DOCUMENT CONTROL PAGE

Title	**Title:** Guidelines for Management of Generalised Convulsive Status Epilepticus in Children **Version:** 1 **Reference Number:** PCCN1
Supersedes	**Supersedes:** n/a (new guideline) **Significant Changes:** n/a
Originator or modifier	**Originated By:** North West and North Wales Paediatric Critical Care Network **Guideline authors:** H. Northover, Consultant Paediatrician, Royal Bolton Hospital. T. Martland, Consultant Paediatric Neurologist, Royal Manchester Childrens Hospital. R. Appleton, Consultant Paediatric Neurologist, Alder Hey Childrens Hospital. J. Samuel, Consultant Paediatric Intensivist, Royal Manchester Childrens Hospital.
Ratification	**Ratified by:** 1. CMFT Paediatric Medicines Management Committee (MMC) Date of Ratification: **6th June 2012.** 2. AHFT Critical Care Clinical Business Unit on: **29th August 2012**.
Application	**Patients –** Children only Recommended for use for the management of paediatric patients in district general hospitals in the North West and North Wales Paediatric Critical Care Network presenting in status epilepticus. Local ratification is also advised.
Circulation	**Issue Date: 15th November 2012** **Circulated by:** Clinical Lead, North West and North Wales Paediatric Critical Care Network **Dissemination and Implementation:** Refer to section 7
Review	**Review Date: Reviewed by Authors September 2014. No changes made. CMFT Divisional Children's Clinical Effectiveness Committee notified. New review date of June 2017 set.** **Responsibility of:** Clinical Lead/Network Manager, North West and North Wales Paediatric Critical Care Network.

Date placed on the Intranet: **22nd November 2012**	**Please enter your EqIA Registration Number here:** **258/11** **Refer to section 2: Equality, Diversity and Human Rights Impact Assessment**

1 Detail of Procedural Document.

Guidelines for Management of Generalised Convulsive Status Epilepticus in Children

2 Equality, Diversity and Human Rights Impact Assessment.

2.1 The best way to promote equality is to make sure it is embedded into all procedural documents. All Trust procedural documents must be inclusive. It is important to address, through consultation, the diverse needs of our community, patients, their carers and our staff. This will be achieved by working to the values and principles set out in the Trust's Equality, Diversity and Human Rights Strategic Framework. The Trust is committed to ensuring all new procedural documents and functions are impact assessed and monitored in accordance within the letter and the spirit of the law regarding equality. The Trust's Equality, Diversity and Human Rights Strategic Framework can be found on the Trust's Intranet or from the Service Equality Team.

2.2 Please contact the Service Equality Team (SET) on **Ext 66897** for support to complete an initial assessment. Upon completion of the assessment, SET will assign the Policy a unique EqIA Registration Number.

3 Consultation, Approval and Ratification Process

3.1 Consultation Process, Consultation and Communication with Stakeholders

This guideline was developed with input from clinical teams within the North West and North Wales Paediatric Critical Care Network (PCCN). Stakeholders are:

- Representative from the North West Specialised Commissioning Team
- Representatives from both PICUs (Central Manchester University Hospitals NHS Foundation Trust and Alder Hey NHS Foundation Trust)
- North West and North Wales Paediatric Transport Service (NWTS)
- Representatives from the 32 Hospitals within the PCCN

This guideline has been circulated to the mailing list for the network with a request for comment. Comments received have been reviewed and appropriate amendments incorporated.

3.2 Policy Approval Process

From 1st April 2011 CMFT became the host organisation for the PCCN and following this, all existing or new policies will be ratified via CMFT processes.

3.3 Ratification Process

Please see appendix 1.

These guidelines were circulated amongst the North West and North Wales Paediatric Critical Care Network for comments on 10th May 2011. These guidelines were signed off by the Network's Clinical Lead on 14th November 2011.

4. Dissemination Implementation

Upon ratification:

- The membership of the North West and North Wales Paediatric Critical Care Network will be informed of the ratification.
- Guidelines will be placed on the websites of both this Network and the North West/North Wales Paediatric Transport Service.
- A parallel process will be carried out in Alder Hey NHS Foundation Trust and other hospitals will be able to consider should they wish this document to go through their own ratification process.

5. References and Bibliography

See guidelines

6. Disclaimer

These clinical guidelines represent the views of the North West and North Wales Paediatric Critical Care Network and North West and North Wales Paediatric Transport Service, which were 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.

Clinical advice is always available from NWTS on a case by case basis. Please feel free to contact us regarding these documents if there are any queries.

NWTS North West & North Wales Paediatric Transport Service

NHS North West & North Wales Paediatric Critical Care Network

Guidelines for Management of Generalised Convulsive Status Epilepticus in Children

Pre hospital setting

Diazepam 0.5mg/kg rectal or Midazolam 0.5mg/kg buccal

Hospital setting

Assess and secure Airway / Breathing / Circulation. Administer high flow oxygen. Check blood glucose and other investigations as appropriate (see page 5). Confirm seizure clinically. Treat hypoglycaemia if present (2ml/kg 10% glucose followed by maintenance). Consider aciclovir, ceftriaxone and erythromycin if aetiology uncertain and infection suspected.

Preferred Treatment Pathway: intravenous (iv) or intraosseous (io) access obtained: lorazepam 0.1mg/kg (max 4mg) over 1 minute

No intravenous or intraosseous access obtained: midazolam 0.5 mg/kg buccal (max 10mg)

Seizure continues after 10 minutes: **Call for senior help**

Only one dose of benzodiazepine given so far

Lorazepam 0.1mg /kg iv or io (max 4mg)

Seizure continues after 10 minutes

2 doses of benzodiazepines given including prehospital treatment

Phenytoin 20mg/kg iv or io over 20 minutes
(infusion rate of 1mg/kg/minute not to exceed 50mg/min, total dose not to exceed 1 gram)
If already on phenytoin then give
Phenobarbital 20mg/kg over 10 to 20 minutes (iv or io)
Consider giving paraldehyde 0.4ml/kg PR (dilute with equal volume of olive oil) (or 0.8 ml/kg of prediluted preparation) AT THE SAME TIME of administration of phenytoin or phenobarbital. Discuss with consultant. Do not delay or omit administration of phenytoin or phenobarbital. (Please see notes).

Seizure continues at end of phenytoin or phenobarbital infusion:
Refractory status epilepticus – call anaesthetist / intensivist
Rapid sequence induction with thiopentone (4mg-8mg/kg) preferred.
Contact NWTS and /or PICU.

Date of Approval: 6th June 2012

Date of Review: 6th June 2014

Originated By: North West & North Wales Paediatric Critical Care Network

Notes

- Most seizures in childhood stop within five minutes, therefore in practice treatment should start if the seizure has not spontaneously terminated after 5 minutes.
- Seizures of longer duration are more difficult to terminate, prolonged seizures (>30 minutes) can cause neuronal death.
- Convulsive status epilepticus is a life-threatening condition, and may result in serious neurological sequelae.
- Refractory status occurs in up to 30% of patients and is associated with high morbidity and mortality, the major aetiology in children is infection with fever.
- For children under 18 months & idiopathic status epilepticus, consider pyridoxine 100 mg IV if not previously trialled, **but be aware** of the possibility of apnoea after administration. Discuss with paediatric neurologist prior to use.
- **Paraldehyde:** if used (at consultant discretion), should be given only **after** the decision to administer a definitive long-acting anticonvulsant (phenytoin or phenobarbital) is made, and should not delay the administration of phenytoin or phenobarbital. If the seizure terminates with paraldehyde prior to administration of phenytoin/phenobarbital, definitive long-acting anticonvulsant should still be given.
- Anti-infective therapy if appropriate should include a cephalosporin, a macrolide as well as aciclovir if aetiology is uncertain, and may be determined by local hospital guidelines.

Investigations

- Anti epileptic drug (AED) concentrations should probably be measured when a child with epilepsy on AED prophylaxis develops status epilepticus because non-concordance is a relatively common cause of paediatric status.
- Phenytoin concentrations should ideally be measured 1 to 1.5 hours after the loading dose has been completed.
- Toxicology testing may be considered in children with status epilepticus, when no apparent aetiology is immediately identified. To detect a specific ingestion, suspected because of the clinical history, it should be noted that a specific serum toxicology level is required, rather than simply urine toxicology screening.
- Studies for inborn errors of metabolism should be considered when the child is < 3 years of age, when the preceding history or examination findings (eg: failure to thrive, hepatosplenomegaly, microcephaly) suggests a possible underlying metabolic disorder, or where the initial evaluation reveals no clear cause.

Neuroimaging studies: CT/MRI scanning

- Neuroimaging may be considered for the evaluation of the child in status epilepticus if there is a suspicion of an underlying structural cause (eg: trauma, haemorrhage, unilateral status), encephalitis or if the cause is unknown.
- Neuroimaging should only be undertaken after the child is appropriately stabilized and the seizure activity controlled.

Baseline Investigations:

In the febrile child

- Blood cultures / CRP / viral and bacterial PCR.

In all children with seizures lasting >30 minutes consider: FBC / clotting / biochemistry / liver function tests / amylase / blood gases / Ca / Mg / lactate / neurometabolic tests as indicated.

Avoid lumbar puncture immediately after a prolonged seizure because of the risk of raised intracranial pressure.

Potential sequelae of convulsive status epilepticus

- Death (rarely).
- Blood glucose changes - initial hyperglycaemia, later hypoglycaemia.
- Cerebral oedema – ventilate to normal pH and avoid hypercarbia. Prevent hyponatraemia. Maintenance fluids should be 0.9% NaCl with glucose as required. Avoid fluid overload; restrict fluids to 70% of normal requirements. Consider 2.7% sodium chloride or mannitol if features suggestive of raised ICP.
- Hyperkalaemia.
- Renal failure - from rhabdomyolysis.
- Disseminated intravascular coagulopathy.
- Pulmonary oedema.
- Seizure recurrence: seizures often recur within 4-6 hours after cessation of the presenting seizure because of the short-acting nature of benzodiazepines.
- Irreversible brain damage.
- Chronic epilepsy.

Paralysis

- Paralysis should only be used during intubation or during transport.
- Discontinuation of paralysing agents allows monitoring of ongoing seizure activity.
- Ongoing seizure activity should be discussed with a tertiary centre.
- Ongoing seizure activity should be managed with escalating doses of anticonvulsant therapy, **not** paralysis.

Extubation of the child intubated for status epilepticus

Early extubation of the child with uncomplicated CSE is recommended as this reduces the risks associated with transfer, and prolonged ventilation, as well as reducing the impact of hospitalisation on the family.

Consider the reason for intubation:

- Apnoea/respiratory depression secondary to anticonvulsant therapy; these children are more likely to be successfully extubated locally.
- Intractable seizures; refractory CSE is a complex disorder and requires specialist advice; these children are less likely to be extubated locally, and are more likely to require neuro-imaging, or transfer to a specialist unit for ongoing management.

Consider extubation if the following criteria are present:

- Seizures are controlled with long-acting anticonvulsant therapy.
- Normal neuro-imaging (CT or MRI) or no change from previous imaging if available.
- On withdrawing sedation, neurological status is unchanged from pre-morbid state.
- No flexor or extensor posturing.
- Intact airway protective reflexes.
- Good respiratory drive; (end tidal CO_2 is normal) and minimal settings on ventilator.
- Normal biochemistry and blood glucose.
- No concerns about a difficult airway.
- Clinical support is available (to re-intubate if necessary).

Resources

www.crashcall.net - for intubation drugs / sedation regime

Contact numbers:
Regional Paediatric Intensive Care Unit Alder Hey Childrens Hospital 0151 252 5241
Regional Paediatric Intensive Care Unit Royal Manchester Childrens Hospital 0161 701 8000
North West and North Wales Paediatric Transport Service 01925 853 550

Additional notes.
These guidelines have been developed in line with the Status Epilepticus Working Group updated recommendations (2010).

Selected References:
Appleton et al. Lorazepam v diazepam in the acute treatment of epileptic seizures and status epilepticus. Dev Med & Child Neurology 37 683-8

Appleton R et al. The treatment of convulsive status epilepticus in children. The Status Epilepticus Working Party. Archives of Disease in Childhood 2000.83(5):415-419

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McIntyre et al. Safety and efficacy of buccal midazolam versus rectal diazepam for emergency treatment of seizures in children: a randomised controlled trial. Lancet. 2005 Jul 16-22;366(9481):205-10

British National Formulary for Children (BNFC) 2011-2012

Advanced Paediatric Life Support Manual 5th Edition 2011

Guidelines consulted.
Children's acute transport service (CATS) guidelines

Infants and children: acute management of seizures second edition. Clinical practice guidelines (NSW Department of Health : www.health.nsw.gov.au)

Clinical practice guidelines – Royal Childrens Hospital, Melbourne.

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North West and North Wales Paediatric Critical Care Network Membership Group

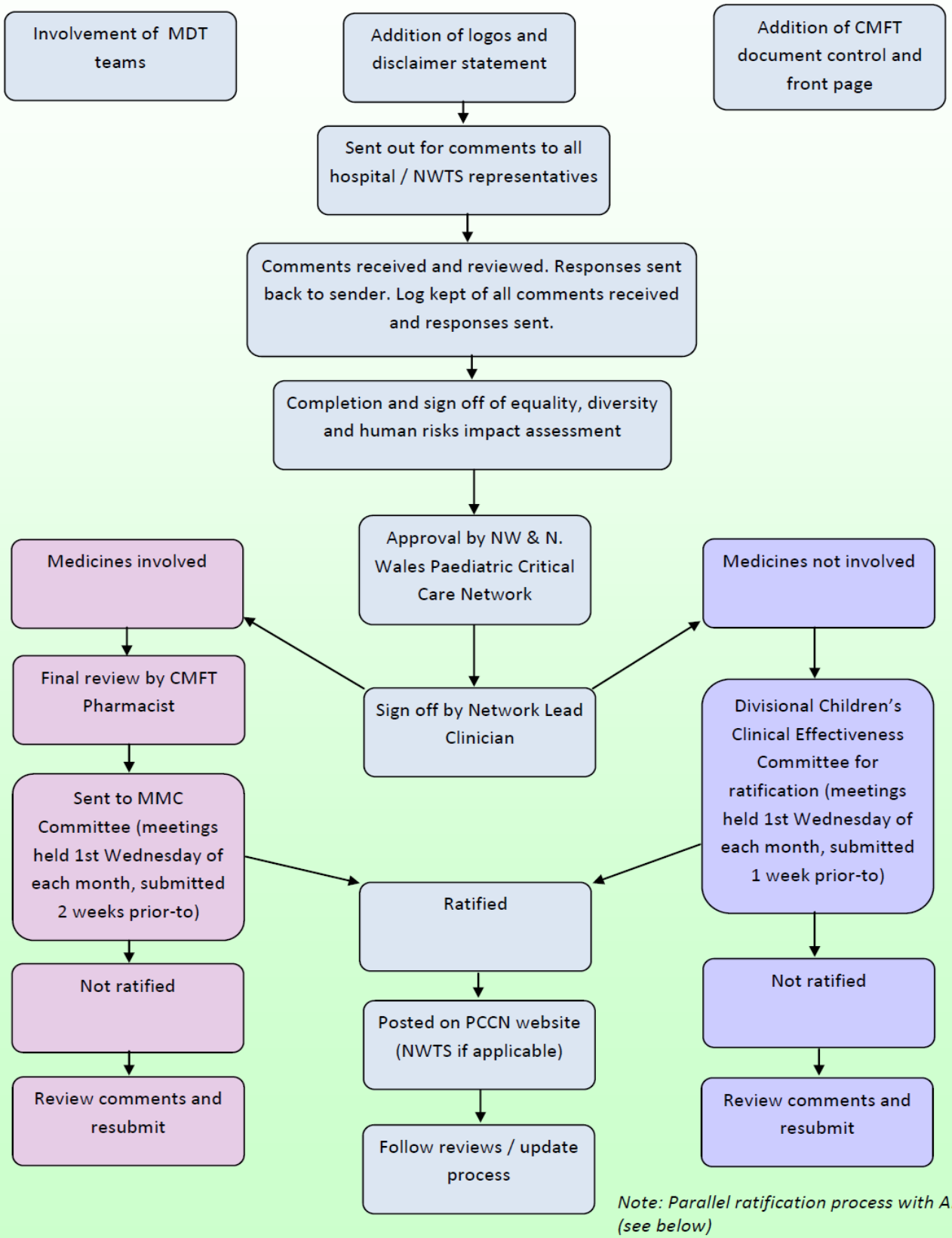
Developed: November 2011
Review date: June 2017

Guideline contact point: Suzanne Dixon on (0161 701 8146) or suzanne.dixon@cmft.nhs.uk
Please visit our website for the most up to date version of this guideline:
www.networks.nhs.uk/nhs-networks/north-west-north-wales-paediatric-critical-care

Appendix 1

Alder Hey Children's NHS Foundation Trust | North West & North Wales Paediatric Critical Care Network | Central Manchester University Hospitals NHS Foundation Trust

Ratification of Guidelines with Host Organisation (CMFT)



Note: Parallel ratification process with AHFT (see below)

Appendix 1 continued

Alder Hey Children's NHS Foundation Trust | North West & North Wales Paediatric Critical Care Network | Central Manchester University Hospitals NHS Foundation Trust

Ratification of Guidelines with Alder Hey