

# The epilepsies: the diagnosis and management of the epilepsies in adults and children in primary and secondary care

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**NICE clinical guideline 137**

[guidance.nice.org.uk/cg137](http://guidance.nice.org.uk/cg137)

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## Introduction

This guidance updates and replaces NICE clinical guideline 20. This guidance also updates and replaces NICE technology appraisal 76 (2004) and NICE technology appraisal 79 (2004).

New recommendations have been added for the pharmacological treatment of people with [epilepsy](#), including the use of [ketogenic diet](#) (see [About this guideline](#) for details).

Epilepsy is a common neurological disorder characterised by recurring seizures. Different types of epilepsy have different causes. Accurate estimates of incidence and prevalence are difficult to achieve because identifying people who may have epilepsy is difficult. Epilepsy has been estimated to affect between 362,000 and 415,000 people in England. In addition, there will be further individuals, estimated to be 5–30%, so amounting to up to another 124,500 people, who have been diagnosed with epilepsy, but in whom the diagnosis is incorrect. Incidence is estimated to be 50 per 100,000 per year and the prevalence of active epilepsy in the UK is estimated to be 5–10 cases per 1000. Two-thirds of people with active epilepsy have their epilepsy controlled satisfactorily with [anti-epileptic drugs \(AEDs\)](#). Other approaches may include surgery. Optimal management improves health outcomes and can also help to minimise other, often detrimental, impacts on social, educational and employment activity. [The epilepsies](#) (NICE clinical guideline 20) stated that the annual estimated cost of established epilepsies was £2 billion (direct and indirect costs).

Newer and more expensive AEDs are now being prescribed, and with an increase in treatment costs likely in coming years it is essential to ensure that AEDs with proven clinical and cost effectiveness are identified. The evidence used to develop [The epilepsies](#) (NICE clinical guideline 20), [Newer drugs for epilepsy in adults](#) (NICE technology appraisal guidance 76) and [Newer drugs for epilepsy in children](#) (NICE technology appraisal guidance 79) showed no difference in effectiveness between newer and older AEDs, or between the newer drugs (as [monotherapy](#)) for seizure control. However, a recent large multicentre trial (the SANAD trial) evaluating newer drugs in newly diagnosed epilepsy (accepting some limitations) suggested that sodium valproate should be the drug of choice in generalised and unclassifiable epilepsies, and lamotrigine in focal epilepsies. It was therefore considered necessary to review new evidence regarding AEDs within an update of NICE clinical guideline 20 (which was published in 2004).

The guideline will assume that prescribers will use a drug's summary of product characteristics to inform decisions made with individual patients.

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This guideline recommends some drugs for indications for which they do not have a UK marketing authorisation at the date of publication, if there is good evidence to support that use. Where recommendations have been made for the use of drugs outside their licensed indications ('off-label use'), these drugs are marked with a footnote in the recommendations.

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## Person-centred care

This guideline offers best practice advice on the care of children, young people and adults with epilepsy.

Treatment and care should take into account people's needs and preferences. People with epilepsy should have the opportunity to make informed decisions about their care and treatment, in partnership with their healthcare professionals. If people do not have the capacity to make decisions, healthcare professionals should follow the [Department of Health's advice on consent](#) and the [code of practice that accompanies the Mental Capacity Act](#). In Wales, healthcare professionals should follow [advice on consent from the Welsh Government](#).

If the person is under 16, healthcare professionals should follow the guidelines in [Seeking consent: working with children](#).

Good communication between healthcare professionals and people with epilepsy (and their family and [carers](#)) is essential. It should be supported by evidence-based written information tailored to the person's needs. Treatment and care, and the information people are given about it, should be culturally appropriate. It should also be accessible to people with additional needs such as physical, sensory or learning disabilities, and to people who do not speak or read English.

If the person agrees, families and carers should have the opportunity to be involved in decisions about treatment and care.

Families and carers should also be given the information and support they need.

Care of young people in transition between paediatric and adult services should be planned and managed according to the best practice guidance described in [Transition: getting it right for young people](#).

Adult and paediatric healthcare teams should work jointly to provide assessment and services to young people with epilepsy. Diagnosis and management should be reviewed throughout the transition process, and there should be clarity about who is the lead [clinician](#) to ensure continuity of care.

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## Key priorities for implementation

The following recommendations have been identified as priorities for implementation.

### *Diagnosis*

- All children, young people and adults with a recent onset suspected seizure should be seen urgently<sup>[1]</sup> by a specialist<sup>[2]</sup>. This is to ensure precise and early diagnosis and initiation of therapy as appropriate to their needs. **[2004]**

### *Management*

- Healthcare professionals should adopt a consulting style that enables the child, young person or adult with epilepsy, and their family and/or carers as appropriate, to participate as partners in all decisions about their healthcare, and take fully into account their race, culture and any specific needs. **[2004]**
- All children, young people and adults with epilepsy should have a comprehensive care plan that is agreed between the person, their family and/or carers as appropriate, and primary and secondary care providers. **[2004]**
- The AED (anti-epileptic drug) treatment strategy should be individualised according to the seizure type, epilepsy syndrome, co-medication and co-morbidity, the child, young person or adult's lifestyle, and the preferences of the person, their family and/or carers as appropriate. **[2004]**

### *Prolonged or repeated seizures and **convulsive status epilepticus***

- Only prescribe buccal midazolam or rectal diazepam<sup>[3]</sup> for use in the community for children, young people and adults who have had a previous episode of prolonged or serial convulsive seizures. **[new 2012]**
- Administer buccal midazolam as first-line treatment in children, young people and adults with prolonged or repeated seizures in the community. Administer rectal diazepam<sup>[3]</sup> if preferred or if buccal midazolam is not available. If intravenous access is already established and resuscitation facilities are available, administer intravenous lorazepam. **[new 2012]**

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## ***Special considerations for women and girls of childbearing potential***

- Women and girls with epilepsy and their partners, as appropriate, must be given accurate information and counselling about contraception, conception, pregnancy, caring for children, breastfeeding and menopause. **[2004]**

## ***Review and referral***

- All children, young people and adults with epilepsy should have a regular structured review. In children and young people, this review should be carried out at least yearly (but may be between 3 and 12 months by arrangement) by a specialist. In adults, this review should be carried out at least yearly by either a generalist or specialist, depending on how well the epilepsy is controlled and/or the presence of specific lifestyle issues. **[2004]**
- At the review, children, young people and adults should have access to: written and visual information; counselling services; information about voluntary organisations; epilepsy specialist nurses; timely and appropriate investigations; referral to [tertiary services](#), including surgery if appropriate. **[2004]**
- If seizures are not controlled and/or there is diagnostic uncertainty or treatment failure, children, young people and adults should be referred to tertiary services soon<sup>[4]</sup> for further assessment. **[2004]**

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<sup>[1]</sup> The Guideline Development Group considered that 'urgently' meant being seen within 2 weeks.

<sup>[2]</sup> For adults, a specialist is defined throughout as a medical practitioner with training and expertise in epilepsy. For children and young people, a specialist is defined throughout as a paediatrician with training and expertise in epilepsy.

<sup>[3]</sup> At the time of publication (January 2012), this drug did not have UK marketing authorisation for this indication and/or population (see [appendix E](#) for details). Informed consent should be obtained and documented in line with normal standards in emergency care.

<sup>[4]</sup> The Guideline Development Group considered that 'soon' meant being seen within 4 weeks.

## 1 Guidance

The following guidance is based on the best available evidence. The [full guideline](#) gives details of the methods and the evidence used to develop the guidance.

In this guideline, the term 'adults' is used to describe people who are aged 18 years and older, and 'children' those who are aged 28 days to 11 years. 'Young people' describes those who are aged 12 to 17 years. '[Older people](#)' is used to describe people who are aged 65 years or older – this age range is based on evidence reviewed by the Guideline Development Group. However, it is recognised that there is a variable age range (15–19 years) at which care is transferred between child and adult health services by local healthcare trusts and primary care organisations.

Please see [appendix G](#) for definitions of abbreviations and a glossary of terms used throughout this guideline.

**January 2015:** The Medicines and Healthcare Products Regulatory Agency (MHRA) has strengthened its warnings on the use of valproate in women of childbearing potential. We are assessing the impact of this on the guideline. In the meantime, healthcare professionals are advised to use the guideline in conjunction with the latest MHRA advice.

### 1.1 Principle of decision making

- 1.1.1 Healthcare professionals should adopt a consulting style that enables the child, young person or adult with epilepsy, and their family and/or carers as appropriate, to participate as partners in all decisions about their healthcare, and take fully into account their race, culture and any specific needs. **[2004]**

### 1.2 Coping with epilepsy

- 1.2.1 Children, young people and adults with epilepsy and their families and/or carers should be empowered to manage their condition as well as possible. **[2004]**

- 1.2.2 Adults should receive appropriate information and education about all aspects of epilepsy. This may be best achieved and maintained through structured self-management plans. **[2004]**
- 1.2.3 In children and young people, self-management of epilepsy may be best achieved through active child-centred training models and [interventions](#). **[2004]**
- 1.2.4 Healthcare professionals should highlight the Expert Patients Programme ([www.expertpatients.co.uk](http://www.expertpatients.co.uk)<sup>[5]</sup>) to children, young people and adults with epilepsy who wish to manage their condition more effectively. **[2004, amended 2012]**

## 1.3 Information

- 1.3.1 Children, young people and adults with epilepsy and their families and/or carers should be given, and have access to sources of, information about (where appropriate):
- epilepsy in general
  - diagnosis and treatment options
  - medication and side effects
  - seizure type(s), triggers and seizure control
  - management and self-care
  - risk management
  - first aid, safety and injury prevention at home and at school or work
  - psychological issues
  - social security benefits and social services
  - insurance issues
  - education and healthcare at school
  - employment and independent living for adults

- importance of disclosing epilepsy at work, if relevant (if further information or clarification is needed, voluntary organisations should be contacted)
- road safety and driving
- prognosis
- sudden death in epilepsy (SUDEP)
- status epilepticus
- lifestyle, leisure and social issues (including recreational drugs, alcohol, sexual activity and sleep deprivation)
- family planning and pregnancy
- voluntary organisations, such as support groups and charitable organisations, and how to contact them. **[2004]**

1.3.2 The time at which this information should be given will depend on the certainty of the diagnosis, and the need for confirmatory investigations. **[2004]**

1.3.3 Information should be provided in formats, languages and ways that are suited to the child, young person or adult's requirements. Consideration should be given to developmental age, gender, culture and stage of life of the person. **[2004]**

1.3.4 If children, young people and adults, and their families and/or carers, have not already found high-quality information from voluntary organisations and other sources, healthcare professionals should inform them of different sources (using the Internet, if appropriate: see, for example, the website of the Joint Epilepsy Council of the UK and Ireland, [www.jointepilepsycouncil.org.uk](http://www.jointepilepsycouncil.org.uk)). **[2004]**

1.3.5 Adequate time should be set aside in the consultation to provide information, which should be revisited on subsequent consultations. **[2004]**

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- 1.3.6 Checklists should be used to remind children, young people and adults, and healthcare professionals, about information that should be discussed during consultations. **[2004]**
- 1.3.7 Everyone providing care or treatment for children, young people and adults with epilepsy should be able to provide essential information. **[2004]**
- 1.3.8 The child, young person or adult with epilepsy and their family and/or carers as appropriate should know how to contact a named individual when information is needed. This named individual should be a member of the healthcare team and be responsible for ensuring that the information needs of the child, young person or adult and/or their family and/or carers are met. **[2004]**
- 1.3.9 The possibility of having seizures should be discussed, and information on epilepsy should be provided before seizures occur, for children, young people and adults at high risk of developing seizures (such as after severe brain injury), with a learning disability, or who have a strong family history of epilepsy. **[2004]**
- 1.3.10 Children, young people and adults with epilepsy should be given appropriate information before they make important decisions (for example, regarding pregnancy or employment). **[2004]**

### **Sudden unexpected death in epilepsy (SUDEP)**

- 1.3.11 Information on SUDEP should be included in literature on epilepsy to show why preventing seizures is important. Tailored information on the person's relative risk of SUDEP should be part of the counselling checklist for children, young people and adults with epilepsy and their families and/or carers. **[2004]**
- 1.3.12 The risk of SUDEP can be minimised by:
- optimising seizure control
  - being aware of the potential consequences of nocturnal seizures. **[2004]**

- 1.3.13 Tailored information and discussion between the child, young person or adult with epilepsy, their family and/or carers (as appropriate) and healthcare professionals should take account of the small but definite risk of SUDEP. **[2004]**
- 1.3.14 Where families and/or carers have been affected by SUDEP, healthcare professionals should contact families and/or carers to offer their condolences, invite them to discuss the death, and offer referral to bereavement counselling and a SUDEP support group. **[2004]**

## **1.4 Following a first seizure**

- 1.4.1 Children, young people and adults presenting to an Accident and Emergency department following a suspected seizure should be screened initially. This should be done by an adult or paediatric physician with onward referral to a specialist<sup>[6]</sup> when an epileptic seizure is suspected or there is diagnostic doubt. **[2004]**
- 1.4.2 Protocols should be in place that ensure proper assessment in the emergency setting for children, young people and adults presenting with an epileptic seizure (suspected or confirmed). **[2004]**
- 1.4.3 The information that should be obtained from the adult and/or family or carer after a suspected seizure is contained in appendix D. **[2004]**
- 1.4.4 The information that should be obtained from the child or young person and/or parent or carer after a suspected seizure is contained in appendix D. **[2004]**
- 1.4.5 It is recommended that all adults having a first seizure should be seen as soon as possible<sup>[7]</sup> by a specialist in the management of the epilepsies to ensure precise and early diagnosis and initiation of therapy as appropriate to their needs. **[2004]**
- 1.4.6 It is recommended that all children and young people who have had a first non-febrile seizure should be seen as soon as possible<sup>[7]</sup> by a specialist in the

management of the epilepsies to ensure precise and early diagnosis and initiation of therapy as appropriate to their needs. **[2004]**

- 1.4.7 At the initial assessment for a recent onset seizure, the specialist should have access to appropriate investigations. **[2004]**
- 1.4.8 In a child, young person or adult presenting with an attack, a physical examination should be carried out. This should address their cardiac, neurological and mental status, and should include a developmental assessment where appropriate. **[2004]**
- 1.4.9 Essential information on how to recognise a seizure, first aid, and the importance of reporting further attacks should be provided to a child, young person or adult who has experienced a possible first seizure, and their family/carer/parent as appropriate. This information should be provided while the child, young person or adult is awaiting a diagnosis and should also be provided to their family and/or carers. **[2004]**

## **1.5 Diagnosis**

- 1.5.1 The diagnosis of epilepsy in adults should be established by a specialist medical practitioner with training and expertise in epilepsy. **[2004]**
- 1.5.2 The diagnosis of epilepsy in children and young people should be established by a specialist paediatrician with training and expertise in epilepsy. **[2004]**
- 1.5.3 Children, young people and adults and their families and/or carers should be given an opportunity to discuss the diagnosis with an appropriate healthcare professional. **[2004]**
- 1.5.4 A detailed history should be taken from the child, young person or adult and an eyewitness to the attack, where possible, to determine whether or not an epileptic seizure is likely to have occurred. **[2004]**
- 1.5.5 The clinical decision as to whether an epileptic seizure has occurred should then be based on the combination of the description of the attack and different

symptoms. Diagnosis should not be based on the presence or absence of single features. **[2004]**

- 1.5.6 It may not be possible to make a definite diagnosis of epilepsy. If the diagnosis cannot be clearly established, further investigations (see section 1.6) and/or referral to a [tertiary epilepsy specialist](#)<sup>[6]</sup> (see [recommendation 1.10.2](#)) should be considered. Follow-up should always be arranged. **[2004]**
- 1.5.7 Where [non-epileptic attack disorder](#) is suspected, suitable referral should be made to psychological or psychiatric services for further investigation and treatment. **[2004]**
- 1.5.8 Prospective recording of events, including video recording and written descriptions, can be very helpful in reaching a diagnosis. **[2004]**

## 1.6 Investigations

- 1.6.1 Information should be provided to children, young people and adults and families and/or carers as appropriate on the reasons for tests, their results and meaning, the requirements of specific investigations, and the logistics of obtaining them. **[2004]**
- 1.6.2 All investigations for children should be performed in a child-centred environment. **[2004]**

### Electroencephalogram (EEG)

- 1.6.3 Children, young people and adults requiring an EEG should have the test performed soon after it has been requested<sup>[6]</sup>. **[2004]**
- 1.6.4 An EEG should be performed only to support a diagnosis of epilepsy in adults in whom the clinical history suggests that the seizure is likely to be epileptic in origin. **[2004]**
- 1.6.5 An EEG should be performed only to support a diagnosis of epilepsy in children and young people. If an EEG is considered necessary, it should be

performed after the second epileptic seizure but may, in certain circumstances, as evaluated by the specialist, be considered after a first epileptic seizure.

**[2004]**

- 1.6.6 An EEG should not be performed in the case of probable syncope because of the possibility of a false-positive result. **[2004]**
- 1.6.7 The EEG should not be used to exclude a diagnosis of epilepsy in a child, young person or adult in whom the clinical presentation supports a diagnosis of a non-epileptic event. **[2004]**
- 1.6.8 The EEG should not be used in isolation to make a diagnosis of epilepsy. **[2004]**
- 1.6.9 An EEG may be used to help determine seizure type and epilepsy syndrome in children, young people and adults in whom epilepsy is suspected. This enables them to be given the correct prognosis. **[2004]**
- 1.6.10 In children, young people and adults presenting with a first unprovoked seizure, unequivocal epileptiform activity shown on EEG can be used to assess the risk of seizure recurrence. **[2004]**
- 1.6.11 For children, young people and adults in whom epilepsy is suspected, but who present diagnostic difficulties, specialist investigations should be available. **[2004]**
- 1.6.12 Repeated standard EEGs may be helpful when the diagnosis of the epilepsy or the syndrome is unclear. However, if the diagnosis has been established, repeat EEGs are not likely to be helpful. **[2004]**
- 1.6.13 Repeated standard EEGs should not be used in preference to sleep or sleep-deprived EEGs. **[2004]**
- 1.6.14 When a standard EEG has not contributed to diagnosis or classification, a sleep EEG should be performed. **[2004]**

- 1.6.15 In children and young people, a sleep EEG is best achieved through sleep deprivation or the use of melatonin<sup>[10]</sup>. **[2004, amended 2012]**
- 1.6.16 Long-term video or ambulatory EEG may be used in the assessment of children, young people and adults who present diagnostic difficulties after clinical assessment and standard EEG. **[2004]**
- 1.6.17 Provocation by suggestion may be used in the evaluation of non-epileptic attack disorder. However, it has a limited role and may lead to false-positive results in some people. **[2004]**
- 1.6.18 Photic stimulation and hyperventilation should remain part of standard EEG assessment. The child, young person or adult and family and/or carer should be made aware that such activation procedures may induce a seizure and they have a right to refuse. **[2004]**

## Neuroimaging

- 1.6.19 Neuroimaging should be used to identify structural abnormalities that cause certain epilepsies. **[2004]**
- 1.6.20 MRI should be the imaging investigation of choice in children, young people and adults with epilepsy. **[2004]**
- 1.6.21 MRI is particularly important in those:
- who develop epilepsy before the age of 2 years or in adulthood
  - who have any suggestion of a focal onset on history, examination or EEG (unless clear evidence of benign focal epilepsy)
  - in whom seizures continue in spite of first-line medication. **[2004]**
- 1.6.22 Children, young people and adults requiring MRI should have the test performed soon<sup>[9]</sup>. **[2004]**
- 1.6.23 Neuroimaging should not be routinely requested when a diagnosis of idiopathic generalised epilepsy has been made. **[2004]**

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- 1.6.24 CT should be used to identify underlying gross pathology if MRI is not available or is contraindicated, and for children or young people in whom a general anaesthetic or sedation would be required for MRI but not CT. **[2004]**
- 1.6.25 In an acute situation, CT may be used to determine whether a seizure has been caused by an acute neurological lesion or illness. **[2004]**

### Other tests

- 1.6.26 Measurement of serum prolactin is not recommended for the diagnosis of epilepsy. **[2004]**
- 1.6.27 In adults, appropriate blood tests (for example, plasma electrolytes, glucose, calcium) to identify potential causes and/or to identify any significant co-morbidity should be considered. **[2004]**
- 1.6.28 In children and young people, other investigations, including blood and urine biochemistry, should be undertaken at the discretion of the specialist to exclude other diagnoses, and to determine an underlying cause of the epilepsy. **[2004]**
- 1.6.29 A 12-lead ECG should be performed in adults with suspected epilepsy. **[2004]**
- 1.6.30 In children and young people, a 12-lead ECG should be considered in cases of diagnostic uncertainty. **[2004]**
- 1.6.31 In cases of diagnostic uncertainty, a referral to a cardiologist should be considered. **[2004]**

### Neuropsychological assessment

- 1.6.32 Neuropsychological assessment should be considered in children, young people and adults in whom it is important to evaluate learning disabilities and cognitive dysfunction, particularly in regard to language and memory. **[2004]**
- 1.6.33 Referral for a neuropsychological assessment is indicated:

- when a child, young person or adult with epilepsy is having educational or occupational difficulties
- when an MRI has identified abnormalities in cognitively important brain regions
- when a child, young person or adult complains of memory or other cognitive deficits and/or cognitive decline. **[2004]**

## 1.7 Classification

- 1.7.1 Epileptic seizures and epilepsy syndromes in children, young people and adults should be classified using a multi-axial diagnostic scheme. The axes that should be considered are: description of seizure ([ictal phenomenology](#)); seizure type; syndrome and [aetiology](#). **[2004]**
- 1.7.2 The seizure type(s) and epilepsy syndrome, aetiology, and co-morbidity should be determined, because failure to classify the epilepsy syndrome correctly can lead to inappropriate treatment and persistence of seizures. **[2004]**
- 1.7.3 Children, young people and adults with epilepsy should be given information about their seizure type(s) and epilepsy syndrome, and the likely prognosis. **[2004]**

## 1.8 Management

- 1.8.1 Children, young people and adults with epilepsy should have an accessible point of contact with specialist services. **[2004]**
- 1.8.2 All children, young people and adults with epilepsy should have a comprehensive care plan that is agreed between the person, family and/or carers where appropriate, and primary care and secondary care providers. This should include lifestyle issues as well as medical issues. **[2004]**
- 1.8.3 Epilepsy specialist nurses (ESNs) should be an integral part of the network of care of children, young people and adults with epilepsy. The key roles of the ESNs are to support both epilepsy specialists and generalists, to ensure access to community and multi-agency services and to provide information,

training and support to the child, young person or adult, families, carers and, in the case of children, others involved in the child's education, welfare and well-being. [2004]

- 1.8.4 Healthcare professionals have a responsibility to educate others about epilepsy so as to reduce the stigma associated with it. They should provide information about epilepsy to all people who come into contact with children, young people and adults with epilepsy, including school staff, social care professionals and others. [2004]

## 1.9 Pharmacological treatment

Note: see [appendix E](#) for further details of pharmacological treatment.

The GDG is aware of the contraindications to prescribing carbamazepine to some people of Han Chinese or Thai origin. Recommendations in this section offer alternatives, and so no specific recommendations are made for these groups.

The GDG is also aware of specific issues with prescribing sodium valproate to girls and women of childbearing age. Recommendations in this section offer alternative prescribing options for this group. Recommendations 1.9.1.10, 1.9.17.3, 1.9.17.6, 1.9.17.9 and [1.15.1.4](#) also provide additional specific information of relevance when considering prescribing AEDs to women of childbearing age.

NICE has also issued guidance on the use of retigabine as an option for the [adjunctive treatment of partial](#) (the term focal has been used in this guideline) onset seizures with or without secondary generalisation in adults aged 18 years and older with epilepsy in [Retigabine for the adjunctive treatment of partial onset seizures in epilepsy](#) (NICE technology appraisal guidance 232).

### 1.9.1 General information about pharmacological treatment

- 1.9.1.1 Information that is provided about anti-epileptic drugs (AEDs) needs to be in the context of that provided by the manufacturer, for example, [indications](#), side effects and licence status. [2004]

- 1.9.1.2 The AED treatment strategy should be individualised according to the seizure type, epilepsy syndrome, co-medication and co-morbidity, the child, young person or adult's lifestyle, and the preferences of the person and their family and/or carers as appropriate (see [appendix E](#)). **[2004]**
- 1.9.1.3 The diagnosis of epilepsy needs to be critically evaluated if events continue despite an optimal dose of a first-line AED. **[2004]**
- 1.9.1.4 Consistent supply to the child, young person or adult with epilepsy of a particular manufacturer's AED preparation is recommended, unless the prescriber, in consultation with the child, young person, adult and their family and/or carers as appropriate, considers that this is not a concern. Different preparations of some AEDs may vary in bioavailability or pharmacokinetic profiles and care needs to be taken to avoid reduced effect or excessive side effects. Consult the summary of product characteristics (SPC) and 'British national formulary' (BNF; available at <http://bnf.org>) on the bioavailability and pharmacokinetic profiles of individual AEDs, but note that these do not give information on comparing bioavailability of different generic preparations<sup>[1],[2]</sup>. **[New 2012]**
- 1.9.1.5 It is recommended that children, young people and adults should be treated with a single AED (monotherapy) wherever possible. If the initial treatment is unsuccessful, then monotherapy using another drug can be tried. Caution is needed during the changeover period. **[2004]**
- 1.9.1.6 If an AED has failed because of adverse effects or continued seizures, a second drug should be started (which may be an alternative first-line or second-line drug) and built up to an adequate or maximum tolerated dose and then the first drug should be tapered off slowly. **[2004]**
- 1.9.1.7 If the second drug is unhelpful, either the first or second drug may be tapered, depending on relative efficacy, side effects and how well the drugs are tolerated before starting another drug. **[2004]**
- 1.9.1.8 It is recommended that combination therapy (adjunctive or 'add-on' therapy) should only be considered when attempts at monotherapy with AEDs have not

resulted in seizure freedom. If trials of combination therapy do not bring about worthwhile benefits, treatment should revert to the regimen (monotherapy or combination therapy) that has proved most acceptable to the child, young person or adult, in terms of providing the best balance between effectiveness in reducing seizure frequency and tolerability of side effects. **[2004]**

1.9.1.9 If using carbamazepine, offer controlled-release carbamazepine preparations. **[new 2012]**

1.9.1.10 When prescribing sodium valproate to women and girls of present and future childbearing potential, discuss the possible risk of malformation and neurodevelopmental impairments in an unborn child, particularly with high doses of this AED or when using as part of polytherapy. **[new 2012]**

## 1.9.2 Initiation of pharmacological treatment

1.9.2.1 AED therapy should only be started once the diagnosis of epilepsy is confirmed, except in exceptional circumstances that require discussion and agreement between the prescriber, the specialist and the child, young person or adult and their family and/or carers as appropriate. **[2004]**

1.9.2.2 AED therapy should be initiated in adults on the recommendation of a specialist. **[2004]**

1.9.2.3 AED therapy in children and young people should be initiated by a specialist. **[2004]**

1.9.2.4 The decision to initiate AED therapy should be taken between the child, young person or adult, their family and/or carers (as appropriate) and the specialist after a full discussion of the risks and benefits of treatment. This discussion should take into account details of the person's epilepsy syndrome, prognosis and lifestyle. **[2004]**

1.9.2.5 Treatment with AED therapy is generally recommended after a second epileptic seizure. **[2004]**

1.9.2.6 When possible, choose which AED to offer on the basis of the presenting epilepsy syndrome. If the epilepsy syndrome is not clear at presentation, base the decision on the presenting seizure type(s). **[new 2012]**

1.9.2.7 AED therapy should be considered and discussed with children, young people and adults and their family and/or carers as appropriate after a first unprovoked seizure if:

- the child, young person or adult has a neurological deficit
- the EEG shows unequivocal epileptic activity
- the child, young person or adult and/or their family and/or carers consider the risk of having a further seizure unacceptable
- brain imaging shows a structural abnormality. **[2004]**

1.9.2.8 It should be recognised that some children, young people and adults (through their families and/or carers, in some instances) may choose not to take AED therapy following a full discussion of the risks and benefits. **[2004]**

### 1.9.3 Pharmacological treatment of focal seizures

#### First-line treatment in children, young people and adults with newly diagnosed focal seizures

1.9.3.1 Offer carbamazepine or lamotrigine as first-line treatment to children, young people and adults with newly diagnosed focal seizures. **[new 2012]**

1.9.3.2 Levetiracetam is not cost effective at June 2011 unit costs<sup>[13]</sup>. Offer levetiracetam, oxcarbazepine or sodium valproate (provided the acquisition cost of levetiracetam falls to at least 50% of June 2011 value documented in the National Health Service Drug Tariff for England and Wales) if carbamazepine and lamotrigine are unsuitable or not tolerated. If the first AED tried is ineffective, offer an alternative from these five AEDs. Be aware of the teratogenic risks of sodium valproate (see recommendation 1.9.1.10). **[new 2012]**

1.9.3.3 Consider adjunctive treatment if a second well-tolerated AED is ineffective (see recommendations 1.9.3.1 and 1.9.3.2). **[new 2012]**

### **Adjunctive treatment in children, young people and adults with refractory focal seizures**

1.9.3.4 Offer carbamazepine, clobazam<sup>[14]</sup>, gabapentin<sup>[14]</sup>, lamotrigine, levetiracetam, oxcarbazepine, sodium valproate or topiramate as adjunctive treatment to children, young people and adults with focal seizures if first-line treatments (see recommendations 1.9.3.1 and 1.9.3.2) are ineffective or not tolerated. Be aware of teratogenic risks of sodium valproate (see recommendation 1.9.1.10). **[new 2012]**

1.9.3.5 If adjunctive treatment (see recommendation 1.9.3.4) is ineffective or not tolerated, discuss with, or refer to, a tertiary epilepsy specialist. Other AEDs that may be considered by the tertiary epilepsy specialist are eslicarbazepine acetate<sup>[14]</sup>, lacosamide, phenobarbital, phenytoin, pregabalin<sup>[14]</sup>, tiagabine, vigabatrin and zonisamide<sup>[14]</sup>. Carefully consider the risk–benefit ratio when using vigabatrin because of the risk of an irreversible effect on visual fields. **[new 2012]**

## **1.9.4 Pharmacological treatment of newly diagnosed generalised tonic–clonic (GTC) seizures**

### **First-line treatment in children, young people and adults with newly diagnosed GTC seizures**

1.9.4.1 Offer sodium valproate as first-line treatment to children, young people and adults with newly diagnosed GTC seizures. Be aware of teratogenic risks of sodium valproate (see recommendation 1.9.1.10). **[new 2012]**

1.9.4.2 Offer lamotrigine if sodium valproate is unsuitable. If the person has myoclonic seizures or is suspected of having juvenile myoclonic epilepsy (JME), be aware that lamotrigine may exacerbate myoclonic seizures. **[new 2012]**

1.9.4.3 Consider carbamazepine and oxcarbazepine<sup>[14]</sup> but be aware of the risk of exacerbating myoclonic or absence seizures. **[new 2012]**

## Adjunctive treatment in children, young people and adults with GTC seizures

- 1.9.4.4 Offer clobazam<sup>[14]</sup>, lamotrigine, levetiracetam, sodium valproate or topiramate as adjunctive treatment to children, young people and adults with GTC seizures if first-line treatments (see recommendations 1.9.4.1, 1.9.4.2 and 1.9.4.3) are ineffective or not tolerated. Be aware of teratogenic risks of sodium valproate (see recommendation 1.9.1.10). **[new 2012]**
- 1.9.4.5 If there are absence or myoclonic seizures, or if JME is suspected, do not offer carbamazepine, gabapentin, oxcarbazepine, phenytoin, pregabalin, tiagabine or vigabatrin. **[new 2012]**

## 1.9.5 Pharmacological treatment of absence seizures

### First-line treatment in children, young people and adults with absence seizures

- 1.9.5.1 Offer ethosuximide or sodium valproate as first-line treatment to children, young people and adults with absence seizures. If there is a high risk of GTC seizures, offer sodium valproate first, unless it is unsuitable. Be aware of teratogenic risks of sodium valproate (see recommendation 1.9.1.10). **[new 2012]**
- 1.9.5.2 Offer lamotrigine<sup>[14]</sup> if ethosuximide and sodium valproate are unsuitable, ineffective or not tolerated. **[new 2012]**

### Adjunctive treatment in children, young people and adults with absence seizures

- 1.9.5.3 If two first-line AEDs (see recommendations 1.9.5.1 and 1.9.5.2) are ineffective in children, young people and adults with absence seizures, consider a combination of two of these three AEDs as adjunctive treatment: ethosuximide, lamotrigine<sup>[14]</sup> or sodium valproate. Be aware of teratogenic risks of sodium valproate (see recommendation 1.9.1.10). **[new 2012]**
- 1.9.5.4 If adjunctive treatment (see recommendation 1.9.5.3) is ineffective or not tolerated, discuss with, or refer to, a tertiary epilepsy specialist and consider

clobazam<sup>[14]</sup>, clonazepam, levetiracetam<sup>[14]</sup>, topiramate<sup>[14]</sup> or zonisamide<sup>[14]</sup>. **[new 2012]**

1.9.5.5 Do not offer carbamazepine, gabapentin, oxcarbazepine, phenytoin, pregabalin, tiagabine or vigabatrin. **[new 2012]**

## 1.9.6 Pharmacological treatment of myoclonic seizures

### First-line treatment in children, young people and adults with myoclonic seizures

1.9.6.1 Offer sodium valproate as first-line treatment to children, young people and adults with newly diagnosed myoclonic seizures, unless it is unsuitable. Be aware of teratogenic risks of sodium valproate (see recommendation 1.9.1.10). **[new 2012]**

1.9.6.2 Consider levetiracetam<sup>[14]</sup> or topiramate<sup>[14]</sup> if sodium valproate is unsuitable or not tolerated. Be aware that topiramate has a less favourable side-effect profile than levetiracetam and sodium valproate. **[new 2012]**

### Adjunctive treatment in children, young people and adults with myoclonic seizures

1.9.6.3 Offer levetiracetam, sodium valproate or topiramate<sup>[14]</sup> as adjunctive treatment to children, young people and adults with myoclonic seizures if first-line treatments (see recommendations 1.9.6.1 and 1.9.6.2) are ineffective or not tolerated. Be aware of teratogenic risks of sodium valproate (see recommendation 1.9.1.10). **[new 2012]**

1.9.6.4 If adjunctive treatment (see recommendation 1.9.6.3) is ineffective or not tolerated, discuss with, or refer to, a tertiary epilepsy specialist and consider clobazam<sup>[14]</sup>, clonazepam, piracetam or zonisamide<sup>[14]</sup>. **[new 2012]**

1.9.6.5 Do not offer carbamazepine, gabapentin, oxcarbazepine, phenytoin, pregabalin, tiagabine or vigabatrin. **[new 2012]**

## 1.9.7 Pharmacological treatment of **tonic** or **atonic seizures**

### First-line treatment in children, young people and adults with tonic or atonic seizures

1.9.7.1 Offer sodium valproate as first-line treatment to children, young people and adults with tonic or atonic seizures. Be aware of teratogenic risks of sodium valproate (see recommendation 1.9.1.10). **[new 2012]**

### Adjunctive treatment in children, young people and adults with tonic or atonic seizures

1.9.7.2 Offer lamotrigine<sup>[14]</sup> as adjunctive treatment to children, young people and adults with tonic or atonic seizures if first-line treatment with sodium valproate is ineffective or not tolerated. **[new 2012]**

1.9.7.3 Discuss with a tertiary epilepsy specialist if adjunctive treatment (see recommendation 1.9.7.2) is ineffective or not tolerated. Other AEDs that may be considered by the tertiary epilepsy specialist are rufinamide<sup>[14]</sup> and topiramate<sup>[14]</sup>. **[new 2012]**

1.9.7.4 Do not offer carbamazepine, gabapentin, oxcarbazepine, pregabalin, tiagabine or vigabatrin. **[new 2012]**

## 1.9.8 Pharmacological treatment of **infantile spasms**

### First-line treatment in infants with infantile spasms

1.9.8.1 Discuss with, or refer to, a tertiary paediatric epilepsy specialist when an infant presents with infantile spasms. **[new 2012]**

1.9.8.2 Offer a steroid (prednisolone or tetracosactide<sup>[14]</sup>) or vigabatrin as first-line treatment to infants with infantile spasms that are not due to tuberous sclerosis. Carefully consider the risk–benefit ratio when using vigabatrin or steroids. **[new 2012]**

1.9.8.3 Offer vigabatrin as first-line treatment to infants with infantile spasms due to tuberous sclerosis. If vigabatrin is ineffective, offer a steroid (prednisolone or

tetracosactide<sup>[14]</sup>). Carefully consider the risk–benefit ratio when using vigabatrin or steroids. **[new 2012]**

### 1.9.9 Pharmacological treatment of **Dravet syndrome**

#### First-line treatment in children with Dravet syndrome

1.9.9.1 Discuss with, or refer to, a tertiary paediatric epilepsy specialist when a child presents with suspected Dravet syndrome. **[new 2012]**

1.9.9.2 Consider sodium valproate or topiramate<sup>[14]</sup> as first-line treatment in children with Dravet syndrome. **[new 2012]**

#### Adjunctive treatment in children, young people and adults with Dravet syndrome

1.9.9.3 Discuss with a tertiary epilepsy specialist if first-line treatments (see recommendation 1.9.9.2) in children, young people and adults with Dravet syndrome are ineffective or not tolerated, and consider clobazam<sup>[14]</sup> or stiripentol as adjunctive treatment. **[new 2012]**

1.9.9.4 Do not offer carbamazepine, gabapentin, lamotrigine, oxcarbazepine, phenytoin, pregabalin, tiagabine or vigabatrin. **[new 2012]**

### 1.9.10 Pharmacological treatment of **Lennox–Gastaut syndrome**

#### First-line treatment in children with Lennox–Gastaut syndrome

1.9.10.1 Discuss with, or refer to, a tertiary paediatric epilepsy specialist when a child presents with suspected Lennox–Gastaut syndrome. **[new 2012]**

1.9.10.2 Offer sodium valproate as first-line treatment to children with Lennox–Gastaut syndrome. Be aware of teratogenic risks of sodium valproate (see recommendation 1.9.1.10). **[new 2012]**

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## Adjunctive treatment in children, young people and adults with Lennox–Gastaut syndrome

1.9.10.3 Offer lamotrigine as adjunctive treatment to children, young people and adults with Lennox–Gastaut syndrome if first-line treatment with sodium valproate is ineffective or not tolerated. **[new 2012]**

1.9.10.4 Discuss with a tertiary epilepsy specialist if adjunctive treatment (see recommendation 1.9.10.3) is ineffective or not tolerated. Other AEDs that may be considered by the tertiary epilepsy specialist are rufinamide and topiramate. **[new 2012]**

1.9.10.5 Do not offer carbamazepine, gabapentin, oxcarbazepine, pregabalin, tiagabine or vigabatrin. **[new 2012]**

1.9.10.6 Only offer felbamate<sup>[14]</sup> in centres providing tertiary epilepsy specialist care and when treatment with all of the AEDs listed in recommendations 1.9.10.3 and 1.9.10.4 has proved ineffective or not tolerated. **[new 2012]**

## 1.9.11 Pharmacological treatment of **benign epilepsy with centrotemporal spikes, Panayiotopoulos syndrome or late-onset childhood occipital epilepsy (Gastaut type)**

### First-line treatment in children and young people with benign epilepsy with centrotemporal spikes, Panayiotopoulos syndrome or late-onset childhood occipital epilepsy (Gastaut type)

1.9.11.1 Discuss with the child or young person, and their family and/or carers, whether AED treatment for benign epilepsy with centrotemporal spikes, Panayiotopoulos syndrome or late-onset childhood occipital epilepsy (Gastaut type) is indicated. **[new 2012]**

1.9.11.2 Offer carbamazepine<sup>[14]</sup> or lamotrigine<sup>[14]</sup> as first-line treatment to children and young people with benign epilepsy with centrotemporal spikes, Panayiotopoulos syndrome or late-onset childhood occipital epilepsy (Gastaut type). **[new 2012]**

1.9.11.3 Levetiracetam is not cost effective at June 2011 unit costs<sup>[13]</sup>. Offer levetiracetam<sup>[14]</sup>, oxcarbazepine<sup>[14]</sup> or sodium valproate (provided the acquisition cost of levetiracetam falls to at least 50% of June 2011 value documented in the National Health Service Drug Tariff for England and Wales) if carbamazepine and lamotrigine are unsuitable or not tolerated. If the first AED tried is ineffective, offer an alternative from these five AEDs. Be aware that carbamazepine and oxcarbazepine may exacerbate or unmask continuous spike and wave during slow sleep, which may occur in some children with benign epilepsy with centrotemporal spikes. Be aware of teratogenic risks of sodium valproate (see recommendation 1.9.1.10). **[new 2012]**

1.9.11.4 Consider adjunctive treatment if a second well-tolerated AED is ineffective (see recommendations 1.9.11.2 and 1.9.11.3). **[new 2012]**

### **Adjunctive treatment in children and young people with benign epilepsy with centrotemporal spikes, Panayiotopoulos syndrome or late-onset childhood occipital epilepsy (Gastaut type)**

1.9.11.5 Offer carbamazepine<sup>[14]</sup>, clobazam<sup>[14]</sup>, gabapentin,<sup>[14]</sup> lamotrigine<sup>[14]</sup>, levetiracetam<sup>[14]</sup>, oxcarbazepine<sup>[14]</sup>, sodium valproate or topiramate<sup>[14]</sup> as adjunctive treatment to children and young people with benign epilepsy with centrotemporal spikes, Panayiotopoulos syndrome or late-onset childhood occipital epilepsy (Gastaut type) if first-line treatments (see recommendations 1.9.11.2 and 1.9.11.3) are ineffective or not tolerated. Be aware of teratogenic risks of sodium valproate (see recommendation 1.9.1.10). **[new 2012]**

1.9.11.6 If adjunctive treatment (see recommendation 1.9.11.5) is ineffective or not tolerated, discuss with, or refer to, a tertiary epilepsy specialist. Other AEDs that may be considered by the tertiary epilepsy specialist are eslicarbazepine acetate<sup>[14]</sup>, lacosamide<sup>[14]</sup>, phenobarbital, phenytoin, pregabalin<sup>[14]</sup>, tiagabine<sup>[14]</sup>, vigabatrin<sup>[14]</sup> and zonisamide<sup>[14]</sup>. Carefully consider the risk–benefit ratio when using vigabatrin because of the risk of an irreversible effect on visual fields. **[new 2012]**

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## 1.9.12 Pharmacological treatment of idiopathic generalised epilepsy (IGE)

### First-line treatment in children, young people and adults with IGE

1.9.12.1 Offer sodium valproate as first-line treatment to children, young people and adults with newly diagnosed IGE, particularly if there is a photoparoxysmal response on EEG. Be aware of teratogenic risks of sodium valproate (see recommendation 1.9.1.110). **[new 2012]**

1.9.12.2 Offer lamotrigine<sup>[14]</sup> if sodium valproate is unsuitable or not tolerated. Be aware that lamotrigine can exacerbate myoclonic seizures. If JME is suspected see recommendations 1.9.13.1 and 1.9.13.2. **[new 2012]**

1.9.12.3 Consider topiramate<sup>[14]</sup> but be aware that it has a less favourable side-effect profile than sodium valproate and lamotrigine<sup>[14]</sup>. **[new 2012]**

### Adjunctive treatment in children, young people and adults with IGE

1.9.12.4 Offer lamotrigine<sup>[14]</sup>, levetiracetam<sup>[14]</sup>, sodium valproate or topiramate<sup>[14]</sup> as adjunctive treatment to children, young people and adults with IGE if first-line treatments (see recommendations 1.9.12.1, 1.9.12.2 and 1.9.12.3) are ineffective or not tolerated. Be aware of teratogenic risks of sodium valproate (see recommendation 1.9.1.10). **[new 2012]**

1.9.12.5 If adjunctive treatment (see recommendation 1.9.12.4) is ineffective or not tolerated, discuss with, or refer to, a tertiary epilepsy specialist and consider clobazam<sup>[14]</sup>, clonazepam or zonisamide<sup>[14]</sup>. **[new 2012]**

1.9.12.6 Do not offer carbamazepine, gabapentin, oxcarbazepine, phenytoin, pregabalin, tiagabine or vigabatrin. **[new 2012]**

## 1.9.13 Pharmacological treatment of juvenile myoclonic epilepsy (JME)

### First-line treatment in children, young people and adults with JME

1.9.13.1 Offer sodium valproate as first-line treatment to children, young people and adults with newly diagnosed JME, unless it is unsuitable. Be aware of

teratogenic risks of sodium valproate (see recommendation 1.9.1.10). **[new 2012]**

1.9.13.2 Consider lamotrigine<sup>[14]</sup>, levetiracetam<sup>[14]</sup> or topiramate<sup>[14]</sup> if sodium valproate is unsuitable or not tolerated. Be aware that topiramate has a less favourable side-effect profile than lamotrigine, levetiracetam and sodium valproate, and that lamotrigine may exacerbate myoclonic seizures. **[new 2012]**

### **Adjunctive treatment in children, young people and adults with JME**

1.9.13.3 Offer lamotrigine<sup>[14]</sup>, levetiracetam, sodium valproate or topiramate<sup>[14]</sup> as adjunctive treatment to children, young people and adults with JME if first-line treatments (see recommendations 1.9.13.1 and 1.9.13.2) are ineffective or not tolerated. Be aware of teratogenic risks of sodium valproate (see recommendation 1.9.1.10). **[new 2012]**

1.9.13.4 If adjunctive treatment (see recommendation 1.9.13.3) is ineffective or not tolerated, discuss with, or refer to, a tertiary epilepsy specialist and consider clobazam<sup>[14]</sup>, clonazepam or zonisamide<sup>[14]</sup>. **[new 2012]**

1.9.13.5 Do not offer carbamazepine, gabapentin, oxcarbazepine, phenytoin, pregabalin, tiagabine or vigabatrin. **[new 2012]**

### **1.9.14 Pharmacological treatment of epilepsy with generalised tonic-clonic (GTC) seizures only**

#### **First-line treatment in children, young people and adults with epilepsy with GTC seizures only**

1.9.14.1 Offer lamotrigine or sodium valproate as first-line treatment to children, young people and adults with epilepsy with GTC seizures only. If they have suspected myoclonic seizures, or are suspected of having JME, offer sodium valproate first, unless it is unsuitable. Be aware of teratogenic risks of sodium valproate (see recommendation 1.9.1.10). **[new 2012]**

1.9.14.2 Consider carbamazepine and oxcarbazepine<sup>[14]</sup> but be aware of the risk of exacerbating myoclonic or absence seizures. **[new 2012]**

## Adjunctive treatment in children, young people and adults with epilepsy with GTC seizures only

1.9.14.3 Offer clobazam<sup>[14]</sup>, lamotrigine, levetiracetam, sodium valproate or topiramate as adjunctive treatment to children, young people and adults with epilepsy with GTC seizures only, if first-line treatments (see recommendations 1.9.14.1 and 1.9.14.2) are ineffective or not tolerated. Be aware of teratogenic risks of sodium valproate (see recommendation 1.9.1.10). **[new 2012]**

## 1.9.15 Pharmacological treatment of childhood absence epilepsy, juvenile absence epilepsy or other absence epilepsy syndromes

### First-line treatment in children, young people and adults with childhood absence epilepsy, juvenile absence epilepsy or other absence epilepsy syndromes

1.9.15.1 Offer ethosuximide or sodium valproate as first-line treatment to children, young people and adults with absence syndromes. If there is a high risk of GTC seizures, offer sodium valproate first, unless it is unsuitable. Be aware of teratogenic risks of sodium valproate (see recommendation 1.9.1.10). **[new 2012]**

1.9.15.2 Offer lamotrigine<sup>[14]</sup> if ethosuximide and sodium valproate are unsuitable, ineffective or not tolerated. **[new 2012]**

### Adjunctive treatment in children, young people and adults with childhood absence epilepsy, juvenile absence epilepsy or other absence epilepsy syndromes

1.9.15.3 If two first-line AEDs (see recommendations 1.9.15.1 and 1.9.15.2) are ineffective in children, young people and adults with absence epilepsy syndromes, consider a combination of two of these three AEDs as adjunctive treatment: ethosuximide, lamotrigine<sup>[14]</sup> or sodium valproate. Be aware of teratogenic risks of sodium valproate (see recommendation 1.9.1.10). **[new 2012]**

1.9.15.4 If adjunctive treatment (see recommendation 1.9.15.3) is ineffective or not tolerated, discuss with, or refer to, a tertiary epilepsy specialist and consider clobazam<sup>[14]</sup>, clonazepam, levetiracetam<sup>[14]</sup>, topiramate<sup>[14]</sup> or zonisamide<sup>[14]</sup>. **[new 2012]**

1.9.15.5 Do not offer carbamazepine, gabapentin, oxcarbazepine, phenytoin, pregabalin, tiagabine or vigabatrin. **[new 2012]**

## 1.9.16 Other epilepsy syndromes

1.9.16.1 Refer to a tertiary paediatric epilepsy specialist all children and young people with continuous spike and wave during slow sleep, Landau–Kleffner syndrome or myoclonic-astatic epilepsy. **[new 2012]**

## 1.9.17 Continuation of pharmacological treatment

1.9.17.1 Maintain a high level of vigilance for treatment-emergent adverse effects (for example, bone health issues and neuropsychiatric issues<sup>[15]</sup>). **[new 2012]**

1.9.17.2 Continuing AED therapy should be planned by the specialist. It should be part of the child, young person or adult's agreed treatment plan, which should include details of how specific drug choices were made, drug dosage, possible side effects, and action to take if seizures persist. **[2004]**

1.9.17.3 The needs of the child, young person or adult and their family and/or carers as appropriate should be taken into account when healthcare professionals take on the responsibility of continuing prescribing. **[2004]**

1.9.17.4 If management is straightforward, continuing AED therapy can be prescribed in primary care if local circumstances and/or licensing allow. **[2004]**

1.9.17.5 The prescriber must ensure that the child, young person or adult and their family and/or carers as appropriate are fully informed about treatment including action to be taken after a missed dose or after a gastrointestinal upset. **[2004]**

1.9.17.6 Adherence to treatment can be optimised with the following:

- educating children, young people and adults and their families and/or carers in the understanding of their condition and the rationale of treatment
- reducing the stigma associated with the condition (see also [section 1.2](#))
- using simple medication regimens
- positive relationships between healthcare professionals, the child, young person or adult with epilepsy and their family and/or carers. **[2004]**

1.9.17.7 Regular blood test monitoring in adults is not recommended as routine, and should be done only if clinically indicated. **[2004]**

1.9.17.8 Regular blood test monitoring in children and young people is not recommended as routine, and should be done only if clinically indicated and recommended by the specialist. **[2004]**

1.9.17.9 Indications for monitoring of AED blood levels are:

- detection of non-adherence to the prescribed medication
- suspected toxicity
- adjustment of phenytoin dose
- management of pharmacokinetic interactions (for example, changes in bioavailability, changes in elimination, and co-medication with interacting drugs)
- specific clinical conditions, for example, status epilepticus, organ failure and certain situations in pregnancy (see recommendation [1.15.3.19](#)). **[2012]**

1.9.17.10 Examples of blood tests include:

- before surgery – clotting studies in those on sodium valproate<sup>[16]</sup>
- full blood count, electrolytes, liver enzymes, vitamin D levels, and other tests of bone metabolism (for example, serum calcium and alkaline phosphatase) every 2–5 years for adults taking enzyme-inducing drugs. **[2004]**

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1.9.17.1 Asymptomatic minor abnormalities in test results are not necessarily an indication for changes in medication. **[2004]**

### **1.9.18 Withdrawal of pharmacological treatment**

1.9.18.1 The decision to continue or withdraw medication should be taken by the child, young person or adult, their family and/or carers as appropriate, and the specialist after a full discussion of the risks and benefits of withdrawal. At the end of the discussion children, young people and adults, and their family and/or carers as appropriate, should understand their risk of seizure recurrence on and off treatment. This discussion should take into account details of the child, young person or adult's epilepsy syndrome, prognosis and lifestyle. **[2004]**

1.9.18.2 Withdrawal of AEDs must be managed by, or be under the guidance of, the specialist. **[2004]**

1.9.18.3 The risks and benefits of continuing or withdrawing AED therapy should be discussed with children, young people and adults, and their families and/or carers as appropriate, who have been seizure free for at least 2 years (see appendix H<sup>[17]</sup> of the [full guideline](#)). **[2004]**

1.9.18.4 When AED treatment is being discontinued in a child, young person or adult who has been seizure free, it should be carried out slowly (at least 2–3 months) and one drug should be withdrawn at a time. **[2004]**

1.9.18.5 Particular care should be taken when withdrawing benzodiazepines and barbiturates (may take up to 6 months or longer) because of the possibility of drug-related withdrawal symptoms and/or seizure recurrence. **[2004]**

1.9.18.6 There should be a failsafe plan agreed with children, young people and adults and their families and/or carers as appropriate, whereby if seizures recur, the last dose reduction is reversed and medical advice is sought. **[2004]**

## 1.10 Referral for complex or refractory epilepsy

1.10.1 All children, young people and adults with epilepsy should have access via their specialist to a tertiary service when circumstances require. **[2004]**

1.10.2 If seizures are not controlled and/or there is diagnostic uncertainty or treatment failure, children, young people and adults should be referred to tertiary services soon<sup>[9]</sup> for further assessment. Referral should be considered when one or more of the following criteria are present:

- the epilepsy is not controlled with medication within 2 years
- management is unsuccessful after two drugs
- the child is aged under 2 years
- a child, young person or adult experiences, or is at risk of, unacceptable side effects from medication
- there is a unilateral structural lesion
- there is psychological and/or psychiatric co-morbidity
- there is diagnostic doubt as to the nature of the seizures and/or seizure syndrome. **[2004]**

1.10.3 In children, the diagnosis and management of epilepsy within the first few years of life may be extremely challenging. For this reason, children with suspected epilepsy should be referred to tertiary services early, because of the profound developmental, behavioural and psychological effects that may be associated with continuing seizures. **[2004]**

1.10.4 Behavioural or developmental regression or inability to identify the epilepsy syndrome in a child, young person or adult should result in immediate referral to tertiary services. **[2004]**

1.10.5 Children, young people and adults with specific syndromes such as Sturge–Weber syndrome, the hemispheric syndromes, Rasmussen's

encephalitis and hypothalamic hamartoma should be referred to a tertiary epilepsy service. **[2004]**

1.10.6 Psychiatric co-morbidity and/or negative baseline investigations should not be a contraindication for referral to a tertiary service<sup>[18]</sup>. **[2004]**

1.10.7 The tertiary service should include a multidisciplinary team, experienced in the assessment of children, young people and adults with complex epilepsy, and have adequate access to investigations and treatment by both medical and surgical means. **[2004]**

1.10.8 The expertise of multidisciplinary teams involved in managing complex epilepsy should include psychology, psychiatry, social work, occupational therapy, counselling, neuroradiology, clinical nurse specialists, neurophysiology, neurology, neurosurgery and neuroanaesthesia. Teams should have MRI and video telemetry facilities available to them. **[2004]**

1.10.9 The neurosurgeon in the multidisciplinary team should have specialist experience of and/or training in epilepsy surgery and have access to invasive EEG recording facilities. **[2004]**

1.10.10 Information should be provided to children, young people and adults and families and/or carers as appropriate about the reasons for considering surgery. The benefits and risks of the surgical procedure under consideration should be fully explained before informed consent is obtained. **[2004]**

## ***1.11 Psychological interventions***

1.11.1 Psychological interventions (relaxation, cognitive behaviour therapy, biofeedback) may be used in conjunction with AED therapy in adults where either the person or the specialist considers seizure control to be inadequate with optimal AED therapy. This approach may be associated with an improved quality of life in some people. **[2004]**

1.11.2 Psychological interventions (relaxation, cognitive behaviour therapy) may be used in children and young people with drug-resistant focal epilepsy. **[2004]**

- 1.11.3 Psychological interventions may be used as adjunctive therapy. They have not been proven to affect seizure frequency and are not an alternative to pharmacological treatment. **[2004]**

## **1.12 Ketogenic diet**

- 1.12.1 Refer children and young people with epilepsy whose seizures have not responded to appropriate AEDs to a tertiary paediatric epilepsy specialist for consideration of the use of a ketogenic diet. **[new 2012]**

## **1.13 Vagus nerve stimulation (VNS)**

- 1.13.1 Vagus nerve stimulation is indicated for use as an adjunctive therapy in reducing the frequency of seizures in adults who are refractory to antiepileptic medication but who are not suitable for resective surgery. This includes adults whose epileptic disorder is dominated by focal seizures<sup>[19]</sup> (with or without secondary generalisation) or generalised seizures. **[2004, amended 2012]**
- 1.13.2 Vagus nerve stimulation is indicated for use as an adjunctive therapy in reducing the frequency of seizures in children and young people who are refractory to antiepileptic medication but who are not suitable for resective surgery. This includes children and young people whose epileptic disorder is dominated by focal seizures<sup>[19]</sup> (with or without secondary generalisation) or generalised seizures<sup>[20]</sup>. **[2004, amended 2012]**

## **1.14 Prolonged or repeated seizures and convulsive status epilepticus**

### **1.14.1 First-line treatment for children, young people and adults with prolonged or repeated generalised, convulsive (tonic–clonic, tonic or clonic) seizures in the community**

- 1.14.1.1 Give immediate emergency care and treatment to children, young people and adults who have prolonged (lasting 5 minutes or more) or repeated (three or more in an hour) convulsive seizures in the community. **[2012]**

1.14.1.2 Only prescribe buccal midazolam or rectal diazepam<sup>[21]</sup> for use in the community for children, young people and adults who have had a previous episode of prolonged or serial convulsive seizures. **[new 2012]**

1.14.1.3 Administer buccal midazolam as first-line treatment in children, young people and adults with prolonged or repeated seizures in the community. Administer rectal diazepam<sup>[21]</sup> if preferred or if buccal midazolam is not available. If intravenous access is already established and resuscitation facilities are available, administer intravenous lorazepam. **[new 2012]**

1.14.1.4 Treatment should be administered by trained clinical personnel or, if specified by an individually agreed protocol drawn up with the specialist, by family members or carers with appropriate training. **[2004]**

1.14.1.5 Care must be taken to secure the child, young person or adult's airway and assess his or her respiratory and cardiac function. **[2004]**

1.14.1.6 Depending on response to treatment, the person's situation and any personalised care plan, call an ambulance, particularly if:

- the seizure is continuing 5 minutes after the emergency medication has been administered
- the person has a history of frequent episodes of serial seizures or has convulsive status epilepticus, or this is the first episode requiring emergency treatment **or**
- there are concerns or difficulties monitoring the person's airway, breathing, circulation or other vital signs. **[new 2012]**

## **1.14.2 Treatment for children, young people and adults with convulsive status epilepticus in hospital**

### **Convulsive status epilepticus**

1.14.2.1 For children, young people and adults with ongoing generalised tonic-clonic seizures (convulsive status epilepticus) who are in hospital, immediately:

- secure airway

- give high-concentration oxygen
- assess cardiac and respiratory function
- check blood glucose levels **and**
- secure intravenous access in a large vein.

See also the suggested protocols in [appendix F](#). **[new 2012]**

1.14.2.2 Administer intravenous lorazepam as first-line treatment in hospital in children, young people and adults with ongoing generalised tonic–clonic seizures (convulsive status epilepticus). Administer intravenous diazepam if intravenous lorazepam is unavailable, or buccal midazolam if unable to secure immediate intravenous access. Administer a maximum of two doses of the first-line treatment (including pre-hospital treatment). See also the suggested protocols in [appendix F](#). **[new 2012]**

1.14.2.3 If seizures continue, administer intravenous phenobarbital or phenytoin as second-line treatment in hospital in children, young people and adults with ongoing generalised tonic–clonic seizures (convulsive status epilepticus). See also the suggested protocols in [appendix F](#). **[new 2012]**

## Refractory convulsive status epilepticus

1.14.2.4 Follow the suggested protocols in [appendix F](#) for treating refractory convulsive status epilepticus in secondary care. **[2012]**

1.14.2.5 Administer intravenous midazolam<sup>[21]</sup>, propofol<sup>[21]</sup> or thiopental sodium<sup>[21]</sup> to treat adults with refractory convulsive status epilepticus. Adequate monitoring, including blood levels of AEDs, and critical life systems support are required. See also the suggested protocols in [appendix F](#). **[new 2012]**

1.14.2.6 Administer intravenous midazolam<sup>[21]</sup> or thiopental sodium<sup>[21]</sup> to treat children and young people with refractory convulsive status epilepticus. Adequate monitoring, including blood levels of AEDs, and critical life systems support are required. See also the suggested protocols in [appendix F](#). **[2012]**

- 1.14.2.7 As the treatment pathway progresses, the expertise of an anaesthetist/intensivist should be sought. **[2004]**
- 1.14.2.8 If either the whole protocol or intensive care is required the tertiary service should be consulted. **[2004]**
- 1.14.2.9 Regular AEDs should be continued at optimal doses and the reasons for status epilepticus should be investigated. **[2004]**
- 1.14.2.10 An individual treatment pathway should be formulated for children, young people and adults who have recurrent convulsive status epilepticus. **[2004]**

### **1.14.3 Non-convulsive status epilepticus**

- 1.14.3.1 Non-convulsive status epilepticus is uncommon and management is less urgent. A suggested guideline can be found in [appendix F](#). **[2004]**

## ***1.15 Women and girls with epilepsy***

### **1.15.1 Information and advice for women and girls with epilepsy**

- 1.15.1.1 In order to enable informed decisions and choice, and to reduce misunderstandings, women and girls with epilepsy and their partners, as appropriate, must be given accurate information and counselling about contraception, conception, pregnancy, caring for children and breastfeeding, and menopause. **[2004]**
- 1.15.1.2 Information about contraception, conception, pregnancy, or menopause should be given to women and girls in advance of sexual activity, pregnancy or menopause, and the information should be tailored to their individual needs. This information should also be given, as needed, to people who are closely involved with women and girls with epilepsy. These may include her family and/or carers. **[2004]**
- 1.15.1.3 All healthcare professionals who treat, care for, or support women and girls with epilepsy should be familiar with relevant information and the availability of counselling. **[2004]**

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- 1.15.1.4 Discuss with women and girls of childbearing potential (including young girls who are likely to need treatment into their childbearing years), and their parents and/or carers if appropriate, the risk of AEDs causing malformations and possible neurodevelopmental impairments in an unborn child. Assess the risks and benefits of treatment with individual drugs. There are limited data on risks to the unborn child associated with newer drugs. Specifically discuss the risk of continued use of sodium valproate to the unborn child, being aware that higher doses of sodium valproate (more than 800 mg/day) and polytherapy, particularly with sodium valproate, are associated with greater risk. **[new 2012]**
- 1.15.1.5 Be aware of the latest data on the risks to the unborn child associated with AED therapy when prescribing for women and girls of present and future childbearing potential. **[2012]**
- 1.15.1.6 All women and girls on AEDs should be offered 5 mg per day of folic acid before any possibility of pregnancy. **[2004]**
- 1.15.1.7 Refer to the SPC and BNF (available at <http://bnf.org>) for individual drug advice on the interactions between AEDs and hormonal replacement and contraception. **[new 2012]**

## 1.15.2 Contraception

- 1.15.2.1 In women of childbearing potential, the possibility of interaction with oral contraceptives should be discussed and an assessment made as to the risks and benefits of treatment with individual drugs. **[2004]**
- 1.15.2.2 In girls of childbearing potential, including young girls who are likely to need treatment into their childbearing years, the possibility of interaction with oral contraceptives should be discussed with the child and/or her carer, and an assessment made as to the risks and benefits of treatment with individual drugs. **[2004]**
- 1.15.2.3 In women and girls of childbearing potential, the risks and benefits of different contraceptive methods, including hormone-releasing IUDs, should be discussed. **[2004]**

- 1.15.2.4 If a woman or girl taking enzyme-inducing AEDs chooses to take the combined oral contraceptive pill, guidance about dosage should be sought from the SPC and current edition of the BNF (available at <http://bnf.org>). **[2004, amended 2012]**
- 1.15.2.5 The progestogen<sup>[22]</sup>-only pill is not recommended as reliable contraception in women and girls taking enzyme-inducing AEDs. **[2004, amended 2012]**
- 1.15.2.6 The progestogen<sup>[22]</sup> implant is not recommended in women and girls taking enzyme-inducing AEDs. **[2004, amended 2012]**
- 1.15.2.7 The use of additional barrier methods should be discussed with women and girls taking enzyme-inducing AEDs and oral contraception or having depot injections of progestogen<sup>[22]</sup>. **[2004, amended 2012]**
- 1.15.2.8 If emergency contraception is required for women and girls taking enzyme-inducing AEDs, the type and dose of emergency contraception should be in line with the SPC and current edition of the BNF (available at <http://bnf.org>). **[2004, amended 2012]**
- 1.15.2.9 Discuss with women and girls who are taking lamotrigine that the simultaneous use of any oestrogen-based contraceptive can result in a significant reduction of lamotrigine levels and lead to loss of seizure control. When a woman or girl starts or stops taking these contraceptives, the dose of lamotrigine may need to be adjusted. **[new 2012]**

### 1.15.3 Pregnancy

- 1.15.3.1 Women and girls with epilepsy need accurate information during pregnancy, and the possibility of status epilepticus and SUDEP should be discussed with all women and girls who plan to stop AED therapy (see section [1.9.18](#)). **[2004]**
- 1.15.3.2 All pregnant women and girls with epilepsy should be encouraged to notify their pregnancy, or allow their clinician to notify the pregnancy, to the UK Epilepsy and Pregnancy Register ([www.epilepsyandpregnancy.co.uk](http://www.epilepsyandpregnancy.co.uk)). **[2004]**

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- 1.15.3.3 The clinician should discuss with the woman and girl the relative benefits and risks of adjusting medication to enable her to make an informed decision. Where appropriate, the woman or girl's specialist should be consulted. **[2004]**
- 1.15.3.4 Women and girls with generalised tonic–clonic seizures should be informed that the fetus may be at relatively higher risk of harm during a seizure, although the absolute risk remains very low, and the level of risk may depend on seizure frequency. **[2004]**
- 1.15.3.5 Women and girls should be reassured that there is no evidence that focal<sup>[19]</sup>, absence and myoclonic seizures affect the pregnancy or developing fetus adversely unless they fall and sustain an injury. **[2004, amended 2012]**
- 1.15.3.6 Women and girls should be reassured that an increase in seizure frequency is generally unlikely in pregnancy or in the first few months after birth. **[2004]**
- 1.15.3.7 Generally, women and girls may be reassured that the risk of a tonic–clonic seizure during the labour and the 24 hours after birth is low (1–4%). **[2004]**
- 1.15.3.8 Women and girls with epilepsy should be informed that although they are likely to have healthy pregnancies, their risk of complications during pregnancy and labour is higher than for women and girls without epilepsy. **[2004]**
- 1.15.3.9 Care of pregnant women and girls should be shared between the obstetrician and the specialist. **[2004]**
- 1.15.3.10 Pregnant women and girls who are taking AEDs should be offered a high-resolution ultrasound scan to screen for structural anomalies. This scan should be performed at 18–20 weeks' gestation by an appropriately trained ultrasonographer, but earlier scanning may allow major malformations to be detected sooner. **[2004]**
- 1.15.3.11 The risk of seizures during labour is low, but it is sufficient to warrant the recommendation that delivery should take place in an obstetric unit with facilities for maternal and neonatal resuscitation and treating maternal seizures. **[2004]**

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- 1.15.3.12 All children born to mothers taking enzyme-inducing AEDs should be given 1 mg of vitamin K parenterally at delivery. **[2004]**
- 1.15.3.13 Genetic counselling should be considered if one partner has epilepsy, particularly if the partner has idiopathic epilepsy and a positive family history of epilepsy. **[2004]**
- 1.15.3.14 Although there is an increased risk of seizures in children of parents with epilepsy, children, young people and adults with epilepsy should be given information that the probability that a child will be affected is generally low. However, this will depend on the family history. **[2004]**
- 1.15.3.15 Advanced planning, including the development of local protocols for care, should be implemented in obstetric units that deliver babies of women and girls with epilepsy. **[2004]**
- 1.15.3.16 Joint epilepsy and obstetric clinics may be convenient for mothers and healthcare professionals but there is insufficient evidence to recommend their routine use. **[2004]**
- 1.15.3.17 It is, however, important that there should be regular follow-up, planning of delivery, and liaison between the specialist or epilepsy team and the obstetrician or midwife. **[2004]**
- 1.15.3.18 Aim for seizure freedom before conception and during pregnancy (particularly for women and girls with generalised tonic–clonic seizures) but consider the risk of adverse effects of AEDs and use the lowest effective dose of each AED, avoiding polytherapy if possible. **[new 2012]**
- 1.15.3.19 Do not routinely monitor AED levels during pregnancy. If seizures increase or are likely to increase, monitoring AED levels (particularly levels of lamotrigine and phenytoin, which may be particularly affected in pregnancy) may be useful when making dose adjustments. **[new 2012]**

### 1.15.4 Breastfeeding

1.15.4.1 All women and girls with epilepsy should be encouraged to breastfeed, except in very rare circumstances. Breastfeeding for most women and girls taking AEDs is generally safe and should be encouraged. However, each mother needs to be supported in the choice of feeding method that best suits her and her family. **[2004]**

1.15.4.2 Prescribers should consult individual drug advice in the SPC and the BNF (available at <http://bnf.org>)<sup>[23]</sup> when prescribing AEDs for women and girls who are breastfeeding. The decision regarding AED therapy and breastfeeding should be made between the woman or girl and the prescriber, and be based on the risks and benefits of breastfeeding against the potential risks of the drug affecting the child. **[2004, amended 2012]**

### 1.15.5 After the birth

1.15.5.1 Parents of new babies or young children should be informed that introducing a few simple safety precautions may significantly reduce the risk of accidents and minimise anxiety. An approaching birth can be an ideal opportunity to review and consider the best and most helpful measures to start to ensure maximum safety for both mother and baby. **[2004]**

1.15.5.2 Information should be given to all parents about safety precautions to be taken when caring for the baby (see appendix D<sup>[24]</sup> of the [full guideline](#)). **[2004]**

1.15.5.3 Parents should be reassured that the risk of injury to the infant caused by maternal seizure is low. **[2004]**

## ***1.16 Children, young people and adults with learning disabilities (see also sections 1.15 and 1.17)***

### **1.16.1 Diagnosis (see also section 1.5)**

1.16.1.1 It can be difficult to diagnose epilepsy in children, young people and adults with learning disabilities, and so care should be taken to obtain a full clinical history.

Confusion may arise between stereotypic or other behaviours and seizure activity. **[2004]**

1.16.1.2 It is important to have an eye witness account supplemented by corroborative evidence (for example, a video account), where possible. **[2004]**

1.16.1.3 Clear, unbiased reporting is essential. Witnesses may need education to describe their observations accurately. **[2004]**

### **1.16.2 Investigations (see also section 1.6)**

1.16.2.1 Those with learning disabilities may require particular care and attention to tolerate investigations. **[2004]**

1.16.2.2 Facilities should be available for imaging under anaesthesia, if necessary. **[2004]**

1.16.2.3 In the child or young person presenting with epilepsy and learning disability, investigations directed at determining an underlying cause should be undertaken. **[2004]**

### **1.16.3 Management (see also section 1.8)**

1.16.3.1 Enable children, young people and adults who have learning disabilities, and their family and/or carers where appropriate, to take an active part in developing a personalised care plan for treating their epilepsy while taking into account any comorbidities. **[new 2012]**

1.16.3.2 Ensure adequate time for consultation to achieve effective management of epilepsy in children, young people and adults with learning disabilities. **[new 2012]**

1.16.3.3 In making a care plan for a child, young person or adult with learning disabilities and epilepsy, particular attention should be paid to the possibility of adverse cognitive and behavioural effects of AED therapy. **[2004]**

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- 1.16.3.4 The recommendations on choice of treatment and the importance of regular monitoring of effectiveness and tolerability are the same for those with learning disabilities as for the general population. **[2004]**
- 1.16.3.5 Do not discriminate against children, young people and adults with learning disabilities, and offer the same services, investigations and therapies as for the general population. **[new 2012]**
- 1.16.3.6 Every therapeutic option should be explored in children, young people and adults with epilepsy in the presence or absence of learning disabilities. **[2004]**
- 1.16.3.7 Healthcare professionals should be aware of the higher risks of mortality for children, young people and adults with learning disabilities and epilepsy and discuss these with them, their families and/or carers. **[2004]**
- 1.16.3.8 All children, young people and adults with epilepsy and learning disabilities should have a risk assessment including:
- bathing and showering
  - preparing food
  - using electrical equipment
  - managing prolonged or serial seizures
  - the impact of epilepsy in social settings
  - SUDEP
  - the suitability of independent living, where the rights of the child, young person or adult are balanced with the role of the carer. **[2004]**

## ***1.17 Young people with epilepsy (see also section 1.15)***

- 1.17.1 The physical, psychological and social needs of young people with epilepsy should always be considered by healthcare professionals. Attention should be paid to their relationships with family and friends, and at school. **[2004]**

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- 1.17.2 Healthcare professionals should adopt a consulting style that allows the young person with epilepsy to participate as a partner in the consultation. **[2004]**
- 1.17.3 Decisions about medication and lifestyle issues should draw on both the expertise of the healthcare professional and the experiences, beliefs and wishes of the young person with epilepsy as well as their family and/or carers. **[2004]**
- 1.17.4 During adolescence a named clinician should assume responsibility for the ongoing management of the young person with epilepsy and ensure smooth transition of care to adult services, and be aware of the need for continuing multi-agency support. **[2004]**
- 1.17.5 Multidisciplinary services provided jointly by adult and paediatric specialists have a key role in the care of the young person with epilepsy. This can facilitate the transition from paediatric to adult services and aid in the dissemination of information. **[2004]**
- 1.17.6 Before the transition to adult services is made, diagnosis and management should be reviewed and access to voluntary organisations, such as support groups and epilepsy charities, should be facilitated. **[2004]**
- 1.17.7 The information given to young people should cover epilepsy in general and its diagnosis and treatment, the impact of seizures and adequate seizure control, treatment options including side effects and risks, and the risks of injury. Other important issues to be covered are the possible consequences of epilepsy on lifestyle and future career opportunities and decisions, driving and insurance issues, social security and welfare benefit issues, sudden death and the importance of adherence to medication regimes. Information on lifestyle issues should cover recreational drugs, alcohol, sexual activity and sleep deprivation (see [section 1.3](#)). **[2004]**
- 1.17.8 The diagnosis and management of epilepsy should be reviewed during adolescence. **[2004]**

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## **1.18 Older people with epilepsy**

- 1.18.1 Do not discriminate against older people, and offer the same services, investigations and therapies as for the general population. **[new 2012]**
- 1.18.2 Pay particular attention to pharmacokinetic and pharmacodynamic issues with polypharmacy and comorbidity in older people with epilepsy. Consider using lower doses of AEDs and, if using carbamazepine, offer controlled-release carbamazepine preparations. **[new 2012]**

## **1.19 Children, young people and adults from black and minority ethnic groups**

- 1.19.1 Children, young people and adults from black and minority ethnic groups may have different cultural and communication needs and these should be considered during diagnosis and management. The need for interpretation should be considered alongside other means of ensuring that a person's needs are appropriately met. **[2004]**
- 1.19.2 An interpreter should have both cultural and medical knowledge. Interpreters from the family are generally not suitable because of issues such as confidentiality, privacy, personal dignity, and accuracy of translation. **[2004]**
- 1.19.3 Information, including information about employment rights and driving, should be available in an appropriate format or through other appropriate means for children, young people and adults who do not speak or read English. **[2004]**

## **1.20 Review**

- 1.20.1 Children, young people and adults with epilepsy should have a regular structured review and be registered with a general medical practice. **[2004]**
- 1.20.2 Adults should have a regular structured review with their GP, but depending on the person's wishes, circumstances and epilepsy, the review may be carried out by the specialist. **[2004]**

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- 1.20.3 Children and young people should have a regular structured review with a specialist. **[2004]**
- 1.20.4 For adults, the maximum interval between reviews should be 1 year but the frequency of review will be determined by the person's epilepsy and their wishes. **[2004]**
- 1.20.5 For children and young people, the maximum interval between reviews should be 1 year, but the frequency of reviews should be determined by the child or young person's epilepsy and their wishes and those of the family and/or carers. The interval between reviews should be agreed between the child or young person, their family and/or carers as appropriate, and the specialist, but is likely to be between 3 and 12 months. **[2004]**
- 1.20.6 Adults should have regular reviews. In addition, access to either secondary or tertiary care should be available to ensure appropriate diagnosis, investigation and treatment if the person or clinician view the epilepsy as inadequately controlled. **[2004]**
- 1.20.7 Adults with well-controlled epilepsy may have specific medical or lifestyle issues (for example, pregnancy or drug cessation) that may need the advice of a specialist. **[2004]**
- 1.20.8 If the structured review is to be conducted by the specialist, this may be best provided in the context of a specialist clinic. **[2004]**
- 1.20.9 Treatment should be reviewed at regular intervals to ensure that children, young people and adults with epilepsy are not maintained for long periods on treatment that is ineffective or poorly tolerated and that concordance with prescribed medication is maintained. **[2004]**
- 1.20.10 Annual review should include an enquiry about side effects and a discussion of the treatment plan to ensure concordance and adherence to medication. **[2004]**

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1.20.11 At the review, children, young people and adults should have access to: written and visual information; counselling services; information about voluntary organisations; epilepsy specialist nurses; timely and appropriate investigations; referral to tertiary services including surgery, where appropriate. **[2004]**

<sup>[5]</sup> This web address has changed since the recommendation was published in 2004 and has been updated.

<sup>[6]</sup> For adults, a specialist is defined throughout as a medical practitioner with training and expertise in epilepsy. For children and young people, a specialist is defined throughout as a paediatrician with training and expertise in epilepsy.

<sup>[7]</sup> The Guideline Development Group considered that with a recent onset suspected seizure, referrals should be urgent, meaning that patients should be seen within 2 weeks.

<sup>[8]</sup> In this recommendation, 'centre' has been replaced with 'specialist' for consistency across recommendations.

<sup>[9]</sup> The Guideline Development Group considered that 'soon' meant being seen within 4 weeks.

<sup>[10]</sup> The licence for use of melatonin in the UK has changed since the recommendation was published in 2004. The recommendation has been updated accordingly and the footnote that contained the old information has been deleted.

<sup>[11]</sup> In November 2013, the MHRA issued new advice about oral anti-epileptic drugs (AEDs) and switching between different manufacturers' products of a particular drug. Following a review of the available evidence, the Commission on Human Medicines (CHM) has classified AEDs into 3 categories depending on the level of potential concerns related to switching between different manufacturers' products. Consult the [MHRA advice](#) for more information.

<sup>[12]</sup> Recommendations [1.1.1](#), [1.2.2](#), [1.3.3](#), 1.3.5 and 1.3.10 describe the principles of decision making and best practice in relation to effective and appropriate consultation between healthcare professionals and children, young people and adults with epilepsy.

<sup>[13]</sup> Estimated cost of a 1500 mg daily dose was £2.74 at June 2011. Cost taken from the National Health Service Drug Tariff for England and Wales, available at [www.ppa.org.uk/ppa/edt\\_intro.htm](http://www.ppa.org.uk/ppa/edt_intro.htm)

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<sup>[14]</sup> At the time of publication (January 2012), this drug did not have UK marketing authorisation for this indication and/or population (see [appendix E](#) for details). Informed consent should be obtained and documented.

<sup>[15]</sup> Treatment with AEDs is associated with a small risk of suicidal thoughts and behaviour; available data suggest that the increased risk applies to all AEDs and may be seen as early as 1 week after starting treatment. Available from: [www.mhra.gov.uk/PrintPreview/DefaultSplashPP/CON019574?DynamicListQuery=&DynamicListSortBy=xCreationDate&DynamicListSortOrder=Desc&Dy](http://www.mhra.gov.uk/PrintPreview/DefaultSplashPP/CON019574?DynamicListQuery=&DynamicListSortBy=xCreationDate&DynamicListSortOrder=Desc&Dy)

<sup>[16]</sup> Please note that 'valproate' has been changed to 'sodium valproate' to be consistent with the terminology used in this update.

<sup>[17]</sup> Appendix H of the [full guideline](#) provides tables for the prognosis for remission of seizures in adults.

<sup>[18]</sup> In this recommendation, 'centre' has been replaced with 'service' for consistency across recommendations.

<sup>[19]</sup> In this recommendation, 'partial seizures' has been replaced with 'focal seizures' to reflect a change in terminology since the original guideline was published in 2004.

<sup>[20]</sup> Evidence from [Vagus nerve stimulation for refractory epilepsy in children](#), NICE interventional procedure guidance 50 (2004).

<sup>[21]</sup> At the time of publication (January 2012), this drug did not have UK marketing authorisation for this indication and/or population (see [appendix E](#) for details). Informed consent should be obtained and documented in line with normal standards in emergency care.

<sup>[22]</sup> In this recommendation, 'progesterone' has been replaced with 'progestogen' to reflect a change in terminology since the original guideline was published in 2004.

<sup>[23]</sup> In this recommendation, the original referral to appendix 5 of the BNF has been removed and replaced with more up-to-date source reference material because this appendix no longer exists and has therefore become obsolete since the original guideline was published in 2004.

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<sup>[24]</sup> Appendix D of the [full guideline](#) provides a checklist for the information needs of women and girls with epilepsy, and practical information for mothers with epilepsy.

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## 2 Notes on the scope of the guidance

NICE guidelines are developed in accordance with a scope that defines what the guideline will and will not cover. The scope of this guideline is available [here](#) – click on 'How this guidance was produced'.

The guideline addresses the diagnosis, treatment and management of epilepsy in children, young people and adults. It does not cover the diagnosis, treatment or management of epilepsy in neonates or the diagnosis or management of febrile convulsions.

The guideline makes recommendations concerning the care provided by healthcare professionals who have direct contact with, or make decisions concerning the care of, people with epilepsy. It deals with care in primary, secondary and tertiary services, and integrated care for epilepsy may span all these sectors. The delivery of tertiary procedures, such as surgical techniques, is not included. The guideline will also be relevant to, but does not cover the practice of, those working in the occupational health services, social services, educational services or the voluntary sector.

In 2012, the pharmacological management sections of the guideline were updated.

### **How this guideline was developed**

NICE commissioned the National Clinical Guideline Centre to develop this guideline. The Centre established a Guideline Development Group (see [appendix A](#)), which reviewed the evidence and developed the recommendations. An independent Guideline Review Panel oversaw the development of the guideline (see [appendix B](#)).

There is more information about [how NICE clinical guidelines are developed](#) on the NICE website. A booklet, 'How NICE clinical guidelines are developed: an overview for stakeholders, the public and the NHS' is [available](#).

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## 3 Implementation

NICE has developed [tools to help organisations implement this guidance](#).

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## 4 Research recommendations

The Guideline Development Group has made the following recommendations for research, based on its review of evidence, to improve NICE guidance and patient care in the future.

### ***4.1 Newly diagnosed seizures (focal and generalised) – monotherapy***

How do the newer AEDs compare in efficacy to the standard AEDs in the treatment of newly diagnosed epilepsy?

- Focal seizures: carbamazepine, eslicarbazepine acetate, lacosamide, lamotrigine, levetiracetam, pregabalin and zonisamide.
- Generalised seizures: lamotrigine, levetiracetam, sodium valproate and zonisamide.

#### **Why this is important**

Levetiracetam and other AEDs licensed for the treatment of focal and generalised seizures since publication of the original guideline [The epilepsies](#) (NICE clinical guideline 20) in 2004 have not been evaluated as first-line monotherapy.

The research should include:

- a prospective randomised controlled trial
- all age groups
- subgroup analyses on seizure types and syndromes
- primary outcome of seizure freedom
- secondary outcomes, including seizure reduction, quality of life and cognitive outcome
- an attempt to obtain data on pharmaco-resistance.

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## 4.2 Epilepsy syndromes

What are the initial and add-on AEDs of choice in the treatment of the epilepsy syndromes with onset in childhood, for example, myoclonic-astatic epilepsy and Dravet syndrome?

### Why this is important

Despite the need to diagnose individual epilepsy syndromes, there is little evidence on the most appropriate initial or add-on AEDs in the treatment of the rarer epilepsies.

The research should include:

- multicentre randomised controlled comparative trials with centralised national data collection
- the ketogenic diet as one of the randomised treatments
- primary outcome of seizure freedom
- secondary outcomes, including seizure reduction, quality of life and cognitive outcome
- an attempt to obtain data on pharmaco-resistance
- the possibility of including all children with specific epilepsy syndromes for consideration in the trial.

## 4.3 Infantile spasms

Does treatment response relate to cause in infantile spasms? Does early treatment success in seizure control and resolution of the hypersarrhythmic EEG influence the long-term developmental and cognitive outcomes more than the underlying cause of the spasms?

### Why this is important

The UK Infantile Spasms Study (UKISS)<sup>[25]</sup> demonstrated 14-day outcome efficacy of steroids over vigabatrin, although this excluded children with tuberous sclerosis. This study provided no specific subgroup analysis based on the cause of the spasms. There was also no analysis on the effect of treatment lag (delay) on the study findings. Further data are available on behavioural outcomes with different treatments at 14 months and 4 years but with no analysis based on

cause or treatment lag. Further developmental and cognitive outcomes would be useful, including response by specific cause and by treatment lag.

The research should include:

- prospective randomised design, including subgroup analyses based on both cause and treatment lag; this would require large numbers of patients and would need to be multicentre, possibly involving Western Europe
- EEG outcomes
- developmental status at presentation, and at follow-up
- an attempt to obtain data on pharmaco-resistance.

#### ***4.4 Treatment of convulsive status epilepticus (that is, not just refractory)***

What is the most effective and safest AED to treat:

- established (usually lasting longer than 30 minutes) convulsive status epilepticus
- refractory convulsive status epilepticus?

#### **Why this is important**

Convulsive status epilepticus (CSE) should be treated as an emergency. The most important aspect of treatment is to try to stop the seizure. Prompt, successful treatment of CSE avoids the need for admission to an intensive care unit (ICU). The most commonly used medication is phenytoin. This should be used with care and close monitoring because of the risk of hypotension and cardiac arrhythmia. Sodium valproate and levetiracetam are potentially as effective and safer alternatives but there are very limited comparative data.

CSE that is refractory to first-line treatment (RCSE) is rare and often complicated by irreversible neurological and intellectual sequelae, including death. Reasons for these complications include the underlying cause of RCSE, its duration and management. The majority, if not all patients with RCSE are managed in an ICU. There are no agreed drugs or treatment protocols for treating RCSE. The three most commonly used anticonvulsants are thiopental sodium, midazolam and

propofol (propofol is rarely used in children). Data on treatment in children, young people and adults are limited and anecdotal. A recently completed 2-year audit of everyone younger than 16 years with RCSE treated in an ICU in England, Wales and Scotland will provide unique epidemiological data on paediatric RCSE, its causes and current management. These data could be used to design a randomised controlled trial (RCT) of specific drug treatments and protocols.

The research should include:

- a multicentre randomised comparative trial of intravenous levetiracetam, sodium valproate and phenytoin in initial treatment of status epilepticus
- a multicentre RCT of treatment of refractory status epilepticus in ICUs, including midazolam and thiopental sodium (and propofol in adults)
- primary outcome of cessation of CSE
- secondary outcomes including recurrence within a designated period (probably 12 hours), mortality and morbidity
- cost data including treatment costs and days in intensive care.

## ***4.5 AEDs and pregnancy***

What is the malformation rate and longer term neurodevelopmental outcome of children born to mothers who have taken AEDs during pregnancy?

### **Why this is important**

Pregnancy registers are increasing the data that are available on established AEDs; however, these registers may give malformation rates but do not provide controlled long-term data on neurodevelopmental outcome.

The research should include:

- measures of maternal outcome, including seizure frequency and quality of life
- major and minor rates of congenital malformations

- 
- prospective neurodevelopmental (including cognitive) and behavioural outcomes in children born to women and girls with epilepsy (these should be undertaken on a long-term basis and ideally using a cohort study, followed from birth until adult life).

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<sup>[25]</sup> Lux AL, Edwards SW, Hancock E et al. (2004) The United Kingdom Infantile Spasms Study comparing vigabatrin with prednisolone or tetracosactide at 14 days: a multicentre, randomised controlled trial. *Lancet* 364: 1773–8.

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## 5 Other versions of this guideline

### 5.1 Full guideline

The full guideline, 'The epilepsies: the diagnosis and management of the epilepsies in adults and children in primary and secondary care (a partial update of clinical guideline 20)', contains details of the methods and evidence used to develop the guideline. It is published by the National Clinical Guideline Centre, and is available from [our website](#).

### 5.2 NICE pathway

The recommendations from this guideline have been incorporated into a [NICE pathway](#).

### 5.3 Information for the public

NICE has produced [information for the public](#) explaining this guideline.

We encourage NHS and voluntary sector organisations to use text from this information in their own materials about epilepsy.

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## 6 Related NICE guidance

- [Retigabine for the adjunctive treatment of partial onset seizures in epilepsy](#). NICE technology appraisal guidance 232 (2011).
- [Transient loss of consciousness \('blackouts'\) management in adults and young people](#). NICE clinical guideline 109 (2010).
- [Medicines adherence](#). NICE clinical guideline 76 (2009).
- [Vagus nerve stimulation for refractory epilepsy in children](#). NICE interventional procedure guidance 50 (2004).

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## 7 Updating the guideline

NICE clinical guidelines are updated so that recommendations take into account important new information. New evidence is checked 3 years after publication, and healthcare professionals and patients are asked for their views; we use this information to decide whether all or part of a guideline needs updating. If important new evidence is published at other times, we may decide to do a more rapid update of some recommendations. Please see our website for information about updating the guideline.

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## **Appendix A: The Guideline Development Group, National Clinical Guideline Centre and NICE project team**

### ***Guideline Development Group (2012, partial update)***

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#### **Professor Helen Cross (Clinical Advisor)**

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Consultant Neurologist, Newcastle Upon Tyne Hospitals NHS Trust

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## ***Guideline Development Group (2004)***

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## ***Guideline Development Group co-opted experts***

For this guideline, the Guideline Development Group was assisted by a number of co-opted experts, who were chosen because of their knowledge in a particular area.

### ***2012 Guideline (partial update)***

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**2004 Guideline**

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Editor

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## Appendix B: The Guideline Review Panel

The Guideline Review Panel is an independent panel that oversees the development of the guideline and takes responsibility for monitoring adherence to NICE guideline development processes. In particular, the panel ensures that stakeholder comments have been adequately considered and responded to. The panel includes members from the following perspectives: primary care, secondary care, lay, public health and industry.

### ***2012 Guideline (partial update)***

**Peter Robb**

Consultant ENT surgeon, Epsom & St Helier University Hospitals and The Royal Surrey County NHS Trusts

**Aomesh Bhatt**

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### ***2004 Guideline***

**Mr Barry Stables**

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Clinical Director, West Cumbria Primary Care

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## Appendix C: Outline care algorithms

These algorithms are available in a [separate file](#).

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## Appendix D: Differential diagnosis of epilepsy in children, young people and adults

These algorithms are available in a [separate file](#).

## Appendix E: Pharmacological treatment

The tables that follow provide a summary reference guide to pharmacological treatment. They were updated in 2011. Licensing details are listed under table 3. All drugs are listed in alphabetical order.

**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 <sup>a</sup> Sodium valproate	Clobazam <sup>a</sup> 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 <sup>a</sup>	Rufinamide <sup>a</sup> Topiramate <sup>a</sup>	Carbamazepine Gabapentin Oxcarbazepine Pregabalin Tiagabine Vigabatrin

Absence	Ethosuximide Lamotrigine <sup>a</sup> Sodium valproate	Ethosuximide Lamotrigine <sup>a</sup> Sodium valproate	Clobazam <sup>a</sup> Clonazepam Levetiracetam <sup>a</sup> Topiramate <sup>a</sup> Zonisamide <sup>a</sup>	Carbamazepine Gabapentin Oxcarbazepine Phenytoin Pregabalin Tiagabine Vigabatrin
Myoclonic	Levetiracetam <sup>a</sup> Sodium valproate Topiramate <sup>a</sup>	Levetiracetam Sodium valproate Topiramate <sup>a</sup>	Clobazam <sup>a</sup> Clonazepam Piracetam Zonisamide <sup>a</sup>	Carbamazepine Gabapentin Oxcarbazepine Phenytoin Pregabalin Tiagabine Vigabatrin
Focal	Carbamazepine Lamotrigine Levetiracetam Oxcarbazepine Sodium valproate	Carbamazepine Clobazam <sup>a</sup> Gabapentin <sup>a</sup> Lamotrigine Levetiracetam Oxcarbazepine Sodium valproate Topiramate	Eslicarbazepine acetate <sup>a</sup> Lacosamide Phenobarbital Phenytoin Pregabalin <sup>a</sup> Tiagabine Vigabatrin Zonisamide <sup>a</sup>	
Prolonged or repeated seizures and convulsive status epilepticus in the community	Buccal midazolam Rectal diazepam <sup>b</sup> Intravenous lorazepam			

Convulsive status epilepticus in hospital	Intravenous lorazepam Intravenous diazepam Buccal midazolam	Intravenous phenobarbital Phenytoin		
Refractory convulsive status epilepticus	Intravenous midazolam <sup>b</sup> Propofol <sup>b</sup> (not in children) Thiopental sodium <sup>b</sup>			
<p><sup>a</sup> At the time of publication (January 2012) 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.</p> <p><sup>b</sup> At the time of publication (January 2012), 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.</p>				

**Table 2 AED options by epilepsy syndrome**

<b>Epilepsy syndrome</b>	<b>First-line AEDs</b>	<b>Adjunctive AEDs</b>	<b>Other AEDs that may be considered on referral to tertiary care</b>	<b>Do not offer AEDs (may worsen seizures)</b>

Childhood absence epilepsy or other absence syndromes	Ethosuximide Lamotrigine <sup>a</sup> Sodium valproate	Ethosuximide Lamotrigine <sup>a</sup> Sodium valproate	Clobazam <sup>a</sup> Clonazepam Levetiracetam <sup>a</sup> Topiramate <sup>a</sup> Zonisamide <sup>a</sup>	Carbamazepine Gabapentin Oxcarbazepine Phenytoin Pregabalin Tiagabine Vigabatrin
Juvenile absence epilepsy or other absence syndromes	Ethosuximide Lamotrigine <sup>a</sup> Sodium valproate	Ethosuximide Lamotrigine <sup>a</sup> Sodium valproate	Clobazam <sup>a</sup> Clonazepam Levetiracetam <sup>a</sup> Topiramate <sup>a</sup> Zonisamide <sup>a</sup>	Carbamazepine Gabapentin Oxcarbazepine Phenytoin Pregabalin Tiagabine Vigabatrin
Juvenile myoclonic epilepsy	Lamotrigine <sup>a</sup> Levetiracetam <sup>a</sup> Sodium valproate Topiramate <sup>a</sup>	Lamotrigine <sup>a</sup> Levetiracetam Sodium valproate Topiramate <sup>a</sup>	Clobazam <sup>a</sup> Clonazepam Zonisamide <sup>a</sup>	Carbamazepine Gabapentin Oxcarbazepine Phenytoin Pregabalin Tiagabine Vigabatrin
Epilepsy with generalised tonic–clonic seizures only	Carbamazepine Lamotrigine Oxcarbazepine <sup>a</sup> Sodium valproate	Clobazam <sup>a</sup> Lamotrigine Levetiracetam Sodium valproate Topiramate		

Idiopathic generalised epilepsy	Lamotrigine <sup>a</sup> Sodium valproate Topiramate <sup>a</sup>	Lamotrigine <sup>a</sup> Levetiracetam <sup>a</sup> Sodium valproate Topiramate <sup>a</sup>	Clobazam <sup>a</sup> Clonazepam Zonisamide <sup>a</sup>	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 <sup>a</sup> ) or vigabatrin			
Infantile spasms due to tuberous sclerosis	Discuss with, or refer to, a tertiary paediatric epilepsy specialist Vigabatrin or steroid (prednisolone or tetracosactide <sup>a</sup> )			

Benign epilepsy with centrotemporal spikes	Carbamazepine <sup>a</sup> Lamotrigine <sup>a</sup> Levetiracetam <sup>a</sup> Oxcarbazepine <sup>a</sup> Sodium valproate	Carbamazepine <sup>a</sup> Clobazam <sup>a</sup> Gabapentin <sup>a</sup> Lamotrigine <sup>a</sup> Levetiracetam <sup>a</sup> Oxcarbazepine <sup>a</sup> Sodium valproate Topiramate <sup>a</sup>	Eslicarbazepine acetate <sup>a</sup> Lacosamide <sup>a</sup> Phenobarbital Phenytoin Pregabalin <sup>a</sup> Tiagabine <sup>a</sup> Vigabatrin <sup>a</sup> Zonisamide <sup>a</sup>	
Panayiotopoulos syndrome	Carbamazepine <sup>a</sup> Lamotrigine <sup>a</sup> Levetiracetam <sup>a</sup> Oxcarbazepine <sup>a</sup> Sodium valproate	Carbamazepine <sup>a</sup> Clobazam <sup>a</sup> Gabapentin <sup>a</sup> Lamotrigine <sup>a</sup> Levetiracetam <sup>a</sup> Oxcarbazepine <sup>a</sup> Sodium valproate Topiramate <sup>a</sup>	Eslicarbazepine acetate <sup>a</sup> Lacosamide <sup>a</sup> Phenobarbital Phenytoin Pregabalin <sup>a</sup> Tiagabine <sup>a</sup> Vigabatrin <sup>a</sup> Zonisamide <sup>a</sup>	
Late-onset childhood occipital epilepsy (Gastaut type)	Carbamazepine <sup>a</sup> Lamotrigine <sup>a</sup> Levetiracetam <sup>a</sup> Oxcarbazepine <sup>a</sup> Sodium valproate	Carbamazepine <sup>a</sup> Clobazam <sup>a</sup> Gabapentin <sup>a</sup> Lamotrigine <sup>a</sup> Levetiracetam <sup>a</sup> Oxcarbazepine <sup>a</sup> Sodium valproate Topiramate <sup>a</sup>	Eslicarbazepine acetate <sup>a</sup> Lacosamide <sup>a</sup> Phenobarbital Phenytoin Pregabalin <sup>a</sup> Tiagabine <sup>a</sup> Vigabatrin <sup>a</sup> Zonisamide <sup>a</sup>	

Dravet syndrome	Discuss with, or refer to, a tertiary paediatric epilepsy specialist Sodium valproate Topiramate <sup>a</sup>	Clobazam <sup>a</sup> Stiripentol		Carbamazepine Gabapentin Lamotrigine Oxcarbazepine Phenytoin Pregabalin Tiagabine Vigabatrin
Continuous spike and wave during slow sleep	Refer to a tertiary paediatric epilepsy specialist			
Lennox–Gastaut syndrome	Discuss with, or refer to, a tertiary paediatric epilepsy specialist Sodium valproate	Lamotrigine	Felbamate <sup>a</sup> Rufinamide Topiramate	Carbamazepine Gabapentin Oxcarbazepine Pregabalin Tiagabine Vigabatrin
Landau–Kleffner syndrome	Refer to a tertiary paediatric epilepsy specialist			
Myoclonic-astatic epilepsy	Refer to a tertiary paediatric epilepsy specialist			

<sup>a</sup> At the time of publication (January 2012), this drug did not have UK marketing authorisation for this indication and/or population (please see table 3 for specific details about this drug for this indication and population). Informed consent should be obtained and documented.

## Licensing indications

Detailed below are drugs that have been recommended but that do not currently have licensed indications for these seizure 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). There was insufficient experience of the use of this drug in children younger than 6 years to enable any dosage recommendation to be made (SPC). It did have authorisation for adjunctive therapy for epilepsy, monotherapy under specialist supervision for catamenial (menstruation) seizures (usually for 7–10 days each month, just before and during menstruation), and cluster seizures (BNFC).
	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).
	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 children younger than 6 years owing to the lack of sufficient supporting data (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).

GTC seizures	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).
	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 6 years to enable any dosage recommendation to be made (SPC). It did have authorisation for adjunctive therapy for epilepsy, monotherapy under specialist supervision for catamenial (menstruation) seizures (usually for 7–10 days each month, just before and during menstruation), and cluster seizures (BNFC).
	Oxcarbazepine	At the time of publication, oxcarbazepine did not have UK marketing authorisation for GTC seizures (BNF). It had authorisation for focal seizures with or without secondary GTC seizures (BNF).
Absence seizures	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 6 years to enable any dosage recommendation to be made (SPC). It did have authorisation for adjunctive therapy for epilepsy, monotherapy 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. It 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 seizures. It had authorisation for monotherapy and adjunctive treatment of focal seizures and GTC seizures and adjunctive treatment for 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. It had authorisation for adjunctive therapy for adult patients with refractory focal 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). There was insufficient experience of the use of this drug in children younger than 6 years to enable any dosage recommendation to be made (SPC). It did have authorisation for adjunctive therapy for epilepsy, monotherapy 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. It 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 myoclonic seizures. It had authorisation for monotherapy and adjunctive treatment of focal seizures and GTC seizures and adjunctive treatment for seizures associated with Lennox–Gastaut syndrome (BNF).
	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 or atonic seizures	Lamotrigine	At the time of publication, lamotrigine did not have UK marketing authorisation for use in tonic or 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 (BNF, BNFC).
	Rufinamide	At the time of publication, rufinamide did not have UK marketing authorisation for use in tonic or atonic seizures. It had authorisation for the adjunctive treatment of seizures associated with Lennox–Gastaut syndrome (BNF).
	Topiramate	At the time of publication, topiramate did not have UK marketing authorisation for use in tonic or atonic seizures. It had authorisation for monotherapy and adjunctive treatment of focal seizures and 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 under 3 years of age (BNFC). There was insufficient experience of the use of this drug in children younger than 6 years to enable any dosage recommendation to be made (SPC). It did have authorisation for adjunctive therapy for epilepsy, monotherapy 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. It had authorisation for monotherapy and adjunctive treatment of focal seizures and GTC seizures and adjunctive treatment for 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). It had authorisation for focal and GTC 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 6 years to enable any dosage recommendation to be made (SPC). It did have authorisation for adjunctive therapy for epilepsy, monotherapy under specialist supervision for catamenial (menstruation) seizures (usually for 7–10 days each month, just before and during menstruation), and cluster seizures (BNFC).
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).
Gabapentin	At the time of publication, gabapentin did not have UK marketing authorisation for BECTS/Panayiotopoulos syndrome and late-onset childhood occipital epilepsy (Gastaut type). It had authorisation for use in focal seizures with and without secondary generalisation (BNF) but it 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 children younger than 6 years owing to the lack of sufficient supporting data (SPC).
Lacosamide	At the time of publication, lacosamide did not have UK marketing authorisation for BECTS/Panayiotopoulos syndrome and late-onset childhood occipital epilepsy (Gastaut type). It had authorisation for adjunctive treatment of focal seizures with or without secondary generalisation (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). It had authorisation for monotherapy and adjunctive treatment of focal and GTC 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). It 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). It had authorisation for focal seizures with or without secondary GTC seizures (BNF).
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).
Tiagabine	At the time of publication, tiagabine did not have UK marketing authorisation for BECTS/Panayiotopoulos syndrome and late-onset childhood occipital epilepsy (Gastaut type). It had authorisation for focal seizures with or without secondary generalisation that are not satisfactorily controlled by other antiepileptics (BNF).

	Topiramate	At the time of publication, topiramate did not have UK marketing authorisation for BECTS/Panayiotopoulos syndrome and late-onset childhood occipital epilepsy (Gastaut type). It had authorisation for monotherapy and adjunctive treatment of focal seizures and GTC seizures and adjunctive treatment for seizures associated with Lennox–Gastaut syndrome (BNF).
	Vigabatrin	At the time of publication, vigabatrin did not have UK marketing authorisation for BECTS/Panayiotopoulos syndrome. It can be prescribed in combination with other epileptic treatment for focal epilepsy with or without secondary generalisation (BNF).
	Zonisamide	At the time of publication, zonisamide did not have UK marketing authorisation for BECTS/Panayiotopoulos syndrome and late-onset childhood occipital epilepsy (Gastaut type). It had authorisation for adjunctive therapy for adult patients with refractory focal seizures, with or without secondary generalisation (BNF).
IGE	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 6 years to enable any dosage recommendation to be made (SPC). It did have authorisation for adjunctive therapy for epilepsy, monotherapy 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 and GTC 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 IGE. It 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. It had authorisation for monotherapy and adjunctive treatment of focal seizures and GTC seizures and adjunctive treatment for seizures associated with Lennox–Gastaut syndrome (BNF).
	Zonisamide	At the time of publication, zonisamide did not have UK marketing authorisation for use in IGE. It had authorisation for adjunctive therapy for adult patients with refractory focal seizures, with or without secondary generalisation (BNF).
JME	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 6 years to enable any dosage recommendation to be made (SPC). It did have authorisation for adjunctive therapy for epilepsy, monotherapy 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. It had authorisation for monotherapy and adjunctive treatment of focal and GTC 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 monotherapy use in JME. It 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 JME. It had authorisation for monotherapy and adjunctive treatment of focal seizures and GTC seizures and adjunctive treatment for seizures associated with Lennox–Gastaut syndrome (BNF).
	Zonisamide	At the time of publication, zonisamide did not have UK marketing authorisation for use in JME. It had authorisation for adjunctive therapy for adult patients with refractory focal 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). There was insufficient experience of the use of this drug in children younger than 6 years to enable any dosage recommendation to be made (SPC). It did have authorisation for adjunctive therapy for epilepsy, monotherapy 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 no authorisation outside this age range (BNF).
	Levetiracetam	At the time of publication, levetiracetam did not have UK marketing authorisation for use in absence syndromes. It 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. It had authorisation for monotherapy and adjunctive treatment of focal seizures and GTC seizures and adjunctive treatment for 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. It had authorisation for adjunctive therapy for adult patients with refractory focal 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 anaesthesia and sedation. 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 to 125 mg (3 to 5 ml of a 2.5% solution) given by intravenous infusion (SPC).

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	Midazolam	At the time of publication, midazolam injection did not have UK marketing authorisation for status epilepticus (BNF, BNFC).
	Diazepam	At the time of publication, diazepam did not have UK marketing authorisation for the use of Rectubes and Stesolid Rectal Tubes in children younger than 1 year (BNFC).

Abbreviations: BECTS, benign epilepsy with centrotemporal spikes; BNF, British national formulary; BNFC, British national formulary for children; GTC, generalised tonic–clonic; IGE, idiopathic generalised epilepsy; JME, juvenile myoclonic epilepsy; SPC, summary of product characteristics.

## Appendix F: 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)*

General measures	
<p><b>1st stage (0–10 minutes)</b></p> <ul style="list-style-type: none"> <li>• Secure airway and resuscitate</li> <li>• Administer oxygen</li> <li>• Assess cardiorespiratory function</li> <li>• Establish intravenous access</li> </ul>	<p><b>Early status</b></p>
<p><b>2nd stage (0–30 minutes)</b></p> <ul style="list-style-type: none"> <li>• Institute regular monitoring</li> <li>• Consider the possibility of non-epileptic status</li> <li>• Emergency AED therapy</li> <li>• Emergency investigations</li> <li>• 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</li> <li>• Treat acidosis if severe</li> </ul>	

<p><b>3rd stage (0–60 minutes)</b></p> <ul style="list-style-type: none"> <li>• Establish aetiology</li> <li>• Alert anaesthetist and ITU</li> <li>• Identify and treat medical complications</li> <li>• Pressor therapy when appropriate</li> </ul>	<p><b>Established status</b></p>
<p><b>4th stage (30–90 minutes)</b></p> <ul style="list-style-type: none"> <li>• Transfer to intensive care</li> <li>• Establish intensive care and EEG monitoring</li> <li>• Initiate intracranial pressure monitoring where appropriate</li> <li>• Initiate long-term, maintenance AED therapy</li> </ul>	<p><b>Refractory status</b></p>
<p><b>Emergency investigations</b></p> <p>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.</p>	
<p><b>Monitoring</b></p> <p>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.</p> <p>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).</p>	

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

<b>Premonitory stage (pre-hospital)</b>	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.
<b>Early status</b>	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.
<b>Established status</b>	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.
<b>Refractory status<sup>a</sup></b>	General anaesthesia, with one of: <ul style="list-style-type: none"> <li>• propofol (1–2 mg/kg bolus, then 2–10 mg/kg/hour) titrated to effect</li> <li>• midazolam (0.1–0.2 mg/kg bolus, then 0.05–0.5 mg/kg/hour) titrated to effect</li> <li>• 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</li> <li>• anaesthetic continued for 12–24 hours after the last clinical or electrographic seizure, then dose tapered.</li> </ul>
<sup>a</sup> 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 0 mins (1 <sup>st</sup> step)	Seizure starts Check ABC, high flow O <sub>2</sub> if available Check blood glucose	Confirm clinically that it is an epileptic seizure
5 mins (2 <sup>nd</sup> 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
15 mins (3 <sup>rd</sup> step)	Lorazepam 0.1 mg/kg intravenously	This step should be in hospital Call for senior help Start to prepare phenytoin for 4 <sup>th</sup> step Re-confirm it is an epileptic seizure
25 mins (4 <sup>th</sup> 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 (5 <sup>th</sup> 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.

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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.

## Appendix G: Abbreviations and glossary

AED	Anti-epileptic drug
BECTS	Benign epilepsy with centrotemporal spikes
BNF	British national formulary
CT	Computed tomography
ECG	Electrocardiogram
EEG	Electroencephalogram
ESNs	Epilepsy specialist nurses
GTC	Generalised tonic–clonic
IGE	Idiopathic generalised epilepsy
IUD	Intrauterine device
JME	Juvenile myoclonic epilepsy
MRI	Magnetic resonance imaging
SPC	Summary of product characteristics
SUDEP	Sudden unexpected death in epilepsy
VNS	Vagus nerve stimulation

Unless otherwise stated, definitions are taken from 'Mosby's medical, nursing and allied health dictionary' 5<sup>th</sup> edition and supplemented by the text of the epilepsy full guideline published in 2004.

### ***Absence seizure***

A seizure characterised by behavioural arrest associated with generalised spike wave activity on EEG.

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## ***Adherence***

The extent to which the person's behaviour matches the prescriber's recommendations. Adherence emphasises the need for agreement and that the patient is free to decide whether or not to adhere to the doctor's recommendation<sup>[26]</sup>.

## ***Adjunctive treatment***

When a medication is added to a first-line AED for combination therapy.

## ***Aetiology***

The cause or origin of a disease or disorder as determined by medical diagnosis.

## ***Anti-epileptic drug (AED)***

Medication taken daily to prevent the recurrence of epileptic seizures. Refer to [appendix E](#) concerning the choice of drug, side effects and suitability to syndrome.

## ***Atonic seizure***

A generalised seizure characterised by sudden onset of loss of muscle tone.

## ***Attack***

An episode in the course of an illness.

## ***Baseline***

The initial set of measurements at the beginning of a study (after run-in period where applicable), with which subsequent results are compared.

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## ***Benign epilepsy with centrotemporal spikes (BECTS)***

An epilepsy syndrome of childhood (5–14 years) characterised by focal motor and/or secondarily generalised seizures, the majority from sleep, in an otherwise normal individual, with centrotemporal spikes seen on EEG.

### ***Carer***

Someone other than a healthcare professional who is involved in caring for a person with a medical condition.

## ***Childhood absence epilepsy***

An epilepsy syndrome with an age of onset of 4–9 years, characterised by frequent absence seizures associated with 3 Hz spike wave activity on EEG.

## ***Clinical presentation***

The description of the history and presentation of the clinical condition to the assessing medical team.

### ***Clinician***

A healthcare professional providing direct patient care (for example, doctor, nurse or physiotherapist).

## ***Comorbidity***

Co-existence of more than one disease or an additional disease (other than that being studied or treated) in a person.

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## **Concordance**

This is a recent term, the meaning of which has changed. It was initially applied to the consultation process in which doctor and patient agree therapeutic decisions that incorporate their respective views, but now includes supporting patients in medicine-taking as well as communication when prescribing. Concordance reflects social values but does not address medicine-taking and may not lead to improved adherence<sup>[25]</sup>.

## **Continuous spike and wave during slow sleep (CSWS)**

An epilepsy syndrome with childhood onset, characterised by a plateau and regression of cognitive abilities associated with dramatic increase in spike wave activity in slow wave sleep (> 85% of slow sleep). There may be few seizures at presentation.

## **Convulsive status epilepticus**

When a convulsive seizure continues for a prolonged period (longer than 5 minutes), or when convulsive seizures occur one after the other with no recovery between. Convulsive status epilepticus is an emergency and requires immediate medical attention.

## **Dosage**

The prescribed amount of a drug to be taken, including the size and timing of the doses.

## **Dravet syndrome**

Previously known as severe myoclonic epilepsy of infancy. An epilepsy syndrome with onset in infancy, characterised by initial prolonged, typically lateralised, febrile seizures, subsequent development of multiple seizure types including myoclonic, absence, focal and generalised tonic–clonic seizures, with developmental plateau or regression.

## **Electrocardiogram (ECG)**

A test that records the heart's electrical activity.

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## ***Electroencephalogram (EEG)***

An investigation that involves recording the electrical activity of the brain. Electrodes are attached to standardised points on the person's head with collodion. Recordings are usually taken across two points.

## ***Epilepsy***

A condition in which a person is prone to recurrent epileptic seizures.

## ***Epilepsy syndrome***

A distinctive disorder identifiable on the basis of a typical age of onset, seizure types, specific EEG characteristics, and often other features. Identification of epilepsy syndrome has implications for treatment, management and prognosis<sup>[27]</sup>.

## ***Epileptic seizure***

A transient occurrence of signs and/or symptoms, the result of a primary change to the electrical activity (abnormally excessive or synchronous) in the brain<sup>[25]</sup>.

## ***Focal seizure***

A seizure that originates within networks limited to one hemisphere, discretely localised or more widely distributed. Replaces the terms partial seizure and localisation-related seizure.

## ***Generalised seizure***

A seizure that originates in, and rapidly engages, bilaterally distributed networks. Such bilateral networks can include cortical and subcortical structures but do not necessarily include the entire cortex<sup>[25]</sup>.

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## ***Generalised tonic–clonic (GTC) seizure***

A seizure of sudden onset involving generalised stiffening and subsequent rhythmic jerking of the limbs, the result of rapid widespread engagement of bilateral cortical and subcortical networks in the brain.

## ***Genetic (with reference to epilepsy)***

The epilepsy is, as best as understood, the direct result of a known or presumed genetic defect(s) in which seizures are the core symptom of the disorder<sup>[25]</sup>.

## ***Ictal phenomenology***

Description or history of ictal events (seizures).

## ***Idiopathic***

A syndrome that is only epilepsy, with no underlying structural brain lesion or other neurological signs or symptoms. These are presumed to be genetic in aetiology and are usually age dependent<sup>[25]</sup>.

## ***Idiopathic generalised epilepsy (IGE)***

A well-defined group of disorders characterised by typical absences, myoclonic and generalised tonic–clonic seizures, alone or in varying combinations in otherwise normal individuals. The EEG is also characteristic, demonstrating a distinct pattern of generalised polyspike wave discharges and/or generalised spike wave. Presumed to have a genetic aetiology. The new classification of the ILAE (2010) suggests the terminology should change to 'genetic generalised epilepsy' (GGE).

## ***Indication (specific)***

The defined use of a technology as licensed by the Medicines and Healthcare products Regulatory Agency (MHRA).

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## ***Infantile spasms***

A specific seizure type presenting in the first year of life, most commonly between 3 and 9 months. Spasms are brief axial movements lasting 0.2–2 seconds, most commonly flexor in nature, involving flexion of the trunk with extension of the upper and lower limbs. They are occasionally referred to as 'salaam seizures'.

## ***Intervention***

Healthcare action intended to benefit the patient, for example, drug treatment, surgical procedure or psychological therapy.

## ***Juvenile absence epilepsy***

An epilepsy syndrome with an age of onset of 9–13 years characterised by absence seizures, associated with 3–4 Hz spike wave on EEG. Generalised tonic–clonic seizures may occur.

## ***Juvenile myoclonic epilepsy (JME)***

An epilepsy syndrome with an age of onset of 5–20+ years (peak 10–16 years) characterised by myoclonic seizures that most commonly occur soon after waking. Absence and generalised tonic–clonic seizures may occur in between 50 and 80% of people with JME. EEG demonstrates 3–6 Hz generalised polyspike and wave activity, with photosensitivity in more than 30% of people.

## ***Ketogenic diet***

A specific diet that is high in fat but low in carbohydrates and protein.

## ***Landau–Kleffner syndrome (LKS)***

A very rare epilepsy syndrome with an age of onset of 3–6 years characterised by loss of language (after a period of normal language development) associated with an epilepsy of centrotemporal origin, more specifically bitemporal spikes on EEG with enhancement in sleep or continuous spike and wave during slow sleep.

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## ***Late-onset childhood occipital epilepsy (Gastaut type)***

Epilepsy with an age of onset in mid-childhood to adolescence with frequent brief seizures characterised by initial visual hallucinations, ictal blindness, vomiting and post-ictal headache. EEG typically shows interictal occipital spikes attenuated by eye opening.

## ***Lennox–Gastaut syndrome***

An epilepsy syndrome with an age of onset of 3–10 years characterised by multiple seizure types (including atonic, tonic, tonic–clonic and atypical absence seizures), cognitive impairment and specific EEG features of diffuse slow spike and wave (< 2 Hz) as well as paroxysmal fast activity (10 Hz or more) in sleep.

## ***Monotherapy***

Use of a single drug in treatment.

## ***Myoclonic-astatic epilepsy (MAE)***

Also known as Doose syndrome. An epilepsy syndrome with an age of onset of 18–60 months, characterised by different seizure types with myoclonic and myoclonic-astatic seizures seen in all, causing children to fall. The EEG shows generalised spike/polyspike and wave activity at 2–6 Hz.

## ***Myoclonic seizures***

Sudden brief (< 100 ms) and almost shock-like involuntary single or multiple jerks due to abnormal excessive or synchronous neuronal activity and associated with polyspikes on EEG.

## ***Neurological deficit***

A deficiency or impairment of the nervous system.

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## ***Non-convulsive status epilepticus***

A change in mental status or behaviour from baseline, associated with continuous seizure activity on EEG, which is also seen to be a change from baseline.

## ***Non-epileptic attack disorder (NEAD)***

A disorder characterised by episodes of change in behaviour or movement, not caused by a primary change in electrical activity of the brain. Movements are varied, and the attacks can be difficult to differentiate from epileptic seizures. Refer to appendix A of the [full guideline](#) for the differentiation of epileptic attacks from NEAD and its subgroups.

## ***Older people***

For the purposes of this guideline, older people are defined as 65 years or older; however, this is based on the cut-off point in the majority of the literature.

## ***Panayiotopoulos syndrome***

Epilepsy syndrome presenting in early childhood (mean 4–7 years) with rare seizures that are prolonged. Characterised by autonomic features including vomiting, pallor and sweating followed by tonic eye deviation, impairment of consciousness with possible evolution into a secondarily generalised seizure. Prognosis is excellent and treatment often unnecessary.

## ***Pharmacokinetics***

The way in which a drug is processed by the body, influencing absorption, metabolism, distribution and excretion.

## ***Polypharmacy***

Multiple different drugs used in a patient's treatment, which could include AEDs.

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## ***Polytherapy***

Two or more medications used in combination therapy. The guideline specifically refers to AEDs.

## ***Prognosis***

A probable course or outcome of a disease. Prognostic factors are patient or disease characteristics that influence the course of a disease. Good prognosis is associated with a low rate of undesirable outcomes; poor prognosis is associated with a high rate of undesirable outcomes.

## ***Provocation techniques***

Methods used to provoke seizures, such as hyperventilation, photic stimulation, sleep deprivation and withdrawal of medication.

## ***Quality of life***

A combination of a person's physical, mental and social wellbeing; not just the absence of disease.

## ***Refractory status epilepticus***

Continued status epilepticus despite treatment with two anticonvulsants in appropriate doses. This can occur in both convulsive and non-convulsive status epilepticus.

## ***Secondarily generalised seizure***

Now referred to as a 'focal seizure evolving to a bilateral convulsive seizure'<sup>[27]</sup>.

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## ***Simple and complex partial epileptic seizures***

These terms are no longer recommended. They have been generally replaced with the single word, 'focal'. Focal seizures should include a clear description of the impairment of consciousness<sup>[27]</sup>.

## ***Specialist (as used in this guideline)***

For adults: a medical practitioner with training and expertise in epilepsy. For children and young people: a paediatrician with training and expertise in epilepsy.

## ***Sudden unexpected (or unexplained) death in epilepsy (SUDEP)***

Sudden, unexplained, witnessed or unwitnessed, non-traumatic and non-drowning death in people with epilepsy, with or without evidence for a seizure, and excluding documented status epilepticus, in which post-mortem examination does not reveal a toxicological or anatomic cause for death<sup>[28]</sup>.

## ***Syncope***

A brief lapse in consciousness caused by transient reduction in blood flow to the brain. May be caused by many different factors, including emotional stress, vagal stimulation, vascular pooling in the legs, diaphoresis, or sudden change in environmental temperature or body position.

## ***Tertiary epilepsy specialist***

A tertiary epilepsy specialist is an adult or paediatric neurologist who devotes the majority of their working time to epilepsy, is working in a multidisciplinary tertiary referral centre with appropriate diagnostic and therapeutic resources, and is subject to regular peer review.

## ***Tertiary service***

Specialist care delivery unit, to which people may be referred from secondary care.

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## ***Tonic seizure***

An epileptic seizure characterised by abrupt generalised muscle stiffening possibly causing a fall. The seizure usually lasts less than a minute and recovery is rapid.

## ***Tonic–clonic seizure***

An epileptic seizure characterised by initial generalised muscle stiffening, followed by rhythmical jerking of the limbs, usually lasting a few minutes. The person may bite their tongue and may be incontinent. They may feel confused or sleepy afterwards, and take a while to recover fully.

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<sup>[26]</sup> National Collaborating Centre for Primary Care (2009) Medicines adherence: involving patients in decisions about prescribed medicines and supporting adherence. London: Royal College of General Practitioners.

<sup>[27]</sup> Definition from the International League Against Epilepsy (ILAE) Task Force on Classification (2001).

<sup>[28]</sup> Provided by Nashef L (1997) Sudden unexpected death in epilepsy: terminology and definitions. *Epilepsia* 38: S20–2.

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## Changes after publication

**January 2015:** The Medicines and Healthcare Products Regulatory Agency (MHRA) has strengthened its warnings on the use of valproate in women of childbearing potential. We are assessing the impact of this on the guideline. In the meantime, healthcare professionals are advised to use the guideline in conjunction with the latest MHRA advice.

**November 2013:** A footnote has been added to recommendation 1.9.1.4 highlighting new advice issued by the MHRA about oral anti-epileptic drugs (AEDs).

**October 2012:** minor maintenance.

**June 2012:** minor maintenance.

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## About this guideline

NICE clinical guidelines are recommendations about the treatment and care of people with specific diseases and conditions in the NHS in England and Wales.

The guideline was developed by the National Clinical Guideline Centre. The Centre worked with a group of healthcare professionals (including consultants, GPs and nurses), patients and carers, and technical staff, who reviewed the evidence and drafted the recommendations. The recommendations were finalised after public consultation.

The methods and processes for developing NICE clinical guidelines are described in [The guidelines manual](#). This guideline updates and replaces NICE clinical guideline 20 (published October 2004). This guidance also updates and replaces NICE technology appraisal 76 (published March 2004) and NICE technology appraisal 79 (published April 2004).

Recommendations are marked as **[2004]**, **[2004, amended 2012]**, **[2012]** or **[new 2012]**.

- **[2004]** indicates that the evidence has not been updated and reviewed since 2004.
- **[2004, amended 2012]** indicates that the evidence has not been updated and reviewed since 2004 but a small amendment has been made to the recommendation.
- **[2012]** indicates that the evidence has been reviewed but no changes have been made to the recommendation.
- **[new 2012]** indicates that the evidence has been reviewed and the recommendation has been updated or added.

The recommendations from this guideline have been incorporated into a [NICE Pathway](#). We have produced [information for the public](#) explaining this guideline. Tools to help you put the guideline into practice and information about the evidence it is based on are also [available](#).

### Your responsibility

This guidance represents the view of NICE, which was arrived at after careful consideration of the evidence available. Healthcare professionals are expected to take it fully into account when exercising their clinical judgement. However, the guidance does not override the individual responsibility of healthcare professionals to make decisions appropriate to the circumstances of

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the individual patient, in consultation with the patient and/or guardian or carer, and informed by the summary of product characteristics of any drugs they are considering.

Implementation of this guidance is the responsibility of local commissioners and/or providers. Commissioners and providers are reminded that it is their responsibility to implement the guidance, in their local context, in light of their duties to avoid unlawful discrimination and to have regard to promoting equality of opportunity. Nothing in this guidance should be interpreted in a way that would be inconsistent with compliance with those duties.

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