Lancashire and South Cumbria Network

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Managing convulsive (tonic-clonic) status epilepticus (adults)

Professor S Chhetri
Clinical Professor and Consultant Neurologist
Clinical Director for Neurology
Co-Director, Lancashire and South Cumbria MND Care and Research Centre
Royal Preston Hospital

Hannah Berry
Lead Pharmacist - Emergency Department
Blackpool Victoria Hospital (BVH)
Blackpool Teaching Hospitals NHS (BTH)

Shaun Morgan
Lead Pharmacist - Critical Care
Royal Blackburn Teaching Hospital (ELHT)
East Lancashire Hospitals NHS Trust

Lauren Kilifin (Version 1)
Lead Pharmacist- ED & Admissions (RLI)
& IVIG and Homecare (UHMB) Pharmacist
Practitioner in acute medicine

Jenny Oakley
Lead Pharmacist - Surgery and Families
Royal Lancaster Infirmary
University Hospitals of Morecambe Bay (UHMB)

Andrew Duncan (Version 2)
Advanced Clinical Pharmacist – Critical Care
Blackpool Teaching Hospitals NHS Foundation Trust

Version 2 Approved by: Approved:*** Review: April 2028

CONTENTS

Automatic Contents page. Place cursor onto Contents page above and press F9 Return to update. All procedural documents with 10 or more pages must utilise a contents page. The template has been designed with an 'automatic' contents page.

1 Introduction / Purpose

This is a guide for the in-hospital care drug management of adult patients with status epilepticus. It is aimed at all staff involved with caring for patients.

2 General Principles / Target Audience

Adult patients with convulsive (tonic-clonic) status epilepticus

Excludes
- All paediatric cases
- Adults in whom a different approach or an alternative care plan has been put in place e.g., patients in the last days/weeks of life

3 Definitions and Abbreviations

ABCDE – Airway, Breathing, Circulation, Disability, Exposure
AED's – Anti-epileptic drugs
BNF – British National Formulary
BTH- Blackpool Teaching Hospitals
ECG – electrocardiogram
EDC – Emergency Drug Cupboard
ELHT- East Lancashire Hospitals NHS Trust
GCS – Glasgow Coma Score
IV – intravenous
IM – intramuscular
LTH – Lancashire Teaching Hospitals
MHRA –Medicines and Healthcare products Regulatory Agency
PNES - Psychogenic nonepileptic seizures
PR – per rectal
SE – status epilepticus
SPC – Summary of product characteristics
UHMB - University Hospitals of Morecambe Bay

4 References and Associated Documents

- Barsan W, Cloyd J, Pharm D, et al. Randomized Trial of Three Anticonvulsant Medications for Status Epilepticus. N Engl J Med Published Online First: 2019. doi:10.1056/NEJMoa1905795
- Chamberlain JM, Kapur J, Shinnar S, et al. Efficacy of levetiracetam, fosphenytoin, and valproate for established status epilepticus by age group (ESETT): a double-blind, responsive-adaptive, randomised controlled trial. Lancet. 2020;395(10231):1217-1224. doi:10.1016/S0140-6736(20)30611-5
- eBNF – accessed 06/07/2020.
- Kinney, M. O., Brigo, F., & Kaplan, P. W. (2020). Optimizing status epilepticus care during the COVID-19 pandemic. Epilepsy and Behavior, 109, [107124]. https://doi.org/10.1016/j.yebeh.2020.107124
- Injectable Medicines Guide NHS. Last updated 18/06/2020. Phenytoin Sodium Monograph on http://medusa.wales.nhs.uk/ available via Medicines Management Site free access, via free password/username, accessed 06/07/2020.

- Injectable Medicines Guide NHS. Last updated 21/08/2018. Levetiracetam Monograph on http://medusa.wales.nhs.uk/ available via Medicines Management Site free access, via free password/username, accessed 06/07/2020.
- Injectable Medicines Guide NHS. Last updated 01/06/2016. Sodium Valproate Monograph on http://medusa.wales.nhs.uk/ available via Medicines Management Site free access, via free password/username, accessed 06/07/2020.
- Intrapharm Laboratories Ltd. 2020. Levetiracetam 100 mg/ml concentrate for solution for infusion. Accessed 06/07/2020. https://www.medicines.org.uk/emc/product/11035/smpc
- Mercury Pharmaceuticals Limited. 2020. Phenytoin Sodium 50mg/ml Solution for Injection. Accessed 06/07/2020. https://www.medicines.org.uk/emc/product/4326
- MHRA. 2018. Valproate use by women and girls. Accessed 06/07/2020. https://www.gov.uk/guidance/valproate-use-by-women-and-girls
- Wrexham Maelor Hospital Pharmacy Department. Last updated June 2020. The NEWT Guidelines for administration of medication to patients with enteral feeding tubes or swallowing difficulties. Accessed 06/07/2020 with username and password https://access.newtguidelines.com/index.html
- NHS Improvement. (09/11/2016). Risk of death and severe harm from error with injectable phenytoin - NHS/PSA/W/2016/010. Accessed 06/07/2020. https://improvement.nhs.uk/news-alerts/risk-death-and-severe-harm-error-injectable-phenytoin/
- NICE guideline. NG 217 Epilepsies in children, young people and adults. Published: 27 April 2022. Accessed 27/06/2022
- NICE Epilepsies: diagnosis and management Clinical Guideline 137. Last updated 11/02/2020. Accessed 06/06/2020. https://www.nice.org.uk/guidance/cg137/chapter/Appendix-F-Protocols-for-treating-convulsive-status-epilepticus-in-adults-and-children-adults-published-in-2004-and-children-published-in-2011
- The Renal Drug Database. 2018. Phenytoin Monograph. Last updated 22/02/2018. Accessed 28/07/2020 via: https://renaldrugdatabase.com/monographs/phenytoin
- UKMi Medicines Q&A 444.4: How to minimise the risks to patients when using intravenous phenytoin in status epilepticus (SE)?, accessed 06/07/2020. https://www.sps.nhs.uk/articles/how-can-we-minimise-the-risks-to-patients-when-using-intravenous-phenytoin-in-status-epilepticus-se/
- UpToDate. Last updated 01/06/2020. Psychogenic nonepileptic seizures. Accessed 06/07/2020. https://www.uptodate.com/contents/psychogenic-nonepileptic-seizures?search=PNES&source=search_result&selectedTitle=1~38&usage_type=default&display_rank=1
- Wockhardt UK Ltd. 2020. Sodium Valproate 100mg/ml Solution for Injection or Infusion. Accessed 06/07/2020. https://www.medicines.org.uk/emc/product/1209

5 Main Part of the Procedural Document

Status Epilepticus (SE) is prolonged, uncontrolled seizure activity that is life threatening and if left untreated, mortality approaches 30%. It is a medical emergency that requires immediate anti-convulsive therapy to terminate the seizure and limit neurological damage. Validated treatment algorithms have been proven to improve outcomes in these patients. Convulsive seizures lasting longer than 5 minutes or recurring without recovery should be treated as SE.

Phenytoin has been the first line choice after benzodiazepines in SE for many years. However, NICE published updated guidance in April 2022 regarding the choice of second line antiepileptic drug if benzodiazepines had failed to terminate seizures.

"The committee agreed that the evidence for further antiseizure medication, if seizures continue after 2 doses of a benzodiazepine, showed a benefit for the intravenous administration of levetiracetam, phenytoin or valproate, but did not favour 1 specific medication over the others. However, based on their experience, the committee agreed that levetiracetam can be quicker to prepare, easier to administer and may be associated with fewer adverse effects than the alternative options, so it is likely to become the preferred second-line treatment. However, because the evidence showed no difference in efficacy, the committee agreed that phenytoin or valproate can also be considered. If status epilepticus does not respond to 1 of these medications, the committee agreed that another second-line medication should be considered."

This guidance will advise how to administer all three drugs (levetiracetam, phenytoin, and sodium valproate); in addition to important safety alerts and monitoring that must be done.

MHRA warning for ALL PATIENTS regarding sodium valproate:

Perform a pregnancy test for all patients with childbearing potential if able when assessing (and treating) for seizures.

Ensure patients who go on to receive single doses/shorts courses of sodium valproate are counselled on the associated risk of pregnancy and are advised to avoid pregnancy for at least 3 months after receiving sodium valproate

Refer to local trust guidelines regarding the use of sodium valproate in women and men of childbearing age for further information.

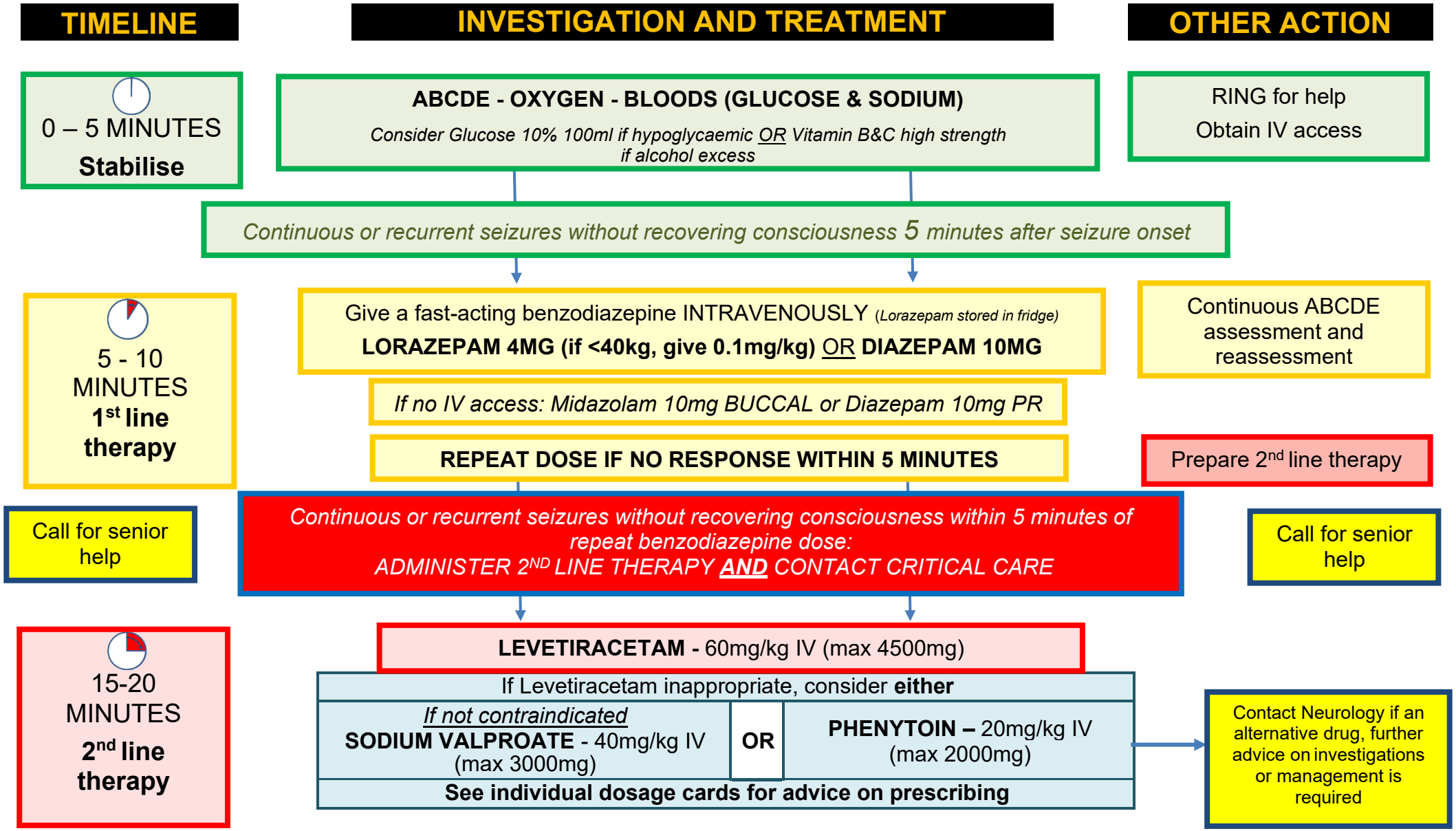
For all medication, strict aseptic techniques must be used throughout the procedure of preparation and administration.

Appropriate reversal agents must be available with staff able to administer them appropriately, i.e. medication for anaphylaxis, and flumazenil for benzodiazepine reversal.

If seizure activity continues beyond administration of the loading dose, ensure critical care are involved in the management of the patient as the patient may require an anaesthetic in order to terminate seizure activity.

NOTE: prescription and administration of loading doses (for the management of status epilepticus) of Sodium Valproate or Levetiracetam is "off-label".

5.1 Quick algorithm to follow for managing status epilepticus



5.2 Initial management – investigations and monitoring

- Assess and treat the patient using ABCDE approach
    - Airway
    - Breathing
    - Circulation
    - Disability
    - Exposure

Assess and monitor the patient as per relevant observation scoring system:
National Early Warning Score (NEWS2) or Modified Early Obstetric Warning Score (MEOWS) if the patient is pregnant and Neurological Observation Chart:

- Heart rate
- Respiratory rate
- Blood pressure
- Temperature
- Oxygen saturation
- Blood glucose – if hypoglycaemic (blood glucose <4mmol/l) consider Glucose 10% 100ml over 15 mins
- Glasgow Coma Score (GCS)
- Ensure adequate oxygenation
    - Administer oxygen to ensure SPO_2 is maintained >94% (if appropriate, 88-92% in patients at risk of type 2 respiratory failure)
    - Ensure this is prescribed (even if retrospectively as not to delay administering oxygen to a patient with reduce oxygen saturations) on the drug chart as this is a prescription only medication
    - Contact critical care immediately if the patient cannot maintain their own airway
- Establish peripheral venous access
- Pregnancy test if the patient is female and of childbearing potential
- Establish a detailed drug history and check for any serum concentrations of anti-epileptics
- Identify potential causes of seizure activity

Care must be taken when identifying potential causes of seizure activity. It is important to bear in mind the risks associated with administration of benzodiazepines in patients who are not having a true epileptic seizure. Clinical judgment must be used at the time to determine the risk of administering a drug that could potentially cause respiratory depression versus not administering it.

Consider questions such as:

- Is the patient known to have epilepsy?

- Is the patient known to have non-epileptic seizures?
- Does the patient already have a plan in place for the management of seizures?

See the below tables to aid differentiation between potential causes of seizures (table 1)

Table 1 - Potential causes of seizures	
Infection	Infection/sepsis, encephalitis (most commonly herpes virus), meningitis and cerebral abscess • Refer to the Trust antimicrobial formulary
Vascular	Ischaemic stroke, intracerebral or subarachnoid haemorrhage, cerebral venous sinus thrombosis, hypertensive encephalopathy, posterior reversible encephalopathy syndrome (PRES)
Inflammatory	Limbic encephalitis, demyelinating diseases or immune-mediated disorders
Metabolic	Acute metabolic disturbances (most commonly sodium, calcium, magnesium and glucose), hypoxia/cardiac arrest
Trauma	Head injury
Neoplasia	Cerebral tumour (primary or secondary)
Paraneoplastic	Some types of encephalitis
Degenerative	All dementia syndromes
Congenital:	Idiopathic epilepsy, developmental anomalies of cerebral structure (e.g. focal cortical dysplasias)
Iatrogenic	Non-concordance (forgetting or omitting medication)
Lifestyle	Alcohol, illicit drugs, 'legal highs' • Consider treatment with intravenous Vitamin B&C high strength 2 pairs in 100mL sodium chloride 0.9% or glucose 5% as an intravenous infusion over 30 minutes • Refer to Trust Alcohol Withdrawal pathway for further management • Refer to TOXBASE if necessary
Pregnancy	Pre-eclampsia

- Post seizure: request biochemical investigations

  - Arterial Blood Gas (ABG)
  - Renal function (including U&Es)
  - Liver Function Tests (LFTs)

- Electrolytes (including calcium, magnesium, phosphate)
- Full Blood Count
- ECG – compare with previous ECGs if available
- Coagulation studies
- Antiepileptic drug concentrations (if prescribed regular antiepileptic medicines, see below)
- Consider toxicology (blood and urine) if suspicion of overdose or use of illicit substances
- Pregnancy test if not already performed

When to contact neurology

Neurology should only be contacted in the following circumstances:

1. The patient is unable to have any of the 3 suggested medications (phenytoin, levetiracetam or sodium valproate) due to allergies, contraindications or another reason
2. The patient is in refractory status and specialist advice is required
3. Advice regarding further investigations is required
4. Advice regarding the initiation of regular antiepileptic medication is required

Neurology registrars can be contacted via Royal Preston Hospital switchboard (01772 716565).

Advice on drug dose calculations and interpretation of measured plasma drug concentrations can be obtained from the ward or the on-call Pharmacist.

- **Where initial dosing is based on body weight, the monographs will state whether the patient's actual, ideal or adjusted (for obese patients) body weight should be used. If weight is led than the calculated ideal body weight then always use actual bodyweight to calculate dose.**

- **Calculation of Ideal Body Weight (IBW)**
  IBW Females = [45.5kg + (2.3 x every inch over 5ft)] kg
  IBW Males = [50kg + (2.3 x every inch over 5ft)] kg

- **Calculation of Adjusted Body Weight (for Aminoglycoside dosing in Patients whose ABW is > 20% more than their IBW)**
  Adjusted body weight = ideal body weight + 0.4 (actual body weight – ideal body weight)

- **Cockcroft and Gault equation for estimating creatinine clearance**
  Creatinine clearance (mL/min) = $\frac{Y \times (140-age) \times weight}{Serum\ creatinine\ micromol/L}$
  Where Y = 1.23 for males and 1.04 for females

Cockcroft and Gault does not apply to all patients. Exclusion criteria include: unstable serum creatinine, pregnancy, malnutrition, amputation and dialysis

Pharmacokinetic information in the following monographs relates to healthy adults unless

otherwise specified. Information on neonates and children can be provided on request from the Pharmacy Department.

Estimated glomerular filtration rate (eGFR)
Renal function is often reported using estimated Glomerular Filtration Rate (eGFR), reported in mL/minute/1.73m^2. This is not the same as creatinine clearance estimates, which is calculated in mL/minute. Since eGFR estimates have not yet been validated for drug dosing, dose adjustment in renal impairment should be based on estimates of creatinine clearance (e.g. calculated from the Cockcroft and Gault equation or from a 24-hour urine collection).

5.3 Prescribing and administration of medication

First line therapy – CHECK IF A PREVIOUS DOSE HAS BEEN GIVEN ALREADY (E.g., by paramedics or other health care professional)

<table>
<tr><td colspan="2">Prescribe and administer a STAT dose of benzodiazepine as a first line therapy:</td></tr>
<tr><td>Intravenous access available</td><td>Lorazepam 4mg injection as an intravenous (IV) bolus injection – (stored in the fridge)

- Dilute a 4mg/mL ampoule with an equal volume of sodium chloride 0.9% or water for injection and administer immediately with the aim to control the seizure
- Dose is 0.1mg/kg – usual dose for patients >40kg is 4mg, however consider lower doses for patients at an increased risk of respiratory depression (e.g. frail patients), or administer the dose over 1 minute whilst monitoring the patients airway.

OR

Diazepam 10mg emulsion injection or Diazepam 10mg solution for injection are intravenous alternatives to lorazepam for the initial control of status epilepticus if lorazepam injection is unavailable

- Administer undiluted as a slow intravenous bolus injection over 2 minutes
- Note: diazepam solution for injection is an irritant and associated with increased risk of thrombophlebitis more than diazepam emulsion for injection. Diazepam solution for injection should be administered into a large vein of the antecubital fossa</td></tr>
<tr><td>NO intravenous access available</td><td>Diazepam 10mg rectal tubes

- 10mg administered rectally (PR)

OR
Midazolam 10mg/2mL oromucosal syringe

- 10mg administered into the buccal cavity

The full amount of solution should be inserted slowly into the space between the gum and the cheek. Avoid the back of the throat to prevent accidental aspiration of the solution. If necessary (for larger volumes and/or smaller patients), approximately half the dose should be given slowly into one side of the mouth, then the other half given slowly into the other side.</td></tr>
<tr><td colspan="2">If seizure activity continues for more than 5 minutes after the first dose, a second dose of benzodiazepine can be administered.
If there is no response observed or seizure activity remains uncontrolled after two doses, continue to treatment of established status epilepticus, continue to monitor the patient. and ensure critical care have been contacted.</td></tr>
</table>

Second line therapy

First line choice	**LEVETIRACETAM**

Contraindications: *known allergies to drug and excipients*
Note this list is not exhaustive – please refer to the BNF/SPC for further information

Dose: 60 mg/kg (max 4500mg) - see table below
Diluent: add required dose to a 100ml Sodium Chloride 0.9% bag (or Glucose 5%)
Route: IV
Rate: over 10 minutes

Flush vein PRE and POST injection with Sodium Chloride 0.9%

Weight (Kg)	Dose (grams)	Volume of 500mg/5ml
Less than 35	2g	20ml
35 – 44	2.5g	25ml
45 – 54	3g	30ml
55 – 64	3.5g	35ml
65 – 74	4g	40ml
Greater than 75	4.5g	45ml

Restart regular AED's at the usual time the patients takes them. If the patient is not on regular AED's and it is deemed necessary for the patient to have further investigations with the initiation of a maintenance dose, this should be started 12 hours after the loading dose.

- If switching between enteral or IV route, keep the same dose and frequency of administration
- The maintenance dose will depend on eGFR or creatinine clearance (using cockcroft and gault equation)

eGFR (ml/min/1.73m^2)	**Levetiracetam IV/PO maintenance doses (start 12 hours after loading dose)**
≥80ml/min	1500mg BD
50-79	1000mg BD
30-49	750mg BD
<30	500mg BD
Dialysis patients	1000mg OD
CVVHD/CVVHDF	750mg BD

Second line if Levetiracetam contraindicated

SODIUM VALPROATE

CONTRAINDICATIONS:

Note this list is not exhaustive – please refer to the BNF/SPC for further information

- acute or severe liver failure
- mitochondrial disorder

Dose: 40mg/kg (max 3000mg) - see table below
Diluent: add required dose to a 100ml Sodium Chloride 0.9% or Glucose 5% bag
Route: IV
Rate: over 10 minutes

Flush vein PRE and POST injection with Sodium Chloride 0.9%

Weight (Kilograms)	Dose (milligrams)	Volume of 100mg/ml
Less than 35 Kg	900 mg	9ml
35-44 Kg	1200 mg	12ml
45-54 Kg	1500 mg	15ml
55-64 Kg	1800 mg	18ml
65-74 Kg	2100 mg	21ml
75-84 Kg	2400 mg	24ml
85-94 Kg	2700 mg	27ml
Greater than 95 Kg	3000 mg	30ml

Restart regular AED's at the usual time the patients takes them. If the patient is not on regular AED's and it is deemed necessary for the patient to have further investigations with the initiation of a maintenance dose, prescribe:

600mg TDS (IV or oral) starting 8 hours after the loading dose

- Renal impairment: no dose adjustments required. But can be dialysed out if on dialysis (discuss with pharmacist).

Third line if Levetiracetam and Sodium Valproate are contraindicated

PHENYTOIN

Contraindications *include: allergy to drug, heart block, sinus bradycardia, Adams-Stokes syndrome*

Note this list is not exhaustive – please refer to the BNF/SPC for further information

Is the patient already on Phenytoin?

No – see table below

Yes* – see appendix 2

*if there are any concerns regarding compliance – give full loading dose

Dose: 20mg/kg*
Route: IV (undiluted)
Rate: Max 50mg/minute
For >65 years/frail adults, or if history of cardiac disease, consider reduced rate to25mg/minute

Phenytoin injection has a high pH and may cause venous irritation and tissue damage in cases of extravasation. Administer via a large peripheral vein monitoring the insertion site for phlebitis. Re-site cannula at first signs of inflammation.

Flush vein PRE and POST injection with 10ml Sodium Chloride 0.9%

Cardiac monitoring must be in place

***If >80kg** – calculate Adjusted Body Weight

- Adjusted Body Weight = IBW + 0.4 x (ABW-IBW)
- ABW = Actual Body weight (kg)IBW = Ideal Body Weight (kg)

Weight (Kilograms)	Dose (milligrams)	Volume of 250mg in 5mL vial
Less than 35 kg	Calculate dose - 20mg/kg	
35 – 44 kg	800 mg	16mL
45 – 54 Kg	1000 mg	20mL
55 – 64 Kg	1200 mg	24mL
65 – 74 Kg	1400 mg	28mL
75 – 84 Kg	1600 mg	32mL
85 – 94 Kg	1800 mg	36mL
Greater than 95 Kg	2000 mg	40mL

A Phenytoin concentration must checked within 2 to 4 hours after the loading dose. This concentration will guide the efficacy of the loading dose and can be used to guide any further partial loading doses (see appendix). If required, a maintenance dose of 100mg TDS IV must be prescribed to start 8 hours post loading dose or restart regular AED's at the usual time the patients takes them. Steady state concentrations will not be clinically accurate until 5-7days after initiation of a maintenance dose.

Appendix 1: Nil by mouth/swallowing difficulties and taking anti-epileptics

Drug	NEWT	Drug Administration via Enteral Feeding Tubes	AED Class	Comment	Formulation	BTH	ELH	LTH	UHMB
Brivaracetam	**NG/PEG** 1 - Oral solution: licensed route 2 - Parenteral injection / infusion **NJ/PEJ/PEGJ** 1 - Parenteral injection / infusion	*Not listed*	?		10mg tablet	N	N	N	N
					25mg tablet	Y	N	y	EDC only
					50mg tablet	N	N	Y	N
					75mg tablet	N	N	n	N
					100mg tablet	Y	N	n	N
					50mg/5ml oral suspension	**N**	**Y**	**Y**	**N**
					50mg/5ml injection	N	EDC only	Y- EDC only	N
Carbamazepine	**Enteral tube** 1 - Suppository: if possible (max 7days, max 1g/day), trials of suppositories did not exceed 7days, risk of rectal irritation if used >7days 2 - Suspension: (contains sorbitol), drug adsorbs to PVC tubes, dilute suspension 1:1 with water to negate *400mg BD MR tablet = suspension 200mg QDS* *100mg tablet / suspension = suppository 125mg* *Consider monitoring drug levels* *Give at the same time of day to minimise variability from feed interaction*	1 - Liquid: dilute 1:1 with water immediately prior to administration, >400mg/day needs split into 4 equal doses, doses >800mg/day may cause bloating (sorbitol)	1		100mg tablet	Y - Tegretol	Y-Tegretol	Y	Y
					200mg tablet	Y - Tegretol	Y-Tegretol	Y	Y
					400mg tablet	Y - Tegretol	Y-Tegretol	Y	N
					200mg MR tablet	Y - Curatil & Tegretol	Y-Tegretol	Y	Y - Tegretol
					400mg MR tablet	Y -Tegretol	Y-Tegretol	Y	Y - Tegretol
					100mg/5ml oral suspension	Y -Tegretol	Y-Tegretol	Y	Y - Tegretol
					125mg suppository	**Y - Tegretol**	**Y-generic**	**Y**	**Y**
					250mg suppository	**Y - Tegretol**	**Y-generic**	**N**	**EDC only**
Cenobamate		*Not listed*	?		50mg tablet	EDC only	N	Y	N

	Enteral tube No information available Lab study showed no loss of drug to tube, no information for use in patients				100mg tablet	N	N	N	N
					150mg tablet	N	N	N	N
					200mg tablet	N	N	N	N
					titration pack (1.25mg & 25mg tablet)	N	N	Y	N
Clobazam	**Enteral tube** 1 -Tablet: disperse in water, disperse in 5mins Flush well, ensure full dose administered (bits of tablet stick to administration equipment)	1 - Tablet: disperse and suspend in water immediately prior to administration	2	CD4	**10mg tablet**	**?**	**Y**	**Y**	**Y**
					5mg/5ml oral suspension	?	N	y	N
Clonazepam	**NG/PEG** 1 - Oral solution: some products are licensed for this route 2 - Tablet: disperse in 30mls water, disperse in 2mins 3 - Injection: given enterally, dilute with 1ml water **NJ/PEJ/PEGJ** 1 - Tablets: disperse in 30ml water, disperse in 2mins 2 - Injection: given enterally	1 - Tablet: disperse and suspend in water immediately prior to administration 2 - Liquid: use for very fine bore tubes	2	CD4	**500mcg tablet**	**?**	**Y**	**Y**	**Y**
					2mg tablet	**?**	**Y**	**n**	**Y**
					500mcg/5ml oral suspension	?	Y	Y	N
					2mg/5ml SF Solution	?	N	N	N
					1mg/ml injection	?	Y	Y	N
Eslicarbazepine	**Enteral tube** No information available	*Not listed*	2		200mg tablet	EDC only - Zebinix	Y	Y	N
					800mg tablet	N	N	Y	N
					50mg/ml oral suspension	**N**	**N**	**N**	**N**
Ethosuximide	**Enteral tube** 1 - Syrup: dilute with water immediately before giving to reduce viscosity	1 - Liquid: dilute 1:1 with water immediately	3		250mg capsule	N	EDC only	Y	EDC only
					250mg/5ml oral suspension	**EDC only**	**Y**	**Y**	**EDC only**

		prior to administration, >400mg/day needs split into 4 equal doses, doses >800mg/day may cause bloating (sorbitol)							
Gabapentin	**NG/PEG** 1 - Oral solution: some products are licensed for this route, do not dilute, flush well 2 - Capsule: open and dissolve in water immediately prior to administration (limited stability in water) **NJ/PEJ/PEGJ** 1 - Capsule: open and dissolve in water immediately prior to administration (limited stability in water)	1 - Oral solution: ideally do not change formulation 2 - Capsule: disperse in wat, ideally do not change formulation	3	CD3	**100mg capsule**	**?**	**Y**	**Y**	**Y**
					300mg capsule	**?**	**N**	**Y**	**Y**
					400mg capsule	**?**	**Y**	**Y**	**Y**
					600mg tablet	?	N	Y	N
					800mg tablet	?	N	Y	N
					50mg/ml oral suspension	?	N	N	N
Lacosamide	**Enteral tube** 1 - Parenteral infusion: infusion dose = oral dose, only experience up to 5days	1 - Syrup	3		50mg tablet	Y	Y	Y	Y
					100mg tablet	Y	Y	Y	Y
					150mg tablet	N	N	Y	N
					200mg tablet	N	Y	Y	N
					10mg/ml oral suspension	**Y**	**Y**	**Y**	**Y**
					200mg/20ml injection	Y	Y	Y	Y
Lamotrigine	**Enteral tube** 1 - Dispersible tablet	1 - Chewable / Dispersible tablet: disperse in	2		**2mg dispersible tablet**	**N**	**N**	**Y**	**N**
					5mg dispersible tablet	**Y**	**N**	**Y**	**Y**

		water immediately before administration, ideally do not change formulation			**25mg dispersible tablet**	**Y - Lamictal**	**Y**	**Y**	**Y**
					100mg dispersible tablet	**Y - Lamictal**	**Y**	**Y**	**Y**
					2mg chewable tablet	N	N	N	N
					5mg chewable tablet	N	EDC only	N	N
					25mg tablet	Y	Y	Y	Y
					50mg tablet	Y	Y	Y	Y
					100mg tablet	Y	Y	Y	Y
					200mg tablet	Y	N	Y	Y
Levetiracetam	**Enteral tube** 1 - Parenteral infusion: infusion dose = oral dose 2 - Sachet: licenced for this route, mix with 10ml water and shake for 2min to suspend, flush with 10ml water (x2) 3 - Oral solution 4 - Tablet: crush and mix with water, drug will dissolve but excipients will not, flush well	1 - Liquid	3		250mg tablet	Y	Y	Y	Y
					500mg tablet	Y	Y	Y	Y
					750mg tablet	Y	Y	N	N
					1g tablet	Y	Y	Y	Y
					500mg/5ml oral suspension	Y	Y	Y	Y
					250mg sachet	N	N	N	N
					500mg sachet	N	N	N	N
					1g sachet	N	N	N	N
					1.5g sachet	N	N	N	N
					500mg/5ml injection	**Y**	**Y**	**Y**	**Y**
Oxcarbazepine	**Enteral tube** 1 - Oral suspension: same dose as tablets, dilute with water if needed	1 - Oral suspension: dilute with wated immediately prior to administration if using a fine bore tube	2		150mg tablet	N	Y	Y	N
					300mg tablet	N	Y	Y	Y
					600mg tablet	N	N	N	N
					300mg/5ml oral suspension	**EDC only - Trileptal**	**Y**	**N**	**N**

		Consider alternative drug for long term therapy							
Perampanel	**Enteral tube** 1 - Oral suspension: no 'real-life' study available, lab study shows no loss of drug 2 - Tablet: no 'real-life' study available, film coated - crush and flush well *Small number of case reports of NG/PEG administration in super-refractory status-epilepticus. The drug appeared to be effective*	*Not listed*	2		2mg tablet	Y - Fycompa	Y	Y	Y
					4mg tablet	N	N	N	Y
					6mg tablet	Y - Fycompa	N	N	Y
					8mg tablet	N	N	Y	N
					10mg tablet	N	N	N	N
					12mg tablet	N	N	N	N
					0.5mg/ml oral suspension	**N**	**N**	**Y**	**N**
Phenobarbitone / Phenobarbital	**Enteral tube** 1 - Parenteral injection 2 - Elixir: contains 38% alcohol 3 - Tablet: crush and mix with water 4 - Oral suspension	1 - Liquid: high alcohol concentration	1	CD3	15mg tablet	?	Y	Y	Y
					30mg tablet	?	Y	Y	Y
					60mg tablet	?	Y	N	N
					50mg/5ml oral suspension	**?**	**Y**	**25mg in 5mL in stock**	**Y**
					30mg/ml injection	?	Y	N	N
					60mg/ml injection	?	Y	N	Y
					200mg/ml injection	?	Y	Y	Y
Phenytoin	**NG/PEG** 1 - Parenteral injection: enteral absorption is extremely unpredictable *Unpredictability is notoriously problematic - Senior review required before considering*	1 - Liquid: stop feed and flush tube 2hr pre-dose, dilute 1:1 with water, flush tube and restart feed 2hr	1		**30mg/5ml oral suspension**	**Y**	**Y-epanutin**	**Y-epanutin**	
Phenytoin Sodium			1		100mg tablet	N	N	N	N
					25mg capsule	Y	Y-epanutin	Y-epanutin	Y
					50mg capsule	Y	Y-epanutin	Y-epanutin	Y

	option 2 2 - Suspension: single daily dose, shake well before use, stop feed 2hr pre-dose, flush with 30-60ml water pre-dose, dilute 1:1 with water, flush with 30-60ml water post-dose, re-start feed 2hr post-dose **NJ/PEJ/PEGJ** 1 - Parenteral injection: decreased effectiveness following jejunal administration Phenytoin (base) 90mg [suspension, chewable tablet] = 100mg Phenytoin sodium [tablet, capsule, injection]	post-dose *100mg phenytoin sodium = 90mg phenytoin base check plasma concentrations and adjust dose as required ensure the same protocol and timetable is used daily to optimise dosing consistency*			100mg capsule	Y	Y-epanutin	Y-epanutin	Y
					300mg capsule	N	N	N	N
					250mg/5ml injection	Y - Epanutin	Y-epanutin	Y-epanutin	Y
Pregabalin	**Enteral tube** 1 - Capsule: open and dissolve with water	1 - Liquid	3	CD3	25mg tablet	?	N	N	N
					50mg tablet	?	N	N	N
					75mg tablet	?	N	N	N
					100mg tablet	?	N	N	N
					150mg tablet	?	N	N	N
					200mg tablet	?	N	N	N
					225mg tablet	?	N	N	N
					300mg tablet	?	N	N	N
					82.5mg MR tablet	?	N	N	N
					165mg MR tablet	?	N	N	N
					330mg MR tablet	?	N	N	N
					25mg capsule	**?**	**Y**	**Y**	**Y**
					50mg capsule	**?**	**Y**	**Y**	**Y**
					75mg capsule	**?**	**Y**	**Y**	**Y**
					100mg capsule	**?**	**Y**	**Y**	**Y**
					150mg capsule	**?**	**Y**	**Y**	**Y**

					200mg capsule	**?**	**N**	**Y**	**N**
					225mg capsule	**?**	**N**	**Y**	**N**
					300mg capsule	**?**	**Y**	**Y**	**N**
					20mg/ml oral suspension	?	N	N	N
Primidone	**Enteral tube** 1 - Tablet: crush and disperse in water, disperse in 5min	1 - Tablet: disperse in water immediately prior to administration	1		**50mg tablet**	**Y**	**EDC only**	**Y**	**Y**
					125mg tablet	**N**	**N**	**N**	**N**
					250mg tablet	**Y - Mysoline**	**Y**	**Y**	**Y**
Rufinamide	**Enteral tube** 1 - Suspension: licensed for this route	*Not listed*	2		100mg tablet	N	Y	N	N
					200mg tablet	N	N	N	N
					400mg tablet	N	N	N	N
					200mg/5ml oral suspension	**N**	**N**		**N**
Sodium Valproate	**Enteral tube** 1 - Parenteral injection 2 - Liquid: contains sorbitol, can be diluted immediately before administration 3 - Crushable tablet *Check conversion if oral formulation is MR*	1 - Liquid: dilute with water immediately prior to administration 2 - Tablet: disperse tablets in water if liquid causes diarrhoea *No information on jejunal administration*	2		200mg EC tablet	Y - Epilim	Y-Epilim	Y - Epilim	Y - Epilim
					500mg EC tablet	Y - Epilim	Y-Epilim	Y - Epilim	Y - Epilim
					200mg MR tablet	Y - Epilim Chrono	Y-Epilim chrono	Y - Epilim	Y
					300mg MR tablet	EDC only - E[ilim Chrono	Y-Epilim chrono	Y - Epilim	Y
					500mg MR tablet	Y - Epilim Chrono	Y-Epilim chrono	Y - Epilim	Y
					100mg crushable tablet	Y - Epilim	Y-Epilim	Y - Epilim	Y
					150mg MR capsule	N	N	Y - Epilim	N
					300mg MR capsule	Y - Epilim Chrono	N	Y - Epilim	N
					300mg/3ml injection	N	N	Y - Epilim	N
					400mg/4ml injection	Y	Y -Generic	Y - Epilim	Y

					50mg sachet	N	N	N	N
					250mg sachet	N	N	N	N
					500mg sachet	N	N	N	N
					750mg sachet	N	N	N	N
					1g sachet	N	N	N	N
					200mg/5ml oral solution	**Y - Epilim**	**Y-Epilim**	**Y-Epilim**	**Y - Epilim**
Stiripentol	**Enteral tube** Not recommended: insoluble in water, reduced absorption via enteral tube	*Not listed*	?		250mg capsule	N	N	N	N
					500mg capsule	N	N	N	N
					250mg sachet	**EDC only - Diacomit**	**N**	**N**	**N**
					500mg sachet	**N**	**N**	**N**	**N**
Tiagabine	**Enteral tube** 1 - Tablet: crush and mix with water	1 - Tablet: disperse in water or crush and suspend in water immediately prior to administration	3		**5mg tablet**	**N**	**N**	**N**	**N**
					10mg tablet	**N**	**N**	**N**	**N**
					15mg tablet	**N**	**N**	**N**	**N**
Topiramate	**Enteral tube** 1 - Tablet: crush and disperse in water *Absorbed in upper GI tract, absorption and clinical effectiveness may be altered if administered into the jejunum*	Consider alternative therapy 1 - Tablet: disperse in water immediately prior to administration	2		**25mg tablet**	**Y**	**Y**	**Y**	**Y**
					50mg tablet	**Y**	**Y**	**Y**	**N**
					100mg tablet	**Y**	**Y**	**Y**	**Y**
					200mg tablet	**N**	**Y**	**Y**	**N**
					15mg sprinkle capsule	N	Y-Topamax	N	N
					25mg sprinkle capsule	Y - Topamax sprinkle	Y-Topamax	Y	N
					50mg sprinkle capsule	N	Y-Topamax	N	N
					50mg/5ml oral suspension	N	N	N	N
					100mg/5ml oral suspension	N	N	N	N

Vigabatrin	**Enteral tube** 1 - Soluble tablet: licensed for this route 2 - Sachet: make up to 100ml with water/juice/milk, have been dispersed in 10ml water where volume is an issue 3 - Tablet: crush and disperse in water	1 - Sachet	3		**500mg tablet**	**N**	**Y**	**N**	**N**
					500mg sachet	EDC only	Y	Y	Y
Zonisamide	**Enteral tube** 1 - Suspension: licensed for this route, flush with 5ml water (x3) 2 - Capsule: open and disperse in water or apple juice	Seek specialist advice re: alternative 1 - Capsule: open and mix with water, monitor closely	2		**25mg capsule**	**Y**	**Y**	**Y**	**EDC Only**
					50mg capsule	**N**	**N**	**Y**	**Y**
					100mg capsule	**Y**	**Y**	**Y**	**Y**
					100mg/5ml oral suspension	N	N	N	N

First line
Second line
Other alternative

First line
Second line
Other alternative

Recommendation in current guideline

1 For these drugs, doctors are advised to ensure that their patient is maintained on a specific manufacturer's product
2 For these drugs, the need for continued supply of a particular manufacturer's product should be based on clinical judgement and consultation with patient and/or carer, taking into account factors such as seizure frequency and treatment history
3 For these drugs, it is usually unnecessary to ensure that patients are maintained on a specific manufacturer's product unless there are specific reasons such as patient anxiety and risk of confusion or dosing errors

Appendix 2: Phenytoin loading dose when a patient is already on Phenytoin

Failure to take into account existing phenytoin levels may lead to toxicity

Is a phenytoin level available?

Note: Initiating treatment should not be delayed for phenytoin blood concentration results

YES

- Is the Phenytoin concentration sub-therapeutic, allowing a 'top up' dose to be given? Ensure the adjusted phenytoin level is calculated for patients with hypoalbuminemia (<32g/L)

Corrected Phenytoin concentration (mg/L) = reported concentration (mg/L)

(0.02 x serum albumin(g/L)) +0.1

	Body Weight			
	50 kg	**60 kg**	**70 kg**	**80 kg**
Top-up Dose (IV)	**Phenytoin level increased by (with top-up dose):**			
250 mg	7 mg/L	6 mg/L	5 mg/L	4.5 mg/L
500 mg	14 mg/L	12 mg/L	10 mg/L	9 mg/L
750 mg	21 mg/L	18 mg/L	15 mg/L	13.5 mg/L

NO

OPTION 1

Administer HALF the recommended loading dose until concentrations are available

OPTION 2

Limit the loading dose to 500mg IV

After the loading dose, prescribe a maintenance dose: 100mg TDS IV

A Phenytoin concentration must be checked 18-24 hours after the loading dose and consideration given to increasing the usual maintenance dose (check compliance)

Lancashire and South Cumbria Consultation		
	Committee/Group	**Date**
Consultation	Lancashire and South Cumbria Critical Care Pharmacists	
Approval Committee	-	
NEXT REVIEW DATE:	-	
Host	Monographs hosted centrally by Lancashire Medicines Management Group	
AMENDMENTS:	Change to levetiracetam in HD dosing Addition of MHRA warning for sodium valproate use Change to phenytoin dosing in obese patients	