

APPENDIX 2

Seizure mimics

Not all events that look like a seizure are in fact a seizure. A seizure is often obvious, but sometimes an event characterized by a change in consciousness, physical movement, behavior, sensation, or feeling appears to be a seizure but is not; rather, it is due to another condition. This is referred to as a “seizure mimic” or a “nonepileptic event.” To differentiate between seizures and seizure mimics, the medical professional uses the process of differential diagnosis. Meticulously eliminating seizure mimics is done before diagnosing the event as a seizure.

Common seizure mimics are presented in Tables A2.1 to A2.3 by the age group in which they most often occur or start to be noticed. These lists are not exhaustive.

Table A2.1 Seizure mimics in the neonatal period and infancy

CONDITION	DESCRIPTION	SIGNS/SYMPTOMS THAT MIMIC SEIZURES	DISTINGUISHING CHARACTERISTICS	REFERRALS AND ADDITIONAL TESTING
Gastroesophageal reflux disease (GERD); acid reflux	A condition where liquid contents from the stomach go back into the esophagus. ¹	Irritability, excessive crying, sleep disturbances, muscle contractions, low heart rate, apnea (breathing stops momentarily). ²	Improvement of signs and symptoms with gastric protection medicines. ²	Gastroenterologist.* pH monitoring.† Upper gastrointestinal endoscopy.‡
Sandifer syndrome	Movement disorder that may occur along with GERD. ⁵	Involuntary muscle contractions, back arching, stiffening of the neck, turning and tilting the head. ^{6,7} Events occur up to 10 times a day and resolve within 3 minutes. ⁶	Events typically occur within 30 minutes of feeding, rarely occur in sleep, may improve by sitting up, no impaired awareness. ⁶ Improvement of signs and symptoms with gastric protection medications. ^{2,5}	Gastroenterologist.
Breath-holding spells	Vigorous crying episode after which, on expiration, the child holds their breath (as a reflex, not on purpose), sometimes until they pass out. ⁸	Body stiffness or convulsions, impaired awareness, cyanosis (bluish skin coloring) or paleness. ^{6,8}	Triggered by an event that makes the child cry. ⁸	Cardiologist (if concern the event may be of a cardiac nature). ⁸
Benign spasms[§] of infancy	Movements that occur in typically developing infants and resolve on their own in the second year of life. ⁹	Brief spasms (1 or 2 seconds) of the head, trunk, shoulders, and arms, which may occur in clusters. ^{7,9}	Occur while awake and in sleep, no impaired awareness; sudden onset and sudden end. ^{7,10}	EEG. ⁹

* A medical professional who specializes in the care of the gastrointestinal tract and related organs.

† A test to determine whether acid is entering the esophagus from the stomach.³

‡ Involves viewing the inside of the gastrointestinal tract with a camera; “upper” refers to the upper part of the gastrointestinal tract, which includes the mouth, esophagus, stomach, and small intestine.⁴

§ “Benign” means something that is not harmful. “Spasms” are brief, involuntary muscle contractions.

Table A2.2 Seizure mimics in childhood

CONDITION	DESCRIPTION	SIGNS/SYMPTOMS THAT MIMIC SEIZURES	DISTINGUISHING CHARACTERISTICS	REFERRALS AND ADDITIONAL TESTING
Cyclic vomiting	A condition that includes repeated bouts of vomiting. ⁶	Abdominal pain, pallor (pale skin), and fatigue; may also occur along with migraine headaches. ⁶	Often occurs in a very predictable pattern and lasts for a certain number of days, then resolves. ⁶	Gastroenterologist* Upper gastrointestinal endoscopy. ^{†6} Abdominal imaging. ⁶
Hypoglycemia	A condition with lower than typical blood glucose (sugar) levels. ¹¹	Confusion, impaired awareness, lack of coordination, difficulties with speech, and tremors. ¹²	Hunger, heart palpitations, sweating. ¹² Examination of the preceding circumstances (is the individual fasting, taking medications, or diabetic?). ¹³	Endocrinologist.‡
Migraine	A type of headache with moderate to severe throbbing and pulsating pain. It often occurs and the pain may be concentrated on one side of the head. ¹⁵	May be accompanied by an aura (a sensation or symptom experienced at the onset of a neurological event) and may include numbness, alterations in speech, visual disturbances, and dizziness. ^{16,17}	Family history of migraines. ¹⁷ Occurs without motor signs, as often occur with seizures. Migraine auras have a gradual onset (seizure auras tend to be abrupt). ¹⁶ Impaired awareness is uncommon. ¹⁶	Imaging or laboratory tests may be recommended.

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* A medical professional who specializes in the care of the gastrointestinal tract and related organs.

† A test to determine whether acid is entering the esophagus from the stomach.³‡ A medical professional who specializes in the treatment of the endocrine system, including organs and glands that regulate hormones.¹⁴

CONDITION	DESCRIPTION	SIGNS/SYMPTOMS THAT MIMIC SEIZURES	DISTINGUISHING CHARACTERISTICS	REFERRALS AND ADDITIONAL TESTING
Movement disorders	Stereotypies: Semivoluntary repetitive movements that are often rhythmic. ^{6,10}	May include clapping or arm-shaking.	Stereotypies are usually not associated with impaired consciousness and may occur multiple times per day. ¹⁰	EEG ¹⁰
	Tics: Involuntary, sudden, rapid, and repetitive sounds or movements. ¹⁰	Vocal tics may include throat-clearing, coughing, grunting, or yelling. Motor tics may include blinking, eye-rolling, mouth movements, shaking of hands, tapping, kicking, or abnormal postures. ¹⁸	Unlike seizures, tics and stereotypies can be interrupted or suppressed voluntarily for a short period. ^{10,19}	
Sleep disorders	Narcolepsy: A sleep disorder characterized by excessive sleepiness during the day and often presenting with irresistible sleep attacks. ²⁰	Often (70 percent) accompanied by cataplexy (loss of posture, causing the individual to fall suddenly).	Typically, after an event related to a sleep disorder, the individual is refreshed, unlike after a seizure when they are confused, or tired. ¹²	Referral to a sleep specialist. Polysomnogram with EEG.
	Parasomnias: A group of sleep disorders characterized by unusual behaviors that occur just prior to falling asleep, while asleep, or just upon waking, ^{13, 21, 22} including sleepwalking, night terrors, or confusional arousal. ^{*21}	Individuals may also experience hallucinations or paralysis upon sleep or when waking. ¹² May be accompanied by impaired awareness and the inability to recall the event. ^{13,21}	Typically occur only once or twice per night, while seizures may occur multiple times in one night. ²¹	
Sleep myoclonus	A sudden, involuntary, muscle jerk that occurs during sleep transitions (falling asleep or waking up). ²¹	Often accompanied by a hallucination of movement, experienced as a feeling of falling. ²³	Extremely brief, only occurs with sleep.	Typically not needed.

* A sudden arousal from sleep accompanied by confusion.²¹

Table A2.3 Seizure mimics in adolescence and adulthood

CONDITION	DESCRIPTION	SIGNS/SYMPTOMS THAT MIMIC SEIZURES	DISTINGUISHING CHARACTERISTICS	REFERRALS AND ADDITIONAL TESTING
Behavioral, psychological, and psychiatric	May include dissociative disorders,* panic attacks, hyperventilation, and episodic dyscontrol.†	Aggression, hallucination, auras, thrashing movements, tremors, dizziness, fear. ^{13,16}	May be brought on by personal or environmental stressors and typically do not involve a change in consciousness. Episodic dyscontrol events typically come on abruptly, are short in duration, without impaired consciousness, and are followed by exhaustion and difficulty recalling the event. ²⁵ Panic attacks tend to last longer than seizures.	Referral to mental health and psychiatric medical professionals. ¹³
Cardiovascular	Conditions that involve the heart and vascular system, including heart abnormalities (long QT syndrome‡), high blood pressure, or postural orthostatic tachycardia syndrome (POTS).§	An individual with long QT syndrome may become pale, or limp (or rigid), and may have impaired consciousness. ²⁶ POTS results in chest pain, rapid heartbeat, lightheadedness, blurred vision, and abdominal pain. ^{7,27}	Long QT episodes may be triggered by exercise or fear. ⁷ POTS is triggered by standing and resolves with sitting or lying down. ²⁷	Cardiologist. ECG/EKG (electrocardiogram; tracing of the electrical activity of the heart). Imaging such as vessel ultrasound, echocardiogram (an ultrasound showing pictures of the heart and valves). ¹²

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* Psychiatric conditions involving “problems with memory, identity, emotion, perception, behavior, and sense of self”²⁴

† Recurrent attacks of uncontrollable rage and violence that result in damage to people or property; also known as intermittent explosive disorder.²⁵

‡ A condition of abnormal cardiac rhythm, causing syncope (fainting) and may lead to death.²⁶

§ A group of conditions where blood flows to the heart after a change of position, resulting in a symptom known as orthostatic intolerance. Individuals with orthostatic intolerance feel faint or lightheaded when they move from lying to standing.

CONDITION	DESCRIPTION	SIGNS/SYMPTOMS THAT MIMIC SEIZURES	DISTINGUISHING CHARACTERISTICS	REFERRALS AND ADDITIONAL TESTING
Cerebrovascular	Conditions that involve the brain and vascular system and include brain abnormalities, strokes, or transient ischemic attacks (TIAs)*	Difficulty with speech, vision, or lack of movement on one side of the body.	Lack of movement occurs instead of extra movements as occurs with seizures.	Imaging.
Psychogenic nonepileptic seizures (PNES)†	Involuntary events that may last for several minutes (sometimes 15 to 30 minutes or longer).	Impaired awareness and motor signs such as irregular jerking or shaking of the limbs and falling. ³⁰	Personal or environmental stressors, or trauma, may be triggers. ³⁰	EEG. May result in significant impact on quality of life and require interdisciplinary management including psychotherapy, behavioral management, and screening and treatment of mental health conditions, as appropriate. ³¹
Syncope (fainting spell)	A condition that involves self-limiting† transient (temporary) loss of consciousness with the inability to maintain a standing or unsupported posture and may be accompanied by brief jerking movements. ^{32,33,34}	Limp posture or jerking movements, impaired consciousness. ³⁴	Typically occurs from standing, not from a sitting or lying down position, unlike seizures. ³² May be triggered by pain, emotions, prolonged standing, or a hot environment and often preceded by dizziness, nausea, paleness, or sweating. ^{12, 34, 35} Consciousness regained quickly. ³⁶	Cardiologist. ³²

* A condition when a blood vessel in the brain is either blocked or ruptured. This leads to damage in the brain and causes symptoms such as paralysis, speech problems, and memory loss.²⁸ A TIA is a transient, or temporary blockage, which resolves on its own, and may cause temporary symptoms similar to a stroke.²⁹

† Refers to something that limits itself or spontaneously resolves.

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