APPENDIX K

Pharmacological Management

Table 1 AED options by seizure type

Table 1 AED options by seizure type

Seizure type	First-line AEDs	Adjunctive AEDs	Other AEDs that may be considered on referral to tertiary care	Do not offer AEDs (may worsen seizures)
Generalised tonic–clonic	Carbamazepine Lamotrigine Oxcarbazepine[a] Sodium valproate	Clobazam[a] Lamotrigine Levetiracetam Sodium valproate Topiramate		(If there are absence or myoclonic seizures, or if JME suspected) Carbamazepine Gabapentin Oxcarbazepine Phenytoin Pregabalin Tiagabine Vigabatrin
Tonic or atonic	Sodium valproate	Lamotrigine[a]	Rufinamide Topiramate[a]	Carbamazepine Gabapentin Oxcarbazepine Pregabalin Tiagabine Vigabatrin
Absence	Ethosuximide Lamotrigine[a] Sodium valproate	Ethosuximide Lamotrigine[a] Sodium valproate	Clobazam[a] Clonazepam Levetiracetam[a] Topiramate[a]	Carbamazepine Gabapentin Oxcarbazepine Phenytoin

Seizure type	First-line AEDs	Adjunctive AEDs	Other AEDs that may be considered on referral to tertiary care	Do not offer AEDs (may worsen seizures)
			Zonisamide[a]	Pregabalin Tiagabine Vigabatrin
Myoclonic	Levetiracetam[a] Sodium valproate Topiramate[a]	Levetiracetam Sodium valproate Topiramate[a]	Clobazam[a] Clonazepam Piracetam Zonisamide[a]	Carbamazepine Gabapentin Oxcarbazepine Phenytoin Pregabalin Tiagabine Vigabatrin
Focal	Carbamazepine Lamotrigine Levetiracetam Oxcarbazepine Sodium valproate	Carbamazepine Clobazam[a] Gabapentin[a] Lamotrigine Levetiracetam Oxcarbazepine Sodium valproate Topiramate	Eslicarbazepine acetate[a] Lacosamide Phenobarbital Phenytoin Pregabalin[a] Tiagabine Vigabatrin Zonisamide[a]	
Prolonged or repeated seizures and convulsive status epilepticus in the community	Buccal midazolam[b] Rectal diazepam[b] Intravenous lorazepam			
Convulsive status epilepticus in hospital	Intravenous lorazepam Intravenous diazepam Buccal midazolam[b]	Intravenous phenobarbital Phenytoin		
Refractory convulsive	Intravenous midazolam[b]			

Seizure type	First-line AEDs	Adjunctive AEDs	Other AEDs that may be considered on referral to tertiary care	Do not offer AEDs (may worsen seizures)
status epilepticus	Propofol[b] (not in children) Thiopental sodium[b]			

[a] At the time of publication ([month year]), this drug did not have UK marketing authorisation for this indication and/or population (see table 3 for specific details about this drug for this indication and population). Informed consent should be obtained and documented.

[b] At the time of publication ([month year]), this drug did not have UK marketing authorisation for this indication and/or population (see table 3 for specific details about this drug for this indication and population). Informed consent should be obtained and documented in line with normal standards in emergency care.

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1 **Table 2 AED options by epilepsy syndrome**

Epilepsy syndrome	First-line AEDs	Adjunctive AEDs	Other AEDs	Do not offer AEDs (may worsen seizures)
Childhood absence epilepsy or other absence syndromes	Ethosuximide Lamotrigine[a] Sodium valproate	Ethosuximide Lamotrigine[a] Sodium valproate	Clobazam[a] Clonazepam Levetiracetam[a] Topiramate[a] Zonisamide[a]	Carbamazepine Gabapentin Oxcarbazepine Phenytoin Pregabalin Tiagabine Vigabatrin
Juvenile absence epilepsy or other absence syndromes	Ethosuximide Lamotrigine[a] Sodium valproate	Ethosuximide Lamotrigine[a] Sodium valproate	Clobazam[a] Clonazepam Levetiracetam[a] Topiramate[a] Zonisamide[a]	Carbamazepine Gabapentin Oxcarbazepine Phenytoin Pregabalin Tiagabine Vigabatrin
Juvenile myoclonic epilepsy	Lamotrigine[a] Levetiracetam[a] Sodium valproate Topiramate[a]	Lamotrigine[a] Levetiracetam Sodium valproate Topiramate[a]	Clobazam[a] Clonazepam Zonisamide[a]	Carbamazepine Gabapentin Oxcarbazepine Phenytoin Pregabalin Tiagabine Vigabatrin
Epilepsy with generalised tonic–clonic seizures only	Carbamazepine Lamotrigine Oxcarbazepine[a] Sodium valproate	Clobazam[a] Lamotrigine Levetiracetam Sodium valproate		

Epilepsy syndrome	First-line AEDs	Adjunctive AEDs	Other AEDs	Do not offer AEDs (may worsen seizures)
		Topiramate		
Idiopathic generalised epilepsy	Lamotrigine[a] Sodium valproate Topiramate[a]	Lamotrigine[a] Levetiracetam[a] Sodium valproate Topiramate[a]	Clobazam[a] Clonazepam Zonisamide[a]	Carbamazepine Gabapentin Oxcarbazepine Phenytoin Pregabalin Tiagabine Vigabatrin
Infantile spasms not due to tuberous sclerosis	Discuss with, or refer to, a tertiary paediatric epilepsy specialist Steroid (prednisolone or tetracosactide[a]) or vigabatrin			
Infantile spasms due to tuberous sclerosis	Discuss with, or refer to, a tertiary paediatric epilepsy specialist Vigabatrin or steroid (prednisolone or tetracosactide[16])			
Benign epilepsy with centrotemporal spikes	Carbamazepine[a] Lamotrigine[a] Levetiracetam[a] Oxcarbazepine[a] Sodium valproate			
Panayiotopoulos syndrome	Carbamazepine [a] Lamotrigine [a] Levetiracetam [a]			

Epilepsy syndrome	First-line AEDs	Adjunctive AEDs	Other AEDs	Do not offer AEDs (may worsen seizures)
	Oxcarbazepine [a] Sodium valproate			
Late-onset childhood occipital epilepsy (Gastaut type)	Carbamazepine [a] Lamotrigine [a] Levetiracetam [a] Oxcarbazepine [a] Sodium valproate			
Dravet syndrome	Discuss with, or refer to, a tertiary paediatric epilepsy specialist Sodium valproate Topiramate[a]	Clobazam[a] Stiripentol		Carbamazepine Gabapentin Lamotrigine Oxcarbazepine Phenytoin Pregabalin Tiagabine Vigabatrin
Continuous spike wave during slow sleep	Refer to a tertiary epilepsy specialist			
Lennox–Gastaut syndrome	Discuss with, or refer to, a tertiary paediatric epilepsy specialist Sodium valproate	Lamotrigine	Felbamate [a] Rufinamide Topiramate	Carbamazepine Gabapentin Oxcarbazepine Pregabalin Tiagabine Vigabatrin
Landau–Kleffner syndrome	Refer to a tertiary epilepsy specialist			
Myoclonic-astatic epilepsy	Refer to a tertiary epilepsy specialist			

Epilepsy syndrome	First-line AEDs	Adjunctive AEDs	Other AEDs	Do not offer AEDs (may worsen seizures)
[a] At the time of publication ([month year]), this drug did not have UK marketing authorisation for this indication and/or population (please see appendix E for specific details about this drug for this indication and population). Informed consent should be obtained and documented.				

Table 2 AED options by epilepsy syndrome

Licensing indications

Detailed below are drugs that have been recommended but which do not currently have licensed indications for these seizures types or syndromes or particular populations.

Table 3 Licensing indications of the guideline AEDs

Seizure type/syndrome	Drug	Details of licensing
Treatment of refractory focal seizures	**Clobazam**	At the time of publication, clobazam did not have UK marketing authorisation for use in children younger than 3 years (BNFC). This was because of insufficient experience of the use of this drug in children younger than 3 years to enable any dosage recommendation to be made (SPC). It did have authorisation for adjunctive therapy for epilepsy monotherapy and under specialist supervision for catamenial (menstruation) seizures (usually for 7-10 days each month, just before and during menstruation) and cluster seizures (BNFC).
	Gabapentin	At the time of publication, gabapentin did not have UK marketing authorisation for use in children younger than 6 years and at doses over 50 mg/kg daily in children younger than 12 years

		(BNFC). The use of gabapentin was not recommended in this age group owing to the lack of sufficient supporting data (SPC).
	Eslicarbazepine acetate	At the time of publication, eslicarbazepine acetate did not have UK marketing authorisation for use in children younger than 18 years. It was not recommended owing to a lack of data on safety and efficacy (SPC).
	Pregabalin	At the time of publication, pregabalin did not have UK marketing authorisation for use in children (BNF). Pregabalin was not recommended for use in children younger than 12 years and adolescents (12–17 years) owing to insufficient data on safety and efficacy (SPC).
	Zonisamide	At the time of publication, zonisamide did not have UK marketing authorisation for use in children younger than 18 years owing to insufficient data on safety and efficacy (SPC).
GTC	**Oxcarbazepine**	At the time of publication, oxcarbazepine did not have UK marketing authorisation for GTC seizures (BNF). It had authorisation for focal with or without secondarily generalised tonic–clonic seizures (BNF).

	Clobazam	At the time of publication, clobazam did not have UK marketing authorisation for use in children younger than 3 years (BNFC). There was insufficient experience of the use of this drug in children younger than 3 years to enable any dosage recommendation to be made (SPC). It did have authorisation for adjunctive therapy for epilepsy monotherapy and under specialist supervision for catamenial (menstruation) seizures (usually for 7-10 days each month, just before and during menstruation) and cluster seizures (BNFC).
Absence seizures	**Clobazam**	At the time of publication, clobazam did not have UK marketing authorisation for use in children younger than 3 years (BNFC). This was because of insufficient experience of the use of this drug in children younger than 3 years to enable any dosage recommendation to be made (SPC). It did have authorisation for adjunctive therapy for epilepsy monotherapy and under specialist supervision for catamenial (menstruation) seizures (usually for 7-10 days each month, just before and during menstruation) and cluster

		seizures (BNFC).
	Lamotrigine	At the time of publication, lamotrigine had UK marketing authorisation for monotherapy of typical absence seizures for those aged 2–12 years only. There was not authorisation outside of this age range (BNF).
	Levetiracetam	At the time of publication, levetiracetam did not have UK marketing authorisation for use in absence seizures but had authorisation for focal seizures with or without secondary generalisation and adjunctive therapy of myoclonic seizures in patients with JME and GTC seizures(BNFC).
	Topiramate	At the time of publication, topiramate did not have UK marketing authorisation for use in absence seizures but had authorisation for focal seizures, GTC seizures and seizures associated with Lennox–Gastaut syndrome(BNF).
	Zonisamide	At the time of publication, zonisamide did not have UK marketing authorisation for use in absence seizures but had authorisation for adjunctive therapy for adult patients with partial seizures, with or without

		secondary generalisation (BNF)
Myoclonic seizures	**Clobazam**	At the time of publication, clobazam did not have UK marketing authorisation for use in children younger than 3 years (BNFC). This was because of insufficient experience of the use of this drug in children younger than 3 years to enable any dosage recommendation to be made (SPC). It did have authorisation for adjunctive therapy for epilepsy monotherapy and under specialist supervision for catamenial (menstruation) seizures (usually for 7-10 days each month, just before and during menstruation) and cluster seizures (BNFC).
	Levetiracetam	At the time of publication, levetiracetam did not have UK marketing authorisation for monotherapy use in myoclonic seizures but had authorisation for monotherapy and adjunctive treatment of focal seizures with or without secondary generalisation and adjunctive therapy of myoclonic seizures in patients with JME and GTC seizures (BNFC).
	Topiramate	At the time of publication, topiramate did not have UK marketing authorisation for use in

		myoclonic seizures. It had authorisation for monotherapy and adjunctive treatment of focal seizures and GTC seizures and as adjunctive treatment for seizures associated with Lennox–Gastaut syndrome (BNFC).
	Zonisamide	At the time of publication, zonisamide did not have UK marketing authorisation for use in myoclonic seizures. It had authorisation for use in adjunctive treatment of refractory focal seizures with or without secondary generalisation (BNF).
Tonic-atonic seizures	**Lamotrigine**	At the time of publication, lamotrigine did not have UK marketing authorisation for use in tonic-atonic seizures. It had authorisation for monotherapy and adjunctive treatment of focal seizures, GTC seizures and seizures associated with Lennox–Gastaut syndrome. It also had authorisation for monotherapy of typical absence seizures for children aged 2-12 years (BNFC).
	Topiramate	At the time of publication, topiramate did not have UK marketing authorisation for use in tonic-atonic seizures. It had authorisation for monotherapy and adjunctive treatment of focal seizures, GTC seizures and

		adjunctive treatment for seizures associated with Lennox–Gastaut syndrome (BNF).
Infantile spasms	**ACTH (tetracosactide)**	At the time of publication, ACTH (tetracosactide) did not have UK marketing authorisation for infantile spasms. Depot ampoules are not recommended in infants and children younger than 3 years owing to the presence of benzyl alcohol in the formulation (SPC).
Lennox–Gastaut syndrome	**Felbamate**	At the time of publication, felbamate did not have UK marketing authorisation. There was no SPC available.
Dravet syndrome	**Clobazam**	At the time of publication, clobazam did not have UK marketing authorisation for use in children younger than 3 years (BNFC). This was because of insufficient experience of the use of this drug in children younger than 3 years to enable any dosage recommendation to be made (SPC). It did have authorisation for adjunctive therapy for epilepsy monotherapy and under specialist supervision for catamenial (menstruation) seizures (usually for 7-10 days each month, just before and during menstruation) and cluster seizures (BNFC).

	Topiramate	At the time of publication, topiramate did not have UK marketing authorisation for use in Dravet syndrome but did have authorisation for generalised tonic–clonic seizures, focal seizures and seizures associated with Lennox–Gastaut syndrome (BNF).
BECTS/Panayiotopoulos syndrome and late-onset childhood occipital epilepsy (Gastaut type)	**Carbamazepine**	At the time of publication, carbamazepine did not have UK marketing authorisation for BECTS/Panayiotopoulos syndrome and late-onset childhood occipital epilepsy (Gastaut type) but had authorisation for focal and generalised tonic–clonic seizures (BNF).
	Lamotrigine	At the time of publication, lamotrigine did not have UK marketing authorisation for BECTS/Panayiotopoulos syndrome and late-onset childhood occipital epilepsy (Gastaut type) but had authorisation for focal and primary and generalised tonic–clonic seizures, seizures associated with Lennox–Gastaut syndrome and monotherapy treatment of typical absence seizures in children aged 2 to 12 years (BNF).

	Levetiracetam	At the time of publication, levetiracetam did not have UK marketing authorisation for BECTS/Panayiotopoulos syndrome and late-onset childhood occipital epilepsy (Gastaut type) but had authorisation for monotherapy and adjunctive treatment of focal seizures with or without secondary generalisation and adjunctive therapy of myoclonic seizures in patients with JME and GTC seizures (BNFC).
	Oxcarbazepine	At the time of publication, oxcarbazepine did not have UK marketing authorisation for BECTS/Panayiotopoulos syndrome and late-onset childhood occipital epilepsy (Gastaut type) but had authorisation for focal seizures with or without generalised tonic–clonic seizures (BNF).

IGE	**Clobazam**	At the time of publication, clobazam did not have UK marketing authorisation for use in children younger than 3 years (BNFC). This was because of insufficient experience of the use of this drug in children younger than 3 years to enable any dosage recommendation to be made (SPC). It did have authorisation for adjunctive therapy for epilepsy monotherapy and under specialist supervision for catamenial (menstruation) seizures (usually for 7-10 days each month, just before and during menstruation) and cluster seizures (BNFC).
	Lamotrigine	At the time of publication, lamotrigine did not have UK marketing authorisation for use in IGE. It had authorisation for monotherapy and adjunctive treatment of focal seizures, GTC seizures and seizures associated with Lennox–Gastaut syndrome and monotherapy treatment of typical absence seizures in children aged 2 to 12 years (BNF).
	Levetiracetam	At the time of publication, levetiracetam did not have UK marketing authorisation for IGE but had authorisation for monotherapy and adjunctive

		treatment of focal seizures with or without secondary generalisation and adjunctive therapy of myoclonic seizures in patients with JME and GTC seizures (BNF).
	Topiramate	At the time of publication, topiramate did not have UK marketing authorisation for use in IGE but had authorisation for focal seizures, GTC seizures and seizures associated with Lennox–Gastaut syndrome (BNF).
	Zonisamide	At the time of publication, zonisamide did not have UK marketing authorisation for use in IGE but had authorisation for adjunctive therapy for adult patients with partial seizures, with or without secondary generalisation (BNF).
Juvenile myoclonic epilepsy	**Clobazam**	At the time of publication, clobazam did not have UK marketing authorisation for use in children younger than 3 years (BNFC). This was because of insufficient experience of the use of this drug in children younger than 3 years to enable any dosage recommendation to be made (SPC). It did have authorisation for adjunctive therapy for epilepsy monotherapy and under specialist supervision

		for catamenial (menstruation) seizures (usually for 7-10 days each month, just before and during menstruation) and cluster seizures (BNFC).
	Lamotrigine	At the time of publication, lamotrigine did not have UK marketing authorisation for use in juvenile myoclonic epilepsy (BNF) but had authorisation for monotherapy and adjunctive treatment of focal seizures, GTC seizures and seizures associated with Lennox–Gastaut syndrome and monotherapy treatment of absence seizures in children aged 2 to 12 years (BNF).
	Levetiracetam	At the time of publication, levetiracetam did not have UK marketing authorisation for monotherapy use in JME but had authorisation for monotherapy and adjunctive treatment of focal seizures with or without secondary generalisation and adjunctive therapy of myoclonic seizures in patients with JME and GTC seizures (BNF).
	Topiramate	At the time of publication, topiramate did not have UK marketing authorisation for use in juvenile myoclonic epilepsy (BNF) but had authorisation for focal seizures, GTC seizures and

		seizures associated with Lennox–Gastaut syndrome (BNF).
	Zonisamide	At the time of publication, zonisamide did not have UK marketing authorisation for use in juvenile myoclonic epilepsy but had authorisation for adjunctive therapy for adult patients with partial seizures, with or without secondary generalisation. (BNF)
Absence syndromes	**Clobazam**	At the time of publication, clobazam did not have UK marketing authorisation for use in children younger than 3 years (BNFC). This was because of insufficient experience of the use of this drug in children younger than 3 years to enable any dosage recommendation to be made (SPC). It did have authorisation for adjunctive therapy for epilepsy monotherapy and under specialist supervision for catamenial (menstruation) seizures (usually for 7-10 days each month, just before and during menstruation) and cluster seizures (BNFC).
	Lamotrigine	At the time of publication, lamotrigine had UK marketing authorisation for monotherapy of typical absence seizures for those aged 2–12 years only. There was not authorisation outside of this

		age range (BNF).
	Levetiracetam	At the time of publication, levetiracetam did not have UK marketing authorisation for use in absence syndromes but had authorisation for monotherapy and adjunctive treatment of focal seizures with or without secondary generalisation and adjunctive therapy of myoclonic seizures in patients with JME and GTC seizures (BNF).
	Topiramate	At the time of publication, topiramate did not have UK marketing authorisation for use in absence syndromes but had authorisation for focal seizures, GTC seizures and seizures associated with Lennox–Gastaut syndrome (BNF).
	Zonisamide	At the time of publication, zonisamide did not have UK marketing authorisation for use in absence syndromes but had authorisation for adjunctive therapy in the treatment of adult patients with partial seizures, with or without secondary generalisation (BNF).
Status epilepticus	**Propofol**	At the time of publication, propofol did not have UK marketing authorisation for status epilepticus but had authorisation for other

		conditions. Diprivan 2%, Propofol-Lipuro 2%, and Propoven 2% were not licensed for use in children younger than 3 years; Diprofusor TCI ('target controlled infusion') system was not licensed for use in children (BNFC).
	Thiopental sodium	At the time of publication, thiopental sodium did not have UK marketing authorisation for status epilepticus (only if other measures fail, see section 4.8.2 in BNF), by slow intravenous injection (BNF). It is authorised for convulsive states (75 mg to 125 mg or 3 ml to 5 ml of a 2.5% intravenous infusion) (SPC).
	Midazolam	At the time of publication, midazolam buccal liquid and injection did not have UK marketing authorisation for children with status epilepticus (BNFC).
	Diazepam	At the time of publication, diazepam did not have UK marketing authorisation for Rectubes and Stesolid Rectal Tubes or for use in children younger than 1 year (BNFC).

BECTS, benign epilepsy with centrotemporal spikes; BNF, British national formulary; BNFC, British national formulary for children; GTC, generalised tonic–clonic; SPC, summary of product characteristics.

Protocols for treating convulsive status epilepticus in adults and children (adults published in 2004 and children published in 2011)

Treating convulsive status epilepticus in adults (published in 2004)

<table>
<tr><th colspan="2">General measures</th></tr>
<tr><td>1st stage (0−10 minutes)
Secure airway and resuscitate
Administer oxygen
Assess cardiorespiratory function
Establish intravenous access</td><td>Early status</td></tr>
<tr><td colspan="2">2nd stage (0−30 minutes)
Institute regular monitoring
Consider the possibility of non-epileptic status
Emergency AED therapy
Emergency investigations
Administer glucose (50 ml of 50% solution) and/or intravenous thiamine (250 mg) as high potency intravenous Pabrinex if any suggestion of alcohol abuse or impaired nutrition
Treat acidosis if severe</td></tr>
<tr><td>3rd stage (0−60 minutes)
Establish aetiology
Alert anaesthetist and ITU
Identify and treat medical complications
Pressor therapy when appropriate</td><td>Established status</td></tr>
</table>

4th stage (30−90 minutes) • Transfer to intensive care • Establish intensive care and EEG monitoring • Initiate intracranial pressure monitoring where appropriate • Initiate long-term, maintenance AED therapy	**Refractory status**
Emergency investigations Blood should be taken for blood gases, glucose, renal and liver function, calcium and magnesium, full blood count (including platelets), blood clotting, AED drug levels; 5 ml of serum and 50 ml of urine samples should be saved for future analysis, including toxicology, especially if the cause of the convulsive status epilepticus is uncertain. Chest radiograph to evaluate possibility of aspiration. Other investigations depend on the clinical circumstances and may include brain imaging, lumbar puncture.	
Monitoring Regular neurological observations and measurements of pulse, blood pressure, temperature. ECG, biochemistry, blood gases, clotting, blood count, drug levels. Patients require the full range of ITU facilities and care should be shared between anaesthetist and neurologist. EEG monitoring is necessary for refractory status. Consider the possibility of non-epileptic status. In refractory convulsive status epilepticus, the primary end-point is suppression of epileptic activity on the EEG, with a secondary end-point of burst-suppression pattern (that is, short intervals of up to 1 second between bursts of background rhythm).	

Emergency AED therapy for convulsive status epilepticus (published in 2004)

Premonitory stage (pre-hospital)	Diazepam 10−20 mg given rectally, repeated once 15 minutes later if status continues to threaten, or midazolam 10 mg given buccally. If seizures continue, treat as below.
Early status	Lorazepam (intravenous) 0.1 mg/kg (usually a 4 mg bolus, repeated once after 10−20 minutes; rate not critical). Give usual AED medication if already on treatment. For sustained control or if seizures continue, treat as below.
Established status	Phenytoin infusion at a dose of 15–18 mg/kg at a rate of 50 mg/minute or fosphenytoin infusion at a dose of 15−20 mg phenytoin equivalents (PE)/kg at a rate of 50–100 mg PE/minute and/or phenobarbital bolus of 10–15 mg/kg at a rate of 100 mg/minute.
Refractory status[a]	General anaesthesia, with one of: • propofol (1–2 mg/kg bolus, then 2–10 mg/kg/hour) titrated to effect • midazolam (0.1–0.2 mg/kg bolus, then 0.05–0.5 mg/kg/hour) titrated to effect • thiopental sodium (3–5 mg/kg bolus, then 3–5 mg/kg/hour) titrated to effect; after 2–3 days infusion rate needs reduction as fat stores are saturated

	• anaesthetic continued for 12−24 hours after the last clinical or electrographic seizure, then dose tapered.
[a] In the above scheme, the refractory stage (general anaesthesia) is reached 60/90 minutes after the initial therapy.	

This scheme is suitable for usual clinical hospital settings. In some situations, general anaesthesia should be initiated earlier and, occasionally, should be delayed.

Experience with long-term administration (hours or days) of the newer anaesthetic drugs is very limited. The modern anaesthetics have, however, important pharmacokinetic advantages over the more traditional barbiturates.

AED therapy must be given in parallel with emergency treatment. The choice of drug depends on previous therapy, the type of epilepsy, and the clinical setting. Any pre-existing AED therapy should be continued at full dose, and any recent reductions reversed.

If phenytoin or phenobarbital has been used in emergency treatment, maintenance doses can be continued orally or intravenously guided by serum level monitoring. Other maintenance AEDs can be started also, with oral loading doses. Care needs to be taken with nasogastric feeds, which can interfere with the absorption of some AEDs. Once the patient has been free of seizures for 12−24 hours and provided that there are adequate plasma levels of concomitant AEDs, then the anaesthetic should be slowly tapered.

Guidelines for treating convulsive status epilepticus in children (published in 2011)

The original guidelines for the treatment of convulsive status epilepticus (CSE) were published in 2000. They were subsequently adopted by the Advanced Life Support Group (ALSG) and taught in their courses across the UK and Europe. They represent the basis for much of the management of CSE by junior doctors although they are not intended to cover all situations. They are hospital guidelines and take no account of pre-hospital treatment. They do not include infants, those born very prematurely and/or less than 28 days of age. Also, they do not cover children who have frequent episodes of CSE for whom an individually tailored guideline is the best option as their seizures may respond better to specific treatments than others.

Generalised convulsive (tonic–clonic) status epilepticus is defined as a generalised convulsion lasting 30 minutes or longer, or repeated tonic–clonic convulsions occurring over a 30 minutes period without recovery of consciousness between each convulsion. However, the guideline stated that 'for practical purposes, the approach to the child who presents with a tonic–clonic convulsion lasting more than 5 minutes should be the same as the child who is in "established" status – to stop the seizure and to prevent the development of status epilepticus'. The consensus guideline can be seen in the table below.

Treating convulsive status epilepticus

Time	Seizure starts Check ABC, high flow O_2 if available Check blood glucose	Confirm clinically that it is an epileptic seizure
0 mins (1st step)		
5 mins (2nd step)	Midazolam 0.5 mg/kg buccally or Lorazepam 0.1 mg/kg if intravenous access established	Midazolam may be given by parents, carers or ambulance crew in non-hospital setting

Time 0 mins (1st step)	Seizure starts Check ABC, high flow O_2 if available Check blood glucose	Confirm clinically that it is an epileptic seizure
15 mins (3rd step)	Lorazepam 0.1 mg/kg intravenously	This step should be in hospital Call for senior help Start to prepare phenytoin for 4th step Re-confirm it is an epileptic seizure
25 mins (4th step)	Phenytoin 20 mg/kg by intravenous infusion over 20 mins or (if on regular phenytoin) Phenobarbital 20 mg/kg intravenously over 5 mins	Paraldehyde 0.8 ml/kg of mixture may be given after start of phenytoin infusion as directed by senior staff Inform intensive care unit and/or senior anaesthetist
45 mins (5th step)	Rapid sequence induction of anaesthesia using thiopental sodium 4 mg/kg intravenously	Transfer to paediatric intensive care unit

When the protocol is initiated it is important to consider what pre-hospital treatment has been received and to modify the protocol accordingly.

Non-convulsive status epilepticus in adults and children (2004 guideline)

Suggested by the 2004 Guideline Development Group.

This is less common than tonic–clonic status epilepticus. Treatment for non-convulsive status epilepticus is less urgent than for convulsive status epilepticus. Treatment should be considered as follows:

- maintenance or reinstatement of usual oral AED therapy
- use of intravenous benzodiazepines under EEG control, particularly if the diagnosis is not established
- referral for specialist advice and/or EEG monitoring.