

Status Epilepticus (SE)

Assistant Professor Dr. Bahaa A. Ahmed
Dept. of Pediatrics

Learning objectives:

1. Define Status Epilepticus.
2. Discuss the etiologies of status epilepticus.
3. Develop an effective plan (strategies) for the management of status epilepticus.

Definition of status epilepticus: is a continuous convulsion lasting longer than 5 min or recurrence seizure activity without regaining of consciousness.

The ILAE has refined the definition of SE to reflect the time at which treatment should be initiated (t_1) and time at which continuous seizure activity leads to long-term sequelae (t_2) such as neuronal injury, depending on the type of SE.

For generalized tonic-clonic seizure ($t_1 = 5$ min, $t_2 \geq 30$ min), focal seizures with impaired awareness ($t_1 = 10$ min, $t_2 = 30$ min), and absence SE ($t_1 = 10-15$ min, $t_2 =$ unknown)

Refractory status epilepticus: is status epilepticus that has failed to respond to therapy, usually with at least 2 medications or persistent seizure activity beyond 60-120 minutes.

Super-refractory status epilepticus: is SE that continues or recurs 24 hr or more after onset of continuous infusion therapy.

Status epilepticus may be classified as:

1. **Convulsive status epilepticus:** the most common type (generalized tonic, clonic, or tonic clonic).
2. **Nonconvulsive status epilepticus:** (complex partial, absence) manifest as confusional state, hyperactivity with behavioral problems, fluctuating impairment of consciousness.

Status epilepticus is a medical emergency that requires an organized and skillful approach to minimize the associated mortality and morbidity.

Etiology:

There are three major subtypes of status epilepticus in children:

1. Febrile status epilepticus:

is the most common type of status epilepticus in children.

2. Idiopathic status epilepticus:

Develop in the absence of an underlying CNS lesion. It includes:

- A. Epileptic patients in whom status epilepticus followed sudden withdrawal or overdose of anticonvulsants.
- B. Epileptic children who are given anticonvulsants on an irregular basis or who are noncompliant.
- C. Status epilepticus may be the initial presentation of epilepsy (30-40%).
- D. Sleep deprivation and an intercurrent infection in epileptic children.

3. Symptomatic status epilepticus: when the seizure occurs as a result of an underlying neurologic disorder or metabolic abnormality .e.g. encephalitis, meningitis, electrolyte abnormalities (hypoglycemia, hypocalcemia ...), drug intoxication and brain tumors.

Management

A. Initial Stabilization phase (0-5 minutes)

1. Stabilization of airway, supporting respiration, maintaining blood pressure, and gaining intravascular access .Body temperature, blood pressure, ECG, and respiratory function should be monitored.

2. Blood glucose level should be determined and if hypoglycemia is confirmed 5ml/kg of 10% dextrose is given by rapid infusion.

3. Laboratory studies: including glucose, sodium, calcium, magnesium, complete blood count basic metabolic panel, CT scan, and continuous EEG, are needed for all Patients. Anticonvulsant drug levels (if patients already on AEDs), blood and urine studies for metabolic and toxicology screen and arterial blood gases.

4. A lumbar puncture is indicated to rule out CNS infection unless a contraindication is suspected.

5. EEG monitoring is indicated in:

1. If the patient is paralyzed and is on a respirator to assess the frequency of seizure discharges, their location, and the response to anticonvulsant therapy.
2. To rule out pseudo-status epilepticus (psychological conversion reaction mimicking status epilepticus).

B. Initial therapy phase (5-20 minutes)

Start from 5 minutes to a 20-minutes end point.

Initial Emergent therapy should be started for convulsive seizures lasting longer than 5 min and involves the use of benzodiazepine medication (IV lorazepam, IV diazepam, and IM midazolam) **should** be used initially.

When IV access is not available immediately rectal diazepam can be given, buccal or nasal midazolam is another option, and intranasal lorazepam can also be used safely.

Respiratory depression and hypotension can occur after benzodiazepine administration, especially if administered with a barbiturate.

If seizures persist 5 min after the initial benzodiazepine dose, a second dose of the drug should be given (maximum of two doses are allowed).

C. Second therapy phase (20-40 minutes)

Start at 40-minutes and end at 40-minutes cut off.

If the emergent treatment with a benzodiazepine is unsuccessful (persistent seizures 5 min after the second benzodiazepine dose the Urgent therapy is recommended.

The three drug options include: Fosphenytoin, valproate, or levetiracetam. These drugs can be administered only once (loading dose followed by maintenance depending on the response).

Intravenous phenobarbital is an alternative option if these drugs are not available but is not recommended as first-line urgent therapy due to its side effects.

D. Third therapy phase (40-60 minutes)

It begins at the end of 40 minutes and ends at 60 minutes. Phase beyond 60 minutes is labeled as refractory SE.

If seizure persist after administration of urgent therapy medication, the decision is either re-dosing with another second-line agent or proceed to a continuous infusion.

For refractory SE the drug choices include Intravenous bolus followed by continuous infusion of midazolam, propofol, pentobarbitone, or thiopental.

Continuous EEG monitoring is often required to monitor the treatment response among those with refractory SE. the EEG becomes the method of choice by which to monitor response to therapy. The goal is to stop electrographic seizure activity before reducing the therapy.