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.

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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.

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.
Paediatric Critical Care

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 REFRATORY STATUS EPILEPTICUS

Causes
- Febrile convulsions and known epilepsy are most common
- Consider also: CNS infection, hypoxaemia, 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

Management principles
- 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

Follow algorithm until seizure is terminated

Consider pre-hospital treatment administered: maximum 2 doses benzodiazepines

0-5 min
Assess and support Airway and Breathing as required
Apply high flow oxygen, attach monitoring
Finger-pick glucose, obtain IV access

Step 1 5 min
- Intravenous access: YES
  - IV Lorazepam 0.1mg/kg (Max 4mg)
- Intravenous access: NO
  - Buccal Midazolam 0.5mg/kg (Max 10mg) OR Rectal Diazepam 0.5mg/kg (Max 20mg)

Step 2 15 min
- 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

Is patient normally on phenytoin?

Step 3 25 min
- NO
  - Phenytoin 20mg/kg by IV/IO
    - Give over 20 minutes
    - Extravasation risk
    - Paraldehyde PR if not yet administered
  - Notify on call senior anaesthetist and inform PICU/ STRS

- YES
  - Phenybarbitone 20mg/kg IV/IO
    - Give over 5 minutes
    - Paraldehyde PR if not yet administered

Step 4 45 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:
- Ongoing seizures – difficult to identify if muscle relaxed (pupils, heart rate, blood pressure) \( \rightarrow \) 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 hyperventilation, assess for extubation
- Lumbar puncture should not be performed in child with reduced GCS

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 \( 1/2 \) 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

Urgent investigations
- 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

Potential problems
- 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)

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