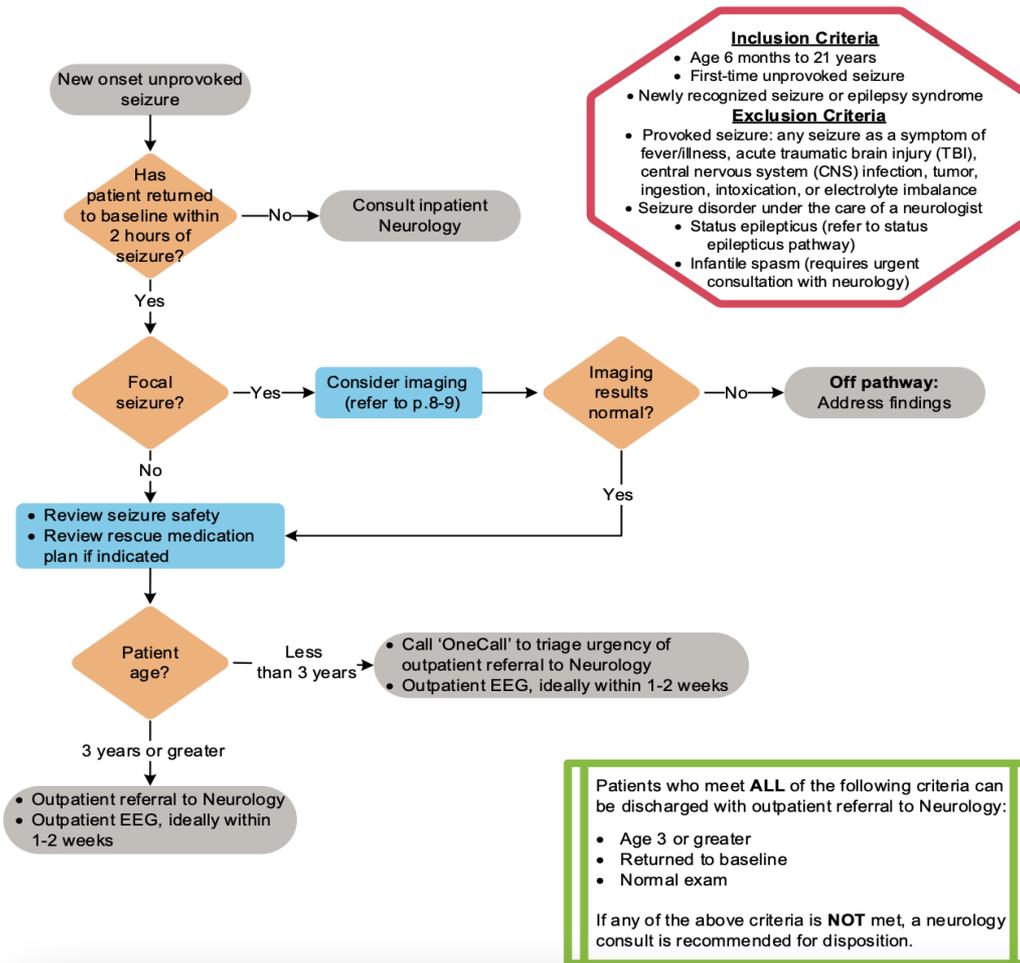


NEED REAL TIME HELP? CALL US!

Call 'OneCall' at 720-777-3999 or 719-305-3999 (Colorado Springs)

Children's Hospital Colorado
New Onset Seizure Pathway

ALGORITHM 2. NEW ONSET UNPROVOKED SEIZURE



Steps for First Unprovoked Seizure

- HISTORY, HISTORY, HISTORY
- Determine if this was truly a seizure
- Determine if this was provoked or unprovoked
- If unprovoked and at baseline
 - Outpatient EEG
 - Teach seizure safety and precautions

Steps for First Unprovoked Seizure

- If EEG is normal but high suspicion for epilepsy, repeat EEG or get prolonged EEG.
- If there is anything suspicious about the story
 - May not be first seizure
 - Having auras
 - Has other predisposition for seizures
- Send to neurology for follow up.
- If questions, always reach out, epilepsy docs(most of us) are here to help!

Questions?

References

- Bluvstein JS, Moshe SL. First unprovoked seizure Current Management in child Neurology. third ed. 2005. pp. 89–92.
- Children’s Hospital Colorado. (2020, February). New onset Seizure Clinical Pathway. Children’s Hospital Colorado. <https://www.childrenscolorado.org/49e72a/globalassets/healthcare-professionals/clinical-pathways/seizure-new-onset-clinical-pathway.pdf>
- Hirtz D, Berg A, Bettis D, et al. Practice parameter: treatment of the child with a first unprovoked seizure: Report of the Quality Standards Subcommittee of the American Academy of Neurology and the Practice Committee of the Child Neurology Society. *Neurology*. 2003 Jan 28. 60(2):166-75.
- D. Hirtz, MD; S. Ashwal, MD; A. Berg, PhD; et al. Evaluating a first nonfebrile seizure in children Report of the Quality Standards Subcommittee of the American Academy of Neurology, the Child Neurology Society, and the American Epilepsy Society. *Neurology* September 12, 2000 vol. 55 no. 5 616-623
- International League Against Epilepsy. 2021. Definition and Classification. International League of Against Epilepsy. <https://www.ilae.org/guidelines/definition-and-classification>
- Shinnar, S, Berg, AT, et al. Risk of Seizure recurrence following a first unprovoked seizure in childhood. *Pediatrics* 1990,
- Shinnar, S, O’Dell, C, Berg, AT et al: Mortality following a first unprovoked seizure in children: a prospective study. *Neurology* 2005.
- STEPHEN M. ADAMS, MD, and PAUL D. KNOWLES, MD. Evaluation of a First Seizure. *Am Fam Physician*. 2007 May 1;75(9):1342-1347.
- Bernd Pohlmann-Eden, Ettore Beghi, Carol Camfield, Peter Camfield. The first seizure and its management in adults and children. *BMJ*. 2006 Feb 11; 332(7537): 339–342.
- Stephen R. Deputy. Evaluation of pediatric patients following first unprovoked seizure. Vol 30, Number 11, November 2009.