

The Treatment of Status Epilepticus at a Community Hospital

Somsak Tiamkao, MD^{1,2}, Siriporn Tiamkao, MD^{2,3}

¹ Department of Medicine, Faculty of Medicine, Khon Kaen University, Khon Kaen, Thailand

² Integrated Epilepsy Research Group, Khon Kaen University, Khon Kaen, Thailand

³ Department of Pharmacy, Faculty of Medicine, Khon Kaen University, Khon Kaen, Thailand

Status epilepticus (SE) is a neurological emergency that poses significant risks, which can lead to high rates of mortality and disability if the diagnosis is delayed or if an inappropriate treatment is administered. The treatment of SE at community hospitals emphasizes the importance of preventing the occurrence of refractory status epilepticus (RSE). When SE does occur, it is crucial to provide prompt treatment, even before reaching the hospital in order to effectively control the epilepticus. Additionally, having injectable anticonvulsants readily available is extremely important, since the absence of these medications can delay treatment and can increase the risk of the patient developing RSE or super refractory status epilepticus (SRSE). Therefore, developing a system for treating and transferring patients with SE is of the utmost importance.

Keywords: Status epilepticus; System for treating and transferring; Injectable anticonvulsants

Received 17 January 2025 | Revised 15 May 2025 | Accepted 1 June 2025

J Med Assoc Thai 2025;108(Suppl.2):S182-186

Website: <http://www.jmatonline.com>

Status epilepticus (SE) is a neurological emergency that poses significant risks, which can lead to high rates of mortality and disability if the diagnosis is delayed or if an inappropriate treatment is administered. The main issue in treating SE in community hospitals is that nearly all physicians are general practitioners, who lack sufficient experience. Additionally, there is often an inadequate supply of intravenous antiepileptic drugs⁽¹⁾, or they may be unavailable at all. This can result in delayed and ineffective diagnosis and treatment, which do not align with the recommended clinical guidelines. Consequently, when patients are referred for further treatment at provincial hospitals, they may present with refractory status epilepticus (RSE) or super-refractory status epilepticus (SRSE), which can lead to poor treatment outcomes and an elevated risk of death⁽²⁾. Therefore, there must be clear and practical guidelines for the treatment of SE in community hospitals.

Outpatient treatment

Patients with SE are divided into two groups: those with a history of epilepsy and those without any prior history of epilepsy, meaning that their first incidence of epilepsy can also be classified as SE. In the first group, where there is a history of epilepsy, the causes of SE often stem from decreases in antiepileptic drug levels⁽³⁾. This can occur due to sudden discontinuation of the medication due to other health issues, which can cause the patient to stop taking his or her antiepileptic drugs, or it may result from drug-drug interactions between antiepileptic medications and the other drug treatments that are being used to treat current illnesses. In the first case, the advice that doctors need to give to their patients is as follows:

1) Taking anti-epileptic medication must be consistent. You must not stop the medication on your own under any circumstances, except in cases of suspected severe drug reactions. In such cases, you should see a doctor immediately.

2) When visiting any doctor for any illness arising from other diseases, you should inform the treating physician that you have epilepsy and what anti-epileptic medication you are regularly taking. The doctor will determine whether there are any interactions between the anti-epileptic medication and the treatment medication.

3) In cases of uncontrolled epilepsy and frequent epilepsy episodes, doctors should administer anticonvulsants (medical rescue), such as benzodiazepines in oral form for epilepsy management, (i.e., diazepam 5 mg. or clobazam

Correspondence to:

Tiamkao S.

Division on Neurology, Department of Medicine, Faculty of Medicine, Khon Kaen University, Khon Kaen 40002, Thailand.

Phone: +66-81-0504626

Email: somtia@kku.ac.th

How to cite this article:

Tiamkao S, Tiamkao S. The Treatment of Status Epilepticus at a Community Hospital. J Med Assoc Thai 2025;108(Suppl.2):S182-186.

DOI: 10.35755/jmedassochai.2025.S02.S182-S186

5 mg). Patients should take medication when experiencing epilepsy or during menstruation in cases in which the patient frequently has epilepsy during her menstrual period or the patient has a high fever.

4) For patients with frequent epilepsy, it is recommended to have injectable diazepam at home. If there are 2 to 3 epilepsy episodes, 10 mg of diazepam should be administered through the rectum⁽⁴⁾, which is done by drawing the medication into a plastic syringe and injecting it into the patient's rectum. After the injection, the buttocks should be squeezed together in order to ensure effective absorption, which is comparable to intravenous administration. Then the patient should be quickly transported to the hospital.

5) When a patient is admitted to the hospital, the doctor should promptly administer the same type of anticonvulsant that the patient uses on a regular basis. For example, if the patient regularly takes oral phenytoin, then an intravenous loading dose of phenytoin should be given immediately.

When a patient, who has never had epilepsy before, is experiencing SE, it is essential to provide proper first aid for the patient. If the epilepsy last longer than usual or exceeds 5 minutes in the form of generalized tonic-clonic seizures that do not stop, it is crucial to quickly take the patient to the emergency room of a hospital⁽⁵⁾ or to call 1669 to request an ambulance and first aid care. Utilizing emergency medical services is preferable to transporting the patient by private vehicle, since a medical team will be available to care for the patient from the onset of the epilepsy and administer treatment with anticonvulsant medication, such as a 10 mg injection of diazepam. In the case of intravenous access, if the vein can be opened quickly⁽⁶⁾, it should be done. If the vein cannot be accessed, administer diazepam intramuscularly instead, which will help the patient to control the epilepsy. Then, promptly transfer the patient to the nearest emergency room.

Emergency treatment

Emergency treatment is a continuation of care from home or where the epilepsy occurs. When a patient arrives at the emergency room, the situation can be divided into two cases.

In the case of emergency ambulance transport⁽⁷⁾

1) Quickly assess the vital signs along with measuring the blood oxygen levels. If the patient is still experiencing epilepsy, promptly administer 10 mg of diazepam. Administer through the intravenous route and prepare the antiepileptic medication that the patient uses on a regular basis for their pre-existing epilepsy. However, if the patient has never had epilepsy and there are no contraindications or precautions, then use the antiepileptic drug phenytoin at a dosage of 20 mg. per kilogram, mix in normal saline and

administer intravenously at a rate of 50 mg. per minute, but if there are contraindications or precautions for phenytoin, such as low blood pressure, arrhythmias, or heart failure, intravenously at rate of 25 mg. per minute. Sodium valproate can be used as an alternative (if the hospital has the medication).

2) Blood test should be conducted in order to measure CBC, BUN, Cr, electrolyte, liver function test, and levels of anticonvulsants in case of regular use of anticonvulsant medication.

3) Oxygen should be provided in order to ensure that the oxygen level remains above 95%.

4) The heart rate should be monitored (monitoring EKG).

5) If a loading dose of anticonvulsants is given and the epilepsy does not stop, a repeat loading dose can be administered. For example, phenytoin can be given initially at 20 mg. For every kilogram of body weight, an additional 10 mg can be given per kilogram of body weight.

6) Preparations should be made to transfer any patient, who is still experiencing seizures that are not under control or who needs to be referred for diagnosis in order to determine the cause of ongoing epilepsy.

7) If the patient stops having epilepsy, regains normal consciousness, and is known to be an epilepsy patient, it should be presumed that the cause may be due to a low level of antiepileptic medication. Moreover, there should not be any other causes that require further investigation. In this case, the patient can be admitted for treatment at a community hospital. However, in other cases, especially for patients experiencing their first episode of SE, they should be referred for treatment and further investigation at a general hospital, provincial hospital, or a specialized centre, depending on the referral system of each hospital.

8) The assessment of a patient's condition to determine if they can effectively control seizures means that the patient must be free of seizures and have normal levels of consciousness. If the patient does not exhibit convulsive seizures, but is in a comatose state, one must consider the possibility of non-convulsive status epilepticus (NCSE).

In the case of a patient arriving at the emergency room on their own, accompanied by relatives⁽⁸⁾

1) Quickly assess the vital signs, oxygen levels, and respiratory system to determine if there are any food particles or dentures that could cause an obstruction to the airway.

2) If the patient is still having seizures, provide first aid and administer 10 mg of diazepam. If the seizures do not stop, you can administer it again through the intravenous route.

3) Blood tests should be conducted to measure

CBC, BUN, Cr, electrolyte, liver function test, and levels of anticonvulsants in case the patient regularly uses anticonvulsant medication.

4) Phenytoin should be intravenously administered as a loading dose in cases in which there are no contraindications or precautions as detailed above or a loading dose of the medication that is used on a regular basis should be provided if the patient has a history of epilepsy.

5) Heart rate measurements (monitoring EKG) should be conducted.

6) Preparations should be made to transfer any patient, who is still experiencing epilepsy that cannot be controlled or who needs to be referred for diagnosis, so that the cause of the ongoing epilepsy can be determined.

7) If a patient, who is a known epilepsy patient, stops seizing and regains normal consciousness, it can be presumed that the cause had most likely been due to a decrease in the level of antiepileptic medication, with no other causes expected. In this case, there is no need for further investigation, and the patient can be admitted for treatment at a community hospital. However, in other cases, the patient should be referred for treatment and further investigation at a general hospital, provincial hospital, or a specialized centre, depending on the referral system of each hospital.

8) An assessment of a patient's condition should be conducted to determine if the patient's epilepsy can be effectively controlled, which means that the patient must be free of epilepsy and have a normal level of consciousness. If the patient does not exhibit convulsive seizures, but is in a comatose state, one must consider the possibility of non-convulsive status epilepticus (NCSE).

9) In case this is a patient's first occurrence of continuous epilepsy, it is necessary to refer for investigation in order to determine the cause of the continuous epilepsy condition and to provide the appropriate treatment thereafter.

The treatment of patients with SE at community hospitals in Finland involves stopping epilepsy with rescue medication, such as diazepam, during the time before reaching the hospital. For example, treatment is provided by the emergency medical team in the ambulance. It was found that 40.7% of the treatments that had been received within 30 minutes after the onset of symptoms, and only 15% had received loading doses of second-line antiepileptic drugs, such as phenytoin (within 60 minutes), which can be assessed as mostly delayed treatment. Additionally, it was found that 80% of the loading doses that were administered had been appropriate, while 20% had been given at lower than the appropriate doses⁽⁹⁾.

The treatment of patients with SE is more effective the sooner it begins after the onset of symptoms, since it leads to quicker cessation of epilepsy. Therefore, pre-hospital

treatment with benzodiazepine anticonvulsants should be administered as soon as possible⁽¹⁰⁾. A study, which was conducted in Australia, found that 66% of patients, who had experienced seizures outside of the hospital had received treatment with benzodiazepine medications, which has been shown to reduce the duration of epilepsy upon hospital admission compared to the group of patients, who had not received benzodiazepine treatment before reaching the hospital, with durations of 0.65 days and 5.8 days, respectively. Additionally, this treatment reduced the length of hospital stay to 7.6 days compared to 15.8 days for those, who had not received benzodiazepines. However, benzodiazepines can only be administered twice, since giving more than two doses can lead to dangerous complications, specifically respiratory depression, which is 2.9 times more likely than when given at the appropriate doses (95% confidence interval 1.4 to 6.1)⁽¹¹⁾. In patients, who have stopped seizing, administering benzodiazepines has been found to control epilepsy within a time period of 1.6 to 15 minutes after administration⁽¹²⁾.

The benzodiazepine anticonvulsants consist of several types such as rectal diazepam, intravenous diazepam, buccal midazolam, intramuscular benzodiazepine, intranasal midazolam, intranasal diazepam, and clonazepam wafers, as well as sublingual and intranasal lorazepam⁽¹³⁾. Currently, in Thailand, only intravenous diazepam is used for treatment during the pre-hospital phase.

Common problems encountered in community hospitals⁽¹⁴⁾

1) In cases in which there is no injectable phenytoin or sodium valproate available, a system for procuring these medications should be developed in collaboration with provincial hospitals in order to ensure that there is a reserve supply available for at least one patient. Community hospitals should not be responsible for purchasing these medications themselves, since this could lead to issues with the inventory exceeding the allowable number of medications in community hospitals.

2) In cases in which there are no injectable anticonvulsants available and the patient continues to experience generalized tonic-clonic epilepsy, consideration may be given to administering oral phenobarbital instead, via a nasogastric tube at a dosage of 15 to 20 mg. for every 1 kilogram of body weight. However, it is necessary to closely monitor the respiratory depression during the transfer.

3) When administering an anticonvulsant medication with 10 mg of diazepam, injections via the vein should only be done a total of 2 times and should be spaced approximately 5 minutes apart. This should not be repeated every time that epilepsy occurs, since it not only proves ineffective, but can also negatively impact respiratory

function, which could cause the patient to stop breathing and could lead to an increased risk of drug-related harm.

4) Community hospitals should develop a systematic referral system for patients with status epilepticus, ranging from the health promotion hospitals to the provincial hospitals, as shown in Figure 1.

5) Develop the capabilities of the medical team working with emergency ambulances so that they are able to appropriately diagnose SE and administer antiepileptic medication.

6) Develop a telemedicine system between medical teams on the ground and emergency ambulances receiving patients with epilepsy, along with a recording system to consult with specialist doctors, with the aim of ensuring accurate diagnoses and prompt treatments starting in the ambulance.

7) Provide knowledge about first aid for patients experiencing epilepsy. Encourage the use of intravenous diazepam. However, administer it rectally in those cases in which the patient has frequent epilepsy episodes within one day in order to prevent status epilepticus.

Conclusion

The treatment of SE at community hospitals emphasizes the importance of preventing the occurrence of RSE. When SE does occur, it is crucial to provide prompt treatment, even before reaching the hospital in order to effectively control the epilepticus. Additionally, having injectable anticonvulsants readily available is extremely important, since the absence of these medications can delay treatment and can increase the risk of the patient developing RSE or SRSE. Therefore,

developing a system for treating and transferring patients with SE is of the utmost importance. Patients, who can receive treatment and be admitted to community hospitals, are those with a history of epilepsy, who have experienced SE due to sudden withdrawal of anticonvulsant medication and who respond well to treatment, thereby regaining normal consciousness after receiving care at the community hospital. Furthermore, they should be referred to a general hospital or a provincial hospital that is better equipped, both in terms of medical staff and the availability of injectable anticonvulsants.

What is already known on this topic?

The main issue in treating SE in community hospitals is that nearly all physicians are general practitioners, who lack sufficient experience.

What this study adds?

When SE does occur, it is crucial to provide prompt treatment, even before reaching the hospital in order to effectively control the epilepticus. Therefore, developing a system for treating and transferring patients with SE is of the utmost importance.

Conflicts of interest

The authors declare no conflict of interest.

References

1. Lertsinudom S, Chainirun N, Tiamkao S, Pranboon S, Nuntasen T, Tuntapaku S, et al. Facilities and services for people with epilepsy-a survey from the Northeast Thailand. *J Med Assoc Thai* 2017;100(Suppl 6):S252-8.
2. Tiamkao S, Suko P, Mayurasakorn N. Outcome of status epilepticus in Srinagarind Hospital. *J Med Assoc Thai* 2010;93:420-3.
3. Chiewthanakul P, Noppaklaio P, Sawanyawisuth K, Tiamkao S. Factors associated with poor discharge status in patients with status epilepticus at Khon Kaen Hospital. *Neuropsychiatr Dis Treat* 2015;11:1097-101.
4. Glauser T, Shinnar S, Gloss D, Alldredge B, Arya R, Bainbridge J, et al. Evidence-based guideline: Treatment of convulsive status epilepticus in children and adults: Report of the Guideline Committee of the American Epilepsy Society. *Epilepsy Curr* 2016;16:48-61.
5. The Association of Ambulance Chief Executives, The Joint Royal Colleges Ambulance Liaison Committee. *UK ambulance services clinical practice guidelines* 2016. Bridgwater, England: Class Professional Publishing; 2016.
6. Osborne A, Taylor L, Reuber M, Grünwald RA, Parkinson M, Dickson JM. Pre-hospital care after a seizure: Evidence base and United Kingdom

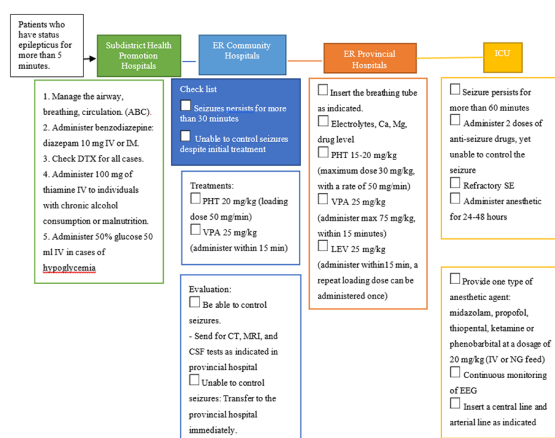


Figure 1. Guidelines for the treatment and referral of patients with status epilepticus from the subdistrict health promotion hospitals to the provincial hospitals.

IV=intravenous; IM=intramuscular; PHT=phenytoin; VPA=valproate; LEV=levetiracetam; NG=nasogastric tube; CT=computer topography; MRI=magnetic resonance imaging; DTX=dextro strip; CSF=cerebrospinal fluid; ER=emergency room; EEG=electroencephalogram

- management guidelines. *Seizure* 2015;24:82-7.
7. Claassen J, Goldstein JN. Emergency neurological life support: Status epilepticus. *Neurocrit Care* 2017;27(Suppl 1):152-8.
8. Patel M, Bagary M, McCorry D. The management of Convulsive Refractory Status Epilepticus in adults in the UK: No consistency in practice and little access to continuous EEG monitoring. *Seizure* 2015;24:33-7.
9. Sairanen JJ, Kantanen AM, Hyppölä HT, Kälviäinen RK. Status epilepticus: Practice variation and adherence to treatment guideline in a large community hospital. *J Neurol Sci* 2021;427:117542. doi: 10.1016/j.jns.2021.117542.
10. Halliday AJ, Santamaria J, D'Souza WJ. Pre-hospital benzodiazepines associated with improved outcomes in out-of-hospital status epilepticus: A 10-year retrospective cohort study. *Epilepsy Res* 2022;179:106846. doi: 10.1016/j.eplepsyres.2021.106846.
11. Chin RF, Neville BG, Peckham C, Wade A, Bedford H, Scott RC. Treatment of community-onset, childhood convulsive status epilepticus: a prospective, population-based study. *Lancet Neurol* 2008;7:696-703.
12. Cruickshank M, Imamura M, Booth C, Aucott L, Counsell C, Manson P, et al. Pre-hospital and emergency department treatment of convulsive status epilepticus in adults: an evidence synthesis. *Health Technol Assess* 2022;26:1-76
13. Samanta D. Rescue therapies for seizure emergencies: current and future landscape. *Neurol Sci* 2021;42:4017-27.
14. Tiamkao S. Current management of status epilepticus. *Thai J Pharmacol* 2009;31:20-5.