CLINICAL GUIDELINE FOR THE MANAGEMENT OF CONVULSIVE STATUS EPILEPTICUS IN CHILDHOOD V3.0
1. **Aim/Purpose of this Guideline**

1.1. This guideline applies to all nursing and medical staff caring for children with convulsive status epilepticus.

2. **The Guidance**

2.1. **Background**

Convulsive status epilepticus (CSE) in childhood is a life threatening condition with a serious risk of neurological sequelae. The outcome from an episode of CSE is mainly determined by its cause, although the duration of CSE and any pre-existing conditions in the child are also important. In general the longer the duration of the episode of CSE the more difficult it is to terminate. Status epilepticus is defined as a condition when a child has a seizure or cluster of seizures lasting for more than 30 minutes or successive convulsions without full recovery between them over a 30 minute period. Seizures persisting for longer than 5 minutes are less likely to stop spontaneously than shorter ones, so medical intervention is usually instituted at 5 minutes for convulsive status epilepticus. Status epilepticus may be convulsive (generalised or partial) or non-convulsive (absence/partial/hypsarrhythmic). Occasionally non paroxysmal disorders may be mistaken for status epilepticus, e.g. dystonia.

2.2. **General Information**

It has been estimated that 70% of children with epilepsy beginning in the first year of life will experience at least one episode of status and that approximately 8000 children under the age of 16 years of age will experience an episode of CSE per annum. Up to 5% of children with febrile seizures present in CSE.

The commonest causes of status epilepticus in childhood are secondary to fever/infection and with changes in medication. Other causes include metabolic disorders, congenital brain abnormalities, hypoxia, trauma, cerebral vascular problems and related to the use of other drugs.

CSE has a significant neurological morbidity (persistent epilepsy, motor abnormalities, learning and behavioural issues, 6% in over 3 years, 29% in those less than 1 year) and mortality (4%), particularly in the younger child and when there is underlying neurological abnormality. Structural brain damage as a result of CSE becomes more likely when seizures are prolonged making early aggressive treatment of seizures essential. ITU management may be necessary for refractory CSE or if there is respiratory/neurological depression as a consequence of treatment or of the underlying cause.

Since seizure control is more likely with early initiation of treatment, pre hospital treatment is important. Most children with CSE initially have normal cardiac and respiratory function, so early drug treatment carries a low risk of side effects. After arrival at hospital if the seizure continues there is the need for continuing pharmacological management as well as consideration of the investigation and management of any underlying condition causing the seizure disorder.

A seizure disorder is described as refractory if it persists beyond 60-90 minutes, in which case alternative therapeutic measures and/or investigations need to be considered.
This evidence based consensus guideline is not intended to cover all circumstances. There are patients with chronic epilepsy who will be known to respond to certain drugs and not to others. For these children an individual protocol is more appropriate. In addition seizures in neonates are managed differently to those of infants and children. This protocol is therefore suitable for the majority of children with CSE who present acutely to the ward or ED Department.

2.3. General Supportive Care

CALL PAEDIATRIC EMERGENCY RESPONSE TEAM (PERT) (X4444)

- **Airway** - establish/maintain
- **Oxygen** - 10-15 litres per/minute via face mask with reservoir
- **Breathing** – assess work, efficacy and effectiveness
  - Oxygen saturations with pulse oximeter
- **Circulation** – assess HR, P, Cap refill, BP and perfusion
  - Monitor heart rate/rhythm and BP if possible. Check BM, see ‘glucose’ below; give 20mls/kg saline if signs of shock: take bloods FBC CRP, Blood cultures, U+E, Calcium, save serum.
- **Disability** – pupillary size and reaction, posture, ?neck stiffness and fontanel
- **Exposure** – temperature, rash, ?poisoning, hypertension. Decorticate and decerebrate postures and dystonic attacks need to be differentiated.
- **Glucose** – and other laboratory investigations including Blood Gas if possible. If test unavailable treat as if hypoglycaemia ( <3 mmol/l) ; bolus 2mls/kg 10% dextrose IV, then 5ml/kg/hr. 10% dextrose with 0.45% saline. Unexplained hypoglycaemia take bloods as per hypoglycaemia pack.

History – present and past history including current febrile illness, recent trauma, history of epilepsy, individual care plan, poison ingestion, last meal.

**Treatment of Convulsive status epilepticus**

For children excluding neonates. To commence if seizure is continuing longer than 5 minutes.

If the seizure started outside hospital then likely to need to start step 1 immediately on arrival.

If the child has received 2 doses of benzodiazepines including any pre hospital medication proceed to step 3.

At step 4 take bloods for glucose, arterial blood gas, urea and electrolytes and calcium. Request urine collected (MC+S, save for toxicology).
2.4. **Flowchart.**
Progression through this protocol may be influenced by knowledge of the pre-hospital management of the child.

- **Airway**
  - High-flow oxygen
  - Don’t ever forget glucose

- **5 minutes after convulsion started**
  - Vascular Access?
  - Yes or can be established quickly

- **STEP 1**
  - Lorazepam 0.1 mg/kg IV/IO

- **STEP 2**
  - Lorazepam 0.1 mg/kg IV/IO
  - Call for senior help
  - Prepare phenytoin
  - If seizure is continuing 10 mins after start of step 1
  - Reconfirm it is an epileptic seizure

- **STEP 3**
  - Senior help is now needed
  - Seek anaesthetic/ICU advice
  - Phenytoin 20 mg/kg IV/IO over 20 min
  - Or if already on phenytoin give phenobarbital 20 mg/kg IV/IO over 5 minutes
  - If seizure is continuing 20 mins after the start of step 3 (start of infusion)
  - An anaesthetist MUST be present

- **STEP**
  - RSI with Thiopental (Thiopentone)
**Drugs**

**Lorazepam**

Lorazepam is equally if not more effective than Diazepam and possibly produces less respiratory depression. It has a longer duration of action (12-24 hours) than Diazepam (less than 1 hour). It appears to be poorly absorbed from the rectal route.

If Lorazepam is not available then Diazepam can be substituted at a dose of 0.25 mg/kg IV/IO.

**Diazepam**

This is an effective quick acting anticonvulsant which takes effect within minutes but whose action is short- lasting (about 40 mins to 1 hour). It has a depressant effect on respiration and this is enhanced by the addition of other anticonvulsants such as Phenobarbitone. Also repeated doses may make side effects more marked. The rectal dose is well absorbed.

**Paraldehyde**

Dose 0.4 mg/kg per rectum (0.3 mg/kg in children less than 6 months of age), made up as a 50/50 solution in olive oil or physiological saline. Arachis oil should be avoided (allergic reaction if peanut allergy). Paraldehyde causes rectal irritation but intramuscular Paraldehyde causes severe pain and may lead to sterile abscess formation. Paraldehyde causes little respiratory depression. It should not be used when there is known liver disease. Paraldehyde takes 10-15 minutes to act and its action is sustained for 2-4 hours.

*NB Do not leave Paraldehyde standing in a plastic syringe for longer than a few minutes.*

**Phenytoin**

Dose 20 mg/kg intravenously infused at no more than 1 mg/kg per minute. Infusion should be made up in 0.9% Sodium Chloride solution to a maximum concentration of 10mg in 1ml. Once started complete infusion even if convulsion has terminated. Consider measuring plasma Phenytoin levels 90-120 minutes after the completion of infusion.

Phenytoin can cause dysrhythmias and hypotension, and therefore an ECG monitor should be used and the BP monitored. It has little depressant effect on respiration.

Do not use this if the child is known to be on oral Phenytoin until the blood level of Phenytoin is known. Then only give it if the Phenytoin level is less than 5micrograms/ml. Phenytoin has a peak action within 1 hour but a long half-life that is dose-dependent. Its action is therefore more sustained than Diazepam.

**IV Sodium Valproate or IV Levetiracetam** may be alternatives to IV Phenytoin.

Consider IV pyridoxine in children under 3years if no obvious cause for CSE.
Thiopentone Sodium

Induction dose 4-8mg/kg IV. This is an alkaline solution which will cause irritation if it leaks into the subcutaneous tissues. It has no analgesic effect and is a general anaesthetic agent. Repeated doses have a cumulative effect. It is a potent drug with marked cardiorespiratory effects and should be used only by experienced doctors who can intubate a child. It is not an effective long-term anticonvulsant and its principal use in status epilepticus is to facilitate ventilation and subsequent management of cerebral oedema due to prolonged seizure activity. Other antiepileptic medications must be continued.

2.5. Aftercare

All children having had a prolonged seizure will need hospital admission for observation and if necessary further investigations. Admission to HDU is indicated if there are concerns about maintenance of airway, depressed neurological state, a need for continuing cardiac monitoring (Phenytoin) or when significant amounts of drugs have been required.

Children reaching step 4 will need ITU. Consider CT or MRI brain imaging.

For raised intracranial pressure, consider use of Mannitol 250-500mg/kg IV over 30-60mins or 3% saline 3ml/kg;
Maintain head up position 20º and head in line, Maintain PCO2 4.5-5.5 kPa.

Consider Dexamethasone for oedema around a brain space occupying mass, 500microgms/kg bd.
Catheterise as a full bladder can aggravate raised intracranial pressure.

Treat pyrexia with PR or IV paracetamol, or PR diclofenac.
Give IV antibiotics if not already administered if serious infection cannot be excluded, LP is contraindicated and will need to be deferred.
Ensure ongoing homeostasis, maintaining normoglycaemia, serum sodium between 135-145 mmol/l
Insert NG tube and aspirate stomach contents if reduced level of consciousness or intubated.
Support ventilation if hypoventilation is present.
Review causes of CSE and review current antiepileptic medication if appropriate. Review need for future rescue medication and care plan (Consultant decision).
3. Monitoring compliance and effectiveness

<table>
<thead>
<tr>
<th>Element to be monitored</th>
<th>Compliance with section 2.4 of guideline.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead</td>
<td>Audit lead Paediatric consultant</td>
</tr>
<tr>
<td>Tool</td>
<td>Documentation review at individual patient</td>
</tr>
<tr>
<td>Frequency</td>
<td>As per patient contact</td>
</tr>
<tr>
<td>Reporting arrangements</td>
<td>Paediatric consultants</td>
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<tr>
<td></td>
<td>Child health audit and guidelines meeting</td>
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<tr>
<td>Acting on recommendations and Lead(s)</td>
<td>Paediatric consultants</td>
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<tr>
<td></td>
<td>Child health audit and guidelines meeting</td>
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<tr>
<td></td>
<td>Required actions will be identified and completed in 3-6 months</td>
</tr>
<tr>
<td>Change in practice and lessons to be shared</td>
<td>Required changes to practice will be identified and actioned within 3-6 months. A lead member of the team will be identified to take each change forward where appropriate. Lessons will be shared with all the relevant stakeholders</td>
</tr>
</tbody>
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4. Equality and Diversity

4.1. This document complies with the Royal Cornwall Hospitals NHS Trust service Equality and Diversity statement which can be found in the 'Equality, Diversity & Human Rights Policy' or the Equality and Diversity website.

4.2. Equality Impact Assessment
The Initial Equality Impact Assessment Screening Form is at Appendix 2.
Appendix 1. Governance Information

<table>
<thead>
<tr>
<th>Document Title</th>
<th>Clinical guideline for the management of convulsive status epilepticus in childhood V3.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date Issued/Approved:</td>
<td>9th Nov 2017</td>
</tr>
<tr>
<td>Date Valid From:</td>
<td>9th Nov 2017</td>
</tr>
<tr>
<td>Date Valid To:</td>
<td>9th Nov 2020</td>
</tr>
<tr>
<td>Directorate / Department responsible (author/owner):</td>
<td>Sian Harris, paediatric consultant and epilepsy lead, WCSH division</td>
</tr>
<tr>
<td>Contact details:</td>
<td>01872 252728</td>
</tr>
<tr>
<td>Brief summary of contents</td>
<td>Management of a child presenting with Convulsive status Epilepticus.</td>
</tr>
<tr>
<td>Suggested Keywords:</td>
<td>Status, epilepticus,</td>
</tr>
<tr>
<td>Target Audience</td>
<td>RCHT</td>
</tr>
<tr>
<td>Executive Director responsible for Policy:</td>
<td>Medical Director</td>
</tr>
<tr>
<td>Date revised:</td>
<td>9th Nov 2017</td>
</tr>
<tr>
<td>This document replaces (exact title of previous version):</td>
<td>Clinical guideline for the management of convulsive status epilepticus in childhood V2.0</td>
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</table>
| Approval route (names of committees)/consultation: | Paediatric consultants
Directorate audit and guidelines meeting |
| Divisional Manager confirming approval processes | David Smith                                                                           |
| Name and Post Title of additional signatories | Not Required                                                                         |
| Name and Signature of Divisional/Directorate Governance Lead confirming approval by specialty and divisional management meetings | {Original Copy Signed}
Name: Caroline Amukusana |
| Signature of Executive Director giving approval | {Original Copy Signed}                                                                |
| Publication Location (refer to Policy on Policies – Approvals and Ratification): | Internet & Intranet | ✓ Intranet Only |
Clinical Guideline for the management of convulsive status epilepticus in childhood.

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Appendix 2. Initial Equality Impact Assessment Form

This assessment will need to be completed in stages to allow for adequate consultation with the relevant groups.

<table>
<thead>
<tr>
<th>Name of Strategy / Policy / Proposal / Service Function to be Assessed</th>
<th>Directorate and Service Area: Child Health</th>
<th>Is this a New or Existing Policy?</th>
<th>Existing</th>
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<tbody>
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<td>CLINICAL GUIDELINE FOR THE MANAGEMENT OF CONVULSIVE STATUS EPILEPTICUS IN CHILDHOOD V3.0</td>
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<table>
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<tr>
<th>Name of Individual Completing Assessment:</th>
<th>T. Fergus</th>
<th>Telephone:</th>
<th>01872252800</th>
</tr>
</thead>
</table>

1. **Policy Aim***
   - Who is the strategy / policy / proposal / service function aimed at?

   Clinical guideline for the management of convulsive status epilepticus in childhood. Includes flowchart.

2. **Policy Objectives***

   Clinical guideline for the management of convulsive status epilepticus in childhood. Includes flow chart.

3. **Policy – intended Outcomes***

   Evidence based, standardised practice.

4. **How will you measure the outcome?**

   Patient review and audit

5. **Who is intended to benefit from the policy?**

   Children and families

6a Who did you consult with?

   Workforce Patients Local groups External organisations Other

   ✗

b) Please identify the groups who have been consulted about this procedure.

   Clinical Guideline Group Paediatrics Directorate

What was the outcome of the consultation?

   Guideline agreed
7. The Impact
Please complete the following table. If you are unsure/don’t know if there is a negative impact you need to repeat the consultation step.

Are there concerns that the policy could have differential impact on:

<table>
<thead>
<tr>
<th>Equality Strands:</th>
<th>Yes</th>
<th>No</th>
<th>Unsure</th>
<th>Rationale for Assessment / Existing Evidence</th>
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<td>Age</td>
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<tr>
<td>Sex (male, female, trans-gender / gender reassignment)</td>
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<td>Race / Ethnic communities /groups</td>
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<tr>
<td>Disability - Learning disability, physical impairment, sensory impairment, mental health conditions and some long term health conditions.</td>
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<td>X</td>
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<tr>
<td>Religion / other beliefs</td>
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<td>X</td>
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<tr>
<td>Marriage and Civil partnership</td>
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<tr>
<td>Pregnancy and maternity</td>
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<td>Sexual Orientation, Bisexual, Gay, heterosexual, Lesbian</td>
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<td>X</td>
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You will need to continue to a full Equality Impact Assessment if the following have been highlighted:
- You have ticked “Yes” in any column above and
- No consultation or evidence of there being consultation- this excludes any policies which have been identified as not requiring consultation. or
- Major this relates to service redesign or development

8. Please indicate if a full equality analysis is recommended. | Yes | No |
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<tbody>
<tr>
<td></td>
<td>X</td>
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</table>

9. If you are not recommending a Full Impact assessment please explain why.

No areas indicated
Keep one copy and send a copy to the Human Rights, Equality and Inclusion Lead
c/o Royal Cornwall Hospitals NHS Trust, Human Resources Department, Knowledge Spa, Truro, Cornwall, TR1 3HD

This EIA will not be uploaded to the Trust website without the signature of the Human Rights, Equality & Inclusion Lead.

A summary of the results will be published on the Trust’s web site.

Signed Chris Warren

Date 09/11/17