NICE National Institute for Health and Care Excellence

NICE guideline

Epilepsies in children, young people and adults

NICE guideline

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Your responsibility

The recommendations in this guideline represent the view of NICE, arrived at after careful consideration of the evidence available. When exercising their judgement, professionals and practitioners are expected to take this guideline fully into account, alongside the individual needs, preferences and values of their patients or the people using their service. It is not mandatory to apply the recommendations, and the guideline does not override the responsibility to make decisions appropriate to the circumstances of the individual, in consultation with them and their families and carers or guardian.

Local commissioners and providers of healthcare have a responsibility to enable the guideline to be applied when individual professionals and people using services wish to use it. They should do so in the context of local and national priorities for funding and developing services, and in light of their duties to have due regard to the need to eliminate unlawful discrimination, to advance equality of opportunity and to reduce health inequalities. Nothing in this guideline should be interpreted in a way that would be inconsistent with complying with those duties.

Commissioners and providers have a responsibility to promote an environmentally sustainable health and care system and should assess and reduce the environmental impact of implementing NICE recommendations wherever possible.

Contents

This guideline replaces CG137, ESNM7, ESNM17 and ESNM37.

Overview

This guideline covers diagnosing and managing epilepsy in children, young people and adults in primary and secondary care. It aims to improve diagnosis and treatment for different seizure types and epilepsy syndromes, and reduce the risks for people with epilepsy.

MHRA advice on antiepileptic drugs in pregnancy: Recommendations in this guideline on carbamazepine, gabapentin, lamotrigine, levetiracetam, oxcarbazepine, phenobarbital, phenytoin, pregabalin, topiramate and zonisamide are in line with the MHRA updated safety advice on antiepileptic drugs in pregnancy.

MHRA advice on valproate: Recommendations on valproate are in line with the MHRA guidance on valproate use by women and girls. Valproate must not be used in women and girls of childbearing potential (including young girls who are likely to need treatment into their childbearing years), unless other options are unsuitable and the pregnancy prevention programme is in place.
The MHRA has published temporary advice on the valproate pregnancy prevention programme during the COVID-19 pandemic.

Who is it for?

- Healthcare professionals in primary, secondary and tertiary care
- Commissioners, providers and voluntary organisations
- People with epilepsy, their families and carers

1 Diagnosis and assessment of epilepsy

People have the right to be involved in discussions and make informed decisions about their care, as described in NICE's information on making decisions about your care.

Making decisions using NICE guidelines explains how we use words to show the strength (or certainty) of our recommendations, and has information about prescribing medicines (including off-label use), professional guidelines, standards and laws (including on consent and mental capacity), and safeguarding.

1.1 Referral after a first seizure or remission and assessing risk of a second seizure

Referral after a first seizure

For recommendations on immediate guidance and referral for children under 2 years with suspected or confirmed infantile spasms, see the section on infantile spasms syndrome.

1.1.1 Refer children, young people and adults urgently (for an appointment within 2 weeks) for an assessment after a first suspected seizure:

- For adults, refer to a clinician with expertise in assessing first seizures and diagnosing epilepsy.
- For children and young people, refer to a paediatrician with expertise in assessing first seizures and diagnosing epilepsy.

Referral after remission

1.1.2 Refer children, young people and adults urgently (for an appointment within 2 weeks) for an assessment if they have a seizure recurrence after a period of remission.

Assessing the risk of a second seizure

1.1.3 When a child, young person or adult presents with a first seizure, carry out an

individualised assessment of their risk of a second seizure.

1.1.4 In adults, assessment should include checking for the following modifiable factors that may increase the risk of a second seizure:

- an underlying mental health problem (such as depression, anxiety, psychosis and alcohol or substance misuse)
- vascular risk factors (for example, diabetes, hypertension, atrial fibrillation)
- sepsis.

1.1.5 Be aware that children presenting with a first afebrile seizure (seizure without a fever) are at an increased risk of further afebrile seizures, especially within 6 to 12 months, compared with children with a febrile seizure (seizure with a fever).

1.1.6 Be aware that children presenting with complicated febrile seizures (febrile seizures that last longer than 10 minutes or febrile seizures associated with other features, such as weakness, on one side of the body) may be at higher risk of epilepsy, especially if other predisposing risk factors for epilepsy are present.

1.1.7 Using a person-centred approach, discuss with the person, and their family and carers if appropriate, their individualised risks for further seizures. This should include any mental, physical and social factors identified as possible risk factors and how these may be modified.

Information and support after a first seizure

1.1.8 After a first seizure, give the person, and their family and carers if appropriate, information about:

- how to recognise a further seizure
- first aid and initial safety guidance in case of another seizure (see safety issues in box 1)
- any changes they can make to reduce their risk of another seizure
- who they should contact if they have a further seizure while awaiting their appointment for assessment and diagnosis.

1.1.9 After a first afebrile seizure in a child, explain to their parents or carers how to

self-refer the child urgently if they have a further seizure.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the rationale and impact section on referral after a first seizure or remission and assessing risk of a second seizure.

Full details of the evidence and the committee's discussion are in:

- evidence review 1: prediction of second seizure
- evidence review 2: modifiable risk factors for a second seizure.

1.2 Specialist assessment and diagnosis

See also NICE's guideline on transient loss of consciousness ('blackouts') in over 16s for recommendations on initial assessment of people after a suspected transient loss of consciousness. In particular, see the recommendations on performing electrocardiogram (ECG) in the section on obtaining patient history, physical examination and tests and on features suggestive of epileptic seizures in the section on suspected epilepsy.

1.2.1 Take a detailed history from the child, young person or adult after a first suspected seizure, and from their families and carers if appropriate, and carry out a physical examination. If possible, use eyewitness accounts and video footage of the seizure to inform the assessment.

1.2.2 Evaluate people after a first suspected seizure with a 12-lead ECG to help identify cardiac-related conditions that could mimic an epileptic seizure.

1.2.3 Be aware that metabolic disturbance, including hypoglycaemia, can result in seizures.

1.2.4 Offer brain neuroimaging tests if an underlying structural cause is suspected (see also the section on neuroimaging).

Electroencephalogram (EEG)

1.2.5 If the person's history and examination suggests an epileptic seizure, and a

diagnosis of epilepsy is suspected, consider a routine EEG carried out while awake to support diagnosis and provide information about seizure type or epilepsy syndrome.

1.2.6 Do not use EEG to exclude a diagnosis of epilepsy.

1.2.7 If an EEG is requested after a first seizure, perform it as soon as possible (ideally within 72 hours after the seizure).

1.2.8 When offering an EEG, discuss the benefits and risks of provoking manoeuvres during EEG, such as hyperventilation and photic stimulation, with the person and their family or carers if appropriate. If agreed, include provoking manoeuvres during routine EEG to assess a suspected first seizure.

1.2.9 If routine EEG is normal, consider a sleep-deprived EEG if agreed with the person, and their family or carers if appropriate, after discussing the benefits and risks.

1.2.10 If routine and sleep-deprived EEG results are normal and diagnostic uncertainty persists, consider ambulatory EEG (for up to 48 hours).

For a short explanation of why the committee made these recommendations and how they might affect practice, see the rationale and impact section on specialist assessment and diagnosis.

Full details of the evidence and the committee's discussion are in evidence review 3: diagnosis of epilepsies.

1.3 Neuroimaging

Initial imaging scans

1.3.1 Offer an MRI scan to children, young people and adults diagnosed with epilepsy, unless they have idiopathic generalised epilepsy or self-limited epilepsy with centrotemporal spikes. The MRI should be carried out:

- within 6 weeks of the MRI referral **and**

- following regionally agreed epilepsy MRI protocols.

1.3.2 If MRI is contraindicated, consider a CT scan for children, young people and adults with epilepsy.

1.3.3 When offering an MRI or CT scan, discuss the risks and benefits with the person with epilepsy (and their families and carers, as appropriate), especially if a general anaesthetic or sedation is needed for the scan.

Reporting and reviewing scans

1.3.4 Ensure that MRI scans are reported by a radiologist with expertise in paediatric or adult neuroradiology, as appropriate.

1.3.5 If seizures are ongoing despite treatment, and diagnosis remains unclear, consider an additional review of MRI scans by a specialist in paediatric or adult neuroradiology within a tertiary centre.

Repeat scanning

1.3.6 Consider an additional MRI scan for children, young people and adults with epilepsy, if:

- the original scan was suboptimal
- there are new features to their epilepsy
- they have idiopathic generalised epilepsy or self-limited epilepsy with centrotemporal spikes that has not responded to first-line treatment
- surgery is being considered.

Scanning in acute situations

1.3.7 Do not carry out a CT scan for people with established epilepsy presenting at an emergency department after a typical seizure, unless there are other concerns.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the rationale and impact section on neuroimaging.

Full details of the evidence and the committee's discussion are in:

- evidence review A: magnetic resonance imaging scan to detect relevant abnormalities in people with epilepsy
- evidence review B: computed tomography scan performance in people with epilepsy.

1.4 Genetic testing

1.4.1 Discuss with a neurologist or geneticist any uncertainties about whether to offer genetic testing or which tests to offer to a person with epilepsy.

1.4.2 When making decisions about which tests to offer, refer to the NHS National Genomic Test Directory for rare and inherited disease for information on genetic tests commissioned by the NHS in England.

1.4.3 Before carrying out genetic tests:

- discuss the purpose of testing and the possible implications of the results with the person with epilepsy, and their family and carers if appropriate
- obtain informed consent with appropriate genetic counselling in line with the NHS Genomic Medicine Service.

1.4.4 Consider whole-genome sequencing for people with epilepsy of unknown cause who:

- were aged under 2 years when epilepsy started **or**
- have clinical features suggestive of a specific genetic epilepsy syndrome (for example, Dravet syndrome) **or**

- have additional clinical features such as:
  - a learning disability
  - autism spectrum disorder
  - a structural abnormality (for example, dysmorphism or congenital malformation)
  - unexplained cognitive or memory decline.

  See also the eligibility criteria that accompany the NHS National Genomic Test Directory.

1.4.5 Consider whole-genome sequencing for people with epilepsy of unknown cause who were aged between 2 and 3 years when epilepsy started, if clinically agreed by a specialist multidisciplinary team.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the rationale and impact section on genetic testing.

Full details of the evidence and the committee's discussion are in evidence review C: effectiveness of genetic testing in determining the aetiology of epilepsy.

1.5 Antibody testing

1.5.1 Consider antibody testing in discussion with a neurologist for people with new-onset epilepsy if autoimmune encephalitis is suspected.

For a short explanation of why the committee made this recommendation and how it might affect practice, see the rationale and impact section on antibody testing.

Full details of the evidence and the committee's discussion are in evidence review D: antibody testing in epilepsy.

2 Information and support

For information and support before diagnosis, see the section on information and support after a first seizure.

2.1.1 When providing information to people with epilepsy and their families or carers, follow:

- the recommendations on communication and information in NICE's guidelines on patient experience in adult NHS services or babies, children and young people's experience of healthcare and
- NICE's guideline on shared decision making.

2.1.2 Provide tailored information and support to people with epilepsy, and their families or carers if appropriate, according to their individual needs and circumstances.

2.1.3 Include children and young people in discussions about their information and support needs, and provide information appropriate to their developmental age.

2.1.4 Take into account the information and support needs of people with epilepsy who are older, have a learning disability or have other complex needs, for example:

- give longer appointments to allow more time for discussion
- provide information in different formats, such as easy read, large print or audio versions
- involve family members or carers or an advocate if the person wishes
- share information with those involved in the care of older people or people with learning disabilities if appropriate.

  See also the section on general principles of care in NICE's guideline on challenging behaviour and learning disabilities and the section on overarching principles in NICE's guideline on care and support of people growing older with learning disabilities.

2.1.5 Give people with epilepsy, and their families and carers if appropriate, details of local and national epilepsy information and support groups.

2.1.6 Support people to self-manage their epilepsy and make informed choices by discussing the following issues with them during their first appointment:

- triggers that may provoke seizures
- medications for epilepsy, the importance of adherence to medication and possible side effects
- reducing epilepsy-related risks, including sudden unexpected death in epilepsy (SUDEP)
- impact on daily activities, including driving
- their epilepsy syndrome or seizure types.

The discussion may be reiterated at an information and care-planning session with an epilepsy specialist nurse (see also the section on epilepsy specialist nurses).

2.1.7 Provide the person with epilepsy, and their family or carers if appropriate, with a copy of their care plan, which includes details of their care and support as discussed and agreed with the person, and their family or carers if appropriate.

2.1.8 Repeat information for people with epilepsy, and their families or carers if appropriate, at subsequent appointments according to their individual needs and circumstances.

2.1.9 Provide information and support at routine appointments with the person's GP, specialist or epilepsy specialist nurse, as needed, and also at dedicated information and care-planning appointments with an epilepsy specialist nurse (see the section on epilepsy specialist nurses).

2.1.10 Consider providing a framework for discussions before appointments that includes issues commonly raised by people with epilepsy or that may be of concern to the person.

2.1.11 Offer people with epilepsy, and their families and carers if appropriate, opportunities at each appointment to discuss issues that concern them

including, but not limited to, the topics in box 1.

Box 1 Topics to discuss with people with epilepsy and their families and carers

Activities of daily living

- Safety issues, including activities that should be adapted or avoided, for example, showering rather than having baths, cooking safely, caring for babies and young children safely, and avoiding working at heights.
- Safety issues for children and young people, including supervised swimming and water sports, not climbing above their height without supervision.
- Potential impact on lifestyle and social life and any experiences of social exclusion.
- Driving, including Driver and Vehicle Licensing Agency (DVLA) regulations.
- Employment and education, including concerns and rights related to employment and education.

Carers

- Physical and emotional demands of caring for and supporting a person with epilepsy.
- Information and support for carers, including assessing carers needs (see also NICE's guideline on supporting adult carers).

Cognition

- Concerns about the impact of epilepsy and antiseizure medication on cognitive function, including memory, attention, concentration, educational attainment and performance in the workplace.

Medication

- Adherence to antiseizure medication and how to improve this (see also NICE's guidelines on medicines adherence and medicines optimisation).
- Experiences of side effects from medication and coping strategies.
- Explaining changes to medication.

Mental health

- Emotional health and psychological wellbeing, for example, experience of depression, anxiety or low mood (see also NICE's guidelines on depression in adults with a chronic physical health problem, depression in children and young people and mental health problems in people with learning disabilities).
- Neurobehavioural disorders commonly associated with epilepsy, including autism and attention deficit hyperactivity disorder.
- Stigmatisation of epilepsy.

Reproductive health and pregnancy

- Support and information on contraception and pregnancy for women and their partners to enable them to make informed decisions.
- Support for changes in medications and the potential interactions with contraception.
- Teratogenicity of antiseizure medications.
- Pre-conception planning, including the use of folic acid and reducing epilepsy-related risk during pregnancy.
- Planning the birth.
- Postnatal care and breastfeeding.

See also the section on antiseizure medications for women and girls and follow the Medicines and Healthcare products Regulatory Agency (MHRA) safety advice on antiepileptic drugs in pregnancy.

SUDEP

- Concerns of people with epilepsy and their families and carers about sudden unexpected death in epilepsy (SUDEP).
- Information about SUDEP, including risk factors for SUDEP and how to reduce the risks.
- Availability of SUDEP counselling.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the rationale and impact section on information and support.

Full details of the evidence and the committee's discussion are in:

- evidence review 4: information and support
- evidence review O: effectiveness of a nurse specialist in the management of epilepsy.

3 Referral to tertiary specialist services

3.1.1 Ensure that all children, young people and adults with suspected or confirmed epilepsy have access to a tertiary epilepsy service, if needed, via their specialist.

3.1.2 Take into account that people with suspected or confirmed epilepsy and a learning disability, physical disability or mental health problem may need additional specialist support to manage their epilepsy. Support them to access a tertiary epilepsy service if needed.

3.1.3 Refer people with epilepsy to a tertiary epilepsy service, to be seen within 4 weeks, if any of the following apply:

- uncertainty about the diagnosis or cause of epilepsy, the seizure type or epilepsy syndrome
- the person has an epilepsy syndrome likely to be drug resistant, their seizures are drug resistant or their treatment is associated with intolerable side effects
- further assessment and treatment approaches are indicated, such as: video electroencephalogram (EEG) telemetry, neuropsychology or neuropsychiatry, specialised neuroimaging, specialised treatments (for example, medication that can only be prescribed by a tertiary epilepsy service or a ketogenic diet), epilepsy surgery or vagus nerve stimulation
- the person is eligible for and wishes to participate in a clinical trial or research study.

3.1.4 Refer children with suspected or confirmed epilepsy to a tertiary paediatric epilepsy service to be seen within 2 weeks, if they:

- are aged under 3 years
- are aged under 4 years and have myoclonic seizures (see recommendation 5.4.1 in the section on myoclonic seizures)
- have a unilateral structural lesion
- are showing deterioration in their behaviour, speech or learning.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the rationale and impact section on referral to tertiary specialist services.

Full details of the evidence and the committee's discussion are in evidence review N: criteria for referral to specialist services.

4 Principles of treatment, safety, monitoring and withdrawal

4.1 Treatment with antiseizure medications

See also the section on antiseizure medications for women and girls for special considerations for this group.

4.1.1 Develop an individualised antiseizure medication treatment strategy with the person, and their family and carers if appropriate, taking into account:

- sex
- age
- seizure type
- epilepsy syndrome
- whether treatment is needed
- risks and benefits of antiseizure medications, including their importance in reducing the risk of epilepsy-related death
- possible interactions with any other medicines taken
- any comorbidities
- the preferences of the person, and their family or carers if appropriate
- personal circumstances, such as education, employment, likelihood of pregnancy, driving, alcohol use, travel
- how and when antiseizure medicines need to be taken.

See also NICE's guidelines on shared decision making and decision making and mental capacity.

4.1.2 Take into account any particular issues for older people starting an antiseizure

medication, especially those with comorbidities, for example:

- check for possible interactions with other medicines they are taking
- use a tailored approach to dosage and titration, usually starting at a lower dose and increasing slowly
- check if the person would benefit from an approach that takes into account multimorbidity; for more information, see NICE's guideline on multimorbidity.

4.1.3 Use a single antiseizure medication (monotherapy) to treat epilepsy whenever possible.

4.1.4 Review the diagnosis of epilepsy if seizures continue despite an optimal dose of a first-line antiseizure medication.

4.1.5 If first-line monotherapy is unsuccessful and epilepsy diagnosis remains confirmed, try monotherapy with another antiseizure medication, using caution during the changeover period:

- Increase the dose of the second medicine slowly while maintaining the dose of the first medicine.
- If the second medicine is successful, slowly taper off the dose of the first medicine.
- If the second medicine is unsuccessful, slowly taper off the dose of the second medicine and consider an alternative.

4.1.6 If monotherapy is unsuccessful, consider trying an add-on treatment.

4.1.7 When starting an add-on treatment, carefully titrate the additional medicine and review treatment frequently, including monitoring for adverse effects such as sedation.

4.1.8 If trials of add-on treatment do not result in a reduction in seizures, use the regimen that provides the best balance between effectiveness and tolerability of side effects.

4.1.9 Discuss with the person, and their family and carers as appropriate, the benefits of taking as few medicines as possible to maintain seizure freedom or control.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the rationale and impact section on treatment with antiseizure medications.

Full details of the evidence and the committee's discussion are in the following evidence reviews:

- evidence review E: monotherapy for generalised tonic-clonic and focal onset seizures
- evidence review F: add-on therapy for generalised tonic-clonic and focal onset seizures
- evidence review G: effectiveness of antiseizure therapies in the treatment of absence seizures
- evidence review H: effectiveness of antiseizure therapies in the treatment of myoclonic seizures
- evidence review I: effectiveness of antiseizure therapies in the treatment of tonic or atonic seizures/drop attacks
- evidence review J: effectiveness of antiseizure therapies in the treatment of idiopathic generalised epilepsies, including juvenile myoclonic epilepsy
- evidence review K: effectiveness of antiseizure therapies in the treatment of Dravet syndrome
- evidence review L: effectiveness of antiseizure therapies in the treatment of Lennox-Gastaut syndrome
- evidence review P: effectiveness of antiseizure therapies for infantile spasms
- evidence review Q: effectiveness of antiseizure medications for self-limited epilepsy with centrotemporal spikes
- evidence review R: effectiveness of antiseizure therapies for epilepsy with myoclonic-atonic seizures (Doose syndrome).

4.2 When to start antiseizure medication

4.2.1 Start treatment with an antiseizure medication once the diagnosis of epilepsy is

confirmed.

4.2.2 Consider starting treatment after a first unprovoked seizure if any of the following apply:

- an examination identifies signs of neurological deficit
- the electroencephalogram (EEG) shows unequivocal epileptic activity
- after a discussion of the risk of further seizures, the person or their family or carers consider the risk unacceptable
- brain imaging shows a structural abnormality.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the rationale and impact section on when to start antiseizure medication.

Full details of the evidence and the committee's discussion are in the following evidence reviews:

- evidence review E: monotherapy for generalised tonic-clonic and focal onset seizures
- evidence review F: add-on therapy for generalised tonic-clonic and focal onset seizures
- evidence review G: effectiveness of antiseizure therapies in the treatment of absence seizures
- evidence review H: effectiveness of antiseizure therapies in the treatment of myoclonic seizures
- evidence review I: effectiveness of antiseizure therapies in the treatment of tonic or atonic seizures/drop attacks
- evidence review J: effectiveness of antiseizure therapies in the treatment of idiopathic generalised epilepsies, including juvenile myoclonic epilepsy
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- evidence review P: effectiveness of antiseizure therapies for infantile spasms
- evidence review Q: effectiveness of antiseizure medications for self-limited epilepsy with centrotemporal spikes
- evidence review R: effectiveness of antiseizure therapies for epilepsy with myoclonic-atonic seizures (Doose syndrome).

4.3 Safety considerations

See the section on antiseizure medications for women and girls for additional safety considerations

for this group.

4.3.1 Follow Medicines and Healthcare products Regulatory Agency (MHRA) safety advice on switching between different manufacturers' products of a particular antiseizure medication.

4.3.2 Be aware that phenytoin is associated with an increased risk of serious skin reactions in people of Han Chinese or Thai family background.

4.3.3 Be aware that carbamazepine and potentially medicines with a similar chemical structure (such as oxcarbazepine and eslicarbazepine acetate) are associated with an increased risk of serious skin reactions in people of Han Chinese, Thai, European or Japanese family background.

4.3.4 Be aware that long-term treatment with some antiseizure medications (such as carbamazepine, phenytoin, primidone and sodium valproate) is associated with decreased bone mineral density and increased risk of osteomalacia. Follow the MHRA safety advice on antiepileptics: adverse effects on bone and consider vitamin D and calcium supplementation for people at risk.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the rationale and impact section on safety considerations.

Full details of the evidence and the committee's discussion are in the following evidence reviews:

- evidence review E: monotherapy for generalised tonic-clonic and focal onset seizures
- evidence review F: add-on therapy for generalised tonic-clonic and focal onset seizures
- evidence review G: effectiveness of antiseizure therapies in the treatment of absence seizures
- evidence review H: effectiveness of antiseizure therapies in the treatment of myoclonic seizures
- evidence review I: effectiveness of antiseizure therapies in the treatment of tonic or atonic seizures/drop attacks
- evidence review J: effectiveness of antiseizure therapies in the treatment of idiopathic generalised epilepsies, including juvenile myoclonic epilepsy
- evidence review K: effectiveness of antiseizure therapies in the treatment of Dravet syndrome
- evidence review L: effectiveness of antiseizure therapies in the treatment of Lennox-Gastaut syndrome
- evidence review P: effectiveness of antiseizure therapies for infantile spasms
- evidence review Q: Effectiveness of antiseizure medications for self-limited epilepsy with centrotemporal spikes
- evidence review R: effectiveness of antiseizure therapies for epilepsy with myoclonic-atonic seizures (Doose syndrome).

4.4 Antiseizure medications for women and girls

4.4.1 Give women and girls with epilepsy information and support that is tailored to their age-specific and developmental needs. Review regularly information

provided about:

- contraception
- folic acid supplementation
- conception
- pregnancy
- breastfeeding
- caring for children
- menopause.

4.4.2 Discuss with women and girls with epilepsy who are able to have children (including young girls who are likely to need treatment when they are able to have children), and their families or carers if appropriate, the risks to an unborn child of taking antiseizure medications during pregnancy, such as congenital malformations, neurodevelopmental impairments and fetal growth restriction.

4.4.3 Assess the risks and benefits of treatment with individual antiseizure medications when prescribing antiseizure medications for women and girls who are able to have children, now or in the future. Take into account the latest data on the risks to the unborn child and be aware that there are important uncertainties about the risks, particularly with newer drugs. Follow the MHRA safety advice on antiepileptic drugs in pregnancy.

4.4.4 Specifically, discuss the risks to the unborn child of using sodium valproate during pregnancy, including the increased risk with higher doses and polytherapy. Follow the MHRA safety advice on valproate use by women and girls.

4.4.5 Be aware that some antiseizure medications, for example, carbamazepine, oxcarbazepine, phenytoin and topiramate, can impair the effectiveness of hormonal contraceptives. Refer to the summary of product characteristics (SPC) and BNF or BNF for children for individual drug advice on the interactions between antiseizure medications and contraception.

4.4.6 Be aware that oestrogen-containing hormonal contraceptives and hormone

replacement therapy can impair the effectiveness of lamotrigine.

4.4.7 Explain that breastfeeding for most women and girls taking antiseizure medications is generally safe and should be encouraged. Support each mother to choose a feeding method that bests suits her and her family.

4.4.8 Prescribers should consult individual drug advice in the SPC and the BNF or BNF for children when prescribing antiseizure medications for women and girls who are breastfeeding. Decisions about antiseizure therapy and breastfeeding should be made between the woman or girl and the prescriber, and take into account the benefits of breastfeeding alongside the potential risks of the medication affecting the child.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the rationale and impact section on antiseizure medications for women and girls.

Full details of the evidence and the committee's discussion are in evidence review 6: safety of antiseizure medications in women and girls.

4.5 Monitoring and review

4.5.1 Arrange regular (at least annual) monitoring reviews for adults with epilepsy and any of the following:

- a learning disability
- drug-resistant epilepsy
- a high risk of sudden unexpected death in epilepsy (SUDEP; see the section on reducing the risk of epilepsy-related death)
- a serious comorbidity, such as complex psychosocial, cognitive or mental health problems
- who are taking antiseizure medications associated with long-term side effects or drug interactions

- who are able to get pregnant and are taking valproate or any other high-risk teratogenic antiseizure medication (see also the MHRA safety advice on antiepileptic drugs in pregnancy).

  See also, the section on epilepsy specialist nurses for epilepsy specialist nurse sessions for adults with ongoing seizures.

4.5.2 Discuss monitoring reviews with children and young people with epilepsy and their families and carers if appropriate, and agree a frequency for regular reviews that is:

- individually tailored to the child or young person's needs, preferences and the nature of their epilepsy **and**
- at least every 12 months.

  See also the section on infantile spasms syndrome for recommendations on additional monitoring reviews for children with infantile spasms. See the section on epilepsy specialist nurses for recommendations on epilepsy specialist nurse sessions for children and young people with ongoing seizures.

4.5.3 Consider monitoring antiseizure medication levels in people with epilepsy and any of the following:

- uncontrolled seizures
- side effects from their medication
- a specific clinical condition needing closer supervision (such as pregnancy or renal failure)
- poor adherence to medication.

4.5.4 Explain to people with epilepsy and, if appropriate, their families and carers, that they can ask for a review of their care if they have concerns, need support or their care needs change, for example, to support medicines withdrawal, pregnancy planning or to review treatment if seizures recur. Provide contact details and information on how to access epilepsy services.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the rationale and impact section on monitoring and review.

Full details of the evidence and the committee's discussion are in:

- evidence review 7: monitoring
- evidence review O: effectiveness of a nurse specialist in the management of epilepsy.

4.6 Support and monitoring for women planning pregnancy or who are pregnant

4.6.1 Refer women and girls with epilepsy who are planning pregnancy or are pregnant to an epilepsy specialist team for a review of their antiseizure medication options.

4.6.2 Ensure information about the care of women and girls during pregnancy is shared between the epilepsy specialist team, a specialist obstetric team and primary care.

4.6.3 Explain to women and girls who are pregnant or are planning pregnancy the importance of adherence to their antiseizure medications and that they should not stop their medication without medical supervision (see also recommendation 4.6.1 on referral).

4.6.4 Discuss the relative benefits and risks of adjusting medication with the woman or girl planning pregnancy to enable her to make informed decisions. This should include discussing the balance between the risks of poorly controlled seizures and the risks to the baby when antiseizure medicines are taken in pregnancy or while breastfeeding.

4.6.5 Consider more frequent monitoring reviews for women and girls with epilepsy who are pregnant and are prescribed antiseizure medication, if they:

- have a learning disability
- are aged under 16 years

- have active epilepsy (a seizure within the past 12 months)
- have bilateral tonic-clonic seizures
- have modifiable risk factors for SUDEP (see recommendation 10.1.2).

4.6.6 Consider monitoring antiseizure medication levels in women or girls with epilepsy who are planning pregnancy and are considered to be at risk of their seizures worsening.

4.6.7 When starting monitoring in women or girls planning pregnancy, obtain a baseline (pre-conception) concentration of antiseizure medications (for example, carbamazepine, lamotrigine, levetiracetam, oxcarbazepine, phenobarbital and phenytoin) and check adherence to their medication.

4.6.8 For women or girls with epilepsy who are pregnant or planning a pregnancy and taking carbamazepine, lamotrigine, levetiracetam, oxcarbazepine, phenobarbital or phenytoin, monitor and adjust dosages following the MHRA safety advice on antiepileptic drugs in pregnancy.

4.6.9 If monitoring of antiseizure medications levels is carried out in pregnancy, discuss the results with the woman or girl with epilepsy to inform choices about any adjustments to doses.

4.6.10 If dosing of antiseizure medications is changed during pregnancy, discuss and make an antenatal plan with the woman or girl to return her medications to pre-conception dosages. Antiseizure medications should begin to return to pre-conception dosages in the first few days after the birth.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the rationale and impact section on support and monitoring for women planning pregnancy or who are pregnant.

Full details of the evidence and the committee's discussion are in:

- evidence review 7: monitoring
- evidence review O: effectiveness of a nurse specialist in the management of epilepsy.

4.7 Discontinuing antiseizure medication

For further guidance on managing withdrawal of benzodiazepines and gabapentinoids in adults, see the section on withdrawing a medicine in NICE's guideline on medicines associated with dependence or withdrawal symptoms.

4.7.1 Discuss the benefits and risks of discontinuing antiseizure medication with the person with epilepsy, and their family and carers as appropriate, as part of an ongoing assessment of their treatment at any appointment or review. Provide information about the risks and benefits in an accessible format.

4.7.2 After a person has been seizure-free for 2 years, carry out an individualised assessment to determine the risk of seizure recurrence if antiseizure medications are discontinued. This should be carried out by an epilepsy specialist if there is any doubt or concern about the risks.

4.7.3 When deciding whether to discontinue antiseizure medications, discuss with the person with epilepsy, and their family or carers if appropriate:

- their individualised risk assessment, including their risk of seizures recurring and, if appropriate, the risk of SUDEP
- the person's preferences and lifestyle, including the implications for driving if relevant.

4.7.4 If a decision is made to discontinue antiseizure medication, agree a plan with the person, and their family or carers if appropriate, based on the person's risk and preferences. The plan should include reducing their antiseizure medications gradually:

- For most medicines, this would typically be over at least 3 months.
- For benzodiazepines and barbiturates, this would typically be over a longer period to reduce the risk of drug-related withdrawal symptoms.

4.7.5 For people with epilepsy taking multiple antiseizure medications, discontinue their medications one at a time.

4.7.6 If seizures recur during or after discontinuation, reverse the last dose reduction and seek guidance from the epilepsy specialist, in line with the agreed plan.

4.7.7 After epilepsy surgery, discontinue antiseizure medications under the guidance of the epilepsy surgery centre.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the rationale and impact section on discontinuing antiseizure medication.

Full details of the evidence and the committee's discussion are in evidence review M: discontinuation of pharmacological treatment.

5 Treating epileptic seizures in children, young people and adults

5.1 Generalised tonic-clonic seizures

For more information on treatment in women and girls, see the section on antiseizure medications for women and girls. Follow the Medicines and Healthcare products Regulatory Agency (MHRA) safety advice on valproate use by women and girls and antiepileptic drugs in pregnancy.

Monotherapy

5.1.1 Offer sodium valproate as first-line monotherapy for generalised tonic-clonic seizures in:

- boys and men
- girls aged under 10 years and who are unlikely to need treatment when they are old enough to have children
- women who are unable to have children.

5.1.2 Offer lamotrigine or levetiracetam as first-line monotherapy for generalised tonic-clonic seizures in women and girls able to have children (including young girls who are likely to need treatment when they are old enough to have children). If the first choice is unsuccessful, offer the other of these options.

In April 2022, these were off-label uses of lamotrigine in children under 13 years and levetiracetam in adults and children. See NICE's information on prescribing medicines.

5.1.3 If first-line monotherapy with sodium valproate is unsuccessful for generalised tonic-clonic seizures, offer lamotrigine or levetiracetam as second-line monotherapy treatment. If the first choice is unsuccessful, try the other of these options.

In April 2022, these were off-label uses of lamotrigine in children under 13 years and levetiracetam in adults and children. See NICE's information on prescribing medicines.

5.1.4 Do not offer sodium valproate monotherapy for generalised tonic-clonic seizures in women and girls able to have children (including young girls who are likely to need treatment when they are old enough to have children), unless:

- other treatment options are unsuccessful
- the risks and benefits have been fully discussed, including the risks to an unborn child
- the likelihood of pregnancy has been taken into account and a pregnancy prevention programme put in place, if appropriate.

Follow the MHRA safety advice on valproate use by women and girls.

Add-on treatment

For guidance on safe prescribing and managing withdrawal of clobazam in adults, see NICE's guideline on medicines associated with dependence or withdrawal symptoms.

5.1.5 If monotherapy is unsuccessful in people with generalised tonic-clonic seizures, consider 1 of the following first-line add-on treatment options:

- clobazam
- lamotrigine
- levetiracetam
- perampanel
- sodium valproate, except in women and girls able to have children

- topiramate.

If the first choice is unsuccessful, consider the other first-line add-on options.

In April 2022, these were off-label uses of clobazam as add-on therapy in children under 6 months, lamotrigine in children under 2 years, levetiracetam in children under 12 years, perampanel in children under 7 years, and topiramate in children under 2 years. See NICE's information on prescribing medicines.

5.1.6 If first-line add-on treatments tried are unsuccessful in people with generalised tonic-clonic seizures, consider 1 of the following second-line add-on treatment options:

- brivaracetam
- lacosamide
- phenobarbital
- primidone
- zonisamide.

If the first choice is unsuccessful, consider the other second-line add-on options.

In April 2022, these were off-label uses of brivaracetam in adults and children, lacosamide in children under 4 years, and zonisamide in adults and children. See NICE's information on prescribing medicines.

5.1.7 Do not offer sodium valproate as an add-on treatment for generalised tonic-clonic seizures in women and girls able to have children (including young girls who are likely to need treatment when they are old enough to have children), unless:

- other treatment options are unsuccessful
- the risks and benefits have been fully discussed, including the risks to an unborn child

- the likelihood of pregnancy has been taken into account and a pregnancy prevention programme put in place, if appropriate.

  Follow the MHRA safety advice on valproate use by women and girls.

Other treatment considerations

5.1.8 Be aware that the following antiseizure medications may exacerbate seizures in people with absence or myoclonic seizures, including in juvenile myoclonic epilepsy:

- carbamazepine
- gabapentin
- lamotrigine (for myoclonic seizures)
- oxcarbazepine
- phenytoin
- pregabalin
- tiagabine
- vigabatrin.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the rationale and impact section on generalised tonic-clonic seizures.

Full details of the evidence and the committee's discussion are in:

- evidence review E: monotherapy for generalised tonic-clonic and focal onset seizures
- evidence review F: add-on therapy for generalised tonic-clonic and focal onset seizures.

5.2 Focal seizures with or without evolution to bilateral tonic-clonic seizures

For more information on treatment in women and girls, see the section on antiseizure medications for women and girls. Follow the MHRA safety advice on valproate use by women and girls and antiepileptic drugs in pregnancy.

Monotherapy

5.2.1 Consider lamotrigine or levetiracetam as first-line monotherapy for people with focal seizures. If the first choice is unsuccessful, consider the other of these options.

In April 2022, these were off-label uses of lamotrigine in children under 13 years, and levetiracetam in children and young people under 16 years. See NICE's information on prescribing medicines.

5.2.2 If first-line monotherapies are unsuccessful in people with focal seizures, consider 1 of the following second-line monotherapy options:

- carbamazepine
- oxcarbazepine
- zonisamide.

If the first choice is unsuccessful, consider the other second-line monotherapy options.

In April 2022, these were off-label uses of oxcarbazepine in children under 6 years, and zonisamide in children. See NICE's information on prescribing medicines.

5.2.3 If second-line monotherapies tried are unsuccessful in people with focal seizures, consider lacosamide as third-line monotherapy.

In April 2022, this was an off-label use of lacosamide in children under 4 years. See NICE's information on prescribing medicines.

Add-on treatment

For guidance on safe prescribing of pregabalin in adults, see NICE's guideline on medicines associated with dependence or withdrawal symptoms.

5.2.4 If monotherapy is unsuccessful in people with focal seizures, consider 1 of the following first-line add-on treatment options:

- carbamazepine
- lacosamide
- lamotrigine
- levetiracetam
- oxcarbazepine
- topiramate
- zonisamide.

If the first choice is unsuccessful, consider the other first-line add-on options.

In April 2022, these were off-label uses of lacosamide in children under 4 years, lamotrigine in children under 2 years, levetiracetam in children under 4 years, oxcarbazepine in children under 6 years, topiramate in children under 2 years, and zonisamide in children under 6 years. See NICE's information on prescribing medicines.

5.2.5 If first-line add-on treatments tried are unsuccessful in people with focal seizures, consider 1 of the following second-line add-on treatment options:

- brivaracetam
- cenobamate (in line with NICE's technology appraisal guidance on cenobamate for treating focal onset seizures in epilepsy)
- eslicarbazepine acetate
- perampanel

- pregabalin
- sodium valproate, except in women and girls able to have children.

If the first choice is unsuccessful, consider the other second-line add-on options.

In April 2022, these were off-label uses of brivaracetam in children under 4 years, eslicarbazepine acetate in children under 6 years, perampanel in children under 4 years, and pregabalin in children. See NICE's information on prescribing medicines.

5.2.6 If second-line add-on treatments tried are unsuccessful in people with focal seizures, consider 1 of the following third-line add-on treatment options:

- phenobarbital
- phenytoin
- tiagabine
- vigabatrin.

If the first choice is unsuccessful, consider the other third-line add-on options.

In April 2022, this was an off-label use of tiagabine in children under 12 years. See NICE's information on prescribing medicines.

5.2.7 Do not offer sodium valproate as an add-on treatment for focal seizures in women and girls able to have children (including young girls who are likely to need treatment when they are old enough to have children), unless:

- other treatment options are unsuccessful
- the risks and benefits have been fully discussed, including the risks to an unborn child
- the likelihood of pregnancy has been taken into account and a pregnancy prevention programme put in place, if appropriate.

Follow the MHRA safety advice on valproate use by women and girls.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the rationale and impact section on focal seizures with or without evolution to bilateral tonic-clonic seizures.

Full details of the evidence and the committee's discussion are in:

- evidence review E: monotherapy for generalised tonic-clonic and focal onset seizures
- evidence review F: add-on therapy for generalised tonic-clonic and focal onset seizures.

5.3 Absence seizures

For more information on treatment in women and girls, see the section on antiseizure medications for women and girls. Follow the MHRA safety advice on valproate use by women and girls and antiepileptic drugs in pregnancy.

Absence seizures (including childhood absence epilepsy)

5.3.1 Offer ethosuximide as first-line treatment for absence seizures.

5.3.2 If first-line treatment is unsuccessful, offer sodium valproate as second-line monotherapy or add-on treatment for absence seizures in:

- boys of all ages
- girls aged under 10 years and who are unlikely to need treatment when they are old enough to have children
- women who are unable to have children.

5.3.3 If second-line treatment is unsuccessful for absence seizures, consider lamotrigine or levetiracetam as a third-line monotherapy or add-on treatment options. If the first choice is unsuccessful, consider the other of these options.

In April 2022, these were off-label uses of lamotrigine in children under 2 years and levetiracetam in adults and children. See NICE's information on prescribing medicines.

5.3.4 Be aware that the following antiseizure medications may exacerbate seizures in people with absence seizures:

- carbamazepine
- gabapentin
- oxcarbazepine
- phenobarbital
- phenytoin
- pregabalin
- tiagabine
- vigabatrin.

Absence seizures with other seizure types

5.3.5 Consider sodium valproate as first-line treatment for absence seizures with other seizure types (or at risk of these) in:

- boys and men
- girls aged under 10 years and who are unlikely to need treatment when they are old enough to have children
- women who are unable to have children.

5.3.6 Consider lamotrigine or levetiracetam as first-line treatment options in women and girls able to have children (including young girls who are likely to need treatment when they are old enough to have children) with absence seizures and other seizure types (or at risk of these). If the first choice is unsuccessful, consider the other of these options.

In April 2022, these were off-label uses of levetiracetam as monotherapy for adults and children, and as an add-on therapy for children under 12 years. See NICE's information on prescribing medicines.

5.3.7 Do not offer sodium valproate for absence seizures with other seizure types (or

at risk of these) in women and girls able to have children (including young girls who are likely to need treatment when they are old enough to have children), unless:

- other treatment options are unsuccessful
- the risks and benefits have been fully discussed, including the risks to an unborn child
- the likelihood of pregnancy has been taken into account and a pregnancy prevention programme put in place, if appropriate.

Follow the MHRA safety advice on valproate use by women and girls.

5.3.8 If first-line treatments tried are unsuccessful for absence seizures and other seizure types (or at risk of these), consider:

- lamotrigine or levetiracetam as a second-line monotherapy or add-on treatment options **or**
- ethosuximide as a second-line add-on treatment.

If the first choice is unsuccessful, consider the other second-line options.

In April 2022, these were off-label uses of lamotrigine in children under 2 years, and levetiracetam in adults and children. See NICE's information on prescribing medicines.

5.3.9 Be aware that the following antiseizure medications may exacerbate seizures in people with absence seizures and other seizure types (or at risk of these):

- carbamazepine
- gabapentin
- oxcarbazepine
- phenobarbital
- phenytoin
- pregabalin
- tiagabine

- vigabatrin.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the rationale and impact section on absence seizures.

Full details of the evidence and the committee's discussion are in evidence review G: effectiveness of antiseizure therapies in the treatment of absence seizures.

5.4 Myoclonic seizures

For more information on treatment in women and girls, see the section on antiseizure medications for women and girls. Follow the MHRA safety advice on valproate use by women and girls and antiepileptic drugs in pregnancy.

Specialist involvement

5.4.1 If a child under 4 years has myoclonic seizures, either seek guidance on treatment from or refer to a tertiary paediatric neurologist.

First-line treatment

5.4.2 Offer sodium valproate as first-line treatment for myoclonic seizures in:

- boys and men
- girls aged under 10 years and who are unlikely to need treatment when they are old enough to have children
- women who are unable to have children.

5.4.3 Offer levetiracetam as first-line treatment for myoclonic seizures in women and girls able to have children (including young girls who are likely to need treatment when they are old enough to have children).

In April 2022, this was an off-label use of levetiracetam. See NICE's information on prescribing medicines.

Second- and third-line treatments

For guidance on safe prescribing and managing withdrawal of clobazam and clonazepam in adults, see NICE's guideline on medicines associated with dependence or withdrawal symptoms.

5.4.4 If sodium valproate is unsuccessful as first-line treatment for myoclonic seizures, offer levetiracetam as a second-line monotherapy or add-on treatment.

In April 2022, these were off-label uses of levetiracetam as monotherapy for adults and children, and as an add-on therapy for children under 12 years. See NICE's information on prescribing medicines.

5.4.5 If levetiracetam is unsuccessful for myoclonic seizures, consider 1 of the following as monotherapy or add-on treatment options:

- brivaracetam
- clobazam
- clonazepam
- lamotrigine
- phenobarbital
- piracetam
- topiramate
- zonisamide.

If the first choice is unsuccessful, consider any other of these options.

In April 2022, these were off-label uses for brivaracetam in adults and children, clobazam as monotherapy in adults and children, clobazam as add-on therapy in children under 6 months, clonazepam solution in children, lamotrigine as monotherapy for children under 13 years and add-on therapy for children under 2 years, piracetam in children, topiramate in adults and children, and zonisamide in adults and children. See NICE's information on prescribing medicines.

5.4.6 Do not offer sodium valproate for myoclonic seizures in women and girls able to have children (including young girls who are likely to need treatment when they are old enough to have children), unless:

- other treatment options are unsuccessful
- the risks and benefits have been fully discussed, including the risks to an unborn child
- the likelihood of pregnancy has been taken into account and a pregnancy prevention programme put in place, if appropriate.

Follow the MHRA safety advice on valproate use by women and girls.

Other treatment considerations

5.4.7 Be aware that lamotrigine can occasionally exacerbate myoclonic seizures.

5.4.8 Do not use any of the following antiseizure medications in people with myoclonic seizures because they may exacerbate seizures:

- carbamazepine
- gabapentin
- oxcarbazepine
- phenytoin
- pregabalin
- tiagabine
- vigabatrin.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the rationale and impact section on myoclonic seizures.

Full details of the evidence and the committee's discussion are in evidence review H: effectiveness of antiseizure therapies in the treatment of myoclonic seizures.

5.5 Tonic or atonic seizures

For more information on treatment in women and girls, see the section on antiseizure medications for women and girls. Follow the MHRA safety advice on valproate use by women and girls and antiepileptic drugs in pregnancy.

Specialist involvement

5.5.1 Ensure that people with a diagnosis of tonic or atonic seizures are assessed by a neurologist with expertise in epilepsy to:

- diagnose the syndrome if possible **and**
- advise on investigation and treatment.

First-line treatment

5.5.2 Offer sodium valproate as first-line treatment for tonic or atonic seizures in:

- boys and men
- girls aged under 10 years and who are unlikely to need treatment when they are old enough to have children
- women who are unable to have children.

5.5.3 Consider lamotrigine as first-line treatment for tonic or atonic seizures in women and girls able to have children (including young girls who are likely to need treatment when they are old enough to have children).

In April 2022, this was an off-label use of lamotrigine in children under 13 years. See NICE's information on prescribing medicines.

Second- and third-line treatments

For guidance on safe prescribing and managing withdrawal of clobazam in adults, see NICE's guideline on medicines associated with dependence or withdrawal symptoms.

5.5.4 If sodium valproate is unsuccessful as first-line treatment for tonic or atonic

seizures, consider lamotrigine as a second-line monotherapy or add-on treatment.

In April 2022, this was an off-label use of lamotrigine as monotherapy in children under 13 years and add-on therapy in children under 2 years. See NICE's information on prescribing medicines.

5.5.5 If lamotrigine is unsuccessful for treating tonic or atonic seizures, consider 1 of the following as monotherapy or add-on treatment options:

- clobazam
- rufinamide
- topiramate.

If the first choice is unsuccessful, consider any other of these options.

In April 2022, these were off-label uses for clobazam as monotherapy in adults and children, clobazam as add-on therapy in children under 6 months, rufinamide, and topiramate as monotherapy in children under 6 years, and topiramate as add-on therapy in children under 2 years. See NICE's information on prescribing medicines.

5.5.6 Do not offer sodium valproate for tonic or atonic seizures in women and girls able to have children (including young girls who are likely to need treatment when they are old enough to have children), unless:

- other treatment options are unsuccessful
- the risks and benefits have been fully discussed, including the risks to an unborn child
- the likelihood of pregnancy has been taken into account and a pregnancy prevention programme put in place, if appropriate.

Follow the MHRA safety advice on valproate use by women and girls.

Further treatment options

5.5.7 If third-line treatment is unsuccessful for tonic or atonic seizures in children, consider a ketogenic diet as an add-on treatment under the supervision of a

ketogenic diet team.

5.5.8 If all other treatment options for tonic or atonic seizures are unsuccessful, consider felbamate as an add-on treatment under the supervision of a neurologist with expertise in epilepsy.

In April 2022, felbamate was not licensed for use in the UK. See NICE's information on prescribing medicines.

Other treatment considerations

5.5.9 Be aware that the following antiseizure medications may exacerbate seizures in people with tonic or atonic seizures:

- carbamazepine
- gabapentin
- oxcarbazepine
- pregabalin
- tiagabine
- vigabatrin.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the rationale and impact section on tonic or atonic seizures.

Full details of the evidence and the committee's discussion are in evidence review I: effectiveness of antiseizure therapies in the treatment of tonic or atonic seizures/drop attacks.

5.6 Idiopathic generalised epilepsies

For more information on treatment in women and girls, see the section on antiseizure medications for women and girls. Follow the MHRA safety advice on valproate use by women and girls and antiepileptic drugs in pregnancy.

First-line treatment

5.6.1 Offer sodium valproate as first-line treatment for idiopathic generalised epilepsies in:

- boys and men
- girls aged under 10 years and who are unlikely to need treatment when they are old enough to have children
- women who are unable to have children.

5.6.2 Offer lamotrigine or levetiracetam as first-line treatment for idiopathic generalised epilepsies in women and girls able to have children (including young girls who are likely to need treatment when they are old enough to have children). If the first choice is unsuccessful, offer the other of these options.

In April 2022, these were off-label uses of lamotrigine in children under 13 years, and levetiracetam in adults and children. See NICE's information on prescribing medicines.

Second-line treatment

5.6.3 If first-line treatments are unsuccessful for idiopathic generalised epilepsies, consider lamotrigine or levetiracetam as a second-line monotherapy or add-on treatment options. If the first choice is unsuccessful, consider the other of these options.

In April 2022, these were off-label uses of lamotrigine as monotherapy in children under 13 years and add-on therapy for children under 2 years, and levetiracetam as monotherapy in adults and children and add-on therapy for children under 12 years. See NICE's information on prescribing medicines.

5.6.4 If second-line treatments tried are unsuccessful for idiopathic generalised epilepsies, consider perampanel or topiramate as third-line add-on treatment options. If the first choice is unsuccessful, consider the other of these options.

In April 2022, this was an off-label use of perampanel for children under 7 years. See NICE's information on prescribing medicines.

5.6.5 Do not offer sodium valproate for idiopathic generalised epilepsies in women and girls able to have children (including young girls who are likely to need treatment when they are old enough to have children), unless:

- other treatment options are unsuccessful
- the risks and benefits have been fully discussed, including the risks to an unborn child
- the likelihood of pregnancy has been taken into account and a pregnancy prevention programme put in place, if appropriate.

Follow the MHRA safety advice on valproate use by women and girls.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the rationale and impact section on idiopathic generalised epilepsies.

Full details of the evidence and the committee's discussion are in evidence review J: effectiveness of antiseizure therapies in the treatment of idiopathic generalised epilepsies, including juvenile myoclonic epilepsy.

6 Treating childhood-onset epilepsies

Antiseizure medications for childhood-onset epilepsy syndromes are considered off-label unless they are authorised for the specific syndrome.

6.1 Dravet syndrome

> For more information on treatment in women and girls, see the section on antiseizure medications for women and girls. Follow the Medicines and Healthcare products Regulatory Agency (MHRA) safety advice on valproate use by women and girls and antiepileptic drugs in pregnancy.

For guidance on safe prescribing and managing withdrawal of clobazam in adults, see NICE's guideline on medicines associated with dependence or withdrawal symptoms.

Specialist involvement

6.1.1 Ensure that people with Dravet syndrome have an adult or paediatric neurologist with expertise in epilepsy involved in their care.

First-line treatment

6.1.2 Consider sodium valproate as first-line treatment for people with Dravet syndrome. Be aware that sodium valproate should be used with caution in women and girls, but it is recommended as first-line treatment for Dravet syndrome because of the severity of the syndrome and the lack of evidence for other effective first-line treatment options.

6.1.3 If sodium valproate first-line monotherapy is started or continued for Dravet syndrome in women and girls able to have children (including young girls who are likely to need treatment when they are old enough to have children):

- discuss the potential risks and benefits of treatment, including the risks to an unborn child

- take into account the likelihood of pregnancy and put in place a pregnancy prevention programme, if appropriate.

  Follow the MHRA safety advice on valproate use by women and girls.

6.1.4 If sodium valproate alone is unsuccessful as first-line monotherapy for Dravet syndrome, consider triple therapy with stiripentol and clobazam as first-line add-on therapy. Carefully titrate the additional drugs and review treatment frequently, including monitoring for adverse effects such as sedation.

In April 2022, these were off-label uses of clobazam as add-on therapy in children under 6 months, and stiripentol when it is started in adults over 18 years. See NICE's information on prescribing medicines.

Second-line treatment

6.1.5 If triple therapy is unsuccessful for Dravet syndrome and the child is over 2 years, consider cannabidiol in combination with clobazam as a second-line add-on treatment option in line with NICE's technology appraisal guidance on cannabidiol with clobazam for treating seizures associated with Dravet syndrome.

Further treatment options

6.1.6 If triple therapy is unsuccessful for Dravet syndrome in a child aged under 2 years or second-line treatment is unsuccessful in a child aged over 2 years, consider 1 of the following add-on options under the supervision of a ketogenic diet team or a neurologist with expertise in epilepsy, as appropriate:

- ketogenic diet
- levetiracetam
- topiramate.

  If the first choice is unsuccessful, consider the other add-on options.

  In April 2022, these were off-label uses of levetiracetam and topiramate. See NICE's information on prescribing medicines.

6.1.7 If all other treatment options for Dravet syndrome are unsuccessful, consider potassium bromide under the guidance of a neurologist with expertise in epilepsy.

In April 2022, potassium bromide was not licensed for use in the UK. See NICE's information on prescribing medicines.

Other treatment considerations

6.1.8 Be aware that the following medications may exacerbate seizures in people with Dravet syndrome:

- carbamazepine
- gabapentin
- lacosamide
- lamotrigine
- oxcarbazepine
- phenobarbital
- pregabalin
- tiagabine
- vigabatrin.

NICE is developing technology appraisal guidance on fenfluramine for treating seizures associated with Dravet syndrome (publication expected 29 June 2022).

For a short explanation of why the committee made these recommendations and how they might affect practice, see the rationale and impact section on Dravet syndrome.

Full details of the evidence and the committee's discussion are in evidence review K: effectiveness of antiseizure therapies in the treatment of Dravet syndrome.

6.2 Lennox–Gastaut syndrome

For more information on treatment in women and girls, see the section on antiseizure medications for women and girls. Follow the MHRA safety advice on valproate use by women and girls and antiepileptic drugs in pregnancy.

Specialist involvement

6.2.1 Ensure that people with Lennox–Gastaut syndrome have an adult or paediatric neurologist with expertise in epilepsy involved in their care.

First-line treatment

6.2.2 Consider sodium valproate as first-line treatment for people with Lennox–Gastaut syndrome. Be aware that sodium valproate should be used with caution in women and girls, but it is recommended as first-line treatment for Lennox–Gastaut syndrome because of the severity of the syndrome and the lack of evidence for other effective first-line treatment options.

6.2.3 If sodium valproate treatment is started or continued for Lennox–Gastaut syndrome in women and girls able to have children (including young girls who are likely to need treatment when they are old enough to have children):

- discuss the risks and benefits of treatment, including the risks to an unborn child
- take into account the likelihood of pregnancy and put in place a pregnancy prevention programme, if appropriate.

  Follow the MHRA safety advice on valproate use by women and girls.

Second-line treatment

6.2.4 If first-line treatment is unsuccessful, consider lamotrigine as a second-line monotherapy or add-on treatment for people with Lennox–Gastaut syndrome.

In April 2022, this use of lamotrigine was off-label as monotherapy in children under 13 years and add-on therapy for children under 2 years. See NICE's information on prescribing medicines.

Third-line treatment

For guidance on safe prescribing and managing withdrawal of clobazam in adults, see NICE's guideline on medicines associated with dependence or withdrawal symptoms.

6.2.5 If second-line treatment is unsuccessful, consider the following as third-line add-on treatment options for people with Lennox–Gastaut syndrome:

- cannabidiol in combination with clobazam if the child is over 2 years, in line with NICE's technology appraisal guidance on cannabidiol with clobazam for treating seizures associated with Lennox–Gastaut syndrome
- clobazam
- rufinamide
- topiramate.

In April 2022, these were off-label uses of clobazam as add-on therapy in children under 6 months, rufinamide in children under 1 year, and topiramate in children under 2 years. See NICE's information on prescribing medicines.

Starting an add-on treatment

6.2.6 When starting an add-on treatment in people with Lennox–Gastaut syndrome, carefully titrate the additional medicine and review treatment frequently, including monitoring for adverse effects such as sedation.

Further treatment options

6.2.7 If seizures continue with third-line treatments for Lennox–Gastaut syndrome, consider a ketogenic diet as an add-on treatment under the supervision of a ketogenic diet team.

6.2.8 If all other treatment options for Lennox–Gastaut syndrome are unsuccessful, consider felbamate as add-on treatment under the supervision of a neurologist with expertise in epilepsy.

In April 2022, felbamate was not licensed for use in the UK. See NICE's information on prescribing medicines.

Other treatment considerations

6.2.9 Be aware that the following medications may exacerbate seizures in people with Lennox–Gastaut syndrome:

- carbamazepine
- gabapentin
- lacosamide
- lamotrigine
- oxcarbazepine
- phenobarbital
- pregabalin
- tiagabine
- vigabatrin.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the rationale and impact section on Lennox–Gastaut syndrome.

Full details of the evidence and the committee's discussion are in evidence review L: effectiveness of antiseizure therapies in the treatment of Lennox-Gastaut syndrome.

6.3 Infantile spasms syndrome

Specialist involvement

6.3.1 If a child under 2 years has suspected or confirmed infantile spasms, within 24 hours seek guidance from, and refer the child urgently to, a tertiary paediatric neurologist to ensure rapid assessment, including a sleep electroencephalogram (EEG), and rapid treatment to stop spasms.

Monitoring

6.3.2 Review children under 2 years with infantile spasms at least weekly during

treatment and repeat sleep EEG at 2 weeks after starting treatment.

6.3.3 When infantile spasms have stopped, review children monthly and repeat sleep EEG if spasms recur or there are clinical concerns.

First-line treatment

6.3.4 Offer combination therapy with high-dose oral prednisolone and vigabatrin as first-line treatment for infantile spasms that are not due to tuberous sclerosis, unless the child is at high risk of steroid-related side effects.

In April 2022, this was an off-label use of vigabatrin in combination with prednisolone. See NICE's information on prescribing medicines.

6.3.5 Consider vigabatrin alone as first-line treatment for infantile spasms in children at high risk of steroid-related side effects.

6.3.6 Offer vigabatrin alone as first-line treatment for infantile spasms due to tuberous sclerosis. If vigabatrin is ineffective after 1 week, add high-dose oral prednisolone.

In April 2022, this was an off-label use of vigabatrin in combination with prednisolone. See NICE's information on prescribing medicines.

6.3.7 Before starting oral prednisolone for infantile spasms:

- discuss the possible side effects of steroid treatment with parents and carers
- test whether the child has antibodies to the varicella zoster virus
- give the parents and carers a steroid card and information about when to seek medical help for side effects.

6.3.8 When using oral prednisolone to treat infantile spasms, follow the advice in the BNF for children on prednisolone dosages. Monitor blood pressure and urinary glucose weekly during treatment.

6.3.9 When using vigabatrin to treat infantile spasms, increase the dose as outlined in the BNF for children on vigabatrin. Discuss further dose increases with a

tertiary paediatric neurologist if the spasms do not stop (clinically and on EEG).

Second-line treatment

6.3.10 If first-line treatment for infantile spasms is unsuccessful, discuss further treatment with a tertiary paediatric epilepsy specialist.

6.3.11 Consider the following as a second-line monotherapy or add-on treatment options for infantile spasms, guided by a ketogenic diet team or tertiary paediatric epilepsy specialist, as appropriate:

- ketogenic diet
- levetiracetam
- nitrazepam
- sodium valproate
- topiramate.

If the first choice is unsuccessful, consider the other second-line options.

In April 2022, these were off-label uses of levetiracetam, nitrazepam and topiramate. See NICE's information on prescribing medicines.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the rationale and impact section on infantile spasms syndrome.

Full details of the evidence and the committee's discussion are in evidence review P: effectiveness of antiseizure therapies for infantile spasms.

6.4 Self-limited epilepsy with centrotemporal spikes

For more information on treatment in women and girls, see the section on antiseizure medications for women and girls and follow the MHRA safety advice on antiepileptic drugs in pregnancy.

Discussing starting treatment

6.4.1 Discuss with children and young people with self-limited epilepsy with centrotemporal spikes, and their families or carers as appropriate, whether they wish to start treatment. In particular, discuss:

- frequency and severity of seizures
- possible hazards of ongoing seizures (including the small risk of death)
- possible side effects of treatment.

First-line treatment

6.4.2 Consider lamotrigine or levetiracetam as first-line treatment for self-limited epilepsy with centrotemporal spikes. If either lamotrigine or levetiracetam is unsuccessful, try the other of these options.

In April 2022, these were off-label uses of lamotrigine in children under 13 years, and levetiracetam in children under 16 years. See NICE's information on prescribing medicines.

Second-line treatment

6.4.3 If first-line treatments for self-limited epilepsy with centrotemporal spikes are unsuccessful, consider the following as second-line monotherapy treatment options:

- carbamazepine
- oxcarbazepine
- zonisamide.

If the first choice is unsuccessful, consider the other second-line monotherapy options.

In April 2022, these were off-label uses for oxcarbazepine in children under 6 years, and zonisamide in adults and children. See NICE's information on prescribing medicines.

Third-line treatment

6.4.4 If second-line treatments tried are unsuccessful for self-limited epilepsy with centrotemporal spikes, consider sulthiame as monotherapy or add-on treatment, but only after discussion with a tertiary paediatric neurologist.

In April 2022, sulthiame was not licensed for use in the UK. See NICE's information on prescribing medicines.

Other treatment considerations

6.4.5 Be aware that carbamazepine, oxcarbazepine and lamotrigine may rarely exacerbate seizures or the development of another epilepsy syndrome, or affect cognitive performance, in a small number of children and young people with self-limited epilepsy with centrotemporal spikes.

6.4.6 If there is concern about the school performance of a child or young person having antiseizure medication, seek guidance from an epilepsy specialist and consider:

- sleep electroencephalogram (EEG) to exclude exacerbation of epileptic activity (electrical status epilepticus during sleep) **and**
- neuropsychology assessment to review academic performance.

6.4.7 If a child or young person having antiseizure medication treatment develops other seizure types, consider a sleep EEG to exclude exacerbation of epileptic activity (developmental epileptic encephalopathy with spike-wave activation in sleep).

6.4.8 Offer follow up at a frequency and with a healthcare professional appropriate to the child or young person's individual needs. Discuss discontinuing treatment if a child or young person with self-limited epilepsy with centrotemporal spikes is seizure-free for at least 2 years or at age 14 years.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the rationale and impact section on self-limited epilepsy with centrotemporal spikes.

Full details of the evidence and the committee's discussion are in evidence review Q: effectiveness of antiseizure medications for self-limited epilepsy with centrotemporal spikes.

6.5 Epilepsy with myoclonic-atonic seizures (Doose syndrome)

For more information on treatment in women and girls, see the section on antiseizure medications for women and girls. Follow the MHRA safety advice on valproate use by women and girls and antiepileptic drugs in pregnancy.

Specialist involvement

6.5.1 Discuss the treatment and management of epilepsy with myoclonic-atonic seizures in children with a tertiary paediatric neurologist.

First-line treatment

6.5.2 Consider levetiracetam or sodium valproate as first-line treatments for epilepsy with myoclonic-atonic seizures. If either levetiracetam or sodium valproate is unsuccessful, try the other of these options.

In April 2022, this was an off-label use of levetiracetam. See NICE's information on prescribing medicines.

6.5.3 If sodium valproate is started or continued for epilepsy with myoclonic-atonic seizures in girls or women able to have children (including young girls who are likely to need treatment when they are old enough to have children):

- discuss the risks and benefits of treatment, including the risks to an unborn child

- take into account the likelihood of pregnancy and put in place a pregnancy prevention programme, if appropriate.

  Follow the MHRA safety advice on valproate use by women and girls.

Second-line treatment

6.5.4 If first-line treatments for epilepsy with myoclonic-atonic seizures are unsuccessful, consider a ketogenic diet as a second-line monotherapy or add-on treatment, under the supervision of a ketogenic diet team.

Third-line treatment

For guidance on safe prescribing and managing withdrawal of clobazam in adults, see NICE's guideline on medicines associated with dependence or withdrawal symptoms.

6.5.5 If second-line treatment for epilepsy with myoclonic-atonic seizures is unsuccessful, consider the following as third-line monotherapy or add-on treatment options:

- clobazam
- ethosuximide
- topiramate
- zonisamide.

  If the first choice is unsuccessful, consider the other third-line options.

  In April 2022, these were off-label uses of clobazam as monotherapy in adults and children, and add-on therapy in children under 6 months, and topiramate and zonisamide in adults and children. See NICE's information on prescribing medicines.

Other treatment considerations

6.5.6 Do not use any of the following medications because they may exacerbate seizures in people with epilepsy with myoclonic-atonic seizures:

- carbamazepine

- gabapentin
- oxcarbazepine
- phenytoin
- pregabalin
- vigabatrin.

Discontinuing medication

6.5.7 Consider discontinuing antiseizure medication treatment in children with epilepsy with myoclonic-atonic seizures who are seizure-free for 2 years.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the rationale and impact section on epilepsy with myoclonic-atonic seizures (Doose syndrome).

Full details of the evidence and the committee's discussion are in evidence review R: effectiveness of antiseizure therapies for epilepsy with myoclonic-atonic seizures (Doose syndrome).

7 Treating status epilepticus, repeated or cluster seizures, and prolonged seizures

7.1 Status epilepticus

Initial treatment for generalised convulsive status epilepticus

7.1.1 Provide resuscitation and immediate emergency treatment for children, young people and adults who have convulsive status epilepticus (seizures lasting 5 minutes or more).

7.1.2 If the person with convulsive status epilepticus has an individualised emergency management plan that is immediately available, administer medication as detailed in the plan.

7.1.3 If the person with convulsive status epilepticus does not have an individualised emergency management plan immediately available:

- give a benzodiazepine (buccal midazolam or rectal diazepam) immediately as first-line treatment in the community **or**
- use intravenous lorazepam if intravenous access and resuscitation facilities are immediately available.

7.1.4 Be aware of the possible underlying causes of status epilepticus, including hypoglycaemia, eclampsia and alcohol withdrawal, which may need to be treated with additional medication.

7.1.5 Be alert to non-adherence to antiseizure medication, which can also be a cause of status epilepticus.

7.1.6 Be aware that non-epileptic seizures (dissociative seizures) can be similar in presentation to convulsive status epilepticus.

Management if initial treatment is unsuccessful

7.1.7 If convulsive status epilepticus does not respond to the first dose of

benzodiazepine:

- call emergency services in the community **or**
- seek expert guidance in hospital.

7.1.8 Continue to follow the person's individualised emergency management plan, if this is immediately available, or give a second dose of benzodiazepine if the seizure does not stop within 5 to 10 minutes of the first dose.

7.1.9 If convulsive status epilepticus does not respond to 2 doses of a benzodiazepine, give any of the following medicines intravenously as a second-line treatment:

- levetiracetam
- phenytoin
- sodium valproate.

  Take into account that levetiracetam may be quicker to administer and have fewer adverse effects than the alternative options.

  In April 2022, this was an off-label use of levetiracetam. See NICE's information on prescribing medicines.

  Follow the Medicines and Healthcare products Regulatory Agency (MHRA) safety advice on valproate use by women and girls.

7.1.10 If convulsive status epilepticus does not respond to a second-line treatment, consider trying an alternative second-line treatment option under expert guidance.

7.1.11 If convulsive status epilepticus does not respond to the second-line treatment options tried, consider the following third-line options under expert guidance:

- phenobarbital **or**
- general anaesthesia.

7.1.12 After an episode of convulsive status epilepticus, agree an emergency management plan with the person if they do not already have one and there is

concern that status epilepticus may recur.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the rationale and impact section on status epilepticus.

Full details of the evidence and the committee's discussion are in evidence review 9: antiseizure medication for status epilepticus.

7.2 Repeated seizures or cluster seizures

7.2.1 Manage repeated or cluster seizures (typically 3 or more self-terminating seizures in 24 hours) as a medical emergency.

7.2.2 If a person has repeated or cluster seizures:

- follow their individualised emergency management plan, if this is immediately available **or**
- consider giving a benzodiazepine, such as clobazam or midazolam, immediately if they do not have an individualised emergency management plan immediately available.

7.2.3 Seek expert guidance if the person has further episodes of repeated or cluster seizures.

7.2.4 Agree an individualised emergency management plan with the person after repeated or cluster seizures if they do not have one already and there is concern that repeated or cluster seizures may recur.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the rationale and impact section on repeated or cluster seizures.

Full details of the evidence and the committee's discussion are in evidence review 10: antiseizure medications for repetitive/cluster seizures: monotherapy and add-on therapies.

7.3 Prolonged seizures

For convulsive seizures that continue for 5 minutes or more, follow the recommendations in the

section on status epilepticus.

7.3.1 Manage prolonged convulsive seizures (any convulsive seizure that continues for more than 2 minutes longer than a person's usual seizure) as a medical emergency.

7.3.2 If a person has a prolonged convulsive seizure:

- follow their individualised emergency management plan if this is immediately available **or**
- consider giving a benzodiazepine, such as midazolam or clobazam, immediately if they do not have an individualised emergency management plan immediately available.

7.3.3 After a prolonged convulsive seizure, agree an emergency management plan with the person if they do not already have one and there is concern that prolonged convulsive seizures may recur.

7.3.4 After a prolonged non-convulsive seizure (a non-convulsive seizure that continues for more than 2 minutes longer than a person's usual seizure), agree an emergency management plan with the person if they do not already have one and there is concern that prolonged non-convulsive seizures may recur.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the rationale and impact section on prolonged seizures.

Full details of the evidence and the committee's discussion are in evidence review 11: antiseizure medication for prolonged seizures: monotherapy.

8 Non-pharmacological treatments

8.1 Ketogenic diet

8.1.1 Consider a ketogenic diet under the guidance of a tertiary epilepsy specialist, in people with:

- certain childhood-onset epilepsy syndromes (see also the section on treating childhood-onset epilepsies), for example:
  - glucose transporter type 1 deficiency syndrome (GLUT1 deficiency syndrome)
  - epilepsy associated with pyruvate dehydrogenase deficiency
  - infantile spasms syndrome
  - epilepsy with myoclonic-atonic seizures (Doose syndrome)
  - Dravet syndrome
  - Lennox–Gastaut syndrome
- drug-resistant epilepsy if other treatment options have been unsuccessful or are not appropriate.

For a short explanation of why the committee made this recommendation and how it might affect practice, see the rationale and impact section on ketogenic diet.

Full details of the evidence and the committee's discussion are in evidence review 12: ketogenic diets for drug-resistant epilepsy.

8.2 Resective epilepsy surgery

Referral for resective epilepsy surgery assessment

8.2.1 Discuss the options for assessment for resective epilepsy surgery with people who have drug-resistant epilepsy, and their families or carers if appropriate. Explain what the process of surgical assessment involves as well as the benefits

and risks associated with surgical procedures.

8.2.2 Refer people with drug-resistant epilepsy, including those without identified MRI abnormalities, for consideration of assessment for resective epilepsy surgery:

- For adults, this should be to a tertiary epilepsy service.
- For children and young people, this should be to a tertiary paediatric neurology service for consideration of referral to a children's epilepsy service surgery centre.

8.2.3 For people with MRI abnormalities that indicate a high risk of drug-resistant epilepsy, consider early referral to a tertiary epilepsy service for assessment, including an evaluation for resective epilepsy surgery if appropriate. Examples of specific lesions seen on MRI may include, but are not limited to, the following:

- hippocampal sclerosis
- malformations of cortical development
- epilepsy-associated low-grade tumours
- hypothalamic hamartomas
- neuronal migrational disorders
- tuberous sclerosis complex
- vascular malformations, including Sturge–Weber syndrome
- cerebral contusions from previous head injury.

8.2.4 Do not exclude people with learning disabilities or underlying genetic abnormalities from referral for resective epilepsy surgery assessment if it is indicated.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the rationale and impact section on resective epilepsy surgery.

Full details of the evidence and the committee's discussion are in evidence review 13: referral and surgical interventions.

8.3 Vagus nerve stimulation

8.3.1 If resective epilepsy surgery is not suitable for a person with drug-resistant seizures, consider vagus nerve stimulation as an add-on treatment to antiseizure medication. See also NICE's interventional procedures guidance on vagus nerve stimulation for refractory epilepsy in children.

8.3.2 Discuss with the person with epilepsy, and their family or carers if appropriate, the benefits and risks of vagus nerve stimulation before making a shared decision about having this procedure.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the rationale and impact section on vagus nerve stimulation.

Full details of the evidence and the committee's discussion are in evidence review 14: vagus nerve stimulation.

9 Psychological, neurobehavioural, cognitive and developmental comorbidities in epilepsy

9.1 Providing coordinated care

9.1.1 Be aware that there is a higher prevalence of mental health difficulties, learning disabilities, neurodevelopmental comorbidities (for example, attention deficit hyperactivity disorder and autism spectrum disorder) and dementia, and a higher risk of suicide in people with epilepsy compared with the general population.

9.1.2 Provide coordinated care for people with epilepsy who have a mental health condition or learning disability using a multidisciplinary team approach.

9.1.3 Be aware that children and young people with a complex childhood epilepsy syndrome can have developmental difficulties and cognitive impairment, and may need additional support from a multidisciplinary team.

9.1.4 Ensure effective communication and liaison between healthcare professionals across the relevant services involved in the care of people with epilepsy and a mental health condition to agree and plan care across services.

9.1.5 For people with epilepsy who have a learning disability, a mental health problem or challenging behaviour, or who have dementia, follow the recommendations on coordinating care in NICE's guidelines on mental health problems in people with learning disabilities, challenging behaviour and learning disabilities and dementia.

9.2 Support and treatment

9.2.1 Recognise that a diagnosis of epilepsy can have a significant adverse impact on a person's mental health and that people with epilepsy may feel socially excluded and stigmatised.

9.2.2 Review neurodevelopment, cognitive function, mental health, social and emotional wellbeing, and learning disabilities as part of the routine management

for people with epilepsy.

9.2.3 Offer assessment and provide mental health support and treatment for people with epilepsy and depression in line with NICE's guidelines on depression in adults with a chronic physical health problem and depression in children and young people.

9.2.4 Be alert to anxiety, other mental health difficulties and the risk of suicide in people diagnosed with epilepsy. If mental health difficulties are suspected, consider referral and follow the recommendations in NICE's guidelines on:

- attention deficit hyperactivity disorder
- autism spectrum disorders in under 19s
- autism spectrum disorder in adults
- common mental health problems
- mental health problems in people with learning disabilities
- generalised anxiety disorder and panic disorder in adults
- psychosis and schizophrenia in adults
- psychosis and schizophrenia in children and young people.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the rationale and impact section on psychological, neurobehavioural, cognitive and developmental comorbidities in epilepsy.

Full details of the evidence and the committee's discussion are in:

- evidence review 15: prevalence of psychological disorders in people with epilepsies
- evidence review 16: psychological treatments for people with epilepsies.

10 Reducing the risk of epilepsy-related death including sudden unexpected death in epilepsy

10.1 Risk factors

10.1.1 Be aware that epilepsy is associated with an increased risk of premature death, including a risk of sudden unexpected death in epilepsy (SUDEP).

10.1.2 Be aware that potentially modifiable risk factors for SUDEP include:

- non-adherence to medication
- alcohol and drug misuse
- having focal to bilateral tonic-clonic seizures or generalised tonic-clonic seizures
- having uncontrolled seizures
- living alone
- sleeping alone without supervision.

10.1.3 Be aware that the risk of epilepsy-related death is increased in people with:

- previous brain injury
- previous central nervous system infection
- metastatic cancer
- previous stroke
- abnormal neurological examination findings.

10.1.4 Discuss with people with epilepsy, and their families and carers if appropriate, their individual risk of epilepsy-related death, including SUDEP, from the time of diagnosis onwards. For young children, this discussion should be with the child's parents or carers. Discussion should include:

- supporting them to understand the risks of epilepsy-related death, including SUDEP
- exploring and agreeing ways to reduce the risks.

10.1.5 Discuss the risk of SUDEP with people who have seizures during sleep and, if appropriate, include their families and carers. Provide information on minimising risks, including taking their medication as prescribed.

10.2 Interventions

10.2.1 Discuss the possibility of introducing or increasing night-time supervision, for example, a parent or carer may wish to use a night monitor for people with epilepsy who have seizures during sleep and have been assessed to be at higher risk of epilepsy-related death.

10.2.2 Support people with epilepsy to take their medications as prescribed to reduce seizures. Explain that uncontrolled seizures increase the risk of epilepsy-related death, particularly for people with generalised tonic-clonic seizures or focal to bilateral tonic-clonic seizures. Follow the recommendations in NICE's guideline on medicines adherence.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the rationale and impact section on reducing the risk of epilepsy-related death including sudden unexpected death in epilepsy.

Full details of the evidence and the committee's discussion are in the following evidence reviews:

- evidence review 17: prediction of death, including SUDEP, in people with epilepsy
- evidence review 18: modifiable risk factors for epilepsy related mortality
- evidence review 19: reducing the risk of seizure-related mortality, including SUDEP.

11 Service provision and transition

11.1 Epilepsy specialist nurses

11.1.1 Ensure that all children, young people and adults with epilepsy have access to an epilepsy specialist nurse who:

- has a central role in providing information, education and support (see box 1 for information that should be covered)
- supports epilepsy specialists and healthcare professionals in primary and secondary care, and in educational, respite and social care settings
- is a point of contact for, and facilitates access to, other community and multi-agency services.

11.1.2 Offer people with epilepsy an information and care-planning session with an epilepsy specialist nurse that includes emotional wellbeing and self-management strategies promoting inclusion and participation.

11.1.3 For people with epilepsy who continue to have seizures, offer epilepsy specialist nurse sessions:

- at least twice a year **and**
- after A&E department visits.

11.1.4 Consider epilepsy specialist nurse-led group sessions for education and information giving in young people and adults with epilepsy.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the rationale and impact section on epilepsy specialist nurses.

Full details of the evidence and the committee's discussion are in evidence review O: effectiveness of a nurse specialist in the management of epilepsy.

11.2 Transition from children's to adults' epilepsy

services

11.2.1 Involve young people with epilepsy in planning for their transition from children's to adult epilepsy services in line with the NICE guideline on transition from children's to adults' services for young people using health or social care services.

11.2.2 Ensure transition from children's to adults' epilepsy services is individually tailored to the young person with epilepsy.

11.2.3 Begin planning transition early for young people who have complex or additional health and social care needs, for example young people whose seizures are not yet controlled or those with learning disabilities.

11.2.4 During transition of young people with epilepsy to adult services, the paediatric and adult multidisciplinary teams should jointly review the person's diagnosis and management plan, taking a person-centred approach that involves the young person, and their family or carers as appropriate, in planning and decisions about their care.

11.2.5 Ensure that information about the young person's management plan and support for transition to adult services is discussed with the young person with epilepsy and shared in an accessible format that meets their needs and uses language they understand. Repeat this information at different time points to establish that the young person understands their care plan and the support that will be provided.

11.2.6 When discussing transition to adult epilepsy services with the young person, cover any issues of concern to the person, including, but not limited to, the following:

- activities of daily living, including driving and sports
- adherence to antiseizure medication
- comorbidities, such as low mood or impaired memory
- continuing in education or work
- emotional health and psychological wellbeing

- living independently
- possible effects of epilepsy and antiseizure medication on neurodevelopment, cognition and behaviour
- risks associated with alcohol and illicit drugs
- safety and risk (including sudden unexpected death in epilepsy [SUDEP])
- reproductive health, including contraception, pregnancy and teratogenicity
- sleep disturbance
- social aspects of epilepsy, including considering if or when to disclose epilepsy status and managing the impact of possible assumed limitations
- stigmatisation of epilepsy.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the rationale and impact section on transition from children's to adults' epilepsy services.

Full details of the evidence and the committee's discussion are in evidence review 20: transition from paediatric to adult epilepsy services.

Terms used in this guideline

This section defines terms that have been used in a particular way for this guideline.

The definitions for the epilepsy syndromes and seizure types are based on the International League Against Epilepsy's proposed new definitions and framework for classifying epilepsy.

Drug-resistant epilepsy

Epilepsy in which seizures persist and seizure freedom is very unlikely to be attained with further manipulation of antiseizure medication. Defined by the International League Against Epilepsy as 'failure of adequate trials of 2 tolerated and appropriately chosen and used antiseizure medication schedules (whether as monotherapy or in combination) to achieve sustained seizure freedom'.

MRI protocols

An MRI scan produces sets of images of the brain, or 'sequences', each with a particular appearance. An epilepsy MRI protocol is made up of a group of sequences, put together to improve the sensitivity and specificity in demonstrating possible structural abnormalities of the brain that cause epilepsy. The use of a regionally agreed, standardised protocol aims to maximise diagnostic quality and deliver consistency in scan quality.

Suboptimal MRI

An MRI scan would be deemed suboptimal if:

- it gives an inappropriate or inadequate set of sequences
- image quality is poor, for example, because of patient movement.

Tertiary epilepsy service

A service provided by epilepsy specialists who are adult or paediatric neurologists who undertake continuing professional development in the investigation, diagnosis and management of complex epilepsy. It offers:

- Access to additional specialist assessments, including:
  - neuropsychology
  - neuropsychiatry
  - specialised neuroimaging, including 3T MRI
  - specialised neurophysiology, including video electroencephalogram (EEG) telemetry.
- Specialised assessment and management of particular patient groups, including:
  - people with learning disability
  - pregnant women
  - people transitioning between services
  - older people with epilepsy.
- Access to:
  - specialised non-surgical treatments, for example, cannabidiol, ketogenic diet
  - genetic diagnosis and counselling
  - specialised assessment for surgery
  - vagus nerve stimulation
  - participation in relevant clinical trials and research studies.

Unprovoked seizure

A seizure that is not caused by a particular event such as a fever, head injury or consumption of alcohol or drugs.

Unsuccessful treatment

Treatment is unsuccessful if it does not reduce or stop seizures, or if side effects are intolerable for the person with epilepsy.

Recommendations for research

The guideline committee has made the following recommendations for research.

Key recommendations for research

1 Antibody testing

What immunomodulation strategies are effective in people with defined autoimmune epilepsy syndromes?

For a short explanation of why the committee made this recommendation for research, see the rationale section on antibody testing.

Full details of the evidence and the committee's discussion are in evidence review D: antibody testing in epilepsy.

2 Complex epilepsy syndromes

What antiseizure therapies (alternative or add-on) are effective in the treatment of complex epilepsy syndromes (that is, Dravet syndrome, Lennox–Gastaut syndrome, infantile spams syndrome and epilepsy with myoclonic-atonic seizures [Doose syndrome]) when first-line therapy is unsuccessful or not tolerated?

For a short explanation of why the committee made this recommendation for research, see the rationale section on Dravet syndrome.

Full details of the evidence and the committee's discussion are in evidence review K: effectiveness of antiseizure therapies in the treatment of Dravet syndrome.

For a short explanation of why the committee made this recommendation for research, see the rationale section on Lennox–Gastaut syndrome.

Full details of the evidence and the committee's discussion are in evidence review L: effectiveness of antiseizure therapies in the treatment of Lennox-Gastaut syndrome.

For a short explanation of why the committee made this recommendation for research, see the rationale section on infantile spasms syndrome.

Full details of the evidence and the committee's discussion are in evidence review P: effectiveness of antiseizure therapies for infantile spasms.

For a short explanation of why the committee made this recommendation for research, see the rationale section on epilepsy with myoclonic-atonic seizures (Doose syndrome).

Full details of the evidence and the committee's discussion are in evidence review R: effectiveness of antiseizure therapies for epilepsy with myoclonic-atonic seizures (Doose syndrome).

3 Risk prediction tool for all-cause epilepsy-related death

Development of a risk prediction tool to detect all-cause mortality including sudden unexpected death in epilepsy (SUDEP) in people with epilepsy or those who have had a single seizure, and an external validation of a risk prediction tool to detect the probability of epilepsy-related death.

For a short explanation of why the committee made this recommendation for research, see the rationale section on reducing the risk of epilepsy-related death including SUDEP.

Full details of the evidence and the committee's discussion are in evidence review 17: prediction of death, including SUDEP, in people with epilepsy.

4 Vagus nerve stimulation

What is the effectiveness of vagus nerve stimulation in treating epilepsy (including people with

learning disabilities as a subgroup)?

For a short explanation of why the committee made this recommendation for research, see the rationale section on vagus nerve stimulation.

Full details of the evidence and the committee's discussion are in evidence review 14: vagus nerve stimulation.

5 Psychological treatments

What is the cost effectiveness of providing tailored psychological treatments for people with epilepsy?

For a short explanation of why the committee made this recommendation for research, see the rationale section on psychological, neurobehavioural, cognitive and developmental comorbidities in epilepsy.

Full details of the evidence and the committee's discussion are in in evidence review 16: psychological treatments for people with epilepsies.

6 Monitoring antiseizure medications in women and girls

What is the clinical and cost effectiveness of therapeutic drug monitoring in girls, young women and women with epilepsy?

For a short explanation of why the committee made this recommendation for research, see the rationale section on support and monitoring for women planning pregnancy or who are pregnant.

Full details of the evidence and the committee's discussion are in evidence review 8: therapeutic drug monitoring in women and girls.

Other recommendations for research

Digital health technologies

What is the clinical and cost effectiveness of digital health technologies in people with epilepsy?

For a short explanation of why the committee made this recommendation for research, see the rationale section on new technologies.

Full details of the evidence and the committee's discussion are in evidence review 5: new technologies.

Antiseizure medication for repeated or cluster seizures

What antiseizure medications (monotherapy or add-on) are effective in the treatment of repeated or cluster seizures?

For a short explanation of why the committee made this recommendation for research, see the rationale section on repeated or cluster seizures.

Full details of the evidence and the committee's discussion are in evidence review 10: antiseizure medications for repetitive/cluster seizures: monotherapy and add-on therapies.

Risk prediction tool for second seizure

Development of a risk prediction tool for second seizures in people with a single seizure, and an external validation of a risk prediction tool to detect the probability of a second seizure in people with a single seizure at baseline.

For a short explanation of why the committee made this recommendation for research, see the rationale section on referral after a first seizure or remission and assessing risk of a second seizure.

Full details of the evidence and the committee's discussion are in evidence review 1: prediction of second seizure.

Ketogenic diets

What is the short-term and long-term clinical and cost effectiveness of ketogenic diets in adults and children with drug-resistant epilepsy, and what factors affect the long-term maintenance and tolerability of ketogenic diets?

For a short explanation of why the committee made this recommendation for research, see the rationale section on ketogenic diet.

Full details of the evidence and the committee's discussion are in evidence review 12: ketogenic diets for drug-resistant epilepsy.

Rationale and impact

These sections briefly explain why the committee made the recommendations and how they might affect practice.

Referral after a first seizure or remission and assessing risk of a second seizure

Recommendations 1.1.1 to 1.1.9

Why the committee made the recommendations

Referral after a first seizure

The committee agreed that people presenting with a suspected first seizure should be referred urgently to ensure that a specialist is involved early in diagnosing epilepsy. Diagnosing epilepsy can be complex and involving a specialist can help avoid misdiagnosis and ensure that the person receives the right care and support.

Assessing the risk of a second seizure

The evidence suggested that adults having a first seizure who have a mental health condition are almost 3 times more likely to have a second seizure when compared with the general population. The risk was even higher for people with sepsis, who are 4.5 times more likely to have a second seizure than people who do not have sepsis. The committee agreed that these are significant risk factors that could be modified to try to prevent second seizures. Evidence for vascular risk factors did not show a difference in risk. However, based on their knowledge and experience, the committee agreed that conditions such as diabetes, hypertension and atrial fibrillation are important risk factors for seizures in adults that may also be modified.

In children, the committee acknowledged that there was a lack of clarity in the evidence for risk associated with higher or lower temperature. A seizure because of a high temperature does not necessarily predispose a child to more seizures, but they agreed that increased temperature is important to take into consideration. Febrile seizures tend not to predispose to a second afebrile seizure. However, afebrile seizures may be associated with an increased risk of a second seizure. The committee agreed that parents and carers should be given information about the potential risk and how to self-refer should the child have a second seizure. Safety guidance should also be given

so that parents and carers can take precautions to minimise the risk of injury.

The risk factors identified in the studies are not the only factors that affect a person's chances of having a second seizure. For this reason, the committee decided that assessment should include identifying any potential mental, physical and social risk factors, which should then be discussed with the person and their family or carers.

The committee discussed the evidence for prediction tools for a second seizure, but did not recommend using any of these tools because they were considered to carry the potential for harm. The evidence suggested that the tools had a poor capacity to discriminate between people at low and high risk of second seizure. Therefore, the committee made a recommendation for research on developing and testing a risk prediction tool for second seizure.

How the recommendations might affect practice

These recommendations are likely to mean a change in clinical practice for how adults are cared for after a first seizure. In current practice, only about 25% of adults are fully assessed for modifiable risk factors. Assessment includes checking for underlying mental health problems, vascular risk factors and sepsis. Although the recommendations for adults will result in a change in clinical practice, the assessment does not take long and is not expected to result in a substantial resource impact. A small increase in costs is likely for additional staff time to assess people presenting with a first seizure.

The recommendation made for children reflects current practice so the committee agreed there should be no substantial resource impact.

Return to recommendations

Specialist assessment and diagnosis

Recommendations 1.2.1 to 1.2.10

Why the committee made the recommendations

In assessing the evidence for individual tests to diagnose epilepsy, the committee agreed that a diagnostic test would need to give the lowest possible level of false-positive and false-negative results. False-positive results may result in unnecessary treatment and anxiety, whereas false-negative results may result in people with epilepsy remaining undiagnosed and untreated. Given the seriousness of these harms, the committee agreed that a 10% rate for false negatives and a

10% rate for false positives were the highest acceptable rates (equating to a minimally acceptable value of 0.9 for both sensitivity and specificity). Most tests evaluated in the review did not meet this threshold.

Clinical history and examination provided by a specialist in epilepsy demonstrated levels of sensitivity and specificity for detecting epilepsy that were above the agreed threshold. Although the evidence was restricted to adults, the committee were confident that this could also be applied to diagnosis in children and young people. Witness reports and review of video footage were included as useful additional features of the clinical history. The evidence did not show sufficient diagnostic accuracy to warrant the use of witness reports or video footage independently, but the committee agreed that they increase the accuracy of expert clinical diagnosis.

The committee agreed, based on their knowledge and experience, that a positive electrocardiogram (ECG) can identify cardiac causes of seizure-like symptoms, and a negative ECG can support a further investigation of suspected epilepsy. Similarly, they agreed that the assessment of metabolic disturbances, such as hypoglycaemia can help to exclude alternative causes of a first seizure.

Although none of the imaging modalities were sufficiently accurate for use as diagnostic tools, the committee agreed that neuroimaging should be used to investigate potential structural causes of epilepsy.

Electroencephalogram (EEG)

The evidence showed low sensitivity for routine interictal EEG, suggesting that many people with epilepsy will not demonstrate interictal EEG abnormalities. The committee therefore agreed that a negative routine interictal EEG should not be used to exclude an epilepsy diagnosis. However, the specificity was high enough for a positive EEG finding to support a provisional diagnosis of epilepsy. Most people without epilepsy will not have EEG abnormalities, so a person with a positive finding on EEG is more likely to have epilepsy than not. The committee agreed that routine EEG should therefore be considered to help support clinical diagnoses of epilepsy. The committee also agreed, based on clinical knowledge and experience, that EEG would provide more accurate results if done as soon as possible (ideally within 72 hours) after the seizure.

Some evidence also suggested that provoking manoeuvres or longer-term EEG (for example, during a period of sleep or ambulatory EEG over 48 hours) could slightly increase sensitivity. Although this small increase in sensitivity would be insufficient to exclude diagnoses if EEG findings are negative, it might help to further support the overall clinical diagnosis of epilepsy. The committee agreed that provoking manoeuvres during an EEG or, for example, sleep deprivation to capture sleep EEG,

could be offered if agreed with the person being tested (or their family or carers). If routine and sleep-deprived EEG are normal, the committee agreed that longer-term monitoring with ambulatory EEG could be considered for some people. This may be particularly indicated in people who are thought to have a focal epilepsy. The committee highlighted the potential harms of these methods and agreed that the risks and benefits should be fully discussed with the person and their families or carers before performing the relevant EEG test.

How the recommendations might affect practice

No impact on practice is expected, because these recommendations do not substantially change current practice.

Return to recommendations

Neuroimaging

Recommendations 1.3.1 to 1.3.7

Why the committee made the recommendations

Initial imaging scans

Neuroimaging may help to identify the cause of epilepsy, inform prognosis and can give information to plan appropriate management. However, the committee agreed that it is unnecessary for people with epilepsy that is not associated with structural brain abnormalities, such as idiopathic generalised epilepsy or self-limited epilepsy with centrotemporal spikes.

Based on the evidence and their experience, the committee agreed that MRI is the investigation of choice for people with epilepsy. The evidence for different protocols was not reviewed, so based on awareness of the wider literature, the committee decided that regionally agreed epilepsy protocols should be followed, using sequences available on most modern MRI scanners, to capture enough detail. The committee stressed the importance of carrying out scans early to inform timely management choices, and discussed variation in current practice, with some people having to wait several weeks. They agreed that imaging should take place as soon as possible and specified a wait of no longer than 6 weeks from referral for the MRI, in line with the pledge on waiting times for diagnostic tests in the Handbook to the NHS Constitution for England.

The committee acknowledged that there may be situations when MRI is not suitable and CT should be offered instead, for example, if a person has severe claustrophobia or a non-MRI conditional

pacemaker.

Reporting and reviewing scans

Successful interpretation of MRI findings depends on the reader's proficiency, so the committee agreed, based on their experience, that scans should be reported by a radiologist with expertise in neuroradiology. Tertiary neuroradiology centres have expertise in performing and interpreting MRI scans, so further review by these specialist centres may be warranted if the diagnosis is in doubt or the person has drug-resistant epilepsy.

Repeat scanning

Based on their experience, the committee agreed on certain situations for which repeat MRI in people with an established epilepsy diagnosis may be important. For example, to look for change in lesions in people with new symptoms, such as rapid cognitive decline or unexplained increase in seizure frequency. Repeat MRI may also be used to help locate the areas of the brain responsible for seizures if surgery is being considered.

Scanning in acute situations

Based on their experience and expertise, the committee agreed that a CT scan can help determine whether a new-onset seizure is caused by an acute neurological lesion or illness in those with acute symptomatic seizures. However, being aware that people with an established diagnosis of epilepsy who present to an emergency department with a seizure often have a CT scan, the committee emphasised that this is not needed for those who have a typical seizure if there are no other clinical concerns.

How the recommendations might affect practice

The use of neuroimaging varies in current practice, and is not routinely used in all settings. The recommendations will reduce variation in current practice. There may be an increase in the number of people who have neuroimaging. However, with the use of regionally agreed protocols, the detection of abnormalities may avoid the need for more scans in the future.

Return to recommendations

Genetic testing

Recommendations 1.4.1 to 1.4.5

Why the committee made the recommendations

The committee agreed that a discussion with a neurologist or geneticist may be needed to advise on who to test and which type of test to use if there are uncertainties. Access to genetic testing varies but is likely to increase. The committee noted that the NHS National Genomic Test Directory for rare and inherited disease lists the genetic tests for epilepsy that are nationally commissioned by the NHS in England, and when they should be performed.

A genetic diagnosis can provide information about treatment options, related medical problems and prognosis. It can also inform genetic counselling for the person and their family members. The committee discussed the importance of genetic counselling to ensure that people, and their families or carers if appropriate, are supported to understand the possible results of testing and what they might mean for them and their family. Results can reveal information about the person who is being tested, but also their family members, which may have emotional and social consequences.

The committee agreed that a full discussion of the purpose and implications of genetic testing is needed before testing, so that the person, and their family or carers if appropriate, can make decisions about testing and give informed consent. Informed consent needs to be documented and it involves a full discussion about the benefits and possible limitations and risks of genetic testing, as well as consent to share information, where appropriate, about the results to advise the person's relatives.

The evidence did not support genetic testing for all people with epilepsy, so the committee took a pragmatic approach and agreed that testing should be considered in situations most likely to yield positive diagnostic results. The committee agreed that there was not enough evidence to recommend genetic testing at a specific point in the clinical pathway.

People whose epilepsy started at an early age (under 2 years) and people whose epilepsy is associated with developmental disorders or certain clinical features are more likely to have epilepsy with a genetic cause. Therefore, based on their knowledge and experience, the committee agreed that whole-genome sequencing would be best targeted to this population. This is in line with the eligibility criteria that accompany the NHS National Genomic Test Directory (clinical indication R59: early-onset or syndromic epilepsy).

The diagnostic yield of genetic testing in people with epilepsy of unknown cause with onset between 2 and 3 years is affected by factors such as co-occurring conditions and MRI and EEG findings. The committee noted that a genetic diagnosis in this group of people can have a significant

positive impact on outcomes and management, therefore, based on their knowledge and experience and as specified by the NHS National Genomic Test Directory, they agreed that whole-genome sequencing should be carried out if agreed by a specialist multidisciplinary team.

How the recommendations might affect practice

The use of genetic testing varies in current practice, and it is not routinely carried out even when a genetic cause is suspected. The recommendations clarify when genetic testing should be considered, which will reduce variation in current practice. There may be an increase in the number of people who have a genetic test and who are referred for genetic counselling. However, with the use of whole-genome sequencing, there may also be a reduction in the number of people having unnecessary tests that do not provide additional information on their diagnosis.

Return to recommendations

Antibody testing

Recommendation 1.5.1

Why the committee made the recommendation

The evidence for antibody testing was limited and did not support routine antibody testing for people with epilepsy. However, the committee discussed antibody testing in the context of suspected autoimmune encephalitis in people with new-onset epilepsy because it is recognised that people with autoimmune encephalitis can present with seizures or status epilepticus with encephalopathy. Although not part of the evidence review, the committee was aware that treatment guided by antibody testing (immunotherapy) may improve outcomes in these people compared with standard antiseizure medication.

There is emerging evidence on 'autoimmune epilepsy', but the committee agreed that further research is needed to assess which immunomodulation strategies are effective in people with defined autoimmune epilepsy syndromes. The committee agreed that further research is needed and developed a recommendation for research on immunomodulation strategies for people with autoimmune epilepsy syndromes to help inform future guidance.

How the recommendation might affect practice

Suspected autoimmune encephalitis is relatively rare and antibody testing is already current practice, so the recommendation reinforces current best practice.

Return to recommendation

Information and support

Recommendations 2.1.1 to 2.1.11

Why the committee made the recommendations

The evidence showed that there are gaps in current practice in communication and in the information and support available to people with epilepsy.

The committee agreed that tailored information should be provided to people with epilepsy, and their parents and carers if appropriate, to enable them to be fully informed and involved in decisions about their care. The evidence reported that some people with epilepsy and some parents and carers felt that information was withheld, making it difficult to be fully involved in their care. It also showed that children and young people wanted to be involved but sometimes struggled to understand information inappropriate for their age, including information about sudden unexpected death in epilepsy (SUDEP). The committee stressed the importance of providing age-appropriate information to enable children to be involved in discussions about their care. Extra support and time in consultations for people with learning disabilities or complex needs, such as other comorbidities, were also highlighted by the committee.

The committee highlighted the important role that epilepsy specialist nurses play in information giving. This was supported by the evidence and recommendations on epilepsy specialist nurses.

The evidence showed that parents and carers struggled to find help from sources other than their doctor. The committee acknowledged that information on where and how people with epilepsy can access information and support for activities of daily living, such as local and national support groups, should be provided.

The committee stressed the importance of providing key information for self-managing epilepsy during the first appointment. Medicines adherence, mitigating epilepsy-related risk and avoiding potential provoking factors for seizures were identified as key topics from the evidence to enable the person to self-manage their epilepsy and maintain everyday activities. Based on their experience, the committee also included activities of daily living, including driving, as a key topic for discussion because it is commonly raised as a concern at the first appointment. The committee agreed that this key information should be repeated at subsequent appointments.

The committee recognised that people with epilepsy may have a range of worries and anxieties that may change over time, and that opportunities should be provided to discuss these at each appointment. They agreed on some topics that are often of concern to people with epilepsy and their families and carers, based on their experience and themes identified in the evidence, which could be used to help provide a framework for discussions.

How the recommendations might affect practice

The recommendations reflect current practice so the committee agreed there should be no substantial resource impact.

Return to recommendations

New technologies

Why the committee did not make any recommendations

No evidence was found on using digital health technologies, so the committee agreed that no recommendation could be made. The committee noted that people are already using devices, such as night monitors and alarms, as self-management tools, but that evidence is lacking to support this use, and these are not currently offered by the NHS. Based on their experience, the committee acknowledged that some monitoring tools may offer benefit to people with epilepsy.

There is a trend towards the use of digital health technologies and the committee were keen to encourage more research in this emerging and potentially important area. A recommendation for research on digital health technologies was developed to help determine their clinical and cost effectiveness for people with epilepsy in the hope that these interventions could lead to improvements in self-management.

Return to recommendation for research

Referral to tertiary specialist services

Recommendations 3.1.1 to 3.1.4

Why the committee made the recommendations

There was a lack of evidence on referral to specialist services, so the committee based their recommendations on their clinical experience and expertise, and also used the NHS England 2019

guidance for referral pathways to specialist services for adults as a reference.

Children, young people and adults may need access to tertiary services at certain times during their care and these services should be available to everyone who needs them through their specialist. However, the committee acknowledged that some groups may need extra tertiary support to manage their epilepsy, even if they are already receiving care from other specialists for another condition. The committee noted that people with a learning disability or mental health problem may struggle to access tertiary services and may need help to get appropriate referrals. They may also need additional support to attend appointments, such as having a family member or carer accompany them.

With the number of referrals increasing, the committee agreed that clearer and more specific criteria for referral would help to ensure that people who will benefit most from specialist services are prioritised. The proposed criteria aim to ensure that people with epilepsy that is difficult to diagnose or manage receive the specialist care and treatment they need, including consideration for clinical trials. The committee recommended, based on their knowledge and expertise, that people with epilepsy meeting these criteria should be seen within 4 weeks. The committee agreed that these are people with substantial health needs, so prompt referral could have a significant positive impact on their prognosis. This is in line with current clinical practice and consistent with the previous version of the guideline, so it is not expected to have an impact on resources. The committee agreed to retain and update the recommendation from the previous guideline because it was important to continue to guide clinicians to improve care and to reduce variation in service provision and outcomes between services.

The committee also discussed particular groups of children that should be prioritised for more urgent referral within 2 weeks. This was based on the committee's knowledge and experience, and on the probability that treatment from a tertiary paediatric epilepsy service would significantly benefit children meeting these criteria. They agreed that all children under 3 years should be referred to tertiary services without delay, because of the risk of developmental problems with some paediatric syndromes with onset before this age. Children with myoclonic seizures presenting aged up to 4 years should be referred because myoclonic seizures may start after 3 years and could indicate an underlying neurodegenerative disorder that may be treatable. Children with a unilateral structural lesion should be prioritised for immediate referral because this is likely to lead to difficulties in seizure management and surgery may need to be considered early. The presence of deterioration in the child's behaviour, speech or learning (such as loss of previously acquired developmental milestones), particularly in the absence of an established diagnosis, should also be a priority for prompt investigation in tertiary services.

How the recommendations might affect practice

The recommendations will not change current practice, but will reinforce current best practice.

Return to recommendations

Treatment with antiseizure medications

Recommendations 4.1.1 to 4.1.9

Why the committee made the recommendations

These recommendations are based on the committee's informal consensus on principles for the use of antiseizure medications for treating all epilepsy syndromes and seizure types. They are based on recommendations from the previous version of the guideline and have been retained and updated because the committee agreed it was important to include them to guide clinicians to improve care.

The committee agreed on some general factors to consider once the diagnosis of epilepsy is confirmed to ensure that the best treatment is started, balancing the risks and benefits of the medicine with the lifestyle and choices of the person. For example, if a person is starting university and the most effective medication can affect cognitive performance, they may wish to choose a different option without these side effects. For some people, their seizure type may mean that a medicine that is faster-acting to reduce seizures might be a priority. These factors should be discussed with the person with epilepsy (and their families and carers if appropriate) in all settings where antiseizure medications may be prescribed and managed, including primary, secondary and tertiary care.

The committee agreed on some particular issues that should additionally be taken into account when giving antiseizure medications in older people. This group presents with specific considerations because of differences in clinical presentation and aetiology when compared with younger people, particularly those with co-occurring conditions. Treatment can be more difficult because of drug interactions, therefore other medications the person may be taking should be taken into account. Additionally, care is needed in choosing the adequate initial dose and subsequent titration. The committee noted that following the NICE guideline on multimorbidity, which covers care optimisation in people with multiple long-term conditions, may benefit people with epilepsy and 1 or more mental or physical health condition.

The committee agreed that an antiseizure medication treatment strategy should take account of these factors and the special considerations for antiseizure medications in women and girls. The

committee agreed that a shared decision should be made with the person to agree their individualised antiseizure medication treatment strategy.

The committee agreed on some principles if seizures continue after monotherapy treatment, which included reviewing the diagnosis and trying monotherapy with another antiseizure medication to ensure that the most effective treatment strategy is being used. The committee agreed that, when starting an alternative antiseizure medication, the dose of the new antiseizure medication should be slowly increased while the existing antiseizure medication is tapered off because this can reduce the risk of drug-related withdrawal symptoms of the first medication and clinicians can monitor the correct dose of the second medication.

If alternative antiseizure medications prove to be unsuccessful, an add-on treatment should be considered. Because of the possible interactions between antiseizure medications, for example sodium valproate and lamotrigine, the committee agreed that add-on therapies should be carefully titrated and people should be monitored for adverse effects and their medicines reviewed frequently.

The committee highlighted the importance of using the regimen that provides the best balance in terms of effectiveness and tolerability of side effects, and that the benefits of rationalising medications (using a single medicine if possible and what to consider if this monotherapy is unsuccessful) should be discussed with the person with epilepsy (and their families and carers if appropriate) to ensure people are not taking more medicines than is necessary to reduce the impact of side effects.

How the recommendations might affect practice

The recommendations will not change current practice, but will reinforce current best practice.

Return to recommendations

When to start antiseizure medication

Recommendations 4.2.1 and 4.2.2

Why the committee made the recommendations

These recommendations are based on the committee's informal consensus on when to start treatment with antiseizure medication for all epilepsy syndromes and seizure types.

The committee agreed that treatment with antiseizure medication after a first unprovoked seizure should not be offered routinely. However, they agreed that some clinical features should prompt early treatment after a first unprovoked seizure, such as if an examination shows the person has a neurological deficit or the EEG shows unequivocal epileptic activity, which may indicate that the risk of recurrence is high. In some circumstances, for example if there is a risk of loss of employment, further seizures may be unacceptable, so the person or their family or carers may choose to start early treatment. A structural brain abnormality indicates that the brain is damaged, therefore prompt treatment may stop further seizures.

How the recommendations might affect practice

The recommendations will not change current practice, but will reinforce current best practice.

Return to recommendations

Safety considerations

Recommendations 4.3.1 to 4.3.4

Why the committee made the recommendations

These recommendations are based on the committee's informal consensus on safety considerations for starting antiseizure medication to treat all epilepsy syndromes and seizure types with antiseizure medication.

Antiseizure medications differ significantly in their characteristics, therefore the risk of switching between different manufacturer's products, different generic products or branded originator and generic products needs to be taken into account. The committee agreed that Medicines and Healthcare products Regulatory Agency (MHRA) advice on switching between different manufacturer's products needs to be followed.

In line with the BNF, the committee agreed clinicians should be aware of the risks of serious complications associated with phenytoin for people of Han Chinese or Thai family background, and the risks of serious complications associated with carbamazepine and potentially medicines with a similar chemical structure (such as oxcarbazepine and eslicarbazepine acetate) for people of Han Chinese, Thai, European or Japanese family background.

In line with the MHRA, the committee noted the antiseizure medicines most commonly reported to cause decreased bone mineral density and increased risk of osteomalacia. The committee agreed

that appropriate supplementation should be considered for those at risk.

How the recommendations might affect practice

The recommendations will not change current practice, but will reinforce current best practice.

Return to recommendations

Antiseizure medications for women and girls

Recommendations 4.4.1 to 4.4.8

Why the committee made the recommendations

The guideline committee wanted to ensure that women and girls with epilepsy had access to appropriate support and information about contraception, conception, pregnancy, breastfeeding and caring for children, and menopause. They stressed the importance of having regular reviews with women and girls to ensure they had access to further information and treatment as their circumstances change.

The committee referred to the MHRA's Public Assessment Report of antiepileptic drugs: review of safety of use during pregnancy to inform the recommendations.

In the absence of evidence, the committee made consensus recommendations for women and girls with epilepsy who were breastfeeding. They agreed women and girls should be supported to breastfeed if they wish, because the benefits of breastfeeding outweigh the small risk of the drug affecting the child.

Impact of the recommendations on practice

Women and girls with epilepsy do not currently have their concerns addressed adequately. Services providing reviews and support are thought to be under-commissioned at the present time and so the recommendations are likely to have an impact on practice with an increase in regular reviews. The MHRA safety advice may encourage women who are on antiseizure medications other than lamotrigine and levetiracetam to reconsider their treatment options.

Return to recommendations

Monitoring and review

Recommendations 4.5.1 to 4.5.4

Why the committee made the recommendations

Monitoring reviews are essential to reassess the clinical management plans of people with epilepsy as their needs change. Evidence comparing regular scheduled reviews with patient-initiated ad-hoc reviews did not suggest any differences in benefit or harm between these approaches. The committee discussed that patient-initiated review could help to ensure timely management of changes in a person's needs and support their sense of ownership of managing their epilepsy. However, it would have disadvantages for people with less independence or capacity to make decisions, and could lead to loss of contact with services, with potentially serious consequences. It might also be unsuitable for people with a serious or complex condition, for whom failing to contact services could be particularly harmful.

The committee agreed that patient-initiated review should be available to all people with epilepsy, but that regular reviews should be provided to groups that are less suited to a patient-initiated approach. Based on their experience, the committee agreed that groups scheduled for regular reviews should include people with reduced capacity for decision making, people with serious or complex epilepsy, those with serious comorbidities, and children and young people. They also identified people taking antiseizure medication associated with long-term side effects or drug interactions as a priority to check for any adverse effects. Long-term side effects may include adverse effects on blood parameters or bone health, or changes in lipid metabolism. Enzyme-inducing medications in particular are associated with reduced bone density. Regular review for women and girls who are able to have children and are taking valproate or other high-risk teratogenic medication was also recommended to allow a discussion of their treatment options and any plans for pregnancy. The committee commented that regular review is current practice for children and young people, typically with 2 reviews a year and at least once every 12 months.

The evidence comparing therapeutic drug monitoring with clinical review suggested there is little difference in benefit between these approaches. Based on their experience, the committee agreed that for most people with epilepsy, therapeutic drug monitoring is unnecessary, but that certain groups might gain particular benefit from it. These groups include people who need accurate titration of their medicine levels, such as those with side effects, whose seizures are not controlled with treatment and those in whom adherence is less assured. They also include people at particular risk from their medication, because of either the intrinsic nature of the medication or the increased risks of the medication in people with comorbidities or who are pregnant (for example, to monitor

for changes in lamotrigine plasma levels during pregnancy and after birth).

How the recommendations might affect practice

The recommendations may change practice because regular review is currently standard practice for all people with epilepsy. There was some concern that specialist nurse services would need to be developed to coordinate patient-initiated reviews. However, the committee agreed that demand on services is likely to be manageable, provided that regular reviews are maintained for groups that might have additional need for coordination. Restricting therapeutic drug monitoring to a few specific groups will not place any extra burden on providers, and might even slightly reduce it.

Return to recommendations

Support and monitoring for women planning pregnancy or who are pregnant

Recommendations 4.6.1 to 4.6.10

Why the committee made the recommendations

The committee acknowledged the potential importance of drug monitoring in pregnancy. However, the available evidence was limited to a single study. The committee agreed that the evidence was inconclusive, so the group based the recommendations on their own experience and guidance from the MHRA about monitoring levels of carbamazepine, lamotrigine, levetiracetam, oxcarbazepine, phenobarbital or phenytoin if used in pregnancy. The committee noted that on-site testing is often available at tertiary epilepsy centres for some antiseizure medications, including carbamazepine, phenytoin and phenobarbital. They acknowledged that phenytoin and phenobarbital are not usually taken by girls and women who are planning pregnancy. The committee also agreed that pre-conception monitoring of antiseizure medication levels should be considered in women and girls at risk of their seizures worsening during pregnancy and made a recommendation based on committee consensus. The committee highlighted the importance of obtaining pre-conception levels of antiseizure medication as a baseline level to compare and titrate against when monitoring drug levels during pregnancy.

The committee expressed the need for robust evidence in this area and therefore suggested a recommendation for research on monitoring antiseizure medications in women and girls.

How the recommendations might affect practice

The committee noted that currently there would be some women with epilepsy who are planning pregnancy or who are pregnant who are not having their antiseizure medications monitored. The recommendations are in line with MHRA safety advice on monitoring in pregnancy, and may result in some increases in drug monitoring compared with current practice.

Return to recommendations

Discontinuing antiseizure medication

Recommendations 4.7.1 to 4.7.7

Why the committee made the recommendations

Decisions about stopping antiseizure medication are nuanced, based on the person's preferences and their individual risk of seizure recurrence. Although there was some evidence for independent risk factors associated with seizure recurrence, the committee agreed that the recommendations should be broader than listing risk factors, which could be misleading in isolation.

Ongoing risk and benefit assessment is important to take account of the evolving needs of the person with epilepsy. Based on their knowledge and experience, the committee agreed that an individualised assessment of the risk of seizure recurrence should be carried out in those who have been 2 years without seizures. The committee stressed the importance of having a discussion with the person, and their family or carer if appropriate, about their personal preferences and the person's individual risk of seizure recurrence, in particular taking into account the type of epilepsy, so that the person is able to make an informed decision about their care. For example, stopping antiseizure medication in people with certain epileptic syndromes, such as juvenile myoclonic epilepsy, structural abnormalities or with co-existing neurodegenerative and other neurological conditions will pose a significant risk of seizure recurrence.

The committee agreed that guidance should be sought if there are doubts or concerns about the risks and benefits of discontinuing antiseizure medications. Because of the complexity and wide variation of epilepsy surgery techniques, the committee agreed that those who have undergone epilepsy surgery should have antiseizure medications discontinued under the guidance of the epilepsy surgery centre.

The committee highlighted the importance of stopping antiseizure medications slowly, especially benzodiazepines and barbiturates, because of the possibility of drug-related withdrawal symptoms.

They also agreed that epilepsy specialist guidance would be needed if seizures recur.

How the recommendations might affect practice

The recommendations will not change current practice, but will reinforce current best practice.

Return to recommendations

Generalised tonic-clonic seizures

Recommendations 5.1.1 to 5.1.8

Why the committee made the recommendations

Generalised tonic-clonic seizures rapidly involve both sides of the brain. During such seizures, consciousness is lost and muscles will stiffen before jerking rhythmically.

The evidence showed that, for time to treatment failure, no drugs performed better than sodium valproate, with sodium valproate showing clear benefits over lacosamide, phenobarbital, carbamazepine and topiramate. There was no clear difference between sodium valproate and all other drugs for remission or time to first seizure. The committee agreed that sodium valproate should be offered as first-line treatment, but because of the risks to unborn babies associated with sodium valproate use in pregnancy, they highlighted that it should not be used in women and girls who are able to have children unless other treatments are unsuccessful and the MHRA safety advice is followed.

The evidence suggested that, after sodium valproate, lamotrigine and levetiracetam had the next best time until treatment failure. For this reason, the committee recommended them as first-line monotherapy options for women and girls who can have children and second-line monotherapy options when sodium valproate is unsuccessful as first-line monotherapy.

The committee discussed the evidence on adverse events and their importance in making choices about drug treatment. However, these were reported inconsistently across the studies making comparisons between drugs difficult. The committee also agreed that for most drugs, adverse events could be managed by careful titration and dosage changes.

From the evidence, it was difficult to determine the most effective add-on drug for generalised tonic-clonic seizures that have failed to respond to monotherapy. Therefore, a number of drugs were recommended as potential first-line add-on treatments. There was evidence that lamotrigine,

levetiracetam, perampanel and topiramate performed better than placebo for achieving a 50% response rate. No evidence was identified for clobazam and sodium valproate, but the committee agreed to include them based on their experience and current use in practice. There was also some evidence that levetiracetam and perampanel were more effective than placebo at achieving seizure freedom, but there was a lot of uncertainty around these results.

The evidence also suggested that brivaracetam might be more effective than placebo at achieving more than 50% reduction in seizure frequency, and lacosamide was less effective than levetiracetam for the same outcome. The committee therefore recommended both brivaracetam and lacosamide, as well as phenobarbital, primidone and zonisamide, based on their experience and knowledge of current practice, as possible second-line add-on treatments.

The committee stressed again that women and girls able to have children should not be offered sodium valproate as a first-line add-on.

The committee highlighted that clinicians should take into account that some drugs used in clinical practice can exacerbate seizures in those with absence or myoclonic seizures, including in juvenile myoclonic epilepsy.

In line with the MHRA, the committee emphasised that long-term treatment with primidone and sodium valproate can cause decreased bone mineral density and increased risk of osteomalacia. The committee noted that appropriate supplementation should be considered for those at risk.

How the recommendations might affect practice

The recommendations will reinforce current practice.

Return to recommendations

Focal seizures with or without evolution to bilateral tonic-clonic seizures

Recommendations 5.2.1 to 5.2.7

Why the committee made the recommendations

Focal-onset seizures originate in 1 area on 1 side of the brain and the person may have full or partial awareness. Symptoms vary widely depending on the area of the brain they originate from.

The evidence showed that lamotrigine and levetiracetam were continued for longer than other drugs for treating focal epilepsy, suggesting that they may be more effective and better tolerated. However, the evidence also suggested they were not more effective than other drugs in terms of remission at 6 and 12 months, and the evidence for time to first seizure suggested they were less effective than carbamazepine.

The committee discussed the evidence on adverse events and their importance in making choices about drug treatment. The evidence suggested that lamotrigine, levetiracetam and gabapentin may have more tolerable adverse events than other drugs. However, adverse events were reported inconsistently across the studies making comparisons between drugs difficult. The committee also agreed that for most drugs, adverse events could be managed by careful titration and dosage changes.

The committee agreed that lamotrigine and levetiracetam should be considered as first-line monotherapy options, and this was supported by economic modelling. They agreed that if these treatments were unsuccessful, carbamazepine, oxcarbazepine or zonisamide could be considered for second-line monotherapy. The evidence was weaker for lacosamide, so this was included as a third-line option.

From the evidence, it was difficult to determine the most effective add-on treatment for people with focal epilepsy that has failed to respond to monotherapy. The evidence showed that a number of antiseizure medications are effective compared with placebo for more than 50% reduction in seizure frequency rate: brivaracetam, carbamazepine, eslicarbazepine acetate, lacosamide, lamotrigine, levetiracetam, oxcarbazepine, perampanel, pregabalin, topiramate and zonisamide. Medications with the strongest evidence for this outcome were recommended as first-line options. The committee agreed the use of cenobamate as an add-on treatment, after at least 1 other add-on antiseizure medication has been unsuccessful, in line with NICE's technology appraisal guidance on cenobamate for treating focal onset seizures in epilepsy.

As with the evidence for monotherapy, the evidence on adverse events with add-on therapy was inconsistent and the committee were not able to use it to inform the recommendations.

Although the evidence was less clear, the committee agreed that, based on their experience, sodium valproate can also be an effective option. Because of the risks to unborn babies associated with sodium valproate use in pregnancy, the committee highlighted that it should not be used in women and girls who are able to have children unless other treatments are unsuccessful and the MHRA safety advice is followed.

There was a lack of evidence for other antiseizure medications, but based on the committee's experience, phenobarbital, phenytoin and vigabatrin were recommended only when the previous treatments are not tolerated or are unsuccessful, for example because of the risk of particular adverse effects.

The committee noted that, in line with guidance from the MHRA, clinicians should be aware of the risks of serious complications associated with phenytoin for people of Han Chinese or Thai family background, and the risks of serious complications associated with carbamazepine, and potentially medicines with a similar chemical structure (such as oxcarbazepine and eslicarbazepine acetate) for people of Han Chinese, Thai, European or Japanese family background.

In addition, in line with the MHRA, the committee emphasised that long-term treatment with carbamazepine, phenytoin and sodium valproate can cause decreased bone mineral density and increased risk of osteomalacia. The committee noted that appropriate supplementation should be considered for those at risk.

How the recommendations might affect practice

The recommendations will reinforce current practice. Previous NICE guidance recommended lamotrigine and carbamazepine for first-line monotherapy, with restrictions on the use of levetiracetam owing to costs. Levetiracetam is now significantly cheaper and widely prescribed in the NHS. These recommendations may lead to a small increase in the use of levetiracetam, but this will not lead to a significant increase in costs.

All drugs recommended as add-on treatments are already widely used. Gabapentin and clobazam are no longer recommended, which may lead to a small decrease in the use of these drugs. However, these drugs are not widely used and are likely to be continued in people who are already using them successfully.

Return to recommendations

Absence seizures

Recommendations 5.3.1 to 5.3.9

Why the committee made the recommendations

Absence seizures are a form of generalised epileptic seizure, characterised by a lack of awareness, stopping moving or talking and staring blankly. They can occur in isolation, but can also be

associated epilepsy syndromes, such as childhood absence epilepsy, juvenile absence epilepsy and juvenile myoclonic epilepsy. The evidence identified was only on children and young people; however, the committee agreed that it was appropriate to extrapolate from this evidence to the adult population because of the similar pathophysiology in children, young people and adults.

Absence seizures (including childhood absence epilepsy)

The limited evidence suggested that ethosuximide may improve outcomes for absence seizures (including childhood absence epilepsy). It also suggested that ethosuximide may increase the likelihood of remission, which is the main objective of treatment for people with these seizures. The committee agreed that, despite a lack of robust evidence, their expertise and experience supported the use of ethosuximide as first-line treatment for absence seizures. The committee noted that ethosuximide treatment may lead to improved cognitive outcomes and is already well established in clinical practice.

The committee agreed that sodium valproate should be offered as second-line monotherapy or add-on treatment for absence seizures because the evidence suggested that it may increase the likelihood of remission and it appears to be associated with fewer adverse events than other drugs reviewed. The committee acknowledged that sodium valproate should be used with caution in women and girls, only if the risks and benefits have been thoroughly discussed, other treatments are unsuccessful and MHRA safety advice is followed. However, they agreed that sodium valproate should be considered because absence seizures are usually self-limiting, so treatment is likely to be discontinued or an alternative sought if seizures continue beyond puberty. In line with the MHRA, the committee emphasised that long-term treatment with sodium valproate can cause decreased bone mineral density and increased risk of osteomalacia. The committee noted that appropriate supplementation should be considered for those at risk.

The evidence also suggested that lamotrigine and levetiracetam were effective in treating absence seizures. However, the evidence was limited and the committee agreed that these medications should only be considered as third-line monotherapy or add-on treatments.

The committee agreed that although other antiseizure medications are used in clinical practice and may benefit some people, it should be highlighted that some can exacerbate seizures.

Absence seizures with other seizure types

The evidence showed that sodium valproate is associated with a higher likelihood of remission and is well tolerated, so the committee agreed that it should be considered as first-line treatment for absence seizures with other seizure types (or at risk of other seizure types). However, because of

the risks to unborn babies associated with sodium valproate use in pregnancy, the committee decided that it should not be offered as first-line treatment for women and girls able to have children who experience absence seizures in addition to other seizure types. In addition, in line with the MHRA, the committee emphasised that long-term treatment with sodium valproate can cause decreased bone mineral density and increased risk of osteomalacia. The committee noted that appropriate supplementation should be considered for those at risk.

The evidence also indicated that lamotrigine and levetiracetam are effective, so the committee agreed that these could be considered as first-line options for women and girls able to have children and as second-line monotherapy or add-on treatment options for men, boys and women unable to have children.

The evidence on ethosuximide suggested that it may improve outcomes for absence seizures and increase the likelihood of remission, so the committee agreed that it could also be a possible second-line add-on treatment. Because ethosuximide only controls absence seizures, the committee noted that it should not be used as monotherapy treatment for absence seizures with other seizure types.

The committee agreed it is important to stress that for some women and girls who are able to have children, sodium valproate may still be an option, but only if the risks and benefits have been thoroughly discussed, other treatments are unsuccessful and safety advice from the MHRA is followed. This should be a shared decision taken by the person with epilepsy and their healthcare professional.

The committee agreed that although other antiseizure medications are used in clinical practice and may benefit some people, it should be highlighted that some can exacerbate seizures.

How the recommendations might affect practice

The recommendations will not change current practice, but will reinforce current best practice.

Return to recommendations

Myoclonic seizures

Recommendations 5.4.1 to 5.4.8

Why the committee made the recommendations

There was very limited evidence on first-line treatment for myoclonic seizures, so the committee used their clinical expertise and expert opinion to inform the recommendations. The onset of myoclonic seizures before the age of 4 years may indicate an underlying neurodegenerative disorder, therefore the committee agreed that these children should be referred to a tertiary paediatric neurologist.

Myoclonic seizures are classified as generalised seizures. Because no evidence was identified on monotherapy or first-line treatments for myoclonic seizures, the committee agreed that it was appropriate to extrapolate from the evidence reviewed on generalised tonic-clonic seizures. Based on this, the committee agreed that sodium valproate is the most effective treatment option for myoclonic seizures compared with other antiseizure medications. However, because of the risks to unborn babies associated with sodium valproate use during pregnancy, the committee agreed that it was important to make separate recommendations for women and girls who are able to have children. In addition, in line with the MHRA, the committee emphasised that long-term treatment with sodium valproate can cause decreased bone mineral density and increased risk of osteomalacia. The committee noted that appropriate supplementation should be considered for those at risk.

There was some evidence that levetiracetam, when used as an add-on treatment, is effective in controlling seizures, so the committee agreed that it should be offered as the first-line treatment in women and girls who are able to have children, and for younger girls with epilepsy likely to continue beyond puberty. Based on this evidence, the committee agreed that levetiracetam should also be offered as a second-line add-on or monotherapy treatment for men and boys if sodium valproate is unsuccessful.

The committee agreed it is important to stress that for some women and girls who are able to have children, sodium valproate may still be an option, but only if the risks and benefits have been thoroughly discussed, other treatments are unsuccessful and safety advice from the MHRA is followed. This should be a shared decision taken by the person with epilepsy and their healthcare professional.

In the absence of robust evidence, the committee discussed their experience and knowledge of other antiseizure medications for myoclonic seizures and agreed that brivaracetam, clobazam, clonazepam, lamotrigine, phenobarbital, piracetam, topiramate and zonisamide may be effective as third-line treatments if second-line monotherapy or add-on treatment is not sufficient to stop seizures. The committee noted that doctors should use their knowledge and experience to

determine which treatment is most appropriate for the person with myoclonic seizures, taking into account clinical factors and the person's preferences and choice. They noted that although lamotrigine is used in clinical practice and may benefit some people, it can sometimes exacerbate myoclonic seizures.

The committee wanted to make clear that carbamazepine, gabapentin, oxcarbazepine, phenytoin, pregabalin, tiagabine and vigabatrin should not be used because they are known to increase the frequency of myoclonic seizures.

How the recommendations might affect practice

The recommendations will not change current practice, but will reinforce current best practice.

Return to recommendations

Tonic or atonic seizures

Recommendations 5.5.1 to 5.5.9

Why the committee made the recommendations

Tonic or atonic seizures are events that may cause a person to suddenly drop to the floor. These may be the result of atonic (generalised loss of tone) or tonic (sustained generalised body stiffening) seizures. Although these are characteristic of Lennox–Gastaut syndrome, they are also seen in other epilepsy syndromes and aetiologies. They often result in injury and can therefore have a significant impact on quality of life.

Because of the complexities associated with the treatment of tonic or atonic seizures and the range of syndromes of which they can be a feature, the committee agreed that a neurologist with expertise in epilepsy should assess people with these seizures in order to provide accurate diagnoses if possible and advise on further investigations as well as treatment.

Tonic or atonic seizures are classified as generalised seizures. Because no evidence was identified on monotherapy or first-line treatments for tonic or atonic seizures, the committee agreed that it was appropriate to extrapolate from the evidence on generalised tonic-clonic seizures. Based on this, the committee agreed that sodium valproate is the most effective treatment option for tonic or atonic seizures compared with other antiseizure medications. However, because of the risks to unborn babies associated with sodium valproate use during pregnancy, the committee agreed that it was important to make separate recommendations for women and girls who are able to have

children. In addition, in line with the MHRA, the committee emphasised that long-term treatment with sodium valproate can cause decreased bone mineral density and increased risk of osteomalacia. The committee noted that appropriate supplementation should be considered for those at risk.

There was some evidence that lamotrigine, when used as an add-on therapy, is effective in controlling tonic and atonic seizures or drop attacks, so the committee agreed that it could be considered as first-line treatment for women and girls who are able to have children and as a second-line monotherapy or add-on treatment for boys and men, and women and girls unable to have children.

However, the committee also agreed that for some women and girls who are able to have children, sodium valproate may still be an option, but only if the risks and benefits have been thoroughly discussed, other treatments are unsuccessful and safety advice from the MHRA is followed. This should be a shared decision taken by the person with epilepsy and their healthcare professional.

The evidence indicated that clobazam, rufinamide and topiramate can also be effective in the management of tonic and atonic seizures and the committee recommended that any of these antiseizure medications could be used as a third-line monotherapy or add-on treatment. In the absence of clear cost-effectiveness evidence of superiority between the different options, the committee agreed that clinicians should use their knowledge and experience to determine which treatment is most appropriate for the person with epilepsy, taking into account clinical factors and the person's preference.

Evidence was identified for a number of other treatment options; however, the low quality and absence of direct comparisons meant that it was difficult for the committee to prioritise 1 treatment over another. The committee agreed that a ketogenic diet can be considered as an add-on treatment and, if this is unsuccessful, felbamate may also be an option as an add-on treatment. However, these treatments should only be used under the supervision of a ketogenic diet team or a neurologist with expertise in epilepsy, respectively, because of the complex nature of the epilepsy.

The committee agreed that although other antiseizure medications are used in clinical practice and may benefit some people, it should be highlighted that some can exacerbate seizures.

How the recommendations might affect practice

The recommendations are not likely to change current practice, but should reinforce best practice.

Return to recommendations

Idiopathic generalised epilepsies

Recommendations 5.6.1 to 5.6.5

Why the committee made the recommendations

Idiopathic generalised epilepsies are 1 of the most common forms of epilepsy. These are well defined, and onset is usually in adolescence, although it can begin in childhood. Seizures will continue into middle age, after which there is some evidence that these will remit, but is not possible to predict in which people this will occur. Many have a good prognosis for seizure control with antiseizure medications and treatment goal is seizure freedom.

The evidence showed that sodium valproate is the most effective treatment for idiopathic generalised epilepsies compared with other antiseizure medications. However, because of the risks to unborn babies associated with sodium valproate use during pregnancy, the committee agreed that it was important to make separate recommendations for women and girls who are able to have children. In addition, in line with the MHRA, the committee emphasised that long-term treatment with sodium valproate can cause decreased bone mineral density and increased risk of osteomalacia. The committee noted that appropriate supplementation should be considered for those at risk.

The evidence showed that both lamotrigine and levetiracetam were effective at reducing seizures, and the committee agreed that they should be options for first-line treatment in women and girls who are able to have children, and for younger girls with epilepsy likely to continue beyond puberty.

The committee agreed it was important to stress that for some women and girls who are able to have children, sodium valproate may still be an option, but only if the risks and benefits have been thoroughly discussed, other treatments are unsuccessful and safety advice from the MHRA is followed. This should be a shared decision taken by the person with epilepsy and their healthcare professional.

There was some evidence that levetiracetam is of benefit as add-on therapy compared with placebo. The evidence also showed that lamotrigine was associated with fewer side effects leading to treatment stopping and better health-related quality of life than sodium valproate. Therefore, the committee agreed that these medications could be considered as monotherapy or add-on treatment if first-line treatment is unsuccessful.

The included studies did not show a clinically important benefit for topiramate when compared with placebo or valproate; however, the committee noted that this drug is useful in clinical practice. The evidence showed that add-on perampanel is effective for reducing seizures and therefore, based on their expert opinion and the evidence reviewed respectively, the committee agreed that these drugs should be available as a third-line add-on treatment option.

How the recommendations might affect practice

The committee agreed these recommendations will reinforce current best practice.

Return to recommendations

Dravet syndrome

Recommendations 6.1.1 to 6.1.8

Why the committee made the recommendations

Onset of Dravet syndrome is usually in the first year of life. Children present with prolonged febrile seizures, which may need admission to an intensive care unit. Dravet syndrome can be difficult to diagnose in the first year of life; therefore, the committee emphasised that these recommendations only apply once the diagnosis has been confirmed and discussed with a paediatric neurologist.

Dravet syndrome is complex to treat and the response to treatment is variable. Based on their experience and expertise, the committee agreed that the involvement of a neurologist with expertise in epilepsy is needed to guide the care of people with Dravet syndrome.

There was no evidence for first-line treatments, so the committee based their recommendations on clinical experience and expert opinion. The committee agreed that sodium valproate can be effective at reducing seizures in people with Dravet syndrome because it is successfully used in current practice to treat generalised epilepsies, including Dravet syndrome. The committee acknowledged that sodium valproate should be used with caution in women and girls, only after the risks and benefits have been thoroughly discussed and in line with safety advice from the MHRA. However, they agreed that sodium valproate should be considered as first-line treatment for all people with Dravet syndrome, because there are few effective treatment options and treatment is often started at a young age (under 2 years). In line with the MHRA, the committee emphasised that long-term treatment with sodium valproate can cause decreased bone mineral density and increased risk of osteomalacia. The committee noted that appropriate supplementation should be considered for those at risk.

The evidence suggested that triple therapy with sodium valproate, clobazam and stiripentol was effective at reducing seizures in children and young people whose seizures were previously treated unsuccessfully with clobazam and sodium valproate in combination. Although the evidence was limited, the committee agreed that it supported this as first-line add-on therapy. The committee also highlighted that careful titration of doses and regular review are important because of possible adverse effects such as sedation.

The committee agreed that the NICE technology appraisal guidance on cannabidiol with clobazam for treating seizures associated with Dravet syndrome supports the use of this combination as a second-line treatment option.

There was an absence of evidence to guide further treatment if seizures continue. The committee recommended further treatment options based on their experience and expert opinion, and agreed that these should be considered only under the supervision of a neurologist with expertise in epilepsy or a ketogenic diet team, as appropriate. The use of potassium bromide is unusual in practice, but the committee noted that for some people with Dravet syndrome, it can be effective.

The committee were aware of ongoing trials, but agreed that further research on treating Dravet syndrome when first-line therapy is unsuccessful or not tolerated would be beneficial and they developed a recommendation for research on complex epilepsy syndromes to help inform future guidance.

How the recommendations might affect practice

The recommendations will not change current practice, but will reinforce best practice.

Return to recommendations

Lennox–Gastaut syndrome

Recommendations 6.2.1 to 6.2.9

Why the committee made the recommendations

Lennox–Gastaut syndrome is a severe developmental and epileptic encephalopathy with onset in childhood. It can be difficult to diagnose, so children may be started on antiseizure medication before a final diagnosis is established.

Lennox–Gastaut syndrome is complex to treat and the response to treatment is variable. Based on

their experience and expertise, the committee agreed that the involvement of a neurologist with expertise in epilepsy is needed to guide the care of people with Lennox–Gastaut syndrome.

There was no evidence for first-line treatments, so the committee based the recommendations on clinical experience and expert opinion. The committee agreed that sodium valproate can be effective in suppressing seizures in people with Lennox–Gastaut syndrome because it is successfully used in current practice to treat generalised epilepsy, including Lennox–Gastaut syndrome. They acknowledged that sodium valproate should be used with caution in women and girls, and only if the risks and benefits have been thoroughly discussed and safety advice from the MHRA is followed. However, they agreed that it should be considered as first-line treatment for all people with Lennox–Gastaut syndrome because there are few effective treatment options and treatment is often started at a young age (under 2 years). In line with the MHRA, the committee emphasised that long-term treatment with sodium valproate can cause decreased bone mineral density and increased risk of osteomalacia. The committee noted that appropriate supplementation should be considered for those at risk.

The evidence showed that when used as an add-on treatment, lamotrigine is effective for reducing seizures and drop attacks, therefore the committee agreed that it could be used as second-line therapy, as either an add-on or monotherapy treatment if treatment was not successful or first-line therapy is not tolerated. If used as an add-on therapy, the committee recommended lower initial doses and caution in titration, in line with the BNF. This is because of interactions between sodium valproate and lamotrigine.

There was some evidence that clobazam, rufinamide and topiramate were of benefit in reducing seizure frequency and drop attacks when used as add-on therapy compared with a placebo. In addition, the NICE technology appraisal guidance on cannabidiol with clobazam for treating seizures associated with Lennox–Gastaut syndrome supports the use of this combination as a further treatment option. Therefore, the committee agreed that any of these treatment options could be considered as an add-on treatment if first- and second-line therapy are not tolerated or if seizures continue.

There was an absence of robust evidence to guide further treatment if seizures continue. The committee discussed possible alternative treatment options and, based on their expert opinion and knowledge, agreed that a ketogenic diet or felbamate could be considered, but only under the supervision of a ketogenic diet team or neurologist with expertise in epilepsy, respectively.

The committee noted that although other drugs are used in clinical practice and may benefit some people with Lennox–Gastaut syndrome, it should be highlighted that they can exacerbate seizures

in some people.

Given the paucity of published drug trial data in this population, the committee decided to prioritise a recommendation for research on complex epilepsy syndromes including the effectiveness of antiseizure therapies in people with Lennox–Gastaut syndrome when first-line therapy is unsuccessful or not tolerated.

How the recommendations might affect practice

The recommendations are not likely to change current practice, but should reinforce best practice.

Return to recommendations

Infantile spasms syndrome

Recommendations 6.3.1 to 6.3.11

Why the committee made the recommendations

Infantile spasms are a severe developmental and epileptic encephalopathy that need urgent care. Based on experience and expertise, the committee agreed that guidance should be sought immediately from a tertiary paediatric neurologist, followed by referral if needed. If untreated, long-term risks of infantile spasms include poor neurodevelopmental outcomes, which could be a serious safety concern. Based on their experience and expertise, the committee stressed that prompt diagnosis and treatment is associated with an improved prognosis. Based on best practice and monitoring strategies used in the studies included in the review, the committee agreed that these children should be monitored both during and after treatment for the relapse of spasms and the emergence of other seizure types, as well as for possible side effects related to treatment.

The evidence suggested that first-line treatment combining steroids with vigabatrin is more effective than either steroids or vigabatrin alone in stopping spasms. There was no clear evidence about whether oral or injectable steroids were better, but the committee agreed that oral steroids would be easier to use.

Based on their expert opinion, the committee agreed that steroids may not be suitable for all children under 2 years and that vigabatrin alone should be considered for those at high risk from the side effects of steroid treatment, such as those with neurological impairments and other comorbidities.

There was evidence that vigabatrin alone is effective for children with infantile spasms associated with tuberous sclerosis, so the committee agreed that it should be used as first-line treatment in these children, with high-dose oral prednisolone added on if vigabatrin is ineffective after 1 week.

The committee agreed that there should be a discussion between parents and carers of children under 2 years taking steroids and their healthcare professional, and that information should be given about possible side effects, such as the increased risk of infection, high blood pressure and high blood sugar levels. Information should include, for example, how to reduce exposure to infections such as chickenpox and what to do if the child may have been exposed.

The evidence showed that higher doses of both vigabatrin and oral steroids gave improved freedom from spasms, so the committee agreed that dosages should be increased in line with the guidance in the BNF for children. Based on their expert opinion, the committee agreed that it may be necessary to go above the specified doses of vigabatrin if the spasms do not stop, but this should be carried out with specialist supervision.

There was an absence of robust evidence to guide second-line treatments. The committee agreed possible options based on expert opinion and experience, which should be guided and supervised by a tertiary paediatric neurologist experienced in the care of these children.

The committee agreed to prioritise a recommendation for research on complex epilepsy syndromes including the effectiveness of antiseizure therapies for infantile spasms when first-line therapy is unsuccessful, because there is no controlled trial data to support evidence-based therapy decisions when first-line treatment fails to stop the spasms.

How the recommendations might affect practice

The recommendations will not change current practice, but will reinforce best practice.

Return to recommendations

Self-limited epilepsy with centrotemporal spikes

Recommendations 6.4.1 to 6.4.8

Why the committee made the recommendations

Children will grow out of self-limited epilepsy with centrotemporal spikes by their early teens. Some only have infrequent seizures, which have little impact on wellbeing. Therefore, not all

children and young people and their families will choose antiseizure medication treatment. The committee acknowledged the importance of discussing the balance of risks and benefits of treatment compared with no treatment, with the child or young person and their family or carers, and agreed on some important factors that should form part of a full discussion about treatment. They also agreed that the risk of sudden unexpected death in epilepsy (SUDEP) should be discussed, and reassurance given that this is very rare.

The committee members were confident, based on their experience and knowledge, that current practice using antiseizure medications is effective at controlling seizures in children and young people with self-limited epilepsy with centrotemporal spikes.

There was a lack of evidence on antiseizure medications for self-limited epilepsy with centrotemporal spikes, but because these children and young people usually have focal seizures, the committee agreed to use the evidence on monotherapy for treating focal seizures to inform the recommendations for first- and second-line treatments. This evidence showed that lamotrigine and levetiracetam were continued for longer than other drugs for treating focal epilepsy, suggesting that they may be more effective and better tolerated. However, the evidence also suggested they were not more effective than other drugs in terms of remission at 6 and 12 months, and the evidence for time to first seizure suggested they were less effective than carbamazepine.

The evidence on focal seizures suggested that lamotrigine, levetiracetam and gabapentin may have more tolerable adverse events than other drugs. However, adverse events were reported inconsistently across the studies making comparisons between drugs difficult. The committee also agreed that, for most drugs, adverse events could be managed by careful titration and dosage changes.

Based on the evidence for focal seizures, the committee agreed that lamotrigine and levetiracetam should be considered as first-line treatment options, and carbamazepine, oxcarbazepine or zonisamide as second-line monotherapy treatments.

The committee noted that, in line with guidance from the MHRA, clinicians should be aware of the risks of serious complications associated with carbamazepine and potentially medicines with a similar chemical structure (such as oxcarbazepine and eslicarbazepine acetate) for people of Han Chinese, Thai, European or Japanese family background.

In addition, in line with the MHRA, the committee emphasised that long-term treatment with carbamazepine can cause decreased bone mineral density and increased risk of osteomalacia. The committee noted that appropriate supplementation should be considered for those at risk.

The evidence on self-limited epilepsy with centrotemporal spikes showed that sulthiame is effective for reducing seizures, and so the committee agreed that it should also be available. However, the evidence was limited in quantity and sulthiame is not currently licensed in the UK, so the committee decided that it should be considered as a third-line treatment if licensed options are unsuccessful, and only in consultation with a tertiary paediatric neurologist.

The committee noted that in their experience, carbamazepine, oxcarbazepine and lamotrigine are sometimes associated with increased seizures or the development of another epilepsy syndrome. The committee recognised that only a small number of children are likely to be affected by these problems, but agreed that any change should prompt a sleep electroencephalogram (EEG) to exclude developmental epileptic encephalopathy with spike-wave activation in sleep, which may indicate an atypical form of self-limited epilepsy with centrotemporal spikes. The committee agreed that poor school performance should also prompt a neuropsychology assessment.

Based on their experience, the committee agreed that these children and young people will have varied needs for review, for example, depending on frequency of seizures and choice of treatment. Regular reviews are important to prevent children and young people continuing on unnecessary treatment and allow discussion of stopping treatment. The committee agreed that this should usually happen when the child has been seizure-free for 2 years or at age 14 years.

How the recommendations might affect practice

The recommendations are not likely to change current practice, but should reinforce best practice.

Return to recommendations

Epilepsy with myoclonic-atonic seizures (Doose syndrome)

Recommendations 6.5.1 to 6.5.7

Why the committee made the recommendations

Epilepsy with myoclonic-atonic seizures is a rare condition in young children. Successful treatment depends on accurate diagnosis, so based on their experience and expertise, the committee agreed that a tertiary paediatric neurologist should advise on management.

No evidence was identified on treating epilepsy with myoclonic-atonic seizures. Based on their

experience, the committee agreed that levetiracetam and sodium valproate should be considered as first-line treatment options because they are used effectively in current practice to treat generalised epilepsy, including epilepsy with myoclonic-atonic seizures. The committee acknowledged that sodium valproate should be used with caution in women and girls, only after the risks and benefits have been thoroughly discussed, other treatments are unsuccessful and MHRA safety advice is followed. However, they agreed that sodium valproate should be considered as a first-line treatment option for girls and women with epilepsy with myoclonic-atonic seizures, with regular review of the risks and benefits, because there are few effective treatment options available, treatment is often started at a young age and most children will outgrow their seizures by their teenage years. In line with the MHRA, the committee emphasised that long-term treatment with sodium valproate can cause decreased bone mineral density and increased risk of osteomalacia. The committee noted that appropriate supplementation should be considered for those at risk.

The committee were aware of studies that showed benefits of a ketogenic diet in these children, and based on this knowledge and their experience, agreed that this should be considered as a second-line add-on or alternative treatment, under the supervision of a ketogenic diet team.

In the absence of evidence, the committee discussed their experience and knowledge of other antiseizure medications for epilepsy with myoclonic-atonic seizures. They agreed that clobazam, ethosuximide, topiramate and zonisamide may be effective. However, these medicines are less commonly used than the first-line treatments, so the committee decided that they could be considered only if first- and second-line options are unsuccessful.

The committee wanted to make it clear that carbamazepine, gabapentin, oxcarbazepine, phenytoin, pregabalin and vigabatrin should not be used for epilepsy with myoclonic-atonic seizures, because they are known to increase the frequency of seizures in this type of epilepsy.

Children can grow out of epilepsy with myoclonic-atonic seizures, so the committee discussed discontinuing treatment. Based on their experience, they agreed that this should be considered if the child is seizure-free for 2 years.

The committee agreed that further research is needed on treating epilepsy with myoclonic-atonic seizures when first-line therapy is unsuccessful or not tolerated and developed a recommendation for research on complex epilepsy syndromes to help inform future guidance.

How the recommendations might affect practice

The recommendations are not likely to change practice.

Return to recommendations

Status epilepticus

Recommendations 7.1.1 to 7.1.12

Why the committee made the recommendations

Convulsive status epilepticus is a medical emergency that needs immediate treatment with antiseizure medication. The committee noted the importance of an agreed, individualised emergency management plan for people with epilepsy that should be followed for people experiencing status epilepticus. The management plan should include details of any emergency medicine that has been prescribed, who is trained to use it and when to give it.

The evidence showed an overall benefit for benzodiazepines, but no clear evidence to support a particular drug. The committee agreed that the speed of delivery is more important than the type of benzodiazepine, and that the route of administration is likely to depend on whether the drug is being given in the community or in a hospital. In community settings, medicines are usually given in buccal or rectal forms because intravenous access is not available. The committee discussed that intravenous lorazepam is routinely given in hospitals and agreed that it should be the first-choice treatment in this setting because of its rapid action and because it causes less respiratory depression and sedation than other drugs. Buccal midazolam is currently used in the community, and based on their experience and the evidence, the committee agreed that it should remain as the first choice, with rectal diazepam as an alternative if agreed, based on previous use or if buccal midazolam is unavailable.

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

A small amount of evidence showed benefit for general anaesthesia and phenobarbital if status epilepticus continues after second-line treatment. The committee agreed that these should be considered as third-line treatment options, but cautioned that guidance should be sought from an expert in administering these drugs.

The committee discussed concerns that some causes of status epilepticus may need additional treatment and agreed that awareness of the different circumstances that can cause status epilepticus should be promoted. They also highlighted the need to differentiate non-epileptic attacks from convulsive status epilepticus.

How the recommendations might affect practice

The committee agreed that the recommendations reflect current practice and are not likely to involve a significant change in practice or have a substantial resource impact.

Return to recommendations

Repeated or cluster seizures

Recommendations 7.2.1 to 7.2.4

Why the committee made the recommendations

The committee discussed the limited evidence available for repeated or clusters of seizures. There was some evidence that benzodiazepines are effective, and the committee agreed that they should be an option. Clobazam and midazolam were given as examples, reflecting the committee's experience and knowledge of current practice. Rectal diazepam is not preferred owing to the route of administration. The committee agreed that further research using clear, consistent definitions for repeated or cluster seizures are needed and developed a recommendation for research on antiseizure medication for repeated or cluster seizures to inform future guidance.

How the recommendations might affect practice

The committee agreed that the recommendations reflect current practice and are not likely to involve a significant change in practice or have a substantial resource impact.

Return to recommendations

Prolonged seizures

Recommendations 7.3.1 to 7.3.4

Why the committee made the recommendations

No evidence was found on treating prolonged convulsive seizures, defined as seizures that last less than 5 minutes but are more than 2 minutes longer than the person's usual seizures. The committee noted that the definition of prolonged convulsive seizures used to include those longer than 5 minutes, because status epilepticus was defined as seizures that persist for 30 minutes. The International League Against Epilepsy (ILAE) proposed a new definition of status epilepticus meaning that all seizures lasting longer than 5 minutes constitute status epilepticus.

The committee noted that prolonged convulsive seizures should be managed as an emergency. Based on their experience and knowledge, they agreed that benzodiazepines should be a treatment option and that midazolam is often used in current practice.

How the recommendations might affect practice

The committee agreed that the recommendations reflect current practice and are not likely to involve a significant change in practice or have a substantial resource impact.

Return to recommendations

Ketogenic diet

Recommendation 8.1.1

Why the committee made the recommendation

The committee were unable to ascertain clear benefits for ketogenic diets in either adults or children with drug-resistant epilepsy from the evidence available. The committee were also mindful of the potential long-term health drawbacks of ketogenic diets, as well as the high-cost implication of providing ketogenic diets. However, from their experience and knowledge, the committee were also aware that benefits are sometimes seen in clinical practice for a small number of people with drug-resistant epilepsy, including children with certain childhood epilepsy syndromes.

The committee decided against recommending ketogenic diets routinely, but did not wish to

remove them completely as an option for specialist consideration in people with few further treatment options. They highlighted the need for high-quality clinical data in this area and agreed that a recommendation for research for children and adults on the effectiveness and long-term tolerability of ketogenic diets would help to inform future guidance.

How the recommendation might affect practice

Ketogenic diets are not routinely offered and so the recommendations are unlikely to have an impact on current practice.

Return to recommendation

Resective epilepsy surgery

Recommendations 8.2.1 to 8.2.4

Why the committee made the recommendations:

The evidence on surgical interventions showed that resective epilepsy surgery is the most clinically effective treatment for children, young people and adults with drug-resistant focal epilepsy. This was based on the evidence showing better quality of life and lower rates of recurrence after surgery compared with medical care. The committee also considered the relative harms of surgery, such as higher rates of postoperative cognitive deficits and other adverse events. The benefits of surgery were agreed to outweigh these harms, because in many cases, the cognitive effects did not cause significant dysfunction in everyday life, and many of the other adverse events (perioperative infection, bleeding and postoperative changes in mood) were self-limiting. In addition, the committee noted that the risk of harm from surgery needed to be balanced against the risks of ongoing seizures, which include injury, head injury and sudden unexpected death in epilepsy (SUDEP). The committee accepted that the risk of harm may increase as the surgical complexity increases, but agreed that the overall balance in favour of a benefit is likely to apply across most types of epilepsy surgery for both children and adults.

Original health economic modelling was undertaken to assess the cost effectiveness of resective epilepsy surgery in adults. However, insufficient data were available to model cost effectiveness in children. The results of the analysis indicated that resective epilepsy surgery was cost effective in adults. Overall, the committee concluded that resective epilepsy surgery was also highly likely to be cost effective for children because they typically have better outcomes after surgery than adults, and the benefits of surgery are experienced for longer. The committee did note that the cost of assessment for resective epilepsy surgery may be higher in children, but these costs would likely be

offset by later savings in the form of fewer outpatient appointments and the benefits observed from resective epilepsy surgery.

No evidence was found on the most effective criteria for referral. However, the committee agreed that because benefits from surgery would outweigh harms across all the populations considered, including improvement in seizure control, potential seizure freedom, better quality of life and reduced risk of epilepsy-related death, all people with drug-resistant epilepsy would benefit from a referral to a tertiary centre for consideration of resective surgery, including those without identified MRI abnormalities.

The committee also discussed whether there were other groups that might benefit from a referral for consideration of surgery. The committee agreed, by consensus, that people with specific MRI abnormalities that might indicate future resistance to antiseizure medication, should be referred to a tertiary centre at diagnosis, rather than waiting until treatment is unsuccessful.

In addition, the committee discussed that, in their experience, people with genetic abnormalities or learning disabilities can sometimes be excluded from referral to a tertiary centre for consideration of surgery. This may happen because it is thought that surgery is not suitable for them, or they might be erroneously considered unable to cope with surgical assessment. The committee agreed they should have treatment in the same way as other people with epilepsy and be referred if indicated.

How the recommendations might affect practice

Only a proportion of people with drug-resistant epilepsy are referred for resective surgery currently, because of relatively low levels of epilepsy surgical treatment provision, as well as lengthy waiting times for presurgical assessments. Therefore, referral of all people with drug-resistant epilepsy to surgical centres will probably lead to an increase in presurgical investigations and surgical procedures. This may necessitate the need for more epilepsy surgical training and a greater investment in epilepsy surgery programmes.

Referral of people whose epilepsy is not drug resistant might increase the burden on tertiary centres, but the number of people in these groups is likely to be relatively small.

Return to recommendations

Vagus nerve stimulation

Recommendations 8.3.1 and 8.3.2

Why the committee made the recommendations

There was no long-term robust evidence on vagus nerve stimulation in epilepsy. The committee noted that there is variation in current use, but that it tends to be offered when antiseizure medications have failed to control seizures and epilepsy surgery is not suitable or has not been successful. There was no evidence to suggest that use of vagus nerve stimulation should stop for this small group with complex needs and few management options. The committee agreed that the benefits and harms should be discussed with the person because the intervention does not work in all people and is not a risk-free procedure. NICE has published interventional procedures guidance on the use of vagus nerve stimulation in children with refractory epilepsy. The committee agreed that more research is needed in this area and drafted a recommendation for research on the effectiveness of vagus nerve stimulation.

How the recommendations might affect practice

The use of vagus nerve stimulation in practice is currently quite varied. It tends to be a palliative procedure for people with epilepsy that is resistant to treatment and who are not candidates for surgery. The recommendations are not expected to lead to a large change in current practice.

Return to recommendations

Psychological, neurobehavioural, cognitive and developmental comorbidities in epilepsy

Recommendations 9.1.1 to 9.1.5 and 9.2.1 to 9.2.4

Why the committee made the recommendations

Providing coordinated care

The committee felt it was important to address the higher prevalence of mental health comorbidities, learning disabilities and dementia in people with epilepsy. They also acknowledged the gap in communication and knowledge between the different specialities involved in managing epilepsy and these comorbidities, and thus the need for joint multidisciplinary working relationships. The committee highlighted the importance of active and ongoing liaison between the

different specialist teams and people with epilepsy (and their families and carers if appropriate) to ensure the adequate support and treatment is in place. The committee agreed the recommendations reflected current good practice.

Support and treatment

There is variability in the evidence in terms of the different types of psychological interventions, the healthcare professionals who delivered the therapies and the characteristics of people included in the studies. The analyses showed that the differences in psychological treatments and populations did not affect the epilepsy-related quality-of-life outcome significantly, but the committee acknowledged that making recommendations for specific subgroups of people for specific interventions would not be possible from the pooled evidence. The committee also agreed that the clinical evidence for children and young people was extremely limited and very uncertain. However, the committee acknowledged the importance of recognising neurodevelopmental comorbidities in children, particularly those with complex syndromes that may need additional support from the multidisciplinary team.

Coupled with the lack of health economic evidence, it was not possible to make recommendations for tailored psychological interventions with any confidence. The committee noted the need for health economic research in this area.

People with epilepsy are at higher risk of experiencing depression. Anxiety is also associated with epilepsy, along with psychosis to a lesser degree. The increased risk of dying from suicide was also noted. The committee highlighted that healthcare professionals should be alert to these psychological comorbidities and check for them in people with epilepsy as part of regular review. The committee agreed to refer to existing NICE guidance on depression. They also agreed to make a recommendation for research on the cost effectiveness of tailored psychological therapy for people with epilepsy.

How the recommendations might affect practice

The recommendations on providing coordinated care do not reflect routine practice, and therefore will involve a change of practice for the majority of providers.

The guideline committee acknowledged the lack of psychological therapies available to people with epilepsy in current practice, especially children and young people. Although some centres have access to neuropsychology services, this varies across the country and there are often long waiting lists. An improvement in access to psychological services for people with epilepsy and depression or anxiety may result from highlighting existing NICE guidance. No significant resource impact is

expected as a consequence of the recommendations on support and treatment.

Return to recommendations

Reducing the risk of epilepsy-related death including sudden unexpected death in epilepsy

Recommendations 10.1.1 to 10.1.5 and 10.2.1 and 10.2.2

Why the committee made the recommendations

Prediction tools

There was a lack of evidence for tools predicting sudden unexpected death in epilepsy (SUDEP) and other causes of epilepsy-related death. Sparse data for the SUDEP-7 and SUDEP-7 revised tools suggested good accuracy, but the level of imprecision was very high because of the small number of SUDEP events recorded. Similarly, although there was some evidence for 3 tools for predicting all-cause mortality, it was from a single study with insufficient data to make recommendations.

The committee agreed that more research is needed and that this should focus on the development of a tool, as well as its validation (see the recommendation for research on risk prediction tool for all-cause epilepsy-related death). The new tool should not focus entirely on SUDEP but should look at other causes of epilepsy-related death, such as suicide, injury and drowning. Large national or international registries recording SUDEP, all causes of death and a wide range of risk factors are needed to produce data of sufficient detail to inform a useful tool. These would need to collect data over a long period of time to provide useful numbers of outcomes.

The committee also acknowledged that the SUDEP-7 tool showed some promise, despite the uncertainties in the data, and agreed that further larger-scale validation studies of SUDEP-7 should be conducted in the shorter term.

Risk factors

The committee agreed it was important to highlight the increased risk of premature death, including SUDEP, for people with epilepsy. The lifetime risk of SUDEP is estimated to be between 7% and 12%. This risk is increased in people with severe drug-resistant epilepsy, and is particularly high among those with uncontrolled tonic-clonic seizures. To help prevent premature death, people with epilepsy and their families or carers should be supported to understand their individualised risk as well as what they can do to reduce the risk of SUDEP.

Based on the evidence and their experience in clinical practice, the committee decided to highlight non-adherence to medication, alcohol and drug misuse, living alone, sleeping alone without supervision, and generalised tonic-clonic, focal to bilateral tonic-clonic and uncontrolled seizures, as important risk factors. Non-adherence to medications may also cause the person to experience more seizures and increase their risk of physical injury and premature death. The committee acknowledged that the type of seizures the person has and how often they have them can be modified through medication, significantly reducing the risk of death from seizures. The evidence showed that living alone or sleeping without supervision increased a person's risk of dying. By modifying these risk factors with support from family, carers and clinicians, a person can directly reduce their risk of premature death or SUDEP. The committee did acknowledge that it may not be possible to provide night-time supervision to adults living independently. They highlighted the use of monitors and alarms to prevent risk in children living with their parents. The committee also acknowledged that it may not be possible to remove all risk related to epilepsy.

The evidence demonstrated that several comorbidities could contribute to the risk of epilepsy-related death. Therefore, the committee agreed that from a person's clinical history, a person's individual risk of premature death including SUDEP should be assessed and should include a history of abnormal neurological findings, neurological conditions and cancer.

The committee noted that other risk factors may increase the risk of premature death in a person with epilepsy, and that these should also be discussed with the person to help them fully understand their individual risk.

Interventions

There was a lack of evidence for interventions to reduce seizure-related death including SUDEP. The committee agreed that the evidence on supervising people with nocturnal seizures was not of sufficient quantity or quality to warrant making a recommendation. However, based on their clinical experience and expertise, the committee agreed it was important to discuss risk factors with people who have nocturnal seizures to minimise the risk of seizures and promote safe practice (such as adherence to medication and improving sleep hygiene) as much as possible. Although limited, the evidence for nocturnal supervision did show some benefit, and based on their knowledge and experience, the committee agreed that this might be discussed alongside other support and information on minimising risks, for example if a carer wishes to use a night monitor or a parent wishes to sleep in the same room as a child.

The committee agreed that every effort should be made to reduce epilepsy-related risk, particularly the risk of mortality, and emphasised the importance of supporting people with epilepsy to take their medications as prescribed to reduce seizures. Although this applies to all

people with epilepsy, the committee noted that this is particularly the case for people with generalised tonic-clonic seizures and focal to bilateral tonic-clonic seizures, because these seizure types are associated with higher risk.

How the recommendations might affect practice

The committee highlighted that there is variation in the information currently discussed about the risk of premature death including SUDEP. The recommendations will have an impact on clinical practice by focusing on specific modifiable risk factors and working with people to reduce risk and prevent premature death. The recommendations will create a framework for discussions between healthcare professionals and the person with epilepsy and their families and carers to help inform decisions.

The recommendation on night-time supervision reflects current good practice and is unlikely to change current practice.

Return to recommendations

Epilepsy specialist nurses

Recommendations 11.1.1 to 11.1.4

Why the committee made the recommendations

The clinical evidence on epilepsy specialist nurses was limited in quality and quantity, and the committee acknowledged that research in this area can be challenging because of limited funding and difficulties conducting high-quality randomised studies, given that epilepsy specialist nurses are already embedded in many services. However, because there was economic evidence of cost savings both long term and within the first year, the committee agreed that people with epilepsy should have access to an epilepsy specialist nurse. Epilepsy specialist nurses are already embedded in practice and the committee agreed that they play a vital role in supporting other healthcare professionals in primary, secondary and tertiary care, as well as educational and social care settings. They are specialised in supporting children, young people and adults with all aspects of living with epilepsy, providing support with information giving, advice on administering medications, care planning, management of side effects and the impact of epilepsy on daily activities. In addition, epilepsy specialist nurses may identify problems that had been previously unnoticed, such as long-standing side effects of antiseizure medications.

The committee used the evidence to determine the common features of clinically and cost-

effective epilepsy specialist nurse interventions. Based on the clinical evidence, they agreed that interventions should include emotional wellbeing and self-management strategies to support improvements to day-to-day living and health. Based on economic evidence and their own expertise, the committee agreed that people's needs for information and care planning may vary over time and more contact may be needed when seizures are ongoing. The economic evidence showed that epilepsy specialist nurse-led interventions are likely to be cost saving and cost effective when delivered twice a year to people with epilepsy and after attending an emergency department. The committee recommended this approach for people with ongoing seizures or after an emergency department visit. Although it was a wider population (approximately 300,000 people in England) to that explored in the economic analyses, they are much more likely to be in regular contact with healthcare services, with a quarter of this group making at least 1 emergency department visit per year. Nearly all will have some sort of outpatient appointment in a hospital setting, often with an epilepsy specialist nurse where these are available. Therefore, a large number of these epilepsy specialist nurse appointments will already be taking place or will replace appointments with other healthcare practitioners. Although there will be additional total healthcare appointments as a result of these recommendations, the increase would be much smaller in this group than for all people with epilepsy, and costs would be potentially regained within the first year.

How the recommendations might affect practice

The recommendations reflect current practice available in some services, but there is variation in epilepsy specialist nurses' involvement across different settings. Some services may need to make changes to practice, such as hiring epilepsy specialist nurses or changing how they work, but this should lead to a number of advantages, including improved patient satisfaction and emotional wellbeing, greater consistency in provision and care, improved access to epilepsy specialist nurses and potentially cost savings.

The involvement of an epilepsy specialist nurse is likely to result in cost savings by reducing the overall use of healthcare services especially in terms of reduced emergency department visits and the subsequent length of hospital stay.

Return to recommendations

Transition from children's to adults' epilepsy services

Recommendations 11.2.1 to 11.2.6

Why the committee made the recommendations

The committee acknowledged that many of the recommendations in the NICE guideline on transition from children's to adults' services for young people using health or social care services are directly applicable to young people with epilepsy and their families or carers. So, they reviewed the evidence on identified themes specific to people with epilepsy that are not covered by that guideline.

The committee noted that a young person's transition should be tailored to their needs and that this should be recognised by both paediatric and adult services. The committee discussed the value of reviewing diagnosis and management at transition and agreed that this should involve both paediatric and adult multidisciplinary teams working together with the young person and their family or carers. The evidence found that young people who engaged with a multidisciplinary team felt more confident and able to communicate their needs, so the committee stressed that planning and decision making should be patient-centred, with young people and their families and carers (if appropriate) fully involved in discussions about their transition and ongoing care.

The committee acknowledged that transition can be a distressing time for young people with epilepsy and their families and carers. The evidence showed a lack of clarity in communication and the information given to young people and their families and carers at transition, for example they lacked clear information about the risks of SUDEP and unplanned pregnancy. The committee agreed that clear and balanced information is vital during transition and, based on their experience, listed some key areas that should be covered in discussions. In particular, stigma around epilepsy was highlighted as an important topic to raise so as to give the young person the opportunity to discuss their experiences and for support to be provided. The evidence showed that stigma can have a significant impact on young people's everyday activities, educational achievement and engagement with healthcare professionals. The evidence also suggested that repeating information at intervals during transition would help young people understand and retain key information. Based on the evidence and their experience, the committee highlighted the importance of providing information in a suitable format for the person, using language they understand and that is appropriate for their developmental age, and avoiding technical terms.

The evidence showed that young people with epilepsy and a learning disability, and their parents, often struggled with transition, and had difficulty finding information and understanding the changes in service provision. They noted that transition was often not planned or happened much later than for young people without learning disabilities. Young people with learning disabilities may have complex needs, and transition to adult services may need more planning and involve other specialties, such as a learning disabilities multidisciplinary team and child and adolescent

mental health services. Based on their experience, the committee agreed that it would be beneficial to start transition planning earlier than usual for young people with complex health or social care needs, including people whose seizures were not fully controlled by their treatment or those with a learning disability, to allow time for care packages to be set up. They agreed that the timeframe would depend on individual circumstances.

How the recommendations might affect practice

The recommendations reflect current best practice so the committee agreed there should be no resource impact.

Return to recommendations

Context

Epilepsy is one of the most common serious neurological disorders, affecting around 50 million people worldwide and about 533,000 in England and Wales. Of these, around 112,000 are children and young people. The incidence of epilepsy is estimated to be 50 per 100,000 per year and the prevalence of active epilepsy in the UK is estimated to be 5 to 10 people per 1,000. Epilepsy is also a common cause of people attending A&E departments. Epileptic seizures can result in injury, and may also be associated with mortality, for example, because of sudden unexpected death in epilepsy (SUDEP).

Current practice

Most people with active epilepsy (60% to 70%) have their seizures satisfactorily controlled with antiseizure medications. Other treatment options may include surgery, vagus nerve stimulation, and psychological and dietary therapies. Optimal management improves health and wellbeing, including reducing the impact of epilepsy on social activities, education and career choices, and reduces the risk of SUDEP.

The original NICE guideline on epilepsy (2004) stated that the annual estimated cost of established epilepsy was £2 billion (direct and indirect costs). However, newer and more expensive antiseizure medications are now being prescribed. With an increase in treatment costs likely in coming years, it is essential to ensure that antiseizure medications with proven clinical and cost effectiveness are identified.

The 2004 NICE guideline on epilepsies, the 2004 NICE technology appraisal guidance and the subsequent 2012 pharmacological review on newer drugs for epilepsy, failed to show a difference in effectiveness between newer and older antiseizure medications, or between the newer drugs (as monotherapy) for seizure control. The International League Against Epilepsy has proposed new definitions and a framework for classifying epilepsy, and diagnosis and investigation have become more focused on aetiology. This guideline update reflects this and considers new evidence on managing epilepsies.

Finding more information and committee details

To find NICE guidance on related topics, including guidance in development, see the NICE topic page on epilepsy.

For full details of the evidence and the guideline committee's discussions, see the evidence reviews. You can also find information about how the guideline was developed, including details of the committee.

NICE has produced tools and resources to help you put this guideline into practice. For general help and advice on putting our guidelines into practice, see resources to help you put NICE guidance into practice.

Update information

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