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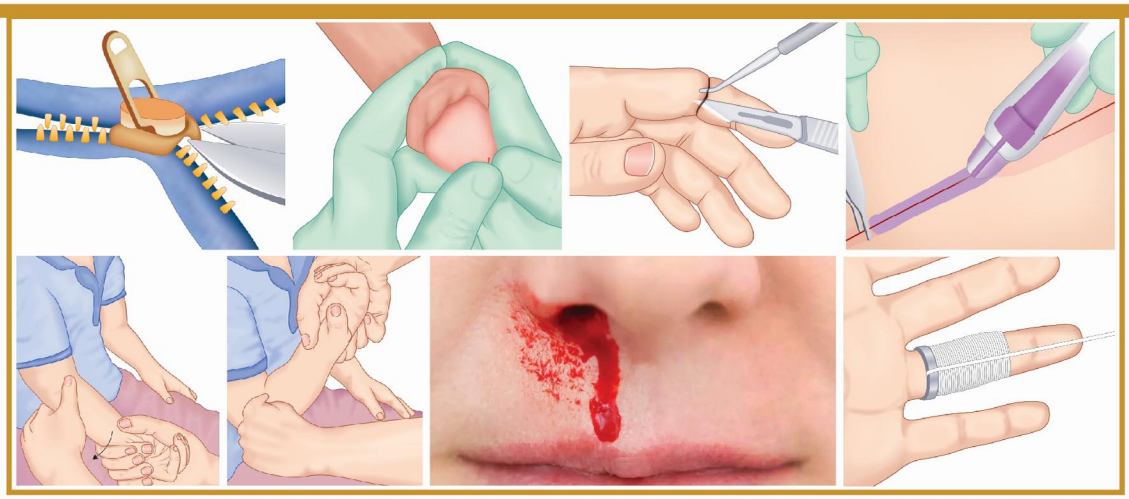

Pediatric Office Emergency Medicine (POEM)

Training Module

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CHAPTER 9

Emergency Management of the Pediatric Patient with Convulsive Status Epilepticus

INTRODUCTION

Convulsive status epilepticus (CSE) is a critical medical emergency characterized by prolonged or repeated convulsive seizures without regaining consciousness between episodes. This chapter outlines a comprehensive approach to the emergency management of CSE in pediatric patients, highlighting the importance of timely intervention, accurate diagnosis, and effective treatment strategies.

UNDERSTANDING CONVULSIVE STATUS EPILEPTICUS

Definition and Epidemiology

Convulsive status epilepticus is defined as continuous generalized tonic-clonic seizure activity with loss of consciousness, lasting longer than 30 minutes, or two or more discrete seizures without a return to baseline mental status. Early or impending status epilepticus refers to seizures, lasting longer than 5 minutes without full recovery of consciousness between them. Prompt treatment is crucial, as delays increase morbidity and mortality.

The incidence of CSE in children ranges from 10 to 73 episodes per 100,000 children annually, with the highest rates observed in children under 2 years old. Mortality rates are between 2.7 and 8%, while morbidity, including neurological deficits and cognitive impairment, affects 10–20% of cases.

Common Etiologies

The causes of CSE can be broadly categorized into acute symptomatic, remote symptomatic, and idiopathic or cryptogenic origins. Common acute causes include central nervous system (CNS) infections (e.g., meningitis and encephalitis), metabolic derangements (e.g., hypoglycemia and hyponatremia), traumatic injury, and drug-related issues (e.g., antiepileptic drug noncompliance or overdose). Remote causes include cerebral dysgenesis, perinatal hypoxic-ischemic encephalopathy, and prior brain injuries. Idiopathic causes remain unknown despite extensive investigation.

EMERGENCY MANAGEMENT PROTOCOLS (FLOWCHART 1)

Initial Assessment and Stabilization

The primary objectives in managing CSE are maintaining airway, breathing, and circulation (ABC), terminating the seizure, and addressing the underlying cause.

Airway Management

- *Positioning:* Place the child on their side to prevent aspiration and suction any accessible secretions. Avoid prying the mouth open.
- *Airway support:* Administer 100% oxygen by face mask. If respiratory depression or low oxygen saturation persists, consider assisted ventilation or intubation.

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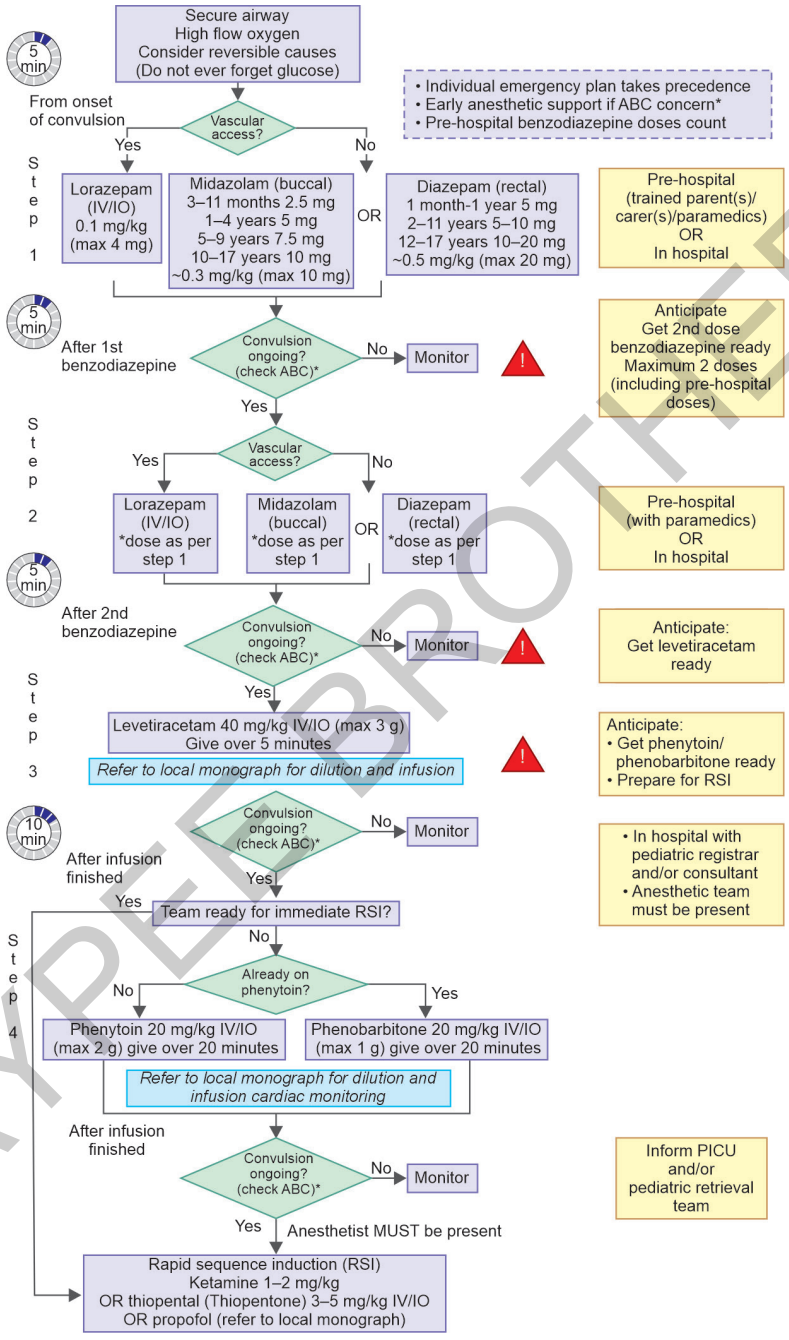
Flowchart 1: Management of convulsing child.



(ABC: airway, breathing, and circulation; IO: intraosseous; IV: intravenous; PICU: pediatric intensive care unit)
Source: Adapted from NEW Advanced Paediatric Life Support (APLS) algorithm on management of the convulsing child 2021. https://www.clinicalguidelines.scot.nhs.uk/nhsggc-guidelines/nhsggc-guidelines/emergency-medicine/status-epilepticus-management/.

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- *Monitoring:* Use cardiorespiratory and oxygen saturation monitors continuously. Intravenous (IV) access should be established promptly.

Circulatory Support

Vital signs: Monitor heart rate and blood pressure (BP). Increased heart rate and BP are common during convulsions but should normalize postseizure. Bradycardia, hypotension, and poor perfusion are critical signs, requiring immediate intervention.

Blood Glucose

Hypoglycemia management: Measure bedside blood glucose. If ≤2.6 mmol/L, administer a dextrose bolus (0.5 g/kg). Recheck glucose levels 3–5 minutes postbolus and repeat if necessary.

SEIZURE TERMINATION

First-line Treatment

Benzodiazepines are the first-line treatment for CSE. Administer these medications promptly, regardless of IV access status.

- *Prehospital:* Options include intramuscular (IM), intranasal, or buccal midazolam; buccal lorazepam; or rectal diazepam. Midazolam is preferred for its efficacy and ease of administration.
- *In-hospital:* IV lorazepam or midazolam are equally effective. If IV access is delayed, use buccal, nasal, or IM routes.

If seizures persist after two doses of benzodiazepines, initiate second-line medications.

Second-line Treatment (Table 1)

Second-line medications include fosphenytoin, phenytoin, levetiracetam, and valproate.

- *Fosphenytoin/phenytoin:* It is effective in 50–80% of cases but requires monitoring for cardiac arrhythmias and hypotension.
- *Levetiracetam*: It has similar efficacy with fewer respiratory and cardiovascular side effects. It is useful in children with respiratory depression or hemodynamic compromise.
- *Valproate:* It is effective but requires caution in patients with liver disease or suspected mitochondrial disorders.

TABLE 1: Anticonvulsant drug therapies for CSE.

Drug	*Route*	*Dose*	*Max*	*Repeat/risks/comments*
Midazolam	IV, IO	0.1 mg/kg	5 mg	May repeat once after 5 minutes, if still seizing hypotension, respiratory depression, and sedation
	IM	0.2 mg/kg	10 mg	
	Buccal	0.5 mg/kg	10 mg	
	Intranasal	0.2 mg/kg	10 mg (5 mg per nostril)	
Lorazepam	IV, IO, buccal	0.1 mg/kg	4 mg	• Hypotension, respiratory depression, and sedation • Use sublingual tablets for buccal route
Diazepam	IV, IO	0.3 mg/kg	• 5 mg (<5 years) 10 mg • (≥5 years)	Hypotension, respiratory depression, and sedation
	PR	0.5 mg/kg	20 mg	

(CSE: convulsive status epilepticus; IO: intraosseous; IM: intramuscular; IV: intravenous; PR: per rectum)

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Refractory Status Epilepticus (RSE)

If seizures persist despite first- and second-line treatments, consider RSE. Management may involve continuous midazolam infusion, pentobarbital, high-dose phenobarbital, or propofol. These require intensive care unit (ICU) management due to significant risks, including respiratory suppression and hypotension.

DIAGNOSTIC APPROACH

Initial Investigations

Perform investigations based on clinical presentation and history.

- *Blood tests:* Electrolytes, glucose, complete blood count, cultures (if sepsis is suspected), and blood gas analysis
- *Anticonvulsant levels:* Measure levels in patients on long-term anticonvulsant therapy.
- *Toxicology screening:* Urine and blood tests for potential toxins
- *Additional tests:* Serum calcium, blood urea nitrogen, magnesium, liver enzymes, lactate, and ammonia as indicated.

Imaging and Lumbar Puncture

- *Head CT scan:* It is indicated for trauma history, increased intracranial pressure (ICP), focal neurological signs, or unexplained loss of consciousness.
- *Magnetic resonance imaging (MRI):* It is considered when CT is inconclusive or for detailed brain imaging.
- *Lumbar puncture:* It is deferred until stable vitals and seizure cessation. Perform if CNS infection is suspected.

Management of Specific Conditions

Hypoglycemia

Administer dextrose bolus and recheck glucose levels, repeating as necessary.

Central Nervous System Infections

Administer IV antibiotics and antivirals urgently without delaying for culture results.

Raised Intracranial Pressure

Treat clinical signs of raised ICP or herniation immediately. Defer lumbar puncture in such cases.

Intoxication

Consider activated charcoal administration postseizure, if intoxication is suspected.

Nonconvulsive Status Epilepticus

If consciousness does not return postseizure or with neuromuscular paralysis, perform an electroencephalogram (EEG) to exclude non-CSE. Consult neurology for empirical treatment, if EEG is unavailable.

CONCLUSION

Effective management of CSE involves prompt assessment and stabilization, timely administration of appropriate medications, and thorough investigation to address underlying causes. Adhering to evidence-based protocols ensures better outcomes and minimizes the risk of long-term complications. All healthcare professionals involved in pediatric emergency care must be equipped with the knowledge and skills to manage CSE effectively.

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Pediatric Office Emergency Medicine (POEM) Training Module

The book *Pediatric Office Emergency Medicine (POEM) Training Module* aims to equip primary care pediatricians with the essential skills and knowledge needed to handle common office emergencies with confidence. This comprehensive guide focuses on practical, step-by-step management of everyday emergencies—from foreign body removal and minor trauma care to urgent procedures and time-sensitive interventions. Written by leading experts, this manual addresses the unique challenges faced by practitioners in both urban and peripheral settings. With clear protocols, detailed procedure guides, and practical tips for minimizing complications, this book is an indispensable resource for anyone providing frontline pediatric care. Special emphasis is placed on procedures that can be performed safely in office settings, potentially preventing unnecessary emergency room visits and reducing both family stress and healthcare costs.

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