
Clinical Guidance

Paediatric Critical Care: Status Epilepticus (SE)

Summary

This guideline is for the use of staff to use when caring for a child following a prolonged seizure or recurrent seizures without return to baseline between seizures. It looks at treatment, management options and investigations.

Document Detail	
Document type	Clinical Guideline
Document name	Paediatric Critical Care: Status Epilepticus
Document location	Evelina London website
Version	2
Effective from	April 2018
Review date	April 2021
Owner	PICU Head of Service
Author(s)	Jon Lillie, PICU Consultant
Approved by, date	Evelina CGC April 2018
Superseded documents	
Related documents	
Keywords	Evelina, child, Paediatric, intensive care, STRS, Retrieval, Paediatric critical care, PICU, status, status epilepticus, seizure, refractory seizures
Relevant external law, regulation, standards	
<p>This clinical guideline has been produced by the South Thames Retrieval Service (STRS) at Evelina London for nurses, doctors and ambulance staff to refer to in the emergency care of critically ill children.</p> <p>This guideline represents the views of STRS and was produced after careful consideration of available evidence in conjunction with clinical expertise and experience. The guidance does not override the individual responsibility of healthcare professionals to make decisions appropriate to the circumstances of the individual patient.</p>	

Change History		
Date	Change details, since approval	Approved by

Status epilepticus (SE)

Definition: prolonged seizure (>30 minutes) or recurrent seizures without return to baseline between seizures
 All seizures lasting > 5 minutes at risk of progressing to SE. Delay in initiating therapy increases risk of refractory seizures.

Majority of seizures are terminated by end of protocol, if not REFRACTORY STATUS EPILEPTICUS

<p>Causes</p> <ul style="list-style-type: none"> • Febrile convulsions and known epilepsy are most common • Consider also : CNS infection, hyponatraemia, hypoglycaemia, head injury (acute or previous), cerebral vascular event (infarct or bleed), space occupying lesion, blocked VP shunt, hypoxia, ischaemia, poisoning, inborn error of metabolism 	<p>Urgent investigations</p> <ul style="list-style-type: none"> • Finger prick blood glucose • FBC, Sodium, calcium, magnesium, urea, creatinine, CRP • Ammonia if neonate/suspect inborn error of metabolism • Consider toxicology screen (esp. teenagers) • Blood pressure (exclude malignant hypertension) • CT if focal signs/new focal seizure, trauma, possible VP shunt complication or space occupying lesion
<p>Management principles</p> <ul style="list-style-type: none"> • Maintain Airway, Breathing and Circulation • Treat seizures as soon as possible per algorithm below • Find and treat underlying cause • Minimize systemic complications e.g. hypoxia, hyperthermia, hypotension, hypoglycaemia 	<p>Potential problems</p> <ul style="list-style-type: none"> • Hypoventilation post benzodiazepines – majority can be extubated as soon as awake • Failure to recognise on-going seizures • Failure to identify and treat cause (e.g. low Na, low glucose)

Follow algorithm until seizure is terminated
 Consider pre-hospital treatment administered : maximum 2 doses benzodiazepines

0-5 min		Assess and support A irway and B reathing as required Apply high flow oxygen, attach monitoring Finger-prick glucose, obtain IV access						
Step 1 5 min	Assess & support Airway / Breathing/ CVS	<table border="1" style="width: 100%;"> <tr> <th style="width: 50%;">Intravenous access: YES</th> <th style="width: 50%;">Intravenous access: NO</th> </tr> <tr> <td style="text-align: center;"> IV Lorazepam 0.1mg/kg (Max 4mg) </td> <td style="text-align: center;"> Buccal Midazolam 0.5mg/kg (Max10mg) OR Rectal Diazepam 0.5mg/kg (Max 20mg) </td> </tr> </table>	Intravenous access: YES	Intravenous access: NO	IV Lorazepam 0.1mg/kg (Max 4mg)	Buccal Midazolam 0.5mg/kg (Max10mg) OR Rectal Diazepam 0.5mg/kg (Max 20mg)		
		Intravenous access: YES	Intravenous access: NO					
IV Lorazepam 0.1mg/kg (Max 4mg)	Buccal Midazolam 0.5mg/kg (Max10mg) OR Rectal Diazepam 0.5mg/kg (Max 20mg)							
Step 2 15 min		<table border="1" style="width: 100%;"> <tr> <td style="width: 50%;">Lorazepam 0.1mg/kg IV</td> <td style="width: 50%;">Paraldehyde PR 0.8mL/kg 50:50 mix</td> </tr> <tr> <td colspan="2" style="text-align: center;">IO if no IV access</td> </tr> <tr> <td colspan="2" style="text-align: center;">Call for senior help, start preparing drugs for step 3</td> </tr> </table>	Lorazepam 0.1mg/kg IV	Paraldehyde PR 0.8mL/kg 50:50 mix	IO if no IV access		Call for senior help, start preparing drugs for step 3	
Lorazepam 0.1mg/kg IV	Paraldehyde PR 0.8mL/kg 50:50 mix							
IO if no IV access								
Call for senior help, start preparing drugs for step 3								
Step 3 25 min		Is patient normally on phenytoin?						
		<table border="1" style="width: 100%;"> <tr> <th style="width: 50%;">NO</th> <th style="width: 50%;">YES</th> </tr> <tr> <td style="text-align: center;"> Phenytoin 20mg/kg by IV/IO • Give over 20 minutes • Extravasation risk • Paraldehyde PR if not yet administered </td> <td style="text-align: center;"> Phenobarbitone 20mg/kg IV/IO • Give over 5 minutes • Paraldehyde PR if not yet administered </td> </tr> </table>	NO	YES	Phenytoin 20mg/kg by IV/IO • Give over 20 minutes • Extravasation risk • Paraldehyde PR if not yet administered	Phenobarbitone 20mg/kg IV/IO • Give over 5 minutes • Paraldehyde PR if not yet administered		
NO	YES							
Phenytoin 20mg/kg by IV/IO • Give over 20 minutes • Extravasation risk • Paraldehyde PR if not yet administered	Phenobarbitone 20mg/kg IV/IO • Give over 5 minutes • Paraldehyde PR if not yet administered							
Step 4 45 min		Notify on call senior anaesthetist and inform PICU/ STRS						
60 min		Rapid sequence induction of anaesthesia: intubate and ventilate Propofol 2-4mg/kg IV (unless metabolic) or thiopental 3-5mg/kg IV Short acting muscle relaxant						
60 min		Reassess and consider: <ul style="list-style-type: none"> • Ongoing seizures –difficult to identify if muscle relaxed (pupils, heart rate, blood pressure) → refractory SE • CT if focal signs, focal/atypical seizure, trauma, possible raised ICP • Check sodium, magnesium, calcium and ammonia results • Specific therapies as appropriate: antibiotics, acyclovir, neurosurgery, etc • If intubated for hypoventilation, assess for extubation • Lumbar puncture should not be performed in child with reduced GCS 						

Important issues

- **Glucose** aim for 4-8 mmol/L
- **Hyponatraemia (Na<135)** if Na <135 mmol/L and still seizing OR Na < 130 mmol/L give bolus 3 mls/kg 2.7% sodium chloride
- **Keep temp** <37°C
- **Meningitis**
 Ceftriaxone 80 mg/kg IV
- **Encephalitis** add aciclovir + macrolide
- **Raised ICP-** on CT or clinical signs- treat aggressively

STRS management

- Confirm seizures stopped
- Does child need CT before transfer (?neurosurgical problem)
- Do not routinely change to nasal ETT as likely short ventilation time
- Avoid propofol for sedation if suspected inborn error of metabolism (e. g. LCAD)
- Attention to fever, low sodium or glucose

In PICU, stop all sedation and allow patient to wake up and extubate if:

- Seizures easily controlled
- No immediate requirement for further imaging
- No signs of raised ICP

Patient must wake up with no focal neurology to perform LP

Discuss with consultant if:

- Refractory seizures
- Delay in waking appropriately
- Known difficult seizure disorder
- Known metabolic disease
- Focal seizures or head trauma

REFRACTORY SEIZURES: inform STRS who will retrieve/ PICU consultant if in ELCH

- Aim to terminate seizures within 30 minutes with Midazolam infusion
- Bolus 0.1mg/kg & start infusion at 2 micrograms/kg/min (wait 10 minutes)
- Increase rate to **5, 10, 15, 20** micrograms/kg/min every **5 min** until seizure stopped
- DO NOT bolus on increments as escalation rapid
- Monitor for hypotension. Avoid muscle relaxation (masks seizures)
- Re-load with ½ dose (10 mg/kg) Phenytoin OR 10 mg/kg Phenobarbitone
- Ongoing seizures discuss urgently with PICU consultant and Neurology Consultant
- Consider Levetiracetam 30mg/kg IV (max 3 grams) over 5 minutes