

## Grand Mal Seizures

Grand mal seizures are generalized events characterized by loss of consciousness and involuntary tonic-clonic muscle contractions. **They are usually, but not always, self-limited.**

**CAUTION:** Be alert for possible causes, including: Intracranial hemorrhage, ischemic stroke, toxic ingestion, eclampsia, hyponatremia, and alcohol withdrawal.

**CAUTION:** Seizures, and their treatment, can result in hypoventilation. Be prepared to manage the airway.

1. **F** Administer oxygen. Proceed with airway management as indicated.
2. **F** Position the patient to reduce the likelihood of injury and aspiration. A bite block may be utilized but should **never** be forced into the patient's mouth.
3. **A** If indicated, place the patient on a cardiac monitor.
4. **B** If indicated, place the patient on a pulse oximeter.
5. **A** Initiate an intravenous reseau, or an infusion if appropriate.
6. **A** Measure the patient's blood sugar (BS) with a glucometer. Treat hypoglycemia (see Acute Non-Traumatic Altered Level of Consciousness).
7. **I** Use ET<sub>CO</sub><sub>2</sub> monitoring if appropriate.

**Utilize the following regimen only if the seizure lasts > five (5) minutes, or is a recurrent seizure during the same emergency response, or if eclampsia is suspected.**

8. **P** Administer **lorazepam** 2 mg (**PEDIATRIC: 0.05 mg/kg**) IV unless eclampsia is suspected (see below), **OR**

If unable to obtain intravenous access in a pediatric patient, consider administering **lorazepam** (**PEDIATRIC: 0.05 mg/kg**) PR **P**, or **midazolam** (**PEDIATRIC: ~0.2 mg/kg**) intranasally **P** (see table below, and use a 1 ml syringe). Do not administer > 1 ml/nosril. Weights listed are approximate, based on age; use actual patient weight or Broselow<sup>®</sup> tape if possible.

Age (yrs)	Weight (kg)	Intranasal Midazolam Dose (5mg/ml)
Neonate	3	0.1 ml (0.5 mg)
< 1	6	0.3 ml (1 mg)
1	10	0.4 ml (2 mg)
2	14	0.5 ml (2.5 mg)
3	16	0.6 ml (3 mg)
4	18	0.7 ml (3.5 mg)
5	20	0.8 ml (4 mg)
6	22	0.9 ml (4.5 mg)
7	24	1 ml (5 mg)
8	26	1 ml (5 mg)
9	28	1.1 ml (5.5 mg)
10	30	1.2 ml (6 mg)
11	32	1.3 ml (6.5 mg)
12	34	1.4 ml (7 mg)
Small teen	40	1.6 ml (8 mg)
Full grown teen	50	2 ml (10 mg)

*If unable to obtain venous access in an adult, **and eclampsia is not suspected**, consider administering midazolam 10 mg intranasally. **P***

- P** If the patient is in the third trimester of pregnancy, or up to two weeks postpartum, **suspect eclampsia** and administer magnesium sulfate 2 gm slow IV, over 2-4 min.

***Eclampsia should be suspected in any pregnant, or recently postpartum, patient. Other findings, though not required, may include a history of pre-eclampsia or eclampsia, gestational hypertension (BP > 140/90), and edema of the face, hands, or feet.***

**CAUTION:** *If eclampsia is suspected, magnesium sulfate should be the **only** anticonvulsant administered without Online Medical Consultation. **OMCP***

9. **P** If seizure activity persists for > 5 min following initial IV administration of **lorazepam**, administer one (1) repeat dose.

**CAUTION:** *Rectal and intranasal benzodiazepine administration may be repeated only with Online Medical Consultation. **OMCP***

10. **I** If seizure activity persists despite repeated benzodiazepine dosing or, in a case of suspected eclampsia, despite administration of magnesium sulfate, obtain Online Medical Consultation for further instructions. **OMCP**

### **Key Considerations**

- **Most seizures will stop spontaneously.** Use medication to treat those that don't.
- Epilepsy and alcohol withdrawal are the most common adult etiologies encountered.
- Febrile convulsions typically occur in children 1-5 yrs, are usually single seizure events associated with a high fever, and usually self-abort in < 5 min; they usually do **not** require anticonvulsants.
- **Be alert for other etiologies**, including trauma and drug ingestion, especially when there is no personal history of seizures.
- Use a bite block carefully and **never** put your fingers into the patient's mouth.
- The use of assisted ventilation, an LMA, or endotracheal intubation to manage the airway of a patient who develops respiratory depression following benzodiazepine use to abort prolonged seizure activity is **not** a patient care failure.

## Lorazepam (Ativan®) P

Lorazepam has multiple uses in EMS practice. Though primarily utilized as an anticonvulsant, it also has sedative properties that make it useful in the management of acute CNS stimulant (e.g., cocaine, amphetamines, etc.) intoxication and alcohol withdrawal.

**PREGNANCY: D**

*Lorazepam is a potent sedative that can lead to respiratory depression. Monitor the patient closely and be prepared to manage the airway. Be especially cautious in elderly patients and those with COPD.*

**CAUTION:** **Dosage warning:** Lorazepam is related to diazepam but **not** identical; it **cannot** be used interchangeably at the same dose.

**Classification:** Benzodiazepine; anticonvulsant and sedative.

### Actions:

- Interacts with the  $\gamma$ -aminobutyric acid (GABA)-benzodiazepine receptor complex. GABA is the chief inhibitory neurotransmitter in the central nervous system (CNS).
- Exerts a general calming effect on the central nervous system, causing sedation, and eventually respiratory depression.

### Indications:

- Acute seizure activity (see Grand Mal Seizures).
- Acute alcohol withdrawal. **OMCP**
- Procedural sedation, though midazolam is generally a better choice. **OMCP**
- Acute CNS stimulant (e.g., cocaine, amphetamines, etc.) intoxication, especially if associated with seizures or delirium. **OMCP**

### Contraindications:

- Known hypersensitivity to lorazepam, diazepam, or other benzodiazepines.
- Acute glaucoma.
- Alcohol intoxication or other causes of CNS depression.

### Adult Dosage and Route:

- Grand mal seizure: 2 mg IV every 5 minutes, until seizure activity stops or a total of 4 mg has been administered. Additional dosing requires Online Medical Consultation. **OMCP**
- Acute cocaine intoxication: 1-2 mg IV as directed by Online Medical Consultation. **OMCP**
- Acute alcohol withdrawal: 1-2 mg IV as directed by Online Medical Consultation. **OMCP**
- Procedural sedation: 1-2 mg IV as directed by Online Medical Consultation. **OMCP**

### Pediatric Dosage and Route:

- Grand mal seizure: 0.05 mg/kg, up to 2 mg, IV every 5 min until seizure activity stops or a total of two (2) doses has been administered. Additional dosing requires Online Medical Consultation. **OMCP**
- Procedural sedation: 0.05 mg/kg IV as directed by Online Medical Consultation. **OMCP**

### Adverse Effects:

- Respiratory depression, especially in pediatric, geriatric, and COPD patients.
- Hypotension, especially in patients with poor hemodynamic reserve.
- Vascular irritation and thrombophlebitis.

**Notes:** Flumazenil is antidotal but contraindicated if the patient has had, or is at risk for, seizure activity (see Flumazenil). **EMS use during pregnancy is permitted with Online Medical Consultation. OMCP**

**Complete Information:** <http://dailymed.nlm.nih.gov/dailymed/lookup.cfm?setid=ba5527fb-76fc-4ee5-b62e-a141c58c957d>.