Management of Prolonged Convulsive Epileptic Seizures in Children and Young People- Derby and Burton

Reference no.: CH CL G45

1. Introduction

- This is a default guideline based on APLS recommended practice for children presenting with convulsive status epilepticus, **EXCEPT** seizures occurring in the neonatal period (see separate protocol).

- If a child or young person has an individualised emergency seizure medication plan in place, this should always be consulted and used in place of this generic advice.

- Note neurosurgical patients may be more sensitive to benzodiazepines or conversely may be more resistant to anticonvulsant treatment

Definitions

• *Convulsive status epilepticus* should be diagnosed if a seizure with loss of awareness / stiffness / jerking or twitching has persisted for more than 5 minutes, or if there is no recovery of awareness between shorter repetitive seizures for the same period of time.

• *Prolonged convulsive epileptic seizure* should be diagnosed if a convulsive seizure with loss of consciousness / responsiveness has persisted for more than 2 minutes longer than a person's usual seizure, or if there is no recovery or awareness between shorter repetitive seizures for the same period of time. Focal motor seizures with preserved consciousness / responsiveness are generally less noxious and should be tolerated for a longer period before giving emergency treatment.

• Commence emergency treatment if convulsive epileptic seizure has persisted more than 5 minutes.

• Consider carefully whether the convulsion is still ongoing or settled, and whether it may be syncopal, dissociative / non-epileptic, tonic-vibratory spasms due to raised intracranial pressure (with decerebrate and / or decorticate posturing), a movement disorder e.g. acute dystonic crisis, a drug related occulo-gyric crisis or other non-epileptic seizure, especially if emergency treatment fails.

History

- Obtain information regarding this event, 1st hand witness account if possible; including what happened just before, the evolution of the episode, duration and what it looked like.

- Possible acute symptomatic causes:
    - ask about fever and measures taken to control it, recent infection or vaccination,
    - history of head injury, consider possibility of NAI
    - history suggestive of raised intracranial pressure
- Record current drug treatments, regular and emergency treatments already given, (compliance, timing, dosage, possible over-dosage)
- Check past history for previous episodes and their management, and other illnesses e.g. diabetes, neurosurgery
- Family history of epilepsy

Physical Examination

1) Assess and support cardio-respiratory status (ABC)

2) Assess the seizure semiology, including whether the patient appears conscious or responsive during the seizure, and which parts of the body are posturing or moving, stiff or jerking or making complex movements.

3) Look for evidence of a cause for the seizure:

ABC assessment including blood pressure and blood glucose

- D: Muscle tone and reflexes; pupil size, reaction and symmetry; fundi; signs of raised intracranial pressure (focal deficits, doll's eye movements, raised fontanelle); head circumference

- E: temperature, rash, trauma, skin signs of neurological disease

Investigations

In all patients: • Blood glucose at bed-side

Then if specifically indicated consider: • plasma glucose (laboratory), electrolytes, Ca, Mg, FBC, LFTs, blood cultures, Anti-seizure medication (ASM) levels*, toxicology screen. (See afebrile seizure, febrile seizure or reduced conscious level guideline).

* ASM levels taken at about the time of prolonged convulsive epileptic seizures are useful in that if the plasma or serum concentration is high (at or above the top of the target range),

that ASM may need to be changed. If the plasma or serum concentration is mid-range or low then it may be worth exploring reasons (e.g. poor adherence, or gastroenteritis) and / or increasing the dose.

If there are signs of raised ICP or focal neurological signs, further management including imaging should be considered and discussed with the appropriate senior registrar/consultant in ED/Paediatrics with onward referral to Neurology/Neurosurgery as required

Management Aims

1. Support vital functions (ABC). Give oxygen by mask. Position patient's head to allow optimal airway.

2. Control seizures to assist support of ABC. Consider intubation if respiratory assistance is needed.

3.Establish IV access. Draw venous blood sample for laboratory investigations. (see afebrile seizure or reduced conscious level guideline)

4. Fluid Therapy

Fluids may be restricted to 2/3 maintenance due to the risk of SIADH. This is unless the child is clinically dehydrated or has a fever when fluid requirements are increased. Avoid hypotonic fluids. Introduce feeds early. If hypoglycaemic, administer glucose 3 ml/kg of 10% glucose followed by maintenance fluids including glucose (see hypoglycaemia guideline).

5. Drug Therapy – see below

Lorazepam
0.1 mg/kg IV. Maximum dose 4 mg. Dilute with equal volume 0.9% saline. Administer total dose over 1-2 minutes.

Buccal Midazolam
Buccal Midazolam is the preferred route of administration of benzodiazepine if IV/IO access not available - 0.3 mg/kg. Administered to buccal fossa. Maximum dose 10mg.

Buccolam (10mg in 2ml) prefilled syringes have 4 available strengths. The *Buccolam* syringes are designed such that the whole dose is administered; partial administration of a pre-filled syringe is not recommended.

Buccolam syringe colour	Strength of buccal midazolam (mg)
Orange	10mg
Purple	7.5mg
Blue	5mg
Yellow	2.5mg

Epistatus (10mg/ml) is available as a bottle or as pre-filled syringes. If using the bottle then prescribe to the nearest ml or to 2.5mg, 5mg, 7.5mg, 10mg doses.

Rectal Diazepam
0.5 mg/kg PR. Maximum dose 20 mg (available in 2.5 mg, 5 mg and 10 mg rectal tubes) use in the absence of venous access if it is not possible to administer Buccal Midazolam.

Paraldehyde
0.8 ml/kg PR of paraldehyde pre-mixed solution is the standard dose. Note if not using the pre-mixed solution, the dose of paraldehyde needed is 0.4ml/kg, maximum dose 20 ml. May be given as an earlier (e.g. step 1) alternative status drug in selected children with personalized emergency plan e.g. previous benzodiazepine reaction.

Levetiracetam
Levetiracetam has been shown to have efficacy in treatment of prolonged seizures with low adverse effect profile. The EcLipse and ConSEPT trials showed no significant difference in time to clinical cessation of seizure activity using Levetiracetam instead of Phenytoin as the second-line drug for prolonged seizures following two benzodiazepine doses. Initial dose is 40mg/kg Levetiracetam IV over 5 minutes. IV Levetiracetam can be given if the child/young person already takes it regularly.
Note – if Levetiracetam is not effective in stopping the seizure, the next step may be RSI intubation if team ready, or phenytoin or phenobarbitone 3rd line if not ready for immediate RSI.

Phenytoin
IV loading dose of 20 mg/kg IV. Maximum dose 2000 mg if not previously on Phenytoin. It must be given into a 0.9% saline IV line with close BP and ECG control and at a maximum rate of 1 mg/kg/min initially (e.g. over 20 minutes). Doses up to 500 **mgs should be diluted in 50 ml 0.9% saline. Doses 500 mg – 1 g should be diluted in 100 ml 0.9% saline, (if** the child's fluid restriction prevents this, then Phenytoin should be diluted to 10 mg/ml or less concentrated). It must not be given IM. It can be given IO.

Phenobarbital (also referred to as Phenobarbitone)
IV Loading dose 20 mg/kg, dilute x 10 with water for injections and infuse over 20 minutes. It can be given IO.

Complications of status epilepticus

• Post ictal drowsiness and confusion, sleep or GCS <12 - usually resolves by 1 hour, however may last longer if a number of medications have been used to stop

the seizure; consider further investigations/management as per reduced conscious level guideline if prolonged beyond 1 hour.
• Facial / scalp / tongue lacerations
• Secondary hypoglycaemia
• Fractured vertebrae
• Todd's paresis
• Cerebral oedema
• Cerebral hypoxia – this may be reversible or irreversible (residual hemiparesis, temporal lobe damage)

Children with refractory convulsive status epilepticus will require admission to PICU for ventilation and further management. – see NUH PICU refractory status epilepticus guideline

If the child is still convulsing or suffers respiratory depression requiring intervention, e.g. airway support, then discussion with PICU is indicated

Inform anaesthetist / intensivist at stage 3 (i.e. if Phenytoin or Phenobarbital is needed) or if there is significant respiratory compromise (requiring intervention).

• If going to PICU, contact the Clinical Neurophysiology Department or the on-call Clinical Neurophysiology Technician (if out of hours) to plan EEG & CFAM, *after* any emergency brain imaging, even if convulsive movements have settled. Further advice from the Paediatric Neurology team may be helpful at this stage.

• Consider emergency brain imaging with CT or MRI before transfer to PICU if safe to do so, or at least before EEG / CFAM electrodes are applied.

Emergency Seizure "rescue" Medication - Discharge Planning

All children and young people who have experienced status epilepticus or a prolonged epileptic seizure require a seizure emergency plan on discharge. This may include an emergency medication.

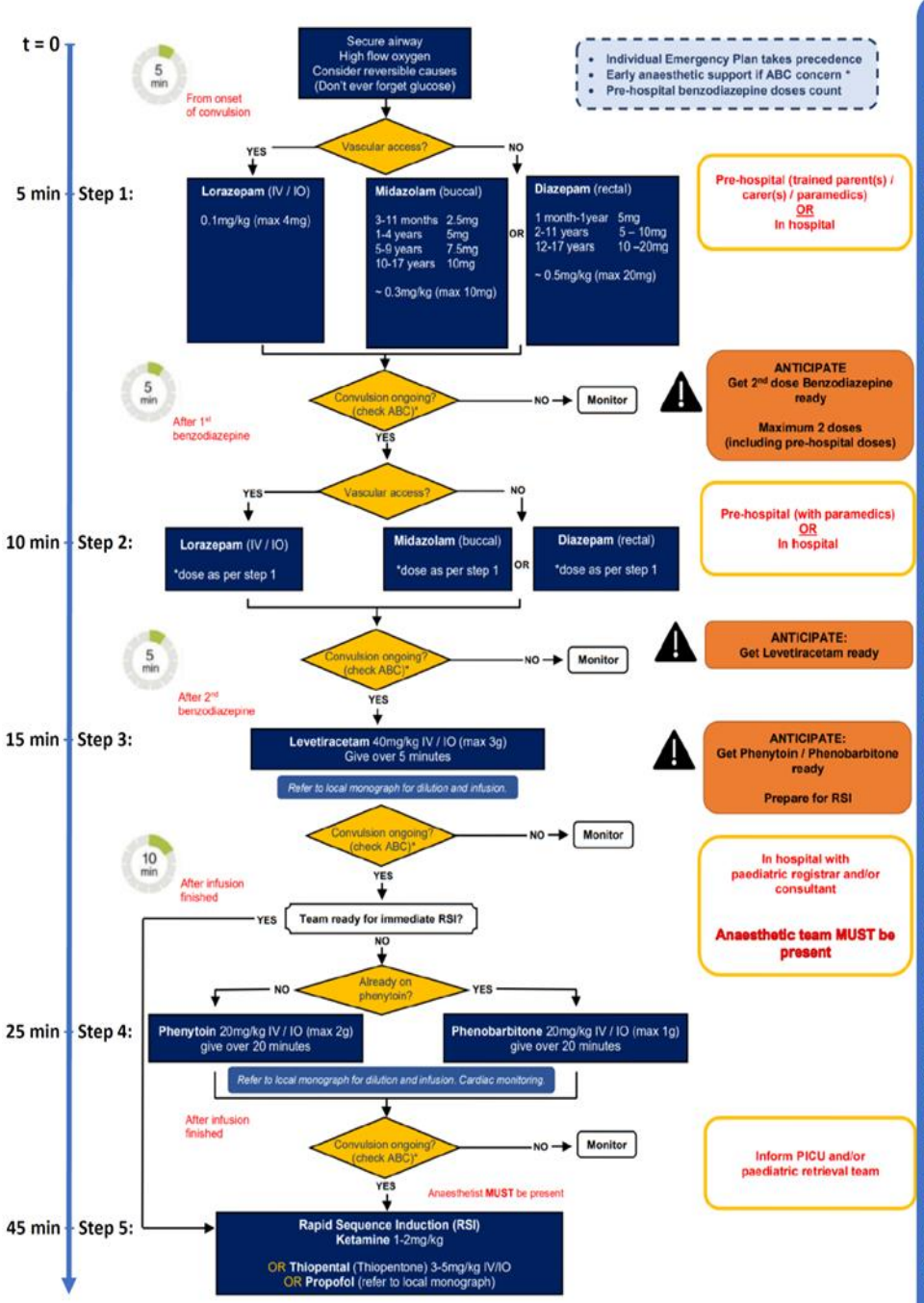
Buccal midazolam as 'rescue medication' at home should be considered in children who have had a previous prolonged convulsive seizure. This will always require formal training for the parents from either trained nursing staff or Epilepsy Specialist Nurses. Each patient will need a written care plan (usually completed at the time of training) and specific training is required for different formulations of buccal midazolam e.g. *Buccolam* or *Epistatus*. Most of the children who may be considered for buccal midazolam at home will have already received a benzodiazepine for prolonged convulsive status. Follow local guidelines regarding the need for test doses

Follow up

All children prescribed rescue medication, including those with prolonged febrile convulsions, should have ongoing follow up. This includes those who may remain seizure free and reach a point where rescue medication is no longer needed and then can be formally discontinued.

GUIDELINE POSTER. Management of Prolonged Convulsive Epileptic Seizures in Children &Young People older than 1 month. v06/09/03

Status epilepticus is an ongoing abnormally prolonged seizure(s). For generalised tonic clonic seizures this is > 5mins. It can have long-term consequences after 30 minutes including neuronal death, neuronal injury, and alteration of neuronal networks, (Trinka et al, ILAE definition; Epilepsia. 2015)



Advanced Life Support Group. *Advanced Paediatric Life Support*. 7th edn.

CEWT

Regional Supplement, 2023

Bloods
Blood glucose each time. First seizure bloods for U&E, Ca, Mg, FBC, LFTs, urine tox screen, blood cultures. ASM (Anti-seizure med levels each time.

Treat ?Cause
Consider parallel management of underlying cause (eg infection, reduced conscious level)

Benzodiazepine choice
If no IV or IO access, use buccal midazolam in preference to rectal diazepam where possible. Avoid more than 2 appropriate doses of benzodiazepines

Lorazepam
Dilute with equal volume 0.9% Sodium Chloride. Administer over 3-5 mins

Levetiracetam
Can be given if already on Levetiracetam. Dilute with Sodium Chloride 0.9% to a concentration of 50 mg/mL and give over 5 minutes.

Phenytoin
Close BP and ECG monitoring. Use inline 0.22-0.5 micron filter. Not more than 1mg/kg/min; Max rate 50mg/min; dilute to between 5-10mg/mL . Eg if 60-125mg, dilute to 12.5mL; if 125-250mg, dilute to 25mL; if 251mg-500mg dilute to 50mL; if 500mg-1g dilute to 100mL.

Phenobarbitone
Dilute to 20mg in 1ml with water for injection and give at a maximum rate of 1mg/kg/minute

Individual plans
May sometime include rectal paraldehyde or IV valproate

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'Rescue Medication' Discharge Planning

Buccal midazolam as 'rescue medication' outside hospital should be considered in children who have had a previous prolonged convulsive seizure. This always requires formal training for the parents from either trained nursing staff or Epilepsy Specialist Nurses. Each patient will need a written care plan (usually completed at the time of training). Specific training is required for different formulations of buccal midazolam e.g. *Buccolam* or *Epistatus*. Most of the children who may be considered for rescue buccal midazolam will have already received a benzodiazepine for prolonged convulsive status. In those children, however, who are benzodiazepine naïve a test dose may be considered to manage the low risk of respiratory depression. Follow local guidelines regarding the need for test doses.

Follow up

All children prescribed rescue medication, including those with prolonged febrile convulsions, should have ongoing follow up. This includes those who become seizure free. This should reach a point where rescue medication is no longer needed and then can be formally discontinued along with discharged.

References

2. *Epilepsies in children, young people and adults. NICE Clinical Guideline NG217, April 2022*
3. *McIntyre J, Robertson S, Norris E, Appleton R, Whitehouse WP, Phillips B, Martland, T, Berry K, Collier J, Smith S, Choonara I. Safety and efficacy of buccal midazolam versus rectal diazepam for emergency treatment of seizures in children: a randomised controlled trial. Lancet 2005;366:204-210]*
4. *APLS guideline [Advanced Life Support Group. Advanced Paediatric Life Support: the practical approach. 7th edition, updated algorithm 2023*
5. *North Central London Epilepsy Network for Children & Young People Guidelines, April 2005.*
6. *Mark Lyttle et al. Levetiracetam versus phenytoin for second-line treatment of paediatric convulsive status epilepticus (EcLiPSE): a multicentre, open-label, randomised trial. Lancet 2019; 393:2125-34*
7. *Dalziel et al. Levetiracetam versus phenytoin for second-line treatment of convulsive status epilepticus in children (ConSEPT): an open-label, multicentre, randomised controlled trial. Lancet 2019; 393:2135*
8. *Children's Epilepsy Workstream in Trent- CEWT guideline for management of prolonged convulsive seizures in children &young people older than one month*

9. Documentation Controls (these go at the end of the document but before any appendices)

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10. Appendices- none