CEWT

Children's Epilepsy Workstream in Trent

Management of a child after a first afebrile seizure(s)

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Disclaimer

Clinical guidelines are guidelines only. The interpretation and application of clinical guidelines will remain the responsibility of the individual clinical. If in doubt, contact a senior colleague. Caution is advised when using guidelines after a review date.

Scope

This guideline is for paediatric health professionals managing children >3 months presenting to acute services with an afebrile seizure(s). These recommendations may not be appropriate for use in all circumstances. This guideline forms part of a CEWT framework of guidelines for children with different types of seizure presenting to different services.

Introduction

Approximately 10% of the UK population will have at least one seizure at some point in their lives. A seizure may be epileptic or non-epileptic. An epileptic seizure may or may not be secondary to an acute neurological or other acute generalised illness (i.e. an acute symptomatic seizure). A first seizure or seizure cluster caused by an acute illness (acute symptomatic seizure) is unlikely to recur (3-10% recurrence). Some children after a first epileptic seizure will go on to have further epileptic seizures and be diagnosed with epilepsy.[1] After a first unprovoked epileptic seizure 30-50% will recur; after a second unprovoked epileptic seizure 70-80% will recur.[2] There are many different types of epilepsies and it is important to structure management of the individual around their particular seizure and epilepsy type and associated problems.

All children with a first seizure require paediatric assessment, advice and follow up. Not all children require investigation.

Note - there is an RCPCH leaflet available for parents/carers following a first possible afebrile seizure: www.rcpch.ac.uk/resources/safety-netting-information-following-first-seizure-without-fever-children-young-people

Definitions

Important definitions to understand in the context of this guideline are summarised in the **Glossary**

This guideline is principally aimed at those children presenting acutely to paediatric services. Some of the information however will be applicable to those children presenting non-acutely.

It is worth considering that a seizure is a non-specific term and can be considered as a symptom or manifestation of a number of conditions or diseases.

A seizure can be…
…epileptic or non-epileptic
… convulsive or non-convulsive
… febrile or afebrile
… isolated or recurrent.
… from an identifiable underlying cause or not

Children with prolonged convulsive seizures, febrile seizures, reduced conscious level or an existing diagnosis of epilepsies, suspected epilepsies or other paroxysmal disorder should be managed by their respective guidelines.

The main differential when a child presents after a first non-prolonged, afebrile seizure(s), without significant reduced conscious level will be:

Afebrile Seizure(s)

Could be:
- epileptic seizure(s)
- non-epileptic seizure(s)
- acute symptomatic seizure(s)

There are several aims of initial assessment:
- Initial management
- Clinical evaluation
- Rapid and accurate management of any underlying acute cause
- Diagnosis and subsequent management

Initial management

A continuing convulsive seizure with loss of consciousness is a paediatric emergency. Ensure First aid/ABC etc including adequate airway and oxygenation, stable vital signs and normal blood sugar.

- Children continuing to convulse with loss of consciousness > 5 minutes should be managed according to the **prolonged seizure guideline**

- Children with evidence of pyrexia >37.8ºC associated with the seizure, or who have a history suggesting a febrile seizure should be managed according to the **febrile seizure guideline**
- Children with decreased conscious level preceding the seizure or persisting >1 hour post termination of seizure should be managed according to the **decreased conscious level guideline**

- Children with an existing diagnosis of epilepsies, suspected epilepsies or other paroxysmal disorder should be managed by the **epilepsies guideline** or their individual **care plan**

Clinical evaluation

History and examination is fundamental to making an accurate diagnosis. Misdiagnosis is a major problem in children with seizures and epilepsies.

The following information should be pursued in **all** children presenting with a seizure. A first-hand witness account should be obtained in all children if possible.

Elements of history
Who is the history from?
Who witnessed the seizure?

Features of the seizure(s):

- *When it happened?*
- *Context in which the seizure happened*
- *Presence, absence and nature of any trigger*
- *Any pre-seizure symptoms reported by patient (dizziness, visual symptoms, auditory symptoms, epigastric sensations etc)*
- *Onset of seizure (focal component? was onset seen?)*
- *Nature of actual seizure including:*
  - *Motor component*
  - *Vocalisations*
  - *Degree of responsiveness*
  - *Any laterality*
  - *Eye/Head deviation*
  - *Duration*
- *Post seizure details including*
  - *Drowsiness or confusion*
  - *Incontinence*
  - *Injury*
  - *Behavioural change*
  - *Any other features including headache, vomiting, weakness.*

Other Features:

- *Health preceding seizure onset—febrile, intercurrent illness? sleep deprived? encephalopathy? fluid balance problems? etc.*
- *Family history of arrhythmias, sudden death, sensorineural deafness, faints, epilepsies etc.*
- *Early development and current developmental milestones*
- *Learning, behaviour, concentration problems, schooling problems etc.*

All children require a thorough examination including:

- Neurological assessment and conscious level
- BP and cardiovascular examination
- Head circumference (see reference charts Appendix 2)
- Chvostek's sign (ipsilateral facial contraction on percussion of the facial nerve which suggests hypocalcemia)
- Signs of dysmorphism or neurocutaneous syndromes

Rapid and accurate management of any underlying acute cause

The child should be assessed to determine whether there could be an acute underlying cause (i.e. an acute symptomatic seizure). Seizures secondary to hypoglycaemia, hyponatraemia, encephalitis etc. are examples of this.
NB. Beware the child presenting with tonic or tonic-vibratory seizures. *(Vibratory is a non-official term that describes the quick low amplitude shaking that is seen in some tonic seizures; this contrasts with the slower high amplitude jerking seen with clonic seizures)* These may be non-epileptic episodes that could indicate raised intracranial pressure i.e. decerebrate / decorticate posturing. (Epileptic tonic seizures are rare as a presenting seizure type in neurodevelopmentally intact children).

Consider need for admission[3]
For guidance only. Social circumstances should also be considered. If in doubt discuss with senior colleague.

Parameter	Indications for admission
Age	Less than 18 months & presenting acutely
Neurology	Glasgow coma score (or equivalent) <15 (>1 hour post-seizure) *(See Decreased Conscious Level Guideline)* New neurological signs
Raised intracranial pressure	Papilloedema, tense fontanelle etc
Generally unwell	Irritable, uninterested, vomiting etc
Meningism	Kernig's sign positive, photophobia, neck stiffness etc
Nature of seizure	Seizures presenting acutely with duration >10 minutes, focal, recurrent or required emergency treatment
Signs of aspiration	Respiratory distress, need for oxygen, chest signs.
High parent or carer anxiety	For example, parents / carers do not feel happy to take the child home following a full discussion
Frequent seizures	Seizures are in keeping with an epilepsy requiring urgent inpatient management e.g. infantile spasms

Investigations

No investigations are routinely indicated in a child over 18 months of age with an afebrile seizure who does not fulfil the criteria for admission.

Glucose

A finger prick blood glucose should be performed if a child is still seizing or not fully alert.

ECG

All children with convulsive seizures should have a 12 lead ECG recorded with calculation and documentation of QTc (Corrected QT interval) to look for evidence of cardiac disease[4] (see Appendix 3). Prolonged QTc may indicate long QT syndrome. Children with arrhythmias or other causes of syncope can present with convulsive syncopal seizures that mimic epileptic seizures.

U&E, Ca, Mg, FBC, Urine toxicology

These tests are undertaken if child <18 months or clinical features are suggestive.

EEG[5]

An EEG should be performed in children with **recurrent** (more than 1) suspected **epileptic** seizures. Occasionally EEG may be appropriate after a first epileptic seizure or where there is uncertainty about the nature of additional ongoing episodes. Individuals requiring an EEG should have the test performed soon (<4 weeks) after it has been requested.[5] Some may require an acute inpatient EEG.

EEG may reveal useful information to help define an electroclinical syndrome. Also unequivocal epileptiform activity shown on EEG can be used to assess the risk of seizure recurrence.

NB. A normal EEG does not exclude an epilepsy. A significant proportion of children **without** epilepsy have an abnormal EEG (5-32% depending on definition of abnormal).[4]

CT/MRI [5]

If a neuroimaging study is indicated, MRI is the preferred modality. CT should be used if MRI is not available or is contraindicated. There are 2 settings where neuroimaging should be considered:

1. In an acute situation, neuroimaging is used to determine whether a seizure has been caused, or is associated with, an acute neurological lesion or illness e.g. traumatic brain injury, encephalitis, intracranial abscess, raised intracranial pressure, unexplained encephalopathy, brain tumour.[6] CT is usually performed as this is often more available acutely.

2. MRI should be considered in the following children soon (within 4 weeks)[5]
   - Children who develop recurrent epileptic seizures before the age of 2 years
   - Children with recurrent epileptic seizures who have any suggestion of a focal onset on history, examination or EEG (unless clear evidence of Benign Epilepsy with Centrotemporal Spikes
   - Children in whom epileptic seizures continue in spite of first-line medication
   - Suspected neurocutaneous syndromes

Typical MRI contraindications (check with your local MRI dept.)

- Shunts, clips, pumps, valves and stents
- Pacemakers and defibrillators

Special considerations (possible but need discussion with MRI dept.)

- Patient pregnant
- Neurostimulator eg. Vagal nerve stimulator
- Cochlear implant
- Dental braces (can cause artifact)
- Renal impairment and IV contrast media

Neuroimaging is **not** routinely indicated after a first seizure; in children with Childhood and Juvenile Absence Epilepsies; Juvenile Myoclonic Epilepsy or Benign Epilepsy with Centrotemporal Spikes. Some children may have indications for neuroimaging for reasons other than epilepsy e.g. learning difficulties, cerebral palsy, neuroregression.

Lumbar puncture
An LP is indicated if there is a concern of possible meningitis or encephalitis. If increased intracranial pressure is suspected, the LP should be preceded by an imaging study of the head. **A normal CT scan does not rule out acutely raised ICP.** Further guidance regarding this is available within the reduced conscious level guideline.

Diagnosis and subsequent management

The following table illustrates management options depending on the seizure. It may be difficult for a variety of reasons to be clear which cause is the most likely for a given child. If there is uncertainty it is better to acknowledge this rather than make a premature diagnosis of epilepsy.

General management <u>for all</u>	• Appropriate history and examination • **All** children with first afebrile convulsive seizure (except acute symptomatic where cause clearly defined) should have 12 lead ECG[2] (with calculation of QTc: see Appendix 3) • FBC, U&E, Ca, Mg not routinely required unless suggested by history or examination or age < 18 months • Consider outpatient paediatric appointment following an acute admission			
Type of seizure	**Acute symptomatic seizure(s)**	**Non-epileptic seizure(s)**	**Single epileptic seizure**	**Recurrent epileptic seizures i.e. epilepsy**
Definition	Epileptic seizure(s) secondary to a concurrent underlying acute illness	A seizure not caused by epileptic neuronal discharge that may or may not be secondary to an underlying acute illness	An epileptic seizure not secondary to an underlying acute illness	A number of epileptic seizures or seizure types (generally continuing to recur in time period >24 hours)
Typical presentation and patient journey	Will predominantly present acutely with criteria for admission and require inpatient paediatric management	May present acutely or non-acutely. Some will require paediatric assessment and management	May present acutely or non-acutely. All require acute or outpatient paediatric assessment	May present acutely or non-acutely depending on type of seizure(s) & epilepsy. All require acute or outpatient paediatric assessment and ongoing management.
Differential Diagnosis	• intracranial infection (bacterial/viral, diffuse/localised) • ingestion (deliberate, accidental) • trauma (head injury, non accidental injury) • tumour • intracranial haemorrhage • hypertension • metabolic (low glucose, calcium, magnesium, high and low sodium, amino and organic acidurias etc) • others	e.g. • cardiac arrythmia syncope • vasavagal syncope • reflex anoxic seizures • blue breath-holding attacks • tics • Sandifers • 'behavioural' • raised intracranial pressure Many to consider: **See Appendix 1** for diff diagnosis flowchart	Consider type of seizure(s): e.g. • uncertain • generalised or focal • convulsive or non-convulsive • tonic • tonic-clonic • dialeptic (e.g. typical absence) • myclonic • spasm • focal motor • focal sensory • focal with automatisms	Consider type(s) of seizure and electroclinical syndrome. There are different types of epilepsies and each should be classified over time using ILAE/**DESSCRIBE** formulations **D** – description of episode(s) **E** – is it epileptic **S** – seizure type **S** – syndrome? **C** – structural, metabolic, genetic, infective, inflammatory cause, unknown **RIBE** – relevant impairments, behaviour and educational problems
Specific inpatient management *(see table 1 for indications for admission)*	Consider: • Bloods (Glucose, FBC, U&E, Ca, Mg) • CT head • LP • Meningitis/Encephalitis management Management according to underlying cause	According to underlying cause		• Consultant review. • Consider inpatient EEG in some. • Consider inpatient neuroimaging in some • Consider acute treatment in some. • Epilepsy nurse review
Specific ongoing management at discharge / outpatients	• Depends on specific diagnosis • Information leaflet etc. • Consider follow-up	• Depends on specific diagnosis • Information leaflet etc. • Consider follow-up	• Seizure first aid advice • Ensure <u>full recovery</u> before discharge • EEG <u>not</u> indicated routinely • Consider buccal midazolam + training if prolonged convulsive seizure >10 minutes • RCPCH leaflet available for parents/carers following a first possible afebrile seizure: www.rcpch.ac.uk/resources/safety-netting-information-following-first-seizure-without-fever-children-young-people	• Seizure first aid advice • Standard EEG indicated (aim for outpatient EEG within max 4 weeks – some children consider inpatient EEG) • Give info leaflet e.g. Epilepsy action • Epilepsy nurse - Care plan including individual emergency plan • Consider buccal midazolam + training if prolonged convulsive >10 minutes • Request home video • Outpatient MRI if not JAE, CAE, JME or BECTS[1] • Seizure diary • See further info in epilepsies guideline

Glossary

Seizure - A seizure can be epileptic or non-epileptic. A paroxysmal abnormality of motor, sensory, autonomic or cognitive function.

Epileptic seizure - Paroxysmal abnormality of motor, sensory, autonomic, cognitive function due to transient dysfunction of the cerebral cortex characterised by excessive and hypersynchronous neuronal activity.

Non-epileptic seizure - Paroxysmal abnormality of motor, sensory, autonomic or cognitive function **not** due to an epileptic seizure.

Febrile seizure - A seizure occurring in the presence of fever (> 37.8°C) or where history or clinical findings is suggestive of febrile seizures.[7]

Epilepsy - A group of chronic neurological conditions characterised by recurrent epileptic seizures.[10]

CAE - Childhood Absence Epilepsy

JAE - Juvenile Absence Epilepsy

JME - Juvenile Myoclonic Epilepsy

ED – Emergency Department

EEG - Standard Electroencephalogram

QTc - Corrected QT interval

BECTS - Benign Epilepsy with Centrotemporal Spikes

References

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7. K Armon, T Stephenson, R MacFaul, P Hemingway, U Werneke and S Smith. Childhood Seizure Guideline An evidence and consensus based guideline for the management of a child after a seizure. *Emerg Med J* 2003; 20:13-20

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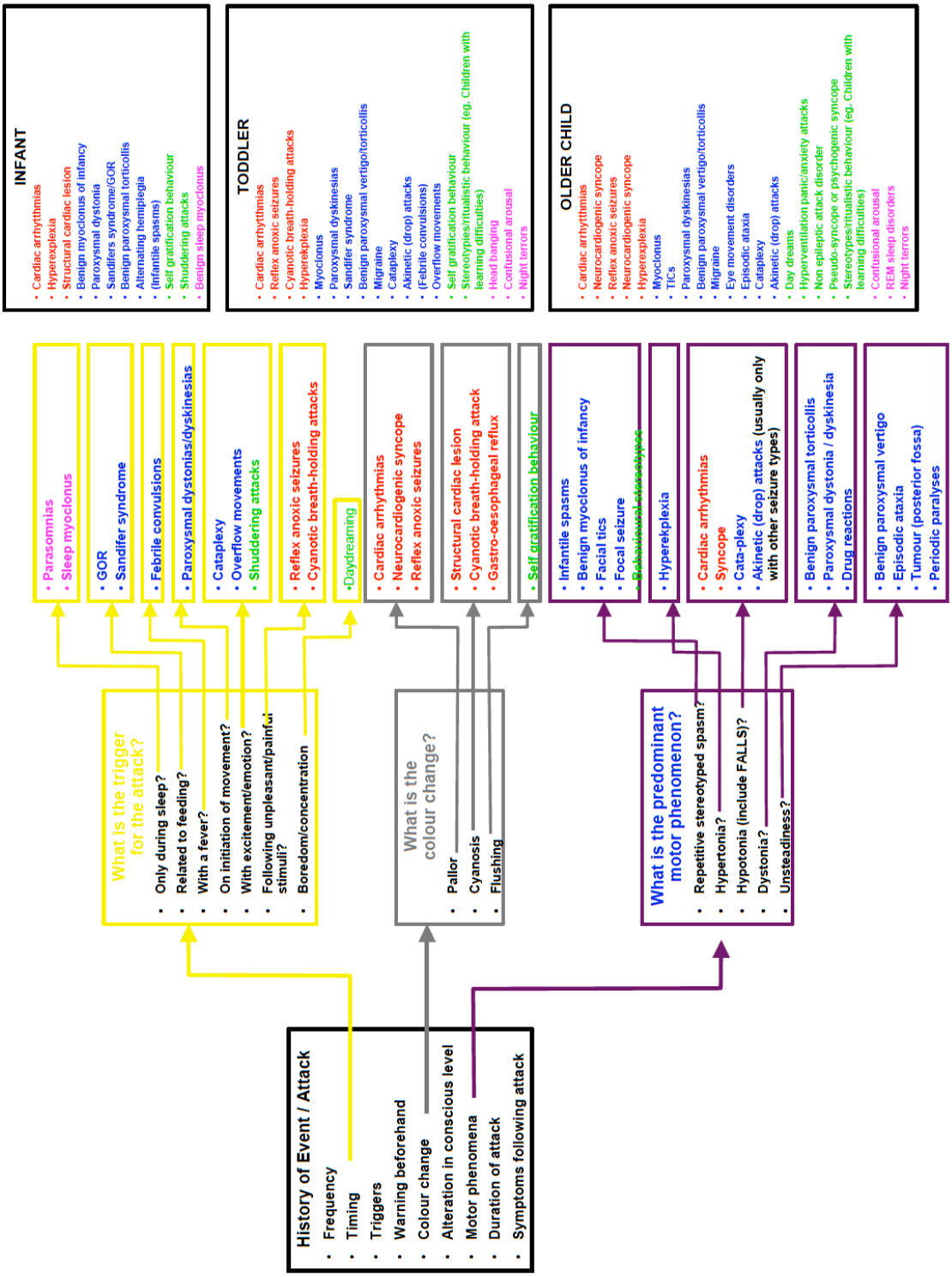
9. Berg AT, Shinnar S. The risk of seizure recurrence following a first unprovoked seizure: a quantitative review. *Neurology* 1991; 41: 965-972.

10. Engel J, ILAE Commission. A proposed diagnostic scheme for people with epileptic seizures and with epilepsy. Epilepsia. 2001 ;42(6):796-803

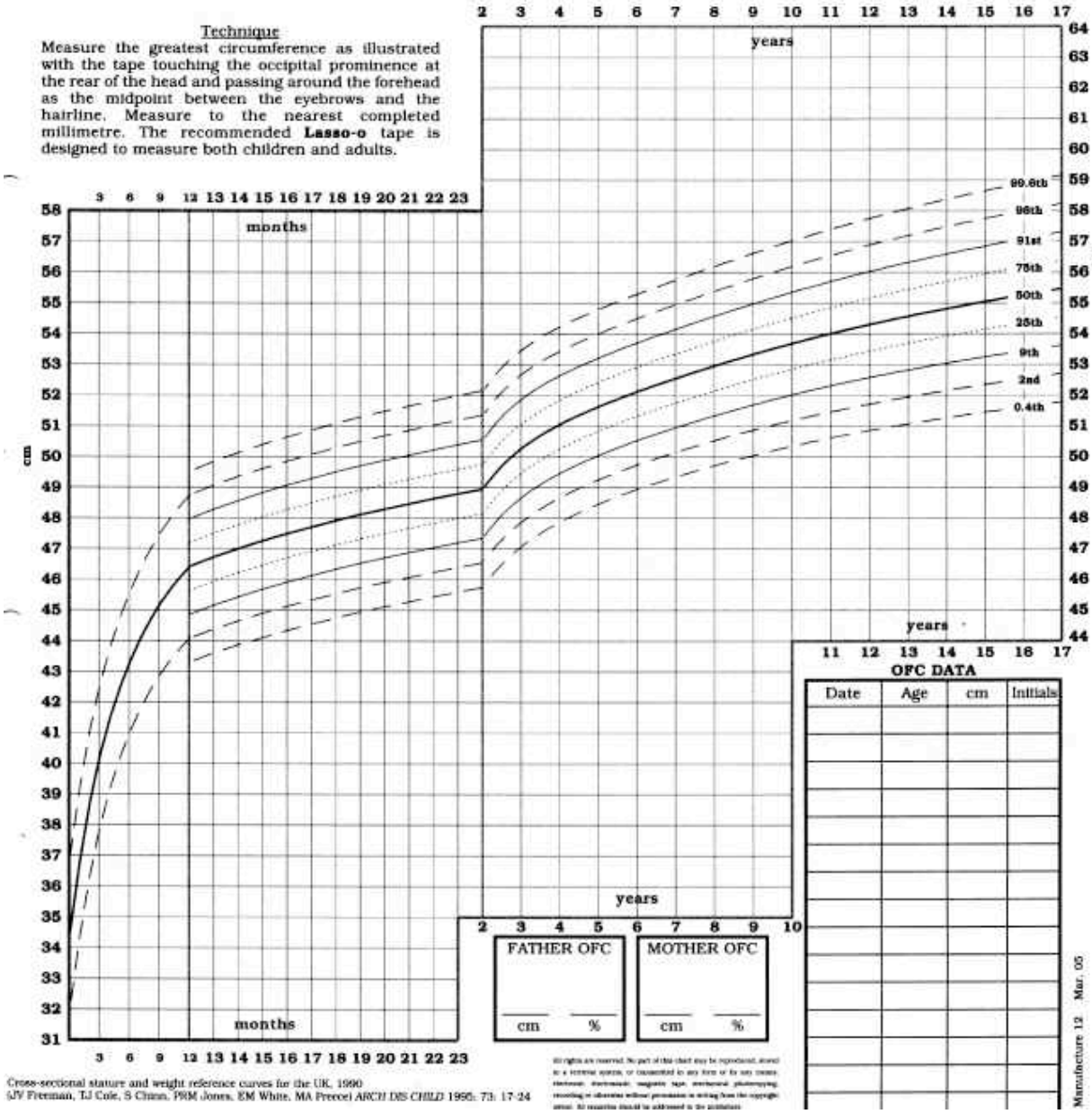
11. ILAE Proposal for Revised Terminology for Organization of Seizures and Epilepsies, ILAE 2010

Appendix 1.
Differential Diagnosis of Epilepsy in Children (taken from NICE[5]

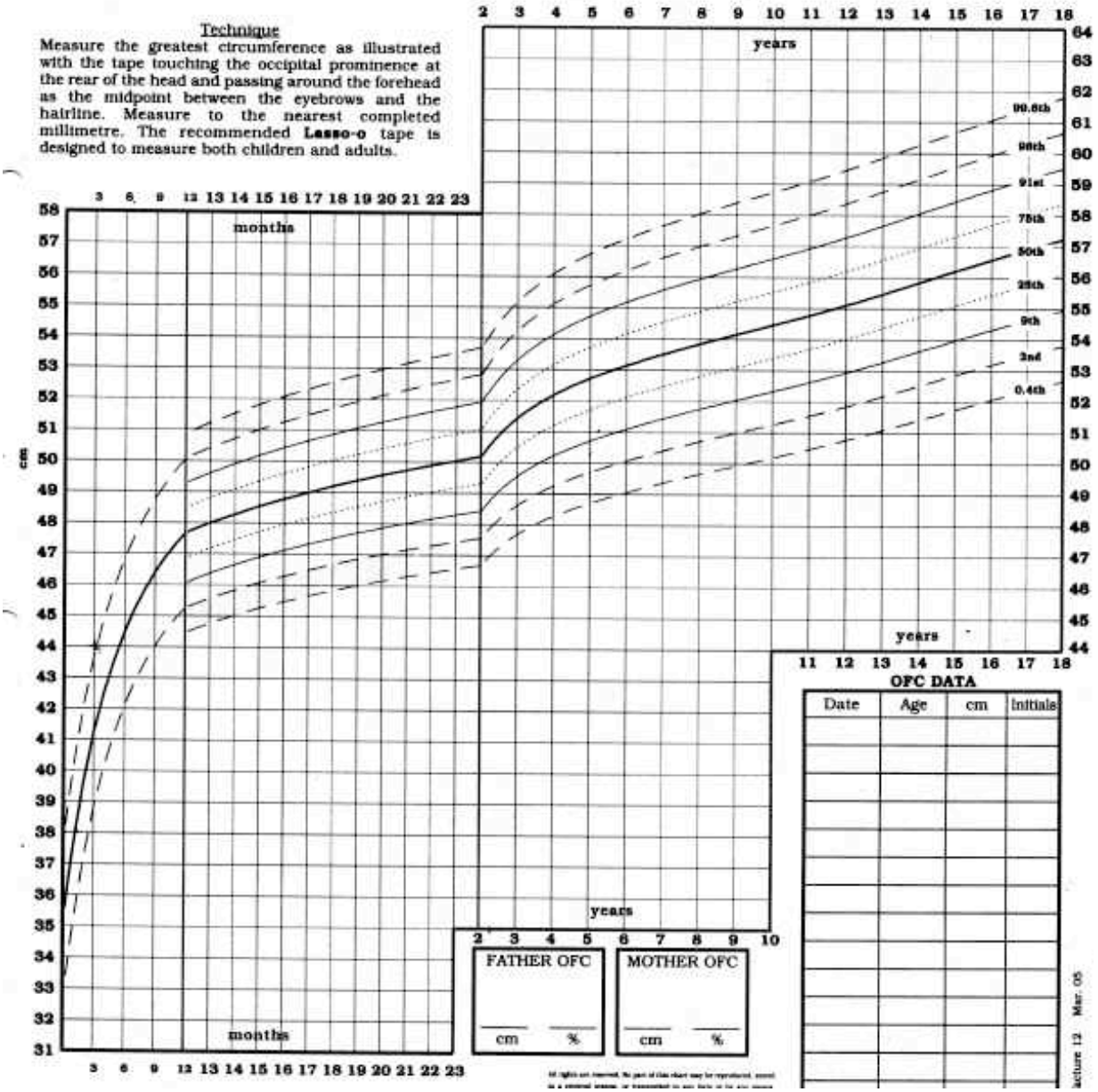


Appendix 2

Girls Head Circumference



Boys Head Circumference



Appendix 3

Calculation of Corrected QT interval (QTc)

QTc (Corrected QT) = QT / √RR

QTc Normal range = < 0.44 (SIGN Guidelines)

Prolonged QTc may indicate long QT syndrome. Children with arrhythmias can present with seizures that mimic epileptic seizures.