INTRODUCTION

Generalized convulsive seizures are frightening to observe and often result in EMS calls. Seizures may be the symptom of a serious underlying medical or neurologic condition or may reflect recurrent seizures, alcohol-related seizures, or poorly controlled epilepsy.

It is estimated that between 1% and 2% of emergency department (ED) visits are for seizure-related complaints, with the majority of these using EMS systems. Many receive advanced level field care. In one study, seizures accounted for almost 12% of the pediatric EMS transports.

Every community has a cadre of patients with poorly controlled seizures or alcohol-related seizures who use EMS frequently. One study showed that seizure disorders were a common cause of repeated ambulance use. This familiar group of frequent users may lead to a casual indifference to all patients with seizures. Physicians and providers must recall that seizures at some level are the symptom of some central nervous system (CNS) dysfunction and initiate appropriate management steps to lessen morbidity.

PATHOPHYSIOLOGY

The concept of a seizure threshold suggests that everyone has the capacity to experience seizures at some level of individual physiologic stress. The precipitating events may be electrolyte abnormalities, medications, medication withdrawal, toxins, hypoxia, CNS infections, systemic infections, trauma, or even sleep deprivation. A fundamental distinction in management is to determine whether a seizure results from some identifiable cause or if it is unprovoked. When seizures are secondary to some other condition, they are termed symptomatic seizures. Recurrent unprovoked seizures define epilepsy.

At a cellular level, seizures are thought to originate in the cerebral cortex or thalamus. Lesions of the brainstem, deep white matter, and cerebellum are not epileptogenic. Seizures result from excitation of susceptible groups of cerebral neurons, with progressively larger groups of neurons developing synchronous discharges. Clinical signs and symptoms follow when a critical mass of neurons is reached. At a biochemical level, there is a disturbance in the balance of cellular excitation and inhibition. Glutamate is the most common excitatory neurotransmitter and acts at the n-methyl-D-aspartate (NMDA) receptor. Current theory is that failure of inhibition mediated by the neurotransmitter gamma-aminobutyric acid (GABA) system leads to prolongation of most seizure types. The neurotransmitter receptor sites are thought to be the sites of action of the antiepileptic drugs.

Physiologic changes of hypoxia, acidosis, hyperthermia, hypotension, and reduced cerebral perfusion occur late in generalized convulsive status epilepticus and were at one time thought to be the cause of injury. However, many different avenues of investigation have suggested that neuronal injury follows prolonged excessive neuronal discharges even if systemic pathophysiologic factors are controlled. Some experimental evidence suggests that neurotransmitter receptors may change in sensitivity or numbers in status epilepticus; potential effects of medications might also change as seizure duration persists.
DIFFERENTIAL DIAGNOSIS

There is a differential diagnosis for seizures because a number of clinical conditions may simulate generalized convulsions (Table 27.1). Syncope is a frequent consideration in the differential diagnosis. Loss of consciousness is abrupt in syncope and occasionally the brief myoclonic jerks that accompany the faint are a source of confusion. “Convulsive syncope” results from the cerebral hypoperfusion during the syncopal event. Investigations and treatments should be directed toward the cause of syncope.7

Persons suffering a blow to the head may have a brief episode of extremity stiffening at the time of impact that understandably may be confused with seizure activity. These events clinically resemble brief abnormal extensor posturing, though myoclonic and tonic-colonic movements are also described. Return to consciousness following these events is usually prompt. These “convulsive concussions” are not associated with injury or neurologic sequelae and do not predict future seizures.8,9

Posttraumatic epilepsy may occur after head trauma but is associated with more severe head injuries. These seizures are typical in appearance and associated with a postictal confusional state.

In any series of stroke patients, seizures and postictal states are a significant source of diagnostic confusion.10,11 Seizure patients may have postictal weakness or confusion that mimic some stroke symptoms. Subarachnoid hemorrhage may cause fragmentary or repetitive extensor posturing that at times is confused with seizures.12,13

Nonepileptic seizures, also known as pseudoseizures, psychogenic, or hysterical seizures, often result in diagnostic uncertainty. Simply stated, the patient appears to be having a seizure but subsequent observation proves that the apparent convulsion does not follow from the excessive neuronal discharges that characterize epileptic seizures. The usual descriptions of nonepileptic seizures include side-to-side head movements, out-of-phase limb movements, and pelvic thrusting.14 However, other reports indicate that simple unresponsiveness without motor movements is a frequent presentation.15

CLASSIFICATION OF SEIZURE TYPES

In theory, almost any behavior or experience may result from the abnormal synchronous discharges of groups of neurons. Motor movements, sensory experiences, or abnormal behaviors may all represent seizures.16 Patterns are seen that allow a categorization of seizures (Table 27.2).17 Modern classification schemes are based on video electroencephalogram (EEG) correlations, but at times seizure-type classification may be made from direct patient observation.

A fundamental distinction is whether the seizure is of partial onset or generalized onset. This distinction may be important clinically because partial onset seizures may imply focal or structural CNS abnormalities and because different medications are effective in different seizure types. In partial onset seizures, clinical information indicates that seizure onset is limited to one part of the brain. Partial seizures may be further divided into simple partial seizures, complex partial seizures, and partial seizures that secondarily become generalized.

In a simple partial seizure, the patient remains at normal consciousness. Partial seizures with sensory symptoms include some patients with episodic paresthesias. Special sensory symptoms delineate seizures with gustatory, olfactory, or auditory components. The term complex implies that consciousness is clouded. Symptoms of these patients are often altered mental status with confusion and simple repetitive motor movements such as lip-smacking or picking at clothes. Sometimes prolonged confusional states occur with complex partial seizures, one of the types of nonconvulsive status epilepticus.18

<table>
<thead>
<tr>
<th>TABLE 27.1</th>
<th>Differential Diagnosis of Seizures in Adults</th>
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<tbody>
<tr>
<td>I. Seizures: from abnormal, excessive neuronal discharges</td>
<td></td>
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<tr>
<td>A. Unprovoked seizures</td>
<td></td>
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<tr>
<td>B. Symptomatic or secondary seizures</td>
<td></td>
</tr>
<tr>
<td>II. Nonepileptic seizures: appear to be seizures but do not result from abnormal excessive neuronal discharges</td>
<td></td>
</tr>
<tr>
<td>A. Psychogenic seizures (sometimes non-epileptic seizures used synonymously with psychogenic seizures)</td>
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</tr>
<tr>
<td>B. Repetitive abnormal posturing</td>
<td></td>
</tr>
<tr>
<td>C. Involuntary movement disorders</td>
<td></td>
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<tr>
<td>D. Syncope/convulsive syncope</td>
<td></td>
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<tr>
<td>E. Concussive syncope</td>
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<tr>
<td>F. Sleep disorders</td>
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</table>
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Generalized onset seizures imply that the cerebral cortex is bilaterally involved at seizure onset. This often requires EEG evaluation for definitive diagnosis. The types of generalized seizures are listed in Table 27.2. Some seizure types are typical enough in appearance that they can be classified by observation alone. Partial onset seizures with secondary generalization are the most common type of generalized seizure in adults. An example of a partial onset seizure with secondary generalization would be a patient with onset of finger twitching, progression of movements to the arm and face, and then a subsequent generalized convulsive seizure. However, often this secondary generalization occurs too rapidly to be appreciated at the bedside.

A few words concerning terminology are in order. Convulsion refers to the motor movements associated with a seizure. Tonic refers to the stiffening of the extremities seen in convulsions. Clonic is the rhythmic, synchronized movements of the extremities. Some patients experience an aura, which is the initial subjective perception of a seizure. Grand mal is generally used in a manner to be synonymous with a generalized convulsion. Petit mal, however, is so frequently misused by patients and physicians that perhaps that term is best not used. Correctly used, it is synonymous with absence seizures, a generalized-onset seizure that has a characteristic EEG three-cycle-per-second pattern. In common usage, however, petit mal is corrupted by association with the word petite, meaning “small,” so that fragments of seizures or partial seizures are incorrectly labeled petit mal seizures.

**Symptomatic Seizures**

A basic point in assessment and management is whether a seizure is secondary to some medical condition, such as electrolyte abnormalities, toxins, hypoxia, CNS infections, systemic infections, or trauma. EMS plays a key role in gathering historical information to identify likely seizure causes and initiating therapy. A few causes of symptomatic seizures warrant particular comment.

Alcohol-withdrawal seizures are a type of symptomatic seizure that usually occur within 48 hours of cessation of drinking. Usually alcohol-withdrawal seizures are single and brief, but up to 30% of patients have recurrent seizures in the ED. Studies of patients with status epilepticus show that in a significant proportion, the seizures are alcohol-related. Many different toxins may cause seizures. Sympathomimetics, including cocaine, are perhaps the most frequently encountered. Other toxins that may cause seizures include antidepressants, antihistamines, salicylates, and anticholinergics. Isoniazid (INH), used to treat tuberculosis, deserves specific mention because the mechanism of action of the drug requires a specific antidote: pyridoxine (vitamin B<sub>6</sub>). Seizures in association with advanced pregnancy or in the postpartum patient may represent eclampsia. Hypertension is present. Review is beyond the scope of this chapter, but treatment involves magnesium sulfate and possibly benzodiazepines, both of which are within the scope of practice of the EMS providers.

**Febrile Seizures**

Febrile seizures are one of the most common seizure types encountered in emergency practice. Definitions in the literature vary, but a seizure associated with
fever in children ages 3 months to 5 years without evidence of intracranial infection or other definite cause of seizure is an accepted definition. The age-delineated definition acknowledges the sensitivity of the maturing brain to fever. Excluded are febrile-associated seizures in patients that have experienced afebrile seizures. Peak incidence is at 18 months. Other events that may simulate seizures in this age group include rigors, breath holding spells, apneic episodes, and anoxic seizures. History is key in sorting out these events.

Many febrile seizures occur early in the course of the underlying illness and may be the presenting symptom of the illness. The magnitude and peak of the fever is likely more important than the rate of increase in provoking seizures. Antipyretics have not been shown to be effective in reducing the risk of febrile seizures.

Febrile seizures are often divided into simple and complex types. A simple febrile seizure is a generalized tonic-clonic convulsion without focal signs lasting less than 10 minutes, resolving spontaneously, and not recurring within 24 hours. Complex febrile seizures fall outside of this definition either by focal signs during the seizures, seizure duration, or recurrence.

By definition, a simple febrile seizure will likely have ceased by arrival of EMS, unless the response interval is very short. Recurrent or prolonged seizures exclude this diagnosis and point to a complex febrile seizure or another cause for the seizure. EMS and other sources of history are important in eliciting a history of irritability, decreased feeding, or abnormal consciousness that might suggest an underlying CNS infection. Most children experiencing febrile seizures recover within 30 minutes. Postictal alteration of consciousness persisting more than 60 minutes has been suggested as a risk factor for a complicating medical condition.

### Status Epileptics

Ongoing seizures or status epilepticus may occur in any seizure type and terminology may be confusing (Table 27.3). Generalized convulsive status epilepticus represents a true emergency condition because the ongoing electrical seizure activity is itself injurious to the brain. In late or decompensated status epilepticus, there may be a dissociation between the ongoing electrical seizure activity and motor convulsions. In other types of status epilepticus, such as the nonconvulsive status seen in prolonged absence seizures, the link between prolonged electrical activity and neuronal injury is not established.

Morbidity in generalized convulsive status epilepticus is related to the duration of the seizures and importantly to any underlying medical causes of the seizures. Modern definitions of generalized convulsive status epilepticus use a period as short as 5 minutes of continuous seizures to define the status, and indicate the need to initiate treatment to terminate the seizures. The other component of the definition is generalized seizures without recovery to full consciousness between seizures. There is a differential diagnosis for generalized convulsive status epilepticus (Table 27.4).

#### TABLE 27.3

<table>
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<tr>
<th>Proposed Terminology: Status Epilepticus</th>
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<tr>
<td>Nonconvulsive status epilepticus</td>
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<tr>
<td>Complex partial status epilepticus</td>
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<tr>
<td>Absence status epilepticus</td>
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<tr>
<td>Generalized status epilepticus</td>
</tr>
<tr>
<td>Generalized convulsive status epilepticus, overt</td>
</tr>
<tr>
<td>Generalized convulsive status epilepticus, subtle</td>
</tr>
<tr>
<td>Simple partial status epilepticus with motor symptoms</td>
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<td>Other enduring seizure types</td>
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Note: Confusion exists in the terminology. Nonconvulsive status epilepticus has been used in the past to encompass such diverse seizure types as partial complex status epilepticus, absence status epilepticus, and epileptic confusional states, as well as generalized convulsive status epilepticus that has evolved a dissociation of the motor convulsions and ongoing electrical activity.

#### TABLE 27.4

<table>
<thead>
<tr>
<th>Differential Diagnosis of Generalized Convulsive Status Epilepticus</th>
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<tr>
<td>Nonepileptic seizures (pseudoseizures)</td>
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<tr>
<td>Repetitive abnormal posturing</td>
</tr>
<tr>
<td>Tetanus</td>
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<tr>
<td>Neuroleptic malignant syndrome</td>
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<tr>
<td>Rigors</td>
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<tr>
<td>Myoclonic jerks</td>
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<tr>
<td>Tremors</td>
</tr>
<tr>
<td>Hemiballismus</td>
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<tr>
<td>Involuntary movements</td>
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</table>
EMS EVALUATION AND RESPONSE

The most appropriate systems response to a patient with seizures is not known because presentations vary greatly. Many patients experience a brief event that has terminated by time of arrival of EMS. Other patients may be convulsing at time of EMS arrival and require ALS interventions. Often patients with a history of seizures may request not to be transported. Usual system protocols should be followed for patient non-transport with the caveat that the patient is awake, alert, and judged to be capable of making decisions; ideally, there should be a companion present for assistance should the seizures reoccur.

A brief period of observation and examination should be performed after EMS arrival. Establish unresponsiveness as a survey for trauma is undertaken. Note if there is resistance to eye opening because most patients with seizures will have open eyes. Forced eye closure may suggest nonepileptic seizures.

Often the patient is somnolent, and some snoring respirations are present that will often resolve with placement of a nasopharyngeal airway. Oxygen supplementation is recommended by mask. Assessment for airway integrity proceeds as usual but with the expectation that patient will become more responsive as the postictal state resolves. IV access is recommended if the patient is not fully awake and alert.

Safety issues include protection by moving the patient away from any hard or sharp objects that might be struck during the convulsive movements. If the teeth are clenched, they should not be pried open. However, if chewing movements are continuing and the tongue is being lacerated, an adjunctive airway device, such as an oropharyngeal airway, may be gently placed between the teeth to prevent further injury.

Hypoglycemia is common and may cause seizures. Perform rapid glucose determination if possible; consider dextrose administration in diabetics or if hypoglycemia is suspected. Administer thiamine if the possibility of malnutrition is present.

History should be obtained as possible. Key factors include a history of epilepsy, current medications, substance abuse, medical conditions, or trauma. A description of the event should be obtained from witnesses, including any prodromal symptoms.

Physical examination will include a survey for injury. Some physical examination findings suggest seizures. Tongue-biting on the lateral portion of the tongue suggests convulsions, although absence of tongue biting has no diagnostic value. Incontinence suggests a generalized seizure.

If the patient is still convulsing at time of EMS arrival, status epilepticus may be presumed to be present, again unless the response interval is very short. Seizure duration of greater than 5 minutes or recurrent seizures without regaining consciousness between convulsions are the modern definition of status epilepticus. Initial stabilization steps and preparation for medication administration should go forward (Table 27.5).

Pharmacologic Interventions

Pharmacologic interventions by EMS will often be limited to benzodiazepines, with the exception of some critical care transport units. The benzodiazepine that is available will have been determined by medical oversight. Tables 27.6 and 27.7 summarize dose recommendations.

Generally speaking, IV administration of benzodiazepines has been the standard because of rapid drug levels, but a variety of reports substantiate efficacy of intramuscular, rectal, nasal, and buccal administration of different agents. Benzodiazepines are well tolerated, with the primary side effect of sedation and respiratory depression. The respiratory depression seems to be related to time to peak serum concentration; somewhat paradoxically, the IV route may offer the quickest time to peak concentrations but at a risk of greater respiratory depression.

The use of alternative routes is particularly attractive in the pediatric population. Intraosseous administration should be an effective route of

### Table 27.5

<table>
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<tr>
<th>Prehospital Approach to Patient with Generalized Seizures</th>
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<tr>
<td>If convulsion is recurrent or ongoing:</td>
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<tr>
<td>Assess ABCs: oxygen supplementation, adjunctive airway if</td>
</tr>
<tr>
<td>necessary</td>
</tr>
<tr>
<td>Protect patient from harm: protect head, move away from</td>
</tr>
<tr>
<td>hard objects</td>
</tr>
<tr>
<td>IV access</td>
</tr>
<tr>
<td>Rapid glucose determination or dextrose administration</td>
</tr>
<tr>
<td>Benzodiazepine administration</td>
</tr>
<tr>
<td>Consider immobilization for transport</td>
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</table>
Rectal administration of benzodiazepines (particularly diazepam) for status epilepticus in children has been reported for years. Studied dosages are 0.5 mg/kg administered using a syringe and a soft catheter. Correction should be made for volume left in catheter. A second dose of 0.25 mg/kg may be administered if needed. Peak levels are thought to be reached within 10 minutes. An FDA-approved preparation, Diastat, is available.

Nasal administration of benzodiazepines (usually midazolam) has been reported in small case series. Ease of use was the focus in studies comparing nasal midazolam with IV diazepam. Time to seizure cessation was comparable. Another report compared intranasal administration of midazolam using an atomizer device with rectal diazepam and found better seizure control and fewer respiratory complications in the group treated with intranasal midazolam.

Buccal midazolam has been studied for seizure control in children in the ED, in comparison with rectal diazepam, and has been found to be as effective or more effective without increased risk of respiratory depression. Dosages administered were 0.25 mg/kg or 0.5 mg/kg with adjustments by age with a 10-mg maximum dosage for children age 10 or older. As with many of the therapies discussed here, this is off-label usage. Buccal midazolam is advocated by some as a choice for initial management of prolonged seizures in children, although issues of dosing (range 0.2–0.5 mg/kg) remain and further study is desirable.

Intramuscular (IM) administration of a benzodiazepine is possible with midazolam, which has solubility characteristics favorable for absorption. IM administration is rapid and aspiration is not a concern. Increased use of midazolam intramuscularly has been noted in some systems. In one small series of children with seizures, comparing treatment with IM midazolam with IV diazepam, the former was found to be an effective alternative. Part of the efficacy was thought to be from the rapid administration possible by the IM route without waiting for IV access to be established.

IV administration of midazolam was found to be more effective than IM administration in one prehospital study, with minimal risk of respiratory depression in both groups. One study found that reduction of dosage of diazepam from a dose of 0.2 to 0.5 mg/kg by rectum or intravenously to 0.05 to 0.1 mg/kg by rectum or intravenously demonstrated a reduction in the intubation rate and need for hospitalization without an increase in adverse events.

**SEIZURE-ASSOCIATED TRAUMA**

In many EMS systems, full spinal immobilization is standard for patients who have experienced a seizure. There appears to be very limited evidence to support this practice, although trauma from seizures has been reported in case reports, case series, and in retrospective reviews.

Seizures uncommonly cause fractures and dislocations. Some uncommon orthopedic injuries, such as bilateral posterior dislocation of the shoulder,
fracture-dislocation of the shoulder, or fracture-dislocation of the hip, suggest a generalized convulsion as the etiology. Bilateral hip fractures have been reported. These cases or notable for their rarity.

Only very rare cases of cervical fractures from uncomplicated seizures are reported. There is one description of an odontoid fracture following an epileptic seizure. One retrospective study of over 1,600 transports for uncomplicated seizures (i.e., age greater than 5 years, no associated major trauma, afebrile) found no spinal fractures. Transport charges and nursing charges were increased in this group of patients. The authors raise the question of the need for full spinal precautions in patients sustaining uncomplicated seizures. Compression fractures of the thoracic vertebrae were reported in a patient taking steroids.

There is one report of a higher risk of cervical spinal cord injuries in patients with refractory epilepsy attributed to seizure-related falls. This residential facility for patients with refractory epilepsy reported four instances of spinal cord injuries in their patient population over 10 years, which they extrapolated to be a 30-fold to 40-fold risk increase.

Retrospective chart reviews of patients with seizures have also identified patients with intracranial hematomas resulting from falls associated with seizures. The authors advocate early investigation in patients with head injury due to seizures, and caution that decreases in level of consciousness or focal neurologic deficits in seizure patients should only cautiously be interpreted as postictal until traumatic hematomas have been excluded. This review was from a neurosurgical service and undoubtedly incorporates significant ascertainment bias.

Given the paucity of reports of significant trauma following uncomplicated seizures, routine immobilization in all cases does not seem warranted, although caregivers should keep in mind that unusual injuries may exist.

EMERGENCY DEPARTMENT MANAGEMENT

Patient management in the ED is a continuation of management in the field. If the patient is not alert, the degree of unresponsiveness should be determined as evaluation proceeds along the pattern of primary survey, resuscitation, secondary survey, and definitive care steps. Information from EMS personnel regarding level of alertness in the field will be helpful here. As previously described, unresponsiveness will be confirmed and airway status reassessed. Interventions follow evaluation and management patterns of other patients with few exceptions. Rapid bedside glucose testing should be performed. Should the need for a definitive airway be established, rapid-sequence intubation (RSI) is performed in the usual manner. Concerns for possible increased intracranial pressure, if suspected from history or physical examination, may prompt consideration for lidocaine administration as part of RSI, although this remains controversial. Most induction agents have some anticonvulsant properties and use of benzodiazepines or propofol would seem prudent, although data are lacking to support these actions. The use of short-acting paralytic agents, if necessary, should proceed in the usual manner. There are only rare case reports in medically complex seizure patients of complications from succinylcholine. Longer-acting neuromuscular blockade should be avoided, however, unless EEG monitoring is established because of concerns that seizure activity may be disguised by neuromuscular paralysis.

Somnolent patients should be observed and monitored. The postictal state is not well defined, but the possibility of ongoing subclinical seizure activity, complex medical issues, or trauma should be considered if a seizure patient is not starting to become alert in approximately 30 minutes.

Simply stated, patients with known seizure disorders who have become alert will likely be discharged. Patients with new onset seizures, complicated clinical issues, or ongoing seizures will be further evaluated with neuroimaging, laboratory testing, and likely admission.

REFRACTORY GENERALIZED CONVULSIVE STATUS EPILEPTICUS

Detailed management of status epilepticus is beyond the scope of this chapter. Benzodiazepines are the mainstay of initial therapy whatever the seizure type or cause, and lorazepam is the recommended initial drug. Most guidelines recommend doses in adults of 4 to 8 mg. Most reviews recommend phenytoin or fosphenytoin as a second-line therapy.

Refractory status epilepticus may be defined as generalized seizures that persist through administration
of optimal benzodiazepines and phenytoin. There are no prospective, randomized trials to guide third-line therapy.\textsuperscript{57}

Anecdotal reports and recommendations list a variety of agents, including high-dose phenytoin,\textsuperscript{56} lidocaine,\textsuperscript{59–62} etomidate,\textsuperscript{63} ketamine,\textsuperscript{64,65} midazolam,\textsuperscript{66,67} propofol,\textsuperscript{67–71} and valproic acid.\textsuperscript{72–74} Because lidocaine is ubiquitously carried on ALS units, it may be a rational choice in systems with prolonged transport times.

Recommendations for propofol or midazolam infusions for refractory generalized convulsive status epilepticus seem to reflect the weight of current articles. Consultation, ICU admission, and continuous EEG monitoring will be necessary. Barbiturates are not as frequently mentioned in the recent literature, and practice patterns have shifted away from phenobarbital use although authoritative data seems lacking to drive this in any evidence-based manner. Definitive airway management and pressor support will be needed with the use of many of these agents.

**SUMMARY**

Seizures are one of the most common conditions resulting in EMS activation. In many cases, the patient is recovering consciousness at time of EMS arrival, and little if any care is needed. However, generalized convulsive status epilepticus represents an emergency with early interventions potentially limiting morbidity. After brief diagnostic intervention to confirm seizures, early treatment of persistent or recurrent generalized convulsions with benzodiazepines is indicated. A variety of treatment options are available for route of administration and drug choices. Persistent convulsions will require additional advanced life support interventions.

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**CLINICAL VIGNETTES**

**Case 1**

EMS was dispatched for a patient with seizures. The patient was actively convulsing at the time of EMS arrival 10 minutes later. The patient had stiffening of all extremities and then synchronous movements of all extremities that continued for an additional 5 minutes. He was unresponsive afterward, and there was no response to verbal or tactile stimulation.

The patient had sonorous respirations and a nasopharyngeal airway was placed, with improvement. A second generalized convulsion was witnessed that lasted 4 to 5 minutes. IV access was established, and the patient was given 2 mg of lorazepam. Rapid glucose testing showed a reading of 120 mg/dl. There were no further seizures en route to the hospital, and the patient became progressively more alert.

Chart review revealed a history of alcoholism and alcohol withdrawal seizures. Thiamine 100 mg was administered intravenously. The patient was observed in the ED for several hours without recurrence of seizures and was discharged to family.

**Comment**

This patient satisfied the definition of status epilepticus. Alcohol-withdrawal seizures were thought to be the cause after evaluation. Risk of seizure recurrence is lessened by benzodiazepine administration.\textsuperscript{21} Daily antiepileptic medications are not effective in this condition. Such a case is “bread-and-butter” in most EMS systems, and providers must be proficient at the assessment and treatment of such a patient.

**Case 2**

EMS dispatch is requested for a patient with generalized convulsions. There is no history of epilepsy, and the patient has no known medical conditions. On EMS arrival, the patient is unresponsive, but then lets out a cry and shakes all extremities. The motions are asynchronous and
the eyes are closed. The patient appears apneic following the event.

**What Is the Correct Response?**
Confirm unresponsiveness before initiating airway and pharmacologic treatments. Attempt to look at the eyes by gently opening the lids. In this patient, there was resistance to eye opening when the examiner attempted to open the lids. The resistance increased as the efforts to open the eyes increased. The patient appeared to startle in response to a loud noise.

With observation, the apparent apnea rapidly resolved. The patient became completely alert en route to the hospital. After arrival in the ED, additional information revealed a history of nonepileptic seizures. The patient was discharged home in care of family.

**REFERENCES**


