

**SEIZURE AND FEVER**

Antipyretics - see Medicines for children for dose and frequency

Does the child have definite neck stiffness?

YES

ADMIT to acute paediatric facility

Treat as MENINGITIS according to your local protocol

No

Does the child have any of these features ?

YES

**COMPLEX FEBRILE SEIZURE**

- Multiple seizures in same illness
  - Focal features
  - Prolonged >15 minutes
- OR**
- Drowsy before the seizure
  - More than 3 days illness
  - GP contact in last 24 hrs
  - Vomiting at home
  - Drowsy >1 hour post seizure
  - Dubious neck stiffness
  - Bulging fontanelle

NO

Infant aged <18 months?  
**OR**  
Prior treatment with antibiotics?

NO

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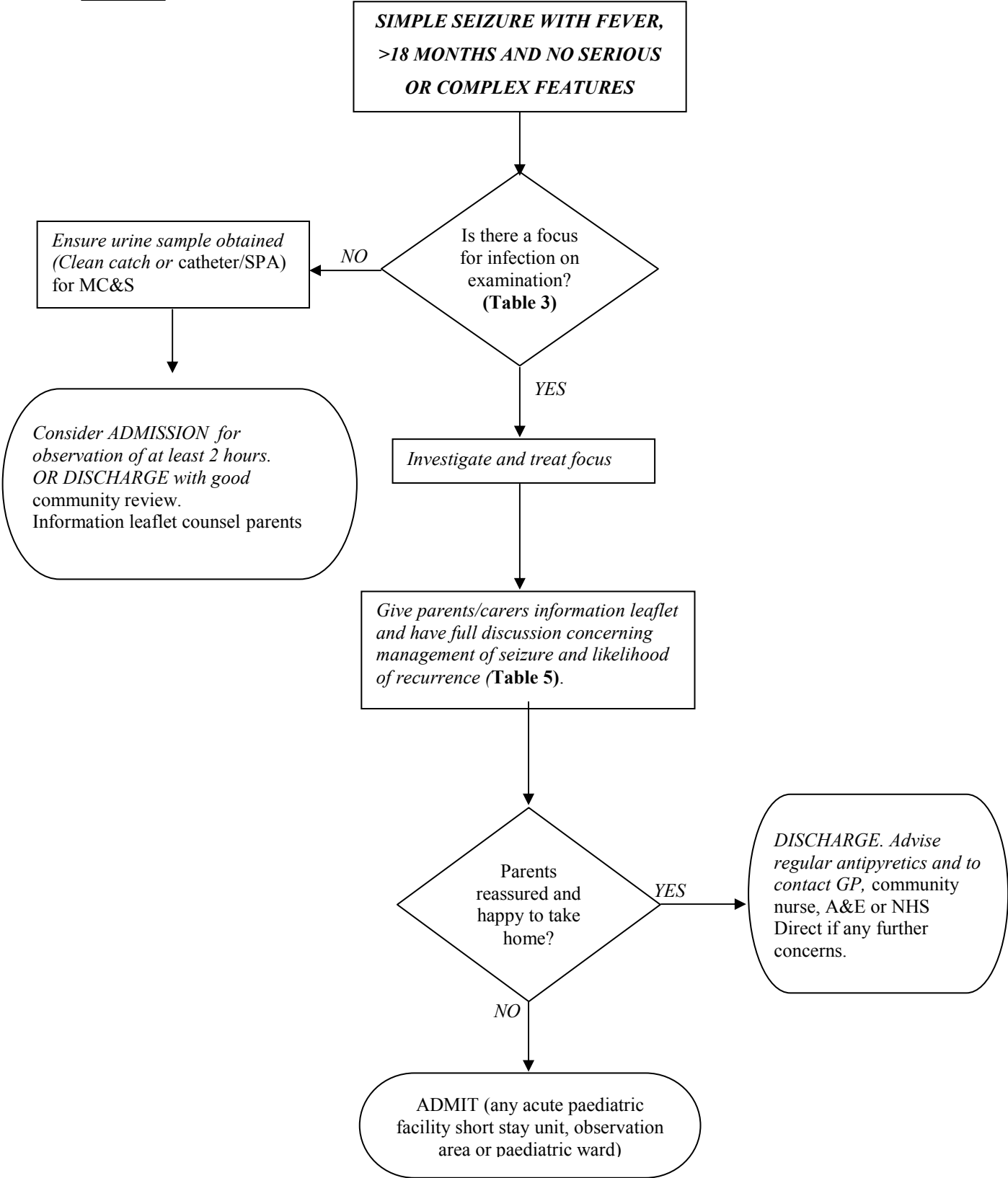
YES

ADMIT (short stay unit, observation unit or paediatric ward)

Evidence shows these features are associated with a small increased risk of meningitis

- Admit
- Consider lumbar puncture
- Review 2 hours

- Identify source of fever, investigate and treat accordingly (Table 3)
- Urine for MC&S in all. Ensure good clean catch, SPA or catheter specimen in those <2 years
- Consider LP if the child develops any of the symptoms or signs listed above
- Minimum 2 hours observation
- Regular antipyretics



**Seizure**

- Episodes of excessive, abnormal muscle contraction, usually bilateral, which may be sustained or interrupted (International League Against Epilepsy Report 2001).

**Febrile seizure**

- An age related disorder almost always characterized by generalized seizures occurring during an acute febrile illness (International League Against Epilepsy Report 1989).
- This definition does not encompass an age cut off or temperature. Most studies define febrile seizure as 6 months to 5 years with either a history of a febrile illness or a documented temperature at presentation.

**Fever and seizure**

- Other conditions can cause a seizure associated with fever. These include intracranial infection / encephalitis and epilepsy, metabolic or neurodegenerative disease.

**Table 1: List of differential diagnoses for the child presenting with a first afebrile seizure to the Accident and Emergency Department**

<i>Type of seizure</i>	<i>Cause</i>
Isolated seizure	No cause found
Symptomatic Epilepsies	Generalised - tonic clonic seizures, absence seizures, myoclonic seizures Partial - benigne rolandic, complex partial epilepsy
Acute symptomatic epileptic seizure	Intracranial infection (bacterial/viral, diffuse/localised) Ingestion (deliberate, accidental) Trauma (head injury, non accidental injury) Tumour Intracranial haemorrhage Hypertension Hydrocephalus Metabolic (low glucose, calcium, magnesium, high and low sodium)
Neonatal/Early infant seizures (<3 months)	<i>In addition to the above causes:</i> Hypoxic ischaemic encephalopathy (from birth) CNS infections (acute and congenital) Fifth day fits Drug withdrawal Pyridoxine dependency
Other important differentials (not epileptic seizures)	Convulsive syncope - reflex anoxic seizure, vasovagal seizure (both neurally mediated syncopes), arrhythmias e.g.long QT (cardiac syncope), suffocation, psychogenic seizures

**Table 2: Criteria for admission of a child with a first afebrile seizure to an acute paediatric facility.**

<i>Category</i>	<i>Criteria/signs</i>
Age	Less than 1 year
Neurology	Glasgow coma scale (or equivalent) <15 (>1hour post fit) New neurological signs
Raised intracranial pressure	Papilloedema, tense fontanelle
Generally unwell	Irritable, disinterested, vomiting
Meningism	Kernig's positive, photophobia, neck stiffness
Complex seizure	Prolonged (>15 minutes), focal, recurrent
Signs of aspiration	Respiratory distress, need for oxygen, chest signs
High parent or carer anxiety	Parent's/ carers do not feel happy to take the child home following a full discussion

**Table 3: Common differential diagnoses of children presenting with fever and seizure.**

**N.B.** Viral infection, otitis media and tonsillitis account for 85-90% with the others making up 10-15% of all causes.

<i>Cause for fever</i>
Viral infection (e.g. upper respiratory tract infection, non specific viral illness, roseola, chicken pox and other exanthema, etc.)
Otitis media
Tonsillitis
Urinary tract infection
Gastroenteritis
Lower respiratory tract infection
Meningitis
Post immunisation
Post ictal fever (only likely after generalised seizure of >10mins)

**Table 4: Contraindications for lumbar puncture**

<i>Category</i>	<i>Criteria/ signs</i>
Drowsiness or impaired consciousness	Falling conscious level, glasgow coma scale of <13
Signs of septicaemic shock	Poor perfusion, low BP, tachycardia
Clinical diagnosis of invasive meningococcal disease	Rapid onset illness, typical haemorrhagic rash
Signs of raised intracranial pressure	Pappiloedema, coma, abnormal posturing, abnormal pupillary responses, high BP, low pulse
Focal neurological signs	On clinical examination of cranial and peripheral nerves

**Table 5: Prognosis of febrile and afebrile seizures**

<i>Risk</i>	<i>Percentage</i>
Population risk of febrile seizure	2.7 to 3.3%
Risk of recurrence of febrile seizure following first seizure	29 to 35%
Risk of epilepsy following simple febrile seizures	1 to 2.4%
Risk of epilepsy following complex febrile seizures (prolonged >15 minutes, focal, multiple in 24 hours)	4.1 to 6%
Risk of a single afebrile seizure in childhood	1%
Risk of a recurrence following a first afebrile seizure	50%

# Evidence Based Guideline for Post Seizure Management

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**Key:** Paed. = Paediatric, Cons. = Consultant, SpR = Specialist Registrar, A&E = Accident and Emergency, Neuro. = Neurologist

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# **Technical Report**

## **Introduction**

Clinical guidelines are being developed at an increasing rate around the world (Woolf 1999). The driving forces are rising health care costs and an increasing patient demand for the best available care.

Paediatric attendances to accident and emergency departments (A&E) or an acute admissions ward in England continue to increase yet the length of stay in hospital continues to fall (Audit Commission 1993, RCPCH 2001, McFaul 1994, Hill 1989). Admission rates have increased from 40 per 1000 aged 0-4 years in 1970 to 100 per 1000 in 1997 (RCPCH, 2001). The reasons for this change are not clear. Children attending A&E with medical problems account for at least 15% of all attendances and it is estimated that at Sheffield Children's Hospital 40% of children less than 2 years attending the A&E department have a medical condition (BPA, 1988).

Seizures are common in children. Three percent of all children six months to five years have a febrile seizure, and five percent of all medical attendances to the accident and emergency department follow a seizure (Armon 1999). Depending on local practice approximately 70% of these are children are admitted and undergo varying degrees of investigation and length of stay in hospital (Sweeney 1996). This guideline was developed because seizures are common, variation in practice is known to occur and many of the initial management decisions are made by junior doctors (Armon 1999).

## **Background information**

### **Definitions**

#### **Seizure**

- Episodes of excessive, abnormal muscle contraction, usually bilateral, which may be sustained or interrupted (Adapted from the International League Against Epilepsy Report 2001, definition of a seizure).

## **Febrile seizures**

- An age related disorder almost always characterised by generalized seizures occurring during an acute febrile illness (International League Against Epilepsy Report 1989).
- Note that this definition does not encompass an age cut off or define what level of temperature is required in order to make a diagnosis of febrile seizure. Most studies use an age range of 6 months to 5 years (Sweeney 1996, Addy 1991). This is discussed fully in the main guideline.

## **Fever and seizure**

- Other conditions can cause a seizure associated with fever. These include intracranial infection / encephalitis and epilepsy, metabolic or neurodegenerative disease (Addy 1991). The risk of meningitis in a child presenting with a seizure and fever is about 3% (see main guideline). A high index of suspicion for meningitis must be maintained as it is treatable and the consequences of missing it may be devastating.

## **Aim Of The Guideline**

- To provide clinicians with recommendations for the management of children presenting following an afebrile or febrile seizures based on the best evidence available.
- To promote consistency of care of patients with similar clinical problems.
- To guide the decision making process of junior doctors seeing the majority of patients in the first instance (Armon 1999).
- To help clinicians recognise those children at higher risk of meningitis and to take appropriate action and to determine the cause of the fever if febrile seizure is diagnosed.

The main guideline consists of

1. Evidence-based recommendations for managing a child following a seizure.
2. An algorithm used to translate the recommendations into a format that can be implemented in the department with accompanying tables.

3. A care pathway.
4. Patient information leaflets.

In the first part of the guideline, the key recommendations are intended to direct clinicians to the most appropriate management of patients based on appraised literature. Recommendations have also been included based on a multidisciplinary consensus opinion to provide guidance in clinically important areas where evidence is lacking. The guideline is transparent about which recommendations are evidence based and which are based on consensus. If evidence was available this was always used in preference to consensus opinion. The transparency of the methods used to develop the guideline allows individual clinicians or departments to implement the recommendations appropriately.

### **Scope Of The Guideline**

This policy is for the child presenting to an acute facility (accident and emergency or admissions / paediatric assessment unit) having had a seizure. It does not address the emergency management of the child who is seizing.

The development group assumes that health care professionals will use general medical knowledge and clinical judgement in applying the recommendations in this document to the management of individual patients. These recommendations may not be appropriate for use in all circumstances.

#### Key areas covered

- Children with febrile seizures presenting to an acute assessment facility.
- Children with afebrile seizures presenting to an acute assessment facility.
- The management of children from the point of presentation to the hospital to a decision regarding admission or discharge.
- The management process in particular where investigation of children is required and identification of children at risk of serious pathology.
- Discharge, admission and referral criteria.

## **Guideline Exclusions**

- Children who are actively seizing.
- Management of children in primary care.
- Management of children by paramedics or ambulance services.

## **Guideline Users**

The guideline has been written primarily for use by junior doctors who see children in acute hospital settings whether that is an accident and emergency department or GP referral unit. Senior doctors, nurses or other professionals allied to medicine may wish to refer to its recommendations in order to keep them up to date with the current evidence.

## **Overview Of Guideline Development Group**

A multi-disciplinary group was convened to advise on the development of the guideline and met regularly throughout the process. The group consisted of Kate Armon (clinical research fellow), Professor Terence Stephenson (Professor of Child Health and Honorary Consultant Paediatrician), Dr Roderick Macfaul (DGH Paediatrician), Ursula Werneke (statistician), Dr Stephanie Smith (Paediatric A&E Consultant), Pippa Ecclestone (nurse).

## **Details Of Guideline Development**

*The guideline development process is based on the methodology suggested by the Scottish Intercollegiate Guideline Network (SIGN, 1999) and the 'AGREE' criteria used to appraise guidelines provided in the Royal College of Paediatrics Standards for development of clinical guidelines (RCPCH 2001). The literature was appraised by following recommendations for grading provided in a recent report by SIGN (2000). A modified Delphi method (described in Appendix 4) was used to provide consensus where evidence was lacking and to help translate the evidence into relevant and unambiguous recommendations.*

Opinions were also sought from the hospital patient representative Pat Bunton and a GP representative Dr G Wilkinson who discussed the algorithm with her partners.

The recommendations for clinical practice are based on:

- The results of a systematic literature search, review and appraisal of the available research evidence identified from the electronic databases from 1966 to 2002.
- A review of the literature identified by hand searching journals thought to be most relevant to the subject from 1997 to 2001.
- A search of the relevant journals not found on the electronic databases.

- A limited search for unpublished studies.
- Expert opinion from the Delphi panel where evidence was lacking.

## **Composition of the Delphi panel**

Members as listed in appendix 5.

The panellists selected were drawn from the United Kingdom. They represented practice in both urban and rural settings and were clinicians who would be involved in management of a child after presentation at hospital. We did not include general practitioners, parents or patients. Seventy-seven medical (consultant, registrar and SHO) and nursing staff from mixed adult/paediatric A&E departments, paediatric A&E departments, general paediatric departments (both teaching hospital and district general hospital) and specialist paediatric neurology services were invited of whom 45 agreed to be included. A brief description of the Delphi process is given below, a more detailed description can be found in Appendix 4.

## **Delphi process**

### *First round*

All panellists received the following by post: the literature review with derived management statements; a copy of all the articles cited along with the critical appraisal abstraction sheet which included grade of evidence and a response form detailing each statement together with a 1-9 Likert scale and space for comments. The panellists were asked to rate their level of agreement with each statement as written and to comment. This first round 'pack' was piloted (n=4) and revised where necessary to improve clarity and remove ambiguity. A reminder letter and a subsequent telephone call were made to non-responders.

The definition of consensus is crucial to the 'consensus development' process, and should be decided before the process starts. For 'nominal consensus development groups' rules have been developed to assess agreement when statements have been ranked on a 9-point scale (Scott 1991, Kahan 1994). We chose to apply this to the Delphi method since the same scale was used. One sixth of the ratings furthest from the median were removed. This is done so that outliers (who may not have understood the question, or are unique in their views) do not overly influence the results. Consensus within the panel (known as 'relaxed' agreement for a

nominal group) is defined as all remaining panellists' responses falling within 3 boxes of each other on the Likert scale. Consensus agreement with the statement as presented to the panel is defined as all remaining responses falling in boxes 7-9 (thus agreement both between the panel members and with the statement as given, known as 'strict agreement' for a nominal group).

### *Second and third rounds*

All statements that achieved 'strict' consensus were removed from subsequent rounds and used for guideline construction where evidence was lacking. For statements that did not gain consensus, modified and new statements were used in the second round. After the extreme one sixth of responses were removed, the range, inter-quartile range and median of the remaining responses were reported back to the panellists. Panellists were asked to re-consider the statements in the light of the responses and comments of the rest of the panel. A third round consisted of statements that had not yet achieved consensus.

There was only one statement where consensus was not reached, this was the level of temperature at which a febrile seizure could be diagnosed. (See recommendation A in the main guideline). In this instance the median, mode and interquartile ranges from the Delphi panel is quoted but it is strongly suggested that this point be discussed at a local level prior to implementation.

## **The Guideline**

All statements which had achieved 'strict' consensus were used to generate a guideline in algorithm format. The literature review, level of evidence, and grade of recommendation is given for each decision on the algorithm. If no evidence was available this is clearly stated followed by a further statement, which details whether Delphi consensus was achieved. The algorithm formed the basis of an integrated care pathway, which was used to pilot the guideline (described later) and to study its impact.

Throughout, the document the word ‘admit’ is defined as follows: ‘any admission to a paediatric facility with paediatric trained staff for observation, further investigation and management regardless of the expected length of stay’.

### **Seed Algorithm**

Following a general review of the literature to identify important clinical questions a seed algorithm was generated. This was used as an outline for a more detailed literature search.

### **Care Pathway**

A care pathway was used to implement the guideline. This document can be used by clinicians to aid documentation and ensure the algorithm is followed.

### **Systematic Literature Review**

A systematic review of the literature was performed following the methodology suggested by SIGN (1999). The literature was identified by an explicit search strategy according to pre-set criteria and evaluated against standards provided by SIGN (2000). A librarian (from the Greenfield Medical Library University of Nottingham) experienced in Medline searching checked the initial searches and found them to be satisfactory.

The search strategies used identified:

- Existing guidelines
- Systematic reviews and meta-analyses
- Randomised controlled trials
- Observational studies
- Cohort studies

### **Search strategy**

Full details about the pre-set criteria for identifying the relevant literature and the results of the literature search for critical appraisal can be found in Appendices 1 and 2.

In general, because research evidence in paediatrics is still sparse it was impossible to restrict inclusion to well-conducted randomised-controlled trials. However, the studies needed to use an appropriate study design for the question asked and the study needed to be rigorous and provide results that were valid and reliable. Articles were chosen according to four criteria:

- Addressed the key clinical question.
- Indicated a thorough scientific review of the literature.
- A review or guideline that was written by a national body.
- An indication of a well designed clinical trial.

We included the following computerised databases: The Cochrane Library, Medline, Embase, Cinhal, and Best Evidence. We searched from 1966 to the present (February 2002) using MesH headings and 'textwords', limited to 0-16 years of age. Further articles were obtained from colleagues and by hand searching the bibliography of articles. A hand search for the last 5 years of the most relevant journals was performed and the web site of Ulrichs Periodicals Directory was searched to identify any relevant journals not found on Medline. The journals not listed on Medline were only searched if thought to be relevant to the subject area. The Internet was searched for existing guidelines and links to other evidence based sites. (Details of all Internet sites searched can found in Appendix 1).

Details about the exact number of papers generated and selected are provided in Appendix 2. Information from reports or existing guidelines was also extracted where appropriate but the guideline is clear about the source of information when providing a grade of recommendation. The articles were assessed for their relevance and quality and then critically appraised. Grading of the papers was discussed with colleagues experienced in critique of papers and evidence based medicine. Good quality data was recorded in evidence tables (Appendix 3) and the strength of evidence generated was graded. The level of evidence was graded 1 to 4 and recommendations were graded A to D based on the level of evidence found.

**Table of the grades of recommendations included in the final guideline**

<b>Grade of recommendation</b>	<b>Number</b>
<b>Grade A</b>	<b>0</b>
<b>Grade B</b>	<b>7</b>
<b>Grade C</b>	<b>10</b>
<b>Grade D</b>	<b>2</b>

**TABLE 2.** Levels of evidence

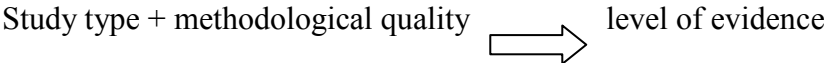
<b>Level</b>	<b>Type of evidence (based on SIGN 2000)</b>
<b>1++</b>	Evidence from high quality meta-analyses, systematic reviews of RCTs, or RCTs with a very low risk of bias
<b>1+</b>	Evidence from well conducted meta-analyses, systematic reviews of RCTs, or RCTs with a low risk of bias
<b>1-</b>	Evidence from meta-analyses, systematic reviews of RCTs, or RCTs with a high risk of bias
<b>2++</b>	Evidence from high quality systematic reviews of case-control or cohort studies or high quality case-control or cohort studies with a very low risk of confounding, bias, or change and a moderate probability that the relationship is causal
<b>2+</b>	Evidence from well conducted case-control or cohort studies with a low risk of confounding, bias, or chance and a moderate probability that the relationship is causal
<b>2-</b>	Evidence from case-control or cohort studies with a high risk of confounding, bias, or chance and a significant risk that the relationship is not causal
<b>3</b>	Evidence from non-analytical studies e.g. case reports, case series
<b>4</b>	Evidence from expert opinion

**TABLE 3.** Grading of recommendations

Grade	Type of recommendation (based on SIGN 2000)
<b>A</b>	Requires at least one meta-analyses, systematic review or RCT rated as 1++, and directly applicable to the target population, and demonstrating overall consistency or results
<b>B</b>	Requires a body of evidence including studies rated as 2++, directly applicable to the target population, and demonstrating overall consistency of results; or extrapolated evidence from studies rated as 1++ or 1+
<b>C</b>	Requires a body of evidence including studies rated as 2+, directly applicable to the target population and demonstrating overall consistency of results; or extrapolated evidence from studies rated as 2++
<b>D</b>	Evidence level 3 or 4; or extrapolated evidence from studies rated as 2+

The method used to derive the final recommendation involved the following stages:

- Evaluation of the methodological quality of the evidence and the allocation of a quality rating.



## **Dissemination**

Prior to implementation an active period of dissemination was undertaken. This involved teaching sessions with nurses and doctors working in accident and emergency and in the GP referral unit. Copies of the algorithm and the tables were distributed to these areas.

## **Implementation and Audit**

The guideline has been provided as a series of recommendations and also as a care pathway to aid the decision-making process by junior doctors. (Shown in the main guideline). Pre- and post implementation data has been collected from the paediatric emergency department at the Queens Medical Centre where the guideline has been developed and piloted.

Clinical outcomes measured during this process included time taken to be seen and managed, rates of investigations and hospital admission. It would be possible for any institution implementing this guideline to undertake a similar audit process. Cost analysis was not addressed but would be important to consider in a further audit.

The guideline has been peer reviewed by the Delphi panel but also has been presented at national meetings. The following publications and presentations have resulted from the guideline.

- Armon K, Stephenson TJ, Macfaul R, Eccleston P, Wernrke U. A consensus based guideline for the management in accident and emergency of the child who has had a seizure
  - British Paediatric A&E Research Group . September 1999
  - Royal College of Paediatricians and Child Health . 4<sup>th</sup> Spring Meeting. April 2000, poster
- Lakhanpaul M, Armon K, Ecclestone P, Werneke U, Smith S, Macfaul R, Stephenson T. Implementing clinical guidelines for paediatric care services: an overview. *Journal of Integrated Care Pathways*; 2002; 6: 18-25.
- Armon K, Stephenson T, Macfaul R, Ecclestone P, Werneke U, Smith S, Williams L. The implementation of an evidence and consensus based care pathway in accident and emergency for the child who has had a seizure. *Archives of Disease in Childhood*, 82, Suppl 1, G18, 2000

- Armon K, Stephenson T, Macfaul R, Ecclestone P, Werneke U, Smith S, Williams L. The development of a consensus based guideline for the management of the child who has had a seizure. *Archives of Disease in Childhood*, 82, Suppl 1, G230, 2000.
- Accepted for publication by the *Journal of Accident and Emergency Medicine*.

## **Implementation pilot**

A study was undertaken to evaluate the implementation of this guideline in a paediatric A&E on the management of the child who has had a seizure.

**Method:** A care pathway was developed with nursing and medical staff, based on the guideline algorithm. This was used as the documentation for children presenting having had a seizure, and followed the child to the ward if admitted.

The key elements of the assessment and management of the child with a seizure, using this guideline were used to develop a data collection form. These data were collected from the notes of children attending A&E (both GP referrals and self-referrals) during a 4 month period in 1997 and compared with those attending during a 4 month period in 1999, following implementation of the care pathway. Data were compared using Chi-square and Man-Whitney-U tests.

**Results:** 212 children with seizure attended pre care pathway and 199 post. There were no differences in age, sex, time of arrival, temperature or admission rates, 69% admitted pre and 73% post care pathway. During the same period there was a 14% increase in admissions of children presenting with all other medical problems. There was no change in the numbers of children returning to A&E having been discharged.

Of those attending with seizure, 61% were managed as febrile seizures. The time taken from seeing the doctor to disposal was reduced by 25 minutes from a median of 80 minutes to 55 minutes (MWU  $p < 0.001$ ). The number of children having serum calcium, magnesium and U&E measured fell (calcium 23% to 10%  $p = 0.01$ , Magnesium 19% to 10%  $p = 0.07$ , U&E 29% to 17%  $p = 0.04$ ). No other investigation differences were found. Five lumbar punctures were performed, 2 pre and 3 post implementation, all in infants less than 18 months, 2 with complex febrile seizures. In the post implementation data 18 infants who were febrile and aged  $< 18$  months, 3 had an LP, 2 were discharged (age 13 and 16 months) and 13 were

observed and reviewed (as suggested by the care pathway if no LP was done). For those managed as 'febrile seizure' the documentation of source of fever improved (25% pre and 51% post  $\chi^2$  p=0.01).

**Conclusion:** The implementation of a care pathway for post seizure management was associated with reduced time spent in the A&E department and numbers of investigations. Admission rates remained unchanged.

Further details of the implementation study can be obtained from the paediatric research group.

### **Patient Information Leaflets**

The patient information leaflets were reviewed and revised by the hospital patient representative and 10 other parents. They have been successfully implemented along with the care pathway and are regularly used.

### **Audit recommendations**

The following data are valuable for monitoring compliance with guideline recommendations and auditing the impact of the guideline on clinical practice:

- Proportions of children admitted to hospital with seizure pre and post guideline implementation.
- Proportion of children admitted with febrile seizure and no risk factors for meningitis pre and post guideline implementation.

*Target – only admit those children who conform to the admission criteria and those where the parents / carers cannot be reassured.*

- Proportion of children returning to hospital (with the same problem within 7 days) pre and post guideline implementation, following discharge with seizure.
- Proportion of children investigated for calcium, magnesium, U&E and EEG pre and post guideline implementation.

*Standard – investigations should be performed only if clinically indicated.*

- Proportion of children with febrile seizure in whom a lumbar puncture was performed pre and post guideline implementation.

*Standard – LPs should be done in accordance with guideline recommendations and only in those with no contraindications.*

- Monitoring of length of time taken to manage a child presenting with seizure from consultation to admission or discharge.
- Cost analysis.

## **Disclaimer**

It is important to remember that guidelines are only one tool used to improve patient care. Clinical acumen and judgement must always be used in conjunction with the guideline. Research is a continuum and it may be necessary to alter practice in light of new evidence before the guideline has been up-dated. It is also important for all clinicians to remember that all guidelines must be used in association with individual patient needs and preferences.

## **Conflict of interest**

The views or interests of the charity funding the development of this guideline have not influenced the final recommendations

Members of the development group have not expressed any conflict of interest with the development of the guideline.

## **Date for review**

Due for review February 2005

## References

1. Addy DP, Hopkins AP. Guidelines for the management of seizures with fever. *British Medical Journal* 1991;303:634-636.
2. Armon K, Stephenson T, Gabriel V. Determining the common medical problems presenting to an accident and emergency department. *Archives of Disease in Childhood* 2001;84:390-2.
3. Audit Commission: Children first, a study of hospital services. HMSO 1993.
4. Blume W International League Against Epilepsy Report 2001 *Epilepsia* 42(9):1212-1218.
5. British Paediatric Association joint statement on childrens attendances at accident and emergency departments 1988.
6. Hill AM Trends in paediatric admissions. *British Medical Journal* 1989, 298:1479-83.
7. Kahan JP, Bernstein SJ, Leape LL, Hilborne LE, Park RE, Park L, et al. Measuring the Necessity of Medical Procedures. *Medical Care* 1994;32(4):357-365.
8. Macfaul R. Appropriateness of paediatric admissions. *Archives Disease Childhood* 1994, 71:51-58.
9. Proposal for the revised classification of epilepsies and epileptic syndromes. *Epilepsia* 1989, 30(4):389-399.
10. Royal College Paediatricians and Child Health - the next 10 years RCPCH Spring Meetind 2001.
11. Scott EA, Black N. When does consensus exist in expert panels? *Journal of Public Health Medicine* 1991;13(1):35-39.

12. Scottish Intercollegiate Guideline Network. A guideline developers handbook 2000.
13. Standards for guideline development. Royal College of Paediatricians and Child Health, 2001.
14. Sweeney A, Gibbs J, Monteil F, Appleton R, Choonara I. The management of febrile seizures in the Mersey Region. *Developmental Medicine & Child Neurology* 1996;38(7):578-584.
15. Woolf SH, Grol R, Hutchinson A, Eccles M, Grimshaw J. Clinical Guidelines Potential benefits, limitations, and harms of clinical guidelines. *British Medical Journal* 1999, 318 527-30.

## **Guideline Recommendations and Strength Of Evidence**

### **Discussion of the evidence for steps on the algorithm**

For each of the steps on the algorithm the literature is discussed. A statement is then made in italics, followed by the level of evidence and grade of recommendation.

#### **A. Definition of fever.**

Temperature is a physiological variable, which fluctuates with time of day, level of activity, level of external temperature and weight of clothing, as well as between individuals. It is therefore impossible to define an absolute value above which it is pathological.

In addition the method of taking the temperature is crucial in recording it accurately, and different methods yield differing results. The rectal temperature routinely gives values of approximately 0.5°C higher than a temperature taken from the axilla. The mean normal temperature as measured from the axilla is 36.2°C with a range of 35.3°C to 37.°C, and fever is considered to be present if the temperature is 37.2°C or higher (Sahib El-Radhi 1994).

The issue is further complicated by the fact that a seizure in itself may generate a fever.

The majority of papers discussing febrile seizure give a definition which describes a generalised seizure in a child in association with a “fever” but without the cut- off point for fever being stated (Nelson 1976, Sweeney 1996). If they do it varies widely from 37.5 or above (Lorber) to 38.5°C or above (Jaffe 1981). Rarely do they state how the temperature was measured. The majority of literature regarding fever and its management is from America, where it seems that rectal temperatures are taken as routine. Baraff’s guidelines 1993 on fever use a rectal temperature of 38.0°C in infants <3 months of age, and 39.0°C thereafter.

The Delphi panel were asked to choose from a range of temperatures, which in their clinical practice they would consider as febrile in a child presenting with a seizure. No consensus was achieved by our pre-defined criteria. The temperature given here (37.8°C) represented the median, mode and inter-quartile range from the Delphi panel (range 7-10 37.7°C to 38.0°C).

## RECOMMENDATION

*The temperature level to define fever with seizure is above 37.8 °C axilla. However, if the clinical history and examination are indicative of a febrile seizure the patient should be managed as such, even if the temperature recorded is 37.8 °C or less.*

No evidence

Delphi panel no consensus reached

Grade D recommendation

*This point will need discussion at the local implementation stage.*

## AFEBRILE SEIZURES

Annotations B to H refer to afebrile seizures.

### **B. Anticonvulsant levels in children on anti-epileptic medication**

Smith 1996 reports on 199 children presenting with seizure on 254 occasions to a paediatric A&E over a one-year period. Fifty-two children with epilepsy made 78 attendances, and in 71 of these attendances the children were on anticonvulsant treatment. On 27 occasions, anticonvulsant levels were checked and 10 (37%) were sub-therapeutic. This was a hospital-based cohort study, generating level 2+ evidence. Eisner 1986 conducted a prospective study to assess a standard seizure workup in A&E including both adults and children of 180 patients 30 were 0-18 years. They found sub-therapeutic anticonvulsant levels in 96 of a 109 tested (88%) resulting in a change in management level 2++ evidence.

## RECOMMENDATION

*A child established on anticonvulsant medication who presents with a seizure without explanation should have an anti-convulsant level checked if they are on any of the following anticonvulsants: Phenytoin, phenobarbitone, ethosuximide, carbamazepine, lamotrigine, sodium valporate*

Level of evidence 2+ and 2++

Grade B recommendation

### **C. Differential diagnosis of a child presenting with an afebrile seizure**

This is not addressed specifically in the literature. Table 1 is based on Smith 1996 observed diagnoses in children presenting to an A&E department over a one year period with both first and recurrent seizures. A 118 children presented with a first seizure, 75 of those were febrile seizures. Of the other 43, the diagnoses one year on were as stated in the table. These are only small numbers, which are not population based and therefore do not give true probabilities, but are the best figures available.

### **RECOMMENDATION**

*Table 1(see below) for the differential diagnosis of a child with a first afebrile seizure.*

Level of evidence 2+

Grade C recommendation

**TABLE 1:** List of differential diagnoses for the child presenting with a first afebrile seizure to the Accident and Emergency department

<i>Type of seizure</i>	<i>Cause</i>
Isolated seizure 11/45 = 24%	No cause found
Epilepsies 16/45 = 36%	Generalized - with tonic clonic seizures, absence seizures, myoclonic seizures Partial - e.g. benign rolandic epilepsy, or epilepsies with complex partial seizures
Acute symptomatic epileptic seizure 12/45 = 27%	Intracranial infection (bacterial/viral, diffuse/localised) Ingestion (deliberate, accidental) Trauma (head injury, non accidental injury) Tumour Intracranial haemorrhage Hypertension Hydrocephalus Metabolic (low glucose, calcium, magnesium, high and low sodium)
Neonatal/Early infant seizures (<3 months) 6/45 = 13%	<i>In addition to the above causes:</i> Hypoxic ischaemic encephalopathy (from birth) CNS infections (acute and congenital) Fifth day fits Drug withdrawal Pyridoxine dependency
Other important differentials (not epileptic seizures)	Convulsive syncope - reflex anoxic seizure, vasovagal seizure (both neurally mediated syncopes), arrhythmias e.g. long QT (cardiac syncope), suffocation, psychogenic seizures

#### **D. Diagnostic tests for the child presenting with an afebrile seizure.**

Four different studies address this issue.

Smith 1996 level 2+ evidence looked at the positive yield of laboratory investigations in children presenting to A&E with seizures over 1 year and found only mildly raised plasma glucose (in 7% of those checked-52 of 199 fits) and mildly depressed plasma sodium concentrations (in 54% of those checked -62 of 199 fits) neither of which required treatment. They concluded there is no need for routine biochemical measurements

Nypaver 1992 in a retrospective hospital based cohort study level 2+ evidence looked at how often serum U&E, calcium, magnesium, glucose and dextrostix were done in children with seizures and how often they were abnormal. 308 children with seizure were identified (both febrile and afebrile) over a one year period 200 had afebrile seizures, 44% of children with afebrile seizures had at least one investigation performed. The few abnormalities included two children with mildly depressed sodium, 14 with abnormal potassiums (mostly high and thought to be due to haemolysis) and three with high glucose. None of the abnormal investigation results were thought to have caused the seizure, or changed patient management.

A retrospective case note review by Kenney 1992, (level 2+ evidence) including both febrile and afebrile seizures found no clinically significant abnormalities in 592 laboratory tests performed on 155 visits made by 119 patients.

A prospective study by Eisner 1986 (level 2++ evidence) of 163 adults and children who all had a full blood count, urea and electrolytes, glucose, calcium and magnesium also found few abnormalities. All apart from one, low glucose would have been suspected clinically. Only one low glucose needed intervention.

Turnbull 1990 level of evidence 2+ found 11 significant abnormalities in 136 adults and children studied (16 children in total) all but two episodes of low glucose would have been suspected clinically.

Note, however, that these authors found that hypoglycaemia may occur with a prolonged seizure, and this simple test should be performed if the child is still seizing or is not fully alert.

A systematic review by Gilbert 2000 looked specifically at the information gained from an EEG and tried to quantify it, they concluded that an EEG is not a useful investigation after one unprovoked seizure (level of evidence 2++). Stroink 1998 followed up 156 children with a first afebrile seizure for two years 54% had a recurrence, all had EEGs, 71% of those with epileptic discharges on the EEG had a recurrence and 40% of children with a normal EEG had a recurrence.

All children should have their blood pressure checked as part of their routine examination, in this case to exclude systemic hypertension as a rare but important presentation of a seizure. There are no studies to addressing this in the literature.

## **RECOMMENDATION**

*1. All children presenting with an afebrile seizure should have their blood pressure measured at the time of presentation.*

No evidence

Delphi consensus achieved

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

Level of evidence 3, extrapolated from studies rated 2+

Grade D Recommendation

*3. It is not necessary to routinely check a full blood count, urea and electrolytes, calcium or magnesium following a first afebrile seizure or a recurrent seizure, unless history or examination features suggest otherwise*

Level 2+ evidence

Grade C recommendation

*4. There is no need for an EEG following a first simple afebrile seizure*

Level evidence 2++

Grade B recommendation

#### **E. Need for admission in children with afebrile seizures.**

Seizures in early infancy are often symptomatic (underlying pathology) and therefore investigation and observation are essential. It is difficult to assess infants and very young children confidently without a period of observation. One could define an arbitrary cut-off age of 12 months. The only paper that relates to this issue is that by Chevrie and Aicardi 1978 who found that of 313 cases of an afebrile seizure in the first year of life, only 65 (21%) had 'no mental retardation' at follow up (median 3 years). They suggest that these children should be referred and investigated urgently.

#### **RECOMMENDATION**

*Following a first afebrile seizure, children conforming to the stated criteria (Table 2 in algorithm) should be admitted to an acute paediatric facility for observation and further investigation.*

No evidence

Delphi consensus

## **F. Follow up of child with an afebrile seizure**

No literature was found to address follow up. The consensus recommendation was that all children seen following a first afebrile seizure should be referred for an outpatient appointment. Prior to discharge the parents should be counselled and given an information leaflet.

When counselling parents it is useful to give some indication about the number of children who suffer from a single seizure. Many studies have looked at the prevalence of epilepsy in the paediatric population such as Kurtz 1998. Hauser 1993 carried out a population study of epilepsy and first unprovoked seizures over a 50 year period in Rochester Minnesota and found that 1% of children by 16 years had suffered from an unprovoked seizure. Stroink 1998 examined the recurrence rate following a first afebrile seizure where 156 children were followed for two years and 54% had a recurrence.

### **RECOMMENDATION**

*Children who do not conform to the stated criteria for admission following an afebrile seizure (Table 2 in algorithm) should have a paediatric outpatient referral.*

No published evidence

Delphi consensus achieved

Needs discussion at local implementation stage

### **RECOMMENDATION**

*By the age of 16 years approximately 1% of the population will have suffered a seizure without a fever*

Level 2++ evidence

Grade B recommendation

## RECOMMENDATION

*Approximately 50% of children who have an afebrile seizure will have a recurrence*

Level of evidence 2++

Grade B Recommendation

## FEBRILE SEIZURES

### **G. Incidence of meningitis in children presenting with febrile seizures**

The probability of having meningitis following a seizure associated with fever is not well documented. In population based papers it is clear that some febrile seizures are dealt with in the community. The numbers admitted to hospital vary from 58% with simple febrile seizures to 76% with complex seizures (Verity UK population based study, on cohort from the 1970's). Of those admitted to hospital there are several studies looking at the incidence of meningitis (see Table 6 below).

Clear definitions of criteria for diagnosis of bacterial and viral meningitis are not given in most of these studies, the exception being the study by Offringa. The relatively high incidence of meningitis in this cohort may reflect the definition given in this study. A diagnosis of meningitis was made if the culture of the CSF was positive or there were 10 or more white cells/mm<sup>3</sup> in the CSF. In only 1 study did all children presenting with febrile seizures undergo lumbar puncture. All the above studies carry evidence level 2+.

**TABLE 6.** Published reports of the incidence of bacterial meningitis in children with fever and a seizure

<i>Date</i>	<i>Author</i>	<i>No. in study</i>	<i>No. with LP</i>	<i>No. with bacterial meningitis</i>	<i>No. with viral meningitis</i>
1980	Lorber	452	304	3(0.6%)	12
	Level 2+		(67%)		
1981	Jaffe	562	All*	6 (1%)	17 (3%)
	Level 2+				
1983	Joffe	254	241	13 (5.1%)	?2
	Level 2+		(95%)	(In 2 CSF was sterile)	
1990	McIntyre	307	154(50%)	2 (0.6%)	3
	Level 2+			(1 diagnosed later on repeat LP)	
1992	Offringa	309	171	21 (6.7%)	2
	Level 2+		(55%)	(In 5 cases the CSF was sterile)	

\*Policy to LP all cases, No. of unsuccessful LP's not stated.

## RECOMMENDATION

*The incidence of bacterial meningitis in children presenting with febrile seizures is 0.6 to 6.7% (Pooled risk 2.4%)*

Level of evidence 2+

Grade C Recommendation

## **H. Febrile seizure, risk of meningitis and clinical features. Age and risk of meningitis**

Two authors in particular have looked at clinical features that might distinguish those with meningitis from those without CNS infection, Joffe in 1983 and Offringa in 1992. The study by Joffe concluded that five features had a high specificity but low sensitivity for meningitis being present. These were:

- 1 a visit to the physician in the 48 hours pre seizure
- 2 seizure on arrival at the emergency room
- 3 type of seizure (focal or generalized)
- 4 suspicious findings on clinical examination (rash/petechiae, cyanosis, hypotension, grunting respirations)
- 5 abnormal neurological examination (stiff neck, increase tone, deviated eyes, ataxia, no response to voice, inability to fix and follow, no response to pain, nystagmus, floppy muscle tone, bulging or tense fontanelle)

Unfortunately this paper did not state whether all or one of the suspicious neurological or examination findings had to be present and the numbers were small - only 13 children with meningitis.

Offringa carried out a further study to look in detail at the features suggested to be indicative of meningitis in the study by Joffe. This was a case control study with 23 cases of meningitis and 69 controls.

The indicators of meningitis were as follows

- Complex features - focal, > 15 mins, multiple seizures in 24 hours
- History features - at least three days of illness, seen by GP in previous 24 hours, drowsiness at home, vomiting at home.
- Physical signs
  - Major - petechiae, definite nuchal rigidity, coma
  - Minor signs - dubious nuchal rigidity, drowsiness, convulsing on examination, weakness or paralysis on examination.

All these features apart from focal seizure, at least 3 days illness, and dubious nuchal rigidity had confidence intervals >1, and odds ratios > 1 Unfortunately the authors did not define coma or give details about the petechial rash.

**TABLE 8.** Distinguishing features on history and examination for the diagnosis of meningitis in those presenting with seizure and fever, from Offringa.

<i>Offringa</i> <i>Feature:</i>	<i>Cases</i> <i>N=23</i>	<i>Controls</i> <i>N=69</i>	<i>Likelihood</i> <i>Ratio (-ve)</i>	<i>Likelihood</i> <i>Ratio (+ve)</i>
At least one complex feature	17(74%)	26(38%)	0.42(0.21-0.85)	1.9(1.33-2.89)
At least one major sign	16(70%)	0	0.3(0.16-0.57)	Infinite
At least one minor sign (after excluding those with major signs)	7(71%)	24(35%)	0.44(0.13-1.43)	2.05(1.16-3.63)
At least one history feature	18(78%)	32(46%)	0.41(0.18-0.91)	1.69(1.21-2.35)

It can be seen that the positive likelihood ratios are only marginally raised apart from "any major signs" where all children with a major sign had meningitis. Normally likelihood ratios of at least eight are needed to make a worthwhile difference to the post test probability.

The major signs were 100% sensitive in identifying children with meningitis. There is no doubt what is meant by nuchal rigidity but the authors do not expand their interpretation of

coma or petechiae. Thus the only major sign which can be reliably extrapolated from the study by Offringa is nuchal rigidity.

There are no studies which look specifically at the incidence of petechiae with bacterial meningitis but there are studies which have evaluated all children attending A&E departments with a non-blanching rash. One such study by Wells 2001 studied 233 children with a non-blanching rash (plus or minus fever), 15 had a clear alternative diagnosis e.g. Acute leukaemia, HSP, 24 had proven meningococcal disease and four further cases were suspected. One child had a positive CSF for meningococcus. There were no other laboratory confirmed cases of bacterial sepsis. Obviously this study has to be interpreted with caution as the population studied was not children with febrile seizures and petechiae. It does however suggest that as a presenting sign petechiae alone are more often benign than pathological.

Green (level 2+) studied a large cohort of children with meningitis over 20 years and identified 115 children who had presented with a febrile seizure prior to the diagnosis of meningitis. The authors suggest that in 111 of these cases there were features in the history or examination which were indicative of meningitis including, comatose, unresponsive, lethargic, prolonged focal seizure, focal or multiple seizures. Of the other four, two were viral in origin, and two children had been pre-treated with antibiotics.

**TABLE 7b.** Green, Retrospective review of 111 cases of meningitis which presented with seizure and fever

<i>Year</i>	<i>No. cases</i>	<i>Simple seizure</i>	<i>Complex seizure</i>	<i>Abnormal LOC</i>	<i>Meningeal Signs</i>	<i>Occult presentation</i>
1993	111	23	88	103	56	0

There have been other studies, (Rutter 1977, Lorber 1980 and Jaffe 1981 all evidence level 2+) that suggest that for the majority, if not all, of the cases with seizure and fever who have meningitis, there are reasons to suspect this diagnosis on history and examination. Rutter 1977 identified 328 children over a one year period with febrile seizures, 314 had a lumbar

puncture, in 310 cases the CSF was normal however two of these children continued to be unwell and had repeat lumbar punctures 36-48 hours later which were abnormal. Of the four children with presumed meningitis one was due to mumps, two were presumed viral with a marked lymphocytosis in the CSF and one was due to *Haemophilus influenzae*. This child had no physical signs suggestive of meningitis but did have three seizures in 24 hours, one lasting up to 15 minutes.

Lorder 1980 studied 452 children with febrile seizures, 15 had meningitis, 14 were suspected clinically and the 15<sup>th</sup> was presumed viral, no treatment was given and the child improved.

Jaffe 1981 studied 562 children with febrile seizures, 6 children had bacterial meningitis; they conclude that all cases were suspected by the clinical presentation.

These are all hospital based observational studies, which are mostly retrospective case note reviews and therefore may benefit from hindsight and bias in case ascertainment.

A population based cohort study carried out in the Nottingham area by Fortnum 1993 gives accurate data over a 10 year period (1980 to 1990) for the incidence of meningitis. The incidence rates were 37.2/100 000 for 0-28 days, 115.5/100 000 for 1-11 months, 28.5/100 000 for 1-5 years and 2.8/100 000 for 5-16 years. Thus the risk of meningitis is highest in those aged 1 to 11 months. However this study was carried out before the reduction in *haemophilus meningitis* which followed the introduction of the *Haemophilus influenzae* b (Hib) vaccine in 1992.

Many people consider that children under one year of age (often extended to 18 months) can have meningitis without displaying any of the classic signs. This seems to be based on clinical experience and some early published case reports. Joffe's study 1983 included 13 cases of meningitis aged 6 months to 6 years, and Offringa's 1992, 23 cases aged 3 months to 5 years. Both showed a higher incidence in the lower age groups but still found that there were features on history and examination that would pick up all of these cases. Green 1993 reviewed 115 cases of meningitis (from 2 months to 15 years) with preceding fever and seizure, many of whom were less than a year, and all were found to have either a history of complex seizures or findings of decreased consciousness, bulging fontanelle, petechiae or nuchal rigidity.

Thus the incidence of meningitis is higher in the lower age ranges but most studies imply that these children can be detected clinically using examination features. A cut off age limit for a lumbar puncture is therefore unsubstantiated by these studies.

## RECOMMENDATIONS

*1. Any child with definite nuchal rigidity should be treated as having meningitis*

Level 2+

Grade C Recommendation

*2. Children with any of these features have an increased risk of meningitis and a lumbar puncture should be considered if there are no contraindications.*

- *Complex features - focal, > 15 mins, multiple seizures in 24 hours*
- *History features - at least three days of illness, seen by GP in previous 24 hours, drowsiness at home, vomiting at home.*
- *Physical signs*  
*petechiae, dubious nuchal rigidity, drowsiness, convulsing on examination, weakness on examination*
- *Other signs - bulging fontanelle*

Statements based on Level 2+ evidence

Grade C recommendation

## **I. Admission following a simple febrile seizure**

There are no studies which specifically address whether parents or clinicians feel admission is needed following a febrile seizure. The Delphi panel felt a period of observation (at least two hours) was reasonable following a febrile seizure for children <18 months.

## **RECOMMENDATION**

*All children below 18 months should be admitted to a paediatric observation area for a period of at least two hours*

No evidence

Delphi consensus

## **J. Complex febrile seizures**

Nelson and Ellenberg in 1976 (evidence level 2++) first suggested the term ‘complex febrile seizure’ with respect to predicting further seizures and epilepsy in children presenting with a first febrile seizure. They found that the following features increased the likelihood of further seizures: prolonged seizure (>15 mins) multiple seizures in 24 hours and focal features. Other authors have found the same (Annegers 1987, Berg 1992, Verity 1985, all level 2+ or 2++ evidence).

These complex seizure features have also been looked at as indicators of CNS infection, and found to be useful. (Offringa 1992, Joffe 1983, Green 1993 and Jaffe 1981, all level 2+ evidence). Table 6 shows the risk of CNS infection. A pooled risk from these studies for bacterial meningitis in children presenting with fever and seizure is 56/1,884 =2.9%. Table 7a distinguishes those children with complex versus simple seizures, signs on examination and meningitis. When we separate those children with complex seizures from those with simple febrile seizures, the risk of bacterial meningitis in a simple seizure is 12/604=2% and in a complex seizure, 28/307=9.1%. It is also evident that very few cases presented in an occult fashion (without decreased level of consciousness or meningeal signs, see table 7b).

**TABLE 7a.** The relationship of complex seizures, meningeal signs and level of consciousness in published reports of children with fever, seizure and meningitis.

Year	study	No. of cases	Seizure type studied	Bacterial Meningitis Cases			
				No. (%)	Abnormal LOC	Meningeal signs	Occult presentation
1981	Gerber	100	simple	0	-	-	0
1981	Jaffe	239	complex	6(2.5)	6	4	0
		323	simple	0	-	-	-
1983	Joffe	25	focal	5(20)	-	5	0
		216	not focal	8(3.7)	-	7	0?
1992	Offringa	43	complex	17(40)	6	16	-
		49	simple	4(8)	-	-	-

## RECOMMENDATION

*1. Clinicians should have a higher level of suspicion of meningitis following a complex seizure (multiple seizures in the same illness, seizure >15 minutes, focal) compared to a simple seizure*

Level 2+ evidence

Grade C recommendation

*2. A child presenting with a complex febrile seizure (defined above) with no clinical signs of meningitis (see I) should be observed closely and reviewed within two hours*

No evidence

Delphi consensus

### **K. Antibiotics and meningitis risk**

It is widely thought that prior antibiotic treatment may mask the signs of meningitis. There is little evidence to support this. In Offringa's study 1992 four of the 23 with meningitis had been previously treated. Joffe 1983 does not comment, but 11 of the 13 cases had positive bacterial cultures. These numbers are clearly too small to analyse separately. Green 1993 (level 2+) found that out of 115 cases of meningitis, the initial level of consciousness was relatively normal in 10 and of these five had had prior treatment with antibiotics (they do not state how many of the depressed consciousness group had also had antibiotics). Nevertheless in these five cases there were still major reasons for suspecting meningitis, namely either complex seizures or major signs on examination (nuchal rigidity or petechiae). Although the studies suggest there is little evidence to support a different approach in those who have had prior treatment with antibiotics the numbers are extremely small so no recommendation was drawn and the statement was put to the Delphi panel.

The British Paediatric Association (Addy 1991) did not comment on this issue, but the American Association Paediatrics (Bergman 1996) suggested that LP be strongly considered in those who have had prior antibiotic treatment.

### **RECOMMENDATION**

*Those children with a simple febrile seizure, >1 year of age and with no serious features from the history or examination findings indicating meningitis (see algorithm), who have had prior antibiotic treatment should be admitted to an acute paediatric facility for a period of observation (at least 2 hours)*

No evidence

Delphi consensus

## **L. Contraindication for Lumber Puncture**

It is impossible to design a randomised-controlled trial to answer this clinical question as the primary outcome measure would be coning and death – very rare and catastrophic! Thus the only evidence available to bring to the discussion is based on population studies and studies that review retrospectively the symptoms/ signs of those patients who died from coning and meningitis. Wylie 1997 looked at cases of meningococcal disease over a 14 year period in adults and children. Two cases of brain stem herniation were found on postmortem; both had rapidly deteriorated following lumbar puncture. Wylie et al advocate a list of contraindications to LP. The paper generates level 2+ evidence but the list of contraindications is suggested by the authors rather than based on evidence from the paper and so this list was put to the Delphi panel.

## **RECOMMENDATION**

*The following are contraindications to LP*

- *Drowsiness or impairment of consciousness (falling conscious level, Glasgow coma scale of <13)*
- *Signs of septicaemic shock (poor perfusion, low BP, and tachycardia)*
- *Clinical diagnosis of invasive meningococcal infection with typical haemorrhagic rash*
- *Signs of raised intracranial pressure (pappiloedema, coma, high BP low pulse)*
- *Focal neurological signs*

No evidence

Based on Delphi consensus

### **M. Causes of fever in children presenting with febrile seizure**

There have been four hospital based observational studies that have reported on their series of febrile seizures and the underlying infections. Some have excluded CNS infection in their definitions of febrile seizure (Green 1985, Smith 1996 and Rutter1977). Others report meningitis among the list of causes (Lorber 1980). The percentages vary quite markedly, no doubt related to differing definitions of each infection. Table 3 (in the algorithm) is based on these studies.

**TABLE 9:** Common differential diagnoses of children presenting with fever and seizure.

**N.B.** Viral infection, otitis media and tonsillitis account for 85-90% with the others making up 10-15% of all causes.

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<i>Cause for fever</i>
Viral infection (e.g. upper respiratory tract infection, non specific viral illness, roseola, chicken pox and other exanthema, etc.)
Otitis media
Tonsillitis
Urinary tract infection
Gastroenteritis
Lower respiratory tract infection
Meningitis
Post immunisation
Post ictal fever (only likely after generalised seizure of >10mins)

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### **RECOMMENDATION**

*Consider the differential diagnoses of fever listed above when seeing children with febrile seizures*

Level 2+ evidence

Grade C recommendation

## **N. Tests for infection**

Several papers have looked at the diagnostic yield of a battery of investigations in those presenting with seizure and fever, without using discrimination in the tests. All (Gerber 1981, Jaffe 1981, Rutter 1977, Smith 1996, Sweeney 1996) found a very poor yield of positive investigations and suggest that no tests should routinely be performed unless clinically indicated. Some however made an exception for checking a blood sugar (as children may be hypoglycaemic without clinical indication) and a urine sample as there are often no signs for a UTI and its diagnosis has important implications. All the above papers were of level 2+ and 3 evidence.

## **RECOMMENDATION**

*1. A finger prick blood sugar should be checked if the child is still seizing at the time of presentation or is not fully alert.*

Level 3 evidence

Grade D recommendation

*2. In a child with a simple febrile seizure where a source for infection other than a UTI is suspected, a urine sample should be obtained to check for infection.*

No published evidence

Delphi consensus achieved

*Local discussion required prior to implementation.*

*3. In a child with a simple febrile seizure no other investigations are routinely indicated.*

Level 2+ evidence

Grade C recommendation

### **O. Management of child with no focus of infection**

There was no published evidence on this issue. The need for a good urine sample collected without contamination (Stephenson 1992) was agreed in the first round. Following first round comments, two statements were given as alternative management plans concerning admission or discharge, and both achieved consensus, at the same level of agreement.

### **RECOMMENDATION**

*A child who has had a simple febrile seizure where no source for infection has been found clinically, should have a urine sample (clean catch, SPA or catheter specimen) taken for microscopy and culture.*

*Children with no focus for infection can be admitted for a short period of observation (minimum two hours) **OR***

*Children with no focus for infection can be discharged home if the child looks well, parents/carers have ready access to health care if required and they are happy with this decision.*

All the above based on Delphi consensus only, no published evidence.

### **P. Population Risk and Prognosis**

Population studies give the best information regarding both incidence and prognosis, as hospitals tend only to see a biased population. There are two large population based studies which have looked at the incidence of febrile seizures. The first by Verity 1991 (level evidence 2++) found that 2.7% of a cohort of 16,004 children followed from birth for 10 years

had suffered from febrile seizures. A study by Nelson 1976 following up 54,000 children (level evidence 2++) found an incidence of 3.3%.

### **RECOMMENDATION**

*The population risk of febrile seizure is 2.7-3.3%*

Level of evidence 2++

Grade B recommendation

There is striking consistency amongst population based studies, which all suggest that the likelihood of a further seizure is about 30%. A systematic review by Ellenberg 1980 which looked at the results of 23 hospital and population based studies and found a recurrence rate of 29-35%.

### **RECOMMENDATION**

*The risk of recurrence of febrile seizure following a first seizure is 29-35%*

Level evidence 2++

Grade B recommendation

Risk factors for recurrent febrile seizures vary between studies. A pooled analysis of the results from 5 such studies by Offringa 1994 (evidence level 2++) found a family history of seizures, febrile or non febrile, initial multiple seizures and temperature less than 40 degrees were all associated with an increased risk of recurrent febrile seizures

### **RECOMMENDATION**

*A family history of seizures febrile or afebrile, initial multiple seizures and temperature less than 40 degrees are all associated with an increased risk of recurrent febrile seizures*

Level evidence 2++

Grade B recommendation

The likelihood of developing unprovoked seizures is slightly raised above the population norm which is 0.5%, Nelson 1976. The population studies by Nelson and Verity followed children up for 7 and 10 years respectively and calculated the risk of epilepsy depending on whether the seizure was simple or complex. Many studies do not make this differentiation which is less useful. In Nelson's study 2% developed epilepsy. The risk of epilepsy following a complex seizure was 4.1% and following a simple seizure was 1.1%. The results in Verity's study are similar; 2.3% developed epilepsy - the risk was 1% following a simple seizure and 6% after a complex seizure. There is a study by Annegers which looks at the risk of epilepsy over a longer time period, the mean length of follow-up was 18 years. They found that the life time risk of epilepsy at age 25 years with no prognostic factors such as complex features and no family history was 2.4% (level 2+ evidence)

## **RECOMMENDATIONS**

*1. Risk of epilepsy following a simple febrile seizure is 1-2.4%*

Level of evidence 2+

Grade C recommendation

*2. Risk of epilepsy following a complex seizure is 4.1-6%*

Level 2++ evidence

Grade B recommendation

## **Q. Follow up**

There are studies which have looked at parental reaction and feelings following febrile seizures (Baumer 1981 and Balslev 1991) but there is no published evidence concerning the need for follow up or parental view of follow up following a simple febrile seizure.

### **RECOMMENDATION**

*Parents of children sent home from A&E with a diagnosis of first simple febrile seizure should be encouraged to contact their own GP or community nurse specialist if they feel they need further information or care.*

No published evidence

Delphi consensus achieved.

## **R. Information leaflets**

There is evidence to support the beneficial effect of giving parents information following febrile seizures. Wassmer 1999 conducted a telephone interview of 50 parents following admission with a febrile seizure in a hospital where information is given by nurses and doctors along with a written information leaflet. Their knowledge was compared to 50 controls. The study found that parents retain information given. Level 2+ evidence. An unpublished study by Ravi 1990 found that parents given written guidance acted more appropriately during management of subsequent seizures. Numbers were small in this study level of evidence 3.

### **RECOMMENDATION**

*Parents should be given an information leaflet on febrile seizures and the management of fever.*

*Level evidence 2+  
Recommendation C*

## References

1. Addy DP, Hopkins AP. Guidelines for the management of seizures with fever. *British Medical Journal* 1991;303:634-636. Annegers JF, Hauser WA, Shirts SB, Kurland LT. Factors prognostic of unprovoked seizures after febrile seizures. *New England Journal of Medicine* 1987;316(9):493-498.
2. Balslev T. Parental reactions to a child's first febrile seizure. A follow-up investigation. *Acta Paediatrica Scandinavica* 1991;80(4):466-469.
3. Baraff LJ, Bass JW, Fleisher GR, Klein JO, McCracken GH, Jr., Powell KR, et al. Practice guideline for the management of infants and children 0 to 36 months of age with fever without source. Agency for Health Care Policy and Research. *Annals of Emergency Medicine* 1993;22(7):1198-210.
4. Baumer JH, David TJ, Valentine SJ, Roberts JE, Hughes BR. Many parents think their child is dying when having a first febrile seizure. *Developmental Medicine & Child Neurology* 1981;23:462-464.
5. Berg AT, Shinnar S, Hauser WA, Almany M, Shapiro ED, Salomon ME, et al. A prospective study of recurrent febrile seizures. *The New England Journal of Medicine* 1992;327:1122-7. Chevrie JJ, Aicardi J. Convulsive disorders in the first year of life: neurological and mental outcome and mortality. *Epilepsia* 1978;19:67-74.
6. Bergman DA, Baltz RD, Cooley JR, Coombs JB, Nazarian LF, Riemenschneider TA, et al. Practice parameter: The neurodiagnostic evaluation of the child with a first simple febrile seizure. *Pediatrics* 1996;97(5):769-772.
7. Eisner RF, Turnbull TL, Howes DS, Gold IW. Efficacy of a 'standard' seizure work up in the emergency department. *Annals of Emergency Medicine* 1986;15:69-
8. Ellenberg JH, Nelson KB. Sample selection and the natural history of disease. Studies of febrile seizures. *Journal of the American Medical Association* 1980;243(13):1337-40.

9. Fortnum HM, Davis AC. Epidemiology of bacterial meningitis. *Archives of Disease in Childhood* 1993;68:763-767 Gerber MA, Berliner BC. The child with a 'simple' febrile seizure. Appropriate diagnostic evaluation. *American Journal of Diseases of Children* 1981;135(5):431-3.
10. Gilbert DL, Buncher CR. An EEG should not be routinely obtained after a first unprovoked seizure in childhood. *Neurology* 2000; 54(3):635-41
11. Green AL, MacFaul R. Duration of admission for febrile seizures. *Archives of Disease in Childhood* 1985;60:1182-1184.
12. Green SM, Rothrock SG, Clem KJ, Zurcher RF, Mellick L. Can seizures be the sole manifestation of meningitis in febrile children? *Pediatrics* 1993;92(4):527-34.
13. Hauser WA, Annegers JF, Kurland LT. Incidence of epilepsy and unprovoked seizures in Rochester, Minnesota: 1935-1984 *Epilepsia* 1993; 43(3):453
14. Jaffe M, Bar-Joseph G, Tirosh E. Fever and seizures--indications for laboratory investigations. *Pediatrics* 1981;67(5):729-31.
15. Joffe A, McCormick M, DeAngelis C. Which children with febrile seizures need lumbar puncture? A decision analysis approach. *American Journal of Diseases of Children* 1983;137(12):1153-6.
16. Kenney RD, Taylor JA. Absence of serum chemistry abnormalities in paediatric patients presenting with seizures. *Pediatrics* 1992,8(2):65-6
17. Kramer MS, MacLellan AM, Ciampi A, Etezadi-Amoli J, Leduc DG. Parents' vs physicians' utilities (values) for clinical outcomes in potentially bacteremic children. *Journal of Clinical Epidemiology* 1990;43(12):1319-25.

18. Kurtz Z, Tookey P, Ross E. Epilepsy in young people: 23 year follow up of the British National Child Development Study. *British Medical Journal* 1998;316:339-342.
19. Lorber J, Sunderland R. Lumbar puncture in children with seizures associated with fever. *Lancet* 1980;1(8172):785-6.
20. McIntyre PB, Gray SV, Vance JC. Unsuspected bacterial infections in febrile seizures. *Medical Journal of Australia* 1990;152(4):183-6
21. Nelson KB, Ellenburg JH. Predictors of epilepsy in children who have experienced febrile seizures. *New England Journal of Medicine* 1976;295(19):1029-1033.
22. Nypaver MM, Reynolds SL, Tanz RR, Davis AT. Emergency department laboratory evaluation of children with seizures: Dogma or dilemma? *Pediatric Emergency Care* 1992;8(1):13-16.
23. Offringa M, Bossuyt PM, Ludsen J Risk factors for seizure recurrence in children with febrile seizures: A pooled analysis of individual patient data from five studies. *Journal of Pediatrics* 1994;124(4):574-84
24. Offringa M, Beishuizen A, Derksen-Lubsen G, Lubsen J. Seizures and fever: can we rule out meningitis on clinical grounds alone? *Clinical Pediatrics* 1992;31(9):514-22.
25. Ravi A, Macfaul R. Does written guidance to parents alter their management of recurrent febrile seizures? Unpublished Rutter N, Smales OR. Role of routine investigations in children presenting with their first febrile seizure. *Archives of Disease in Childhood* 1977;52(3):188-91.
26. Sahib El-Radhi A, Carrol JE. *Fever in Paediatric Practice*. Oxford: Blackwell Scientific Publications, 1994.

27. Smith RA, Martland T, Lowry MF. Children with seizures presenting to accident and emergency. *Journal of Accident and Emergency Medicine* 1996;13:54-58.
28. Stephenson T, O'Callahan. *Pocket paediatrics*. first ed. London: Churchill Livingstone, 1992.
29. Stroink H, Brouwer OF, Arts WF, Geerts AT, Boudewyn Peters AC, Van Donselaar CA. The first unprovoked, untreated seizure in childhood: a hospital based study of the accuracy of the diagnosis, rate of recurrence, and long term outcome after recurrence. Dutch study of epilepsy in childhood. *Journal of Neurology, Neurosurgery and Psychiatry*. 1998;64(5):595-600
30. Sweeney A, Gibbs J, Monteil F, Appleton R, Choonara I. The management of febrile seizures in the Mersey Region. *Developmental Medicine & Child Neurology* 1996;38(7):578-584.
31. Turnbull TL, Vanden Hoek TL, Howes DS. Utility of Laboratory Studies in the Emergency Department Patient with a New-Onset Seizure. *Annals of Emergency Medicine* 1990;19:373-377.
32. Verity CM, Butler NR, Golding J. Febrile seizures in a national cohort followed up from birth. 1- Prevalence and recurrence in the first five years of life. *British Medical Journal* 1985;290:1307-1315
33. Verity CM, Golding J. Risk of epilepsy after febrile seizures: a national cohort study. *British Medical Journal* 1991;303:1373-6.
34. Wassemer E, Hanlon M Effects of information on parental knowledge of febrile seizures. *Seizure* 1999;8 421-23
- Wells L, Smith J, Weston V The child with a non-blanching rash: how likely is meningococcal disease? *Archives of Disease in Childhood* 2001;85(3):218-22

Wylie P, Stevens D, Drake W, Stuart J, Cartwright K. Epidemiology and clinical management of meningococcal disease in West Gloucestershire: retrospective population based study. *British Medical Journal* 1997;315(7111):774-779.

## Care pathway for seizure implementation

The following three pages show the care pathway as used during the implementation study in Nottingham paediatric A&E

**THE CHILD WITH A SEIZURE**

Evaluate and maintain ABC.

If still seizing - follow status policy 4.3

Please tick box when completed. Circle Y / N

If deviations from pathway occur please record in variance table (page 3)

Complete Nursing, History and Examination for all. Then complete Box A or B or C as applies.

DATE.....

<b>Patient label</b>
NAME.....
A&E NUMBER.....

**NURSING assessment:** Nurse name:.....Triage score.....Weight.....Position with Oxygen and suction

<b>Time</b>						BM <input type="checkbox"/> Result..... Antipyretics given <input type="checkbox"/> Freq. of obs required..... <b>NB</b> Only rpt BP/ Sats if abnormal	Other comments ..... ..... .....
Temp							

**MEDICAL assessment:** Print name (Dr).....Time .....

**HISTORY:** History taken from.....eye witness Y / N Child's age.....

HPC.....

.....

.....

Time of start of seizure..... Duration.....mins

Description.....

.....Any focal features Y / N Multiple in 24 hours Y / N If yes, number and duration.....

History of other symptoms (fever etc).....

**EXAMINATION**

General appearance.....

.....CVS	RS	ABDO
NEURO		

BP .....

OFC.....



*Box C. HIGHEST RECORDED TEMPERATURE  $\geq 37.8^{\circ}\text{C}$  OR HISTORY & EXAM INDICATE FEBRILE SEIZURE (follow page two algorithm)*

Neck stiffness

Y / N

*IF YES TREAT AS MENINGITIS.* Note contraindications to LP (Table 4)

Follow meningitis policy. ADMIT Dr.....contacted Time.....

<i>Does the child have any of these features?</i>		
Multiple seizures in the same illness Y/N	Focal features Y/N	Prolonged >15 mins Y/N
Drowsy pre seizure Y/N	More than 3 days illness Y/N	GP contact last 24 hrs Y/N
Vomiting at home Y/N	Drowsy >1 hour post seizure Y/N	Dubious neck stiffness Y/N
Bulging fontanelle Y/N		

*IF YES* to any of the above the child has an increased risk of meningitis, admit and consider LP, review 2 hours

Admit to Short Stay Unit, Dr.....contacted, Time.....

Admit to short stay if Yes to any of :	Advice
Infant <18 months Yes/No	Minimum observation 2 hours Consider LP if the child develops of the features listed above Review 2 hours
Prior antibiotic treatment Yes/No	
Consider admission with high parental anxiety Yes/No	
Consider admission if no source for fever found Yes/No	

If YES to any of the above, admit to Short stay unit, Dr.....contacted, Time.....

*IF NO, follow page three algorithm:*

**Table 3** for differential diagnosis of child presenting with fever and seizure. Investigate and treat appropriately

Likely **focus** for infection.....

Management.....

Discuss with parents:

Management of fever, further seizures, when to return  Give information sheets  Discharge

Time.....

Discharge

*URINE*

- All children <2 years, urine for MC&S (*ensure* clean catch or in/out catheter or SPA)

- All others, routine urine for MC&S (parent may take pot home if necessary)

Urine sample obtained

*ADDITIONAL MEDICAL NOTES AND VARIANCES*

*Print name, date, time and sign each entry.*

**Time of next review (2-4 hours**

suggested).....

VARIANCES

Time	Actions Deviating From Pathway	Reason	Initial

## **Parent information sheets**

# **Your guide to a high temperature (fever)**

## **What is a high temperature?**

The body's natural response to fighting infection is to raise its temperature. If your child feels hot and is off colour or unwell it is likely that he/she has a fever. You can take your child's temperature by placing the silver end of a thermometer under their armpit for 3-5 minutes with their arm held against their side. If the reading is 37.5°C or above they have a fever. Rarely a temperature can be as high as 40°C or above.

## **Does a high temperature harm my child?**

- ❖ The fever itself will not harm your child. However it may make him or her feel unwell. It is therefore wise to try to bring the temperature down.
- ❖ In children between about 6 months and 5 years a rapid rise in temperature may lead to a seizure ('fit' or 'seizure'). This is described later in this leaflet.

## **What should I do?**

- ❖ Heat is lost through the skin, so take off most of your child's clothes (leave nappy on and a vest or just a sheet if in bed)
- ❖ Do not overheat the room

- ❖ Give your child plenty to drink
- ❖ Give your child medicine to bring the temperature down. Children's Paracetamol is recommended and is sold at chemists and supermarkets.

### **Guide to Paracetamol doses:**

#### **Check the instructions on the bottle**

**Up to 1 year old** 120mg (one 5ml medicine spoonful)

**1 year to 3 years old** 240mg (two 5ml medicine spoonfuls)

**4 years and over** 360mg (three 5ml medicine spoonfuls)

- ❖ Repeat the dose every 4 hours until the temperature falls to normal, and then every 6 hours for the next 24 hours
- ❖ Children's Ibuprofen is a good alternative in a child over one year.
- ❖ Do not give aspirin.

### **When should I ask for help or advice?**

Seek help if your child seems ill with the temperature. Ask your GP to see him or her.

For advice you could:

- ❖ Call your health visitor or GP

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❖ Call NHS Direct

Telephone No.

0845 4647 or 0800

❖ Call the short stay unit at the Queen's Medical Centre up to 48 hours  
after being on the ward

Telephone No.

0115 919 4425

❖ Call Children's A&E at the Queen's Medical Centre up to 48 hours  
after being seen there

Telephone No.

0115 924 9924

## Your guide to febrile seizures

(a 'fit' with a temperature)

Watching your child have a febrile seizure (also called a fit or a convulsion ) is a very frightening experience. You may even think that your child is dying. However febrile seizures are not as serious as they look. This leaflet will give you information about what they are and what to do if your child has one.

## What is a febrile seizure?

- ❖ It is a seizure (sometimes called 'fit' or 'convulsion') brought on by fever (a raised temperature).
- ❖ A seizure is when a person becomes unconscious (unable to respond to you) and often stiff with jerking of the arms and legs. It is often caused by a storm of electrical activity in the brain.
- ❖ A seizure of less than 30 minutes does not cause any lasting damage.
- ❖ Febrile seizures happen in children aged about 6 months to 5 years.

## How common are febrile seizures?

About one child in every class of 30 will have had a febrile seizure by the age of 5.

## Will it happen again?

About one in every 3 children who have had a febrile seizure will have another one.

## Is it the same as epilepsy?

- ❖ No. Epilepsies are brain disorders that cause recurrent seizures even without a high temperature (fever).

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- ❖ Very few (1 in 100) children who have had 2 or more febrile seizures will develop epilepsy.

## What do I do if my child has a seizure?

- ❖ Lie your child on a surface where he/she cannot hurt themselves (carpet, sofa, bed)
- ❖ Lie him or her on their side with the face turned to the side so that if there is anything in the mouth it can come out and they will not choke.
- ❖ Note the time if you can
- ❖ You do not need to do anything else
- ❖ Do not leave your child
- ❖ Do not force anything into their mouth
- ❖ The seizure usually stops by itself within a few minutes. Phone your GP afterwards.
- ❖ If the seizure has not stopped after 5 minutes dial 999 for an ambulance to bring him/her to the nearest hospital accident and emergency department.

## Parent Information Leaflet

### Your guide to seizures

### ('fits' or 'convulsions')

Watching your child have a seizure is a very frightening experience. You may even think that your child is dying. However seizures are not as serious as they look. This leaflet will give you information about what they are and what to do if your child has one.

#### What is a seizure?

- ❖ A seizure (sometimes called a 'fit' or 'convulsion') is when a person becomes unconscious (unable to respond to you) and often stiff with jerking of the arms and legs. It is often caused by a storm of electrical activity in the brain.
- ❖ A seizure of less than 30 minutes does not cause any lasting damage.
- ❖ People who have a seizure are often sleepy for some time (about 1 hour) afterwards.

#### How common are seizures?

About 4 in 100 children will have a seizure by the age of 5. A high temperature (fever) will bring on three quarters of these. So 1 in 100 children will have a seizure that was not brought on by a high temperature.

## **Will it happen again?**

If your child has had a seizure that was not brought on by a high temperature their risk of having another seizure is about 50/50. So 1 out of 2 children will go on to have further seizures.

## **Does my child have epilepsy?**

It is too early to tell. Epilepsies are brain disorders that cause recurrent seizures even without a high temperature (fever). If your child has more than 1 seizure without a fever they may have a type of epilepsy, but you will need to discuss this with your paediatrician (childrens specialist).

## **What do I do if my child has a seizure?**

- ❖ Lie your child on a surface where he/she cannot hurt themselves (carpet, sofa, bed)
  
- ❖ Lie him or her on their side with the face turned to the side so that if there is anything in the mouth it can come out and they will not choke.
  
- ❖ Note the time if you can
  
- ❖ You do not need to do anything else
  
- ❖ Do not leave your child
  
- ❖ Do not force anything into their mouth

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- ❖ The seizure usually stops by itself within a few minutes. Phone your *GP* afterwards.
- ❖ If the seizure has not stopped after 5 minutes dial 999 for an ambulance to bring him/her to the nearest hospital accident and emergency department.

### When should I ask for help or advice?

Contact your *GP* if your child has another seizure.

For advice you could:

- ❖ Call your *GP*

- ❖ Call NHS Direct

Telephone No.

- ❖ Call the short stay unit at the Queen's Medical Centre up to 48 hours after being on the ward

Telephone No.

- ❖ Call Children's A&E at the Queen's Medical Centre up to 48 hours after being seen there

Telephone No.

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# **Appendix 1**

## **Search Strategy**

## **Search Strategy**

This Appendix describes the search strategy used to identify the evidence for the guideline.

A systematic search for the evidence involved the following steps:

- 1) A search of internet sites for existing guidelines.
- 2) A systematic search of appropriate databases for identification of existing studies
- 3) Hand search
- 4) Limited search for unpublished studies

## **Inclusion criteria**

Papers were included if they:

- a) Addressed the clinical question
- b) Had been published since 1966
- c) Were primary research
- d) Were reliable and valid
- e) Included methodology in the paper and the results were thought to be valid and relevant
- f) Were in any language

## **Exclusion Criteria**

- a) Literature referring solely to adults (some studies with paediatric and adult data were included).
- b) Case reports
- c) Overviews
- d) Assessed to be of poor quality

### **Internet Search**

The following sites were accessed to look for evidence-based links and existing guidelines. This list of web sites was generated from information gathered from study days attended on guideline development and evidence based medicine, from an established list of sites searched by previous guideline developers at Nottingham and finally a search of the web for any new evidence based medicine sites.

### **Internet web sites searched**

AHCPR (US Agency for Health Care Policy and Research) This is the site for the National Guideline Clearing House  
American Academy of Neurology  
Canadian Medical Association Clinical Practice Guidelines Database  
Centre For Disease Control and Prevention  
Group Health Northwest: Evidence-Based Guidelines - none found  
New Zealand Guidelines Project  
University of Washington's Physicians  
Evidence-Based Guidelines and Critical Pathways For Quality Improvement  
Evidence Based Guidelines  
World Health Organization Site  
CDR Database (this site searches the databases of DARE, NHS EED, HTA)  
Scottish Intercollegiate Guideline Network  
National Institute of Clinical Excellence  
TRIP  
The Centre For Clinical Effectiveness  
Centre For Evidence-Based Child Health  
Centre For Evidence-Based Medicine  
Clinical Governance Resource  
E-guidelines  
Clinical Practice Guidelines Infobase  
Medical Matrix  
BestBETS  
Netting the Evidence  
SUM Search  
American Academy of Pediatrics

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### **Computerized Databases**

The following databases were searched

The Cochrane database of systematic reviews and Cochrane trials register

Medline

Embase

Cinhal

Best Evidence

The searches were performed using MesH headings and 'textwords' limited to 0-18 or 0-16 depending on the limits available on the different databases.

The quality of the initial searches were checked and discussed with a librarian experienced in Medline searching and found to be thorough.

### **Hand Search**

A hand search of the following journals was performed from January 1997 to December 2001.

Archives of Disease in Childhood

Epilepsia

Development Medicine and Child Neurology

Journal of Pediatrics

Further articles were obtained by speaking to colleagues (a mixture of specialists and general paediatricians). A search of Ulrich's Periodical Directory was undertaken to identify further journals relevant to the guideline. This directory contains some journals not available on the databases searched.

### **Appraisal and Data Extraction**

The research fellow used data-extraction forms and quality checklists developed by SIGN (2000) to appraise each paper.

Details of the literature search and the number of abstracts reviewed and papers finally used can be found in appendix 2.

## **Problems with studies**

Many of the questions arising in the guideline cannot be answered with randomised controlled trials and so some recommendations will never be more than a Grade C recommendation. For instance a randomised controlled trial into contraindications to lumbar puncture would never be performed as the outcome would be coning and death. The number of children presenting with febrile seizure who have meningitis is another difficult area to evaluate. Because meningitis is so rare, an adequately powered prospective study would require thousands of children in order to look at this association and in reality is very unlikely to ever be done. Hirtz et al highlighted this problem during the development of a practice parameter to evaluate a first non-febrile seizure by the American Academy of Neurology. They designed a new three tiered system to look specifically at diagnostic studies as follows.

### Classification of evidence

#### Class I Must have all of A-D

- A. Prospective study of a well-defined cohort, which includes a description of the nature of the population, the inclusion/exclusion criteria, demographic characteristics such as age and sex, and seizure type.
- B. The sample size must be adequate with enough statistical power to justify a conclusion or for identification of subgroups for whom testing does or does not yield significant information.
- C. The interpretation of evaluations performed must be done blinded to the outcome
- D. There must be a satisfactory description of the technology used for evaluations (e.g. EEG, MRI).

#### Class II Must have A or B

- A. A retrospective study of a well defined cohort which otherwise meets criteria for class 1A, 1B, and 1D.
- B. A prospective or retrospective study which lacks any of the following: adequate sample size, adequate methodology, a description of exclusion /exclusion criteria, and information such as age, sex and characteristics of the seizure.

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Class III Must have A or B

A. A small cohort or case report

B. Relevant expert opinion, consensus, or survey

The above criteria are useful as they allow the quality of diagnostic studies to be differentiated further than the SIGN system allows. We should not accept grading systems which give poor research a higher level of evidence but for clinical questions which can never be answered by a randomised controlled trial it would be useful to have a tool which allows better differentiation of cohort studies and retrospective cohort reviews.

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## **Appendix 2**

### **Results of search**

## **Results of the literature search**

The tables below detail the MesH headings and textwords used for each individual clinical question and the number of abstracts reviewed and papers finally used. A systematic search of the literature to answer each individual question was carried out. A search of all hits for febrile seizures and seizures (on Medline only) as detailed below was undertaken to ensure no relevant articles were missed in the individual searches.

General Search Medline - Febrile Seizure

Search Medline mid 1998 to October 2001

Search term - Explode febrile seiz/convulsion + text word

204 hits

9 references already found elsewhere

3 further abstracts reviewed

1 new article requested

1 used

Search term - Explode conv/seiz

5876 hits

limit child 2163

14 references already found elsewhere

13 abstracts reviewed

2 papers reviewed

2 used

## **Guideline and EBM Sites**

3 guidelines on febrile seizures were identified and 1 on the management of fever.

1. The neurodiagnostic evaluation of the child with a first simple febrile seizure.

American Academy Pediatrics (AAP) May 1996.

See evidence tables Appendix 3.

2. Practice Parameter: Evaluating a first non-febrile seizure in children.

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American Academy Neurology, the Child Neurology Society, and the American Epilepsy Society September 2000

Endorsed by the AAP

See evidence tables Appendix 3

Most of the guideline is beyond the scope of this document but parts are relevant such as biochemical investigations in accident and emergency and EEG's. This guideline has a different approach to classification of diagnostic studies. A new system was developed to take account of the fact that many diagnostic questions cannot be addressed with randomised controlled trials. (see problems with studies in Appendix 1).

3. Practice Parameter: Long-term treatment of the child with simple febrile seizures  
American Academy Pediatrics June 1999.

Addresses the issues of long term anticonvulsant therapy, intermittent anticonvulsant therapy and antipyretics. Most beyond the scope of the guideline.

All found in searches of the American Academy Pediatrics website and the National Guideline Clearing House.

4. Guidelines for the management of convulsions with fever. British Paediatric Association 1991 See Appendix 3.

Practice guideline for the management of infants and children 0 to 36 months of age with fever without source.

Pediatrics 1993;92:1-12. Consensus view

Best BETs

1 article reviewed, beyond the scope of the guideline.

DARE and Cochrane Trials Register

4 relevant articles found none used.

2 articles by van Stuijvenberg M (see rejected papers Appendix 6).

2 beyond the scope of the guideline (see rejected papers Appendix 6).

### Cochrane Databases of Systematic Reviews

3 relevant reviews were found all in the protocol stage.

1. Therapeutic monitoring of antiepileptic drugs for epilepsy.
2. Prophylactic drug management for febrile convulsions in children.
3. Drugs and other methods for managing fever in children.

### **Unpublished Research and References Sourced From Colleagues**

1. Chvostek's sign in patients with recurrent seizures

Ahmed M, Mariam S, Shirsalkar A, Kean M, Robinson D, Luke S

Abstract from the British Paediatric Neurology Association 2002

Positive Chvostek's sign found in 3 of 65 patients who had recurrent seizures .

Biochemical investigation revealed hypocalcaemia due to hypoparathyroidism in 2 patients and pseudo hypoparathyroidism. Anticonvulsants were successfully weaned after calcium supplementation. The paper does not state whether these children had clinical signs, which may have led clinicians to suspect a diagnosis of hypocalcaemia.

2. Does written guidance to parents alter their management of recurrent febrile convulsions?. See Appendix 3
3. Febrile convulsions in a national cohort followed up from birth. Prevalence and recurrence in the first year of life. See Appendix 3
4. Duration of admission for febrile convulsions. See appendix 3.
5. Many parents think their child is dying when having a first febrile convulsion. See Appendix 3.
6. Can seizures be the sole manifestation of meningitis in febrile children? See Appendix 3
7. Seizures and fever: Can we rule out meningitis on clinical ground alone. See Appendix 3

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## **Hand search**

2 articles found 1 used

## **Articles found from search of references**

1. Sample selection and the natural history of disease. See Appendix 3

2. Predictors of epilepsy in children who have experienced febrile seizures. See Appendix 3

### *Summary*

In total 39 papers were used in the guideline

They were sourced from the following areas

22 Medline

1 Embase

14 colleagues and references

1 hand searching

1 National Guideline Clearing House

Many references were found in more than one place, for instance Medline and Embase. In these cases documentation was only made once in the tables of searches, this was generally in Medline since this was the first database searched.

**Definition of fever**

MESH Heading/ Text Words	Medline	Embase	Cinhal	Cochrane	Best Evidence
Exp Seizures, febrile -1	1243	1407	66	4	<b>1</b>
Exp Fever -2	19811	28345	880	249	
Combine ( 1 and 2 )	<b>64</b>	<b>167</b>	<b>16</b>	<b>1</b>	0
Abstracts Reviewed	7	0	0	0	0
Papers Reviewed	1	0	0	0	0
Papers Used	0	0	0	0	0

The numbers in bold signify the number of 'hits' searched on each database

### Anticonvulsant Levels In Children On Anti-Epileptic Medication

MesH Heading/ Textwords	Medline	Embase	Cinhal	Cochrane	Best Evidence
Exp Convulsion/ Seizure + tw -1	38021	72299	1083	75	52
Anti-convulsant levels tw -2	78	63	0	49	0
Combine 1+2	<b>35</b>	<b>51</b>	0	<b>16</b>	0
Limit child	23	7	0	1	0
Abstracts Reviewed	2	0	0	0	0
Papers Reviewed	2	0	0	0	0
Papers Used	0	0	0	0	0

### Parental View On Management

MESH Heading/ Text Words	Medline	Embase	Cinhal	Cochrane	Best Evidence
Exp Parent/ Parental View + tw -1	30644	17977	13785	0	0
Exp seizure, febrile + tw -2	1315	71846	66	4	1
Exp convulsion /seizure + tw -3	38021	1401	1083	75	52
Combine 1+( 2 or 3)	138	206	<b>40</b>	0	1
Limit Child	<b>126</b>	<b>66</b>		0	0
Abstracts Reviewed	18	8	6	0	0
Papers Reviewed	7	2	5	0	0
Papers Used	2	1	0	0	0

There were many articles looking at parental perception of epilepsy and the effect of educational programmes. The great majority of these were for established epilepsy rather than the first febrile or afebrile fit.

## Differential Diagnosis Of A Child Presenting With An Afebrile Convulsion

MesH Heading/Textword	Medline	Embase	Cinhal	Cochrane	Best Evidence
Exp.Convulsion/ Seizures + tw -1	38021	71846	1083	75	52
Aetiology or differential diagnosis tw -2	16125	520	3421	141	2
Combine 1 and 2	<b>133</b>	<b>10</b>	<b>35</b>	<b>11</b>	<b>0</b>
Abstracts Reviewed	7	0	1	0	0
Papers Reviewed	7	0	0	0	0
Papers Used	0	0	0	0	0

### Diagnostic Tests For The Child Presenting With An Afebrile Seizure

MesH Heading/Textword	Medline	Embase	Cinhal	Cochrane	Best Evidence
Exp convulsion/ seizure + tw -1 (Also done using first seizure on Medline )	3802 (373)	372	1083	75	48
Investigation tw -2	79143	125937	145	145	69
Exp Diagnostic Tests tw -3	8262	142328	55	55	
Combine 1 + 2 or 3	87165	264378	<b>10</b>	<b>10</b>	<b>3</b>
Limit child	<b>218</b>	<b>363</b>			

**F Continued**

MESH Heading/ Text Words	Medline	Embase	Cinhal
Exp convulsion/ seizure + tw -1	38021	71920	1083
Exp Calcium or magnesium -2	61392	179210	2325
Combine	486	1991	<b>13</b>
Limit 0-18 yrs	<b>138</b>	<b>103</b>	
Exp blood cell count/full blood count -3	38021	28014	839
Combine 1 + 3	<b>58</b>	249 Limit child <b>39</b>	1
Exp biochemistry/ electrolytes + tw -4	520693	10316	1388
Combine 1 + 4 Limit child	1364 <b>183</b>	427 <b>45</b>	<b>2</b>
Exp ammonia -5	13030	16331	84
Combine 1 + 5 Limit child	141 <b>49</b>	263 <b>45</b>	0
Exp glucose -6	72239	59143	2958
Combine 1 + 5 Limit child	280 <b>94</b>	588 <b>95</b>	<b>15</b>

<b>F continued</b>			
Abstracts Reviewed ( total for F)	17	16	0
Papers Reviewed	7	0	0
Papers Used	2	0	0

### Need For Admission In A Child With Afebrile Seizures

MESH Heading/ Text Words	Medline	Embase	Cinhal	Cochrane	Best Evidence
Exp convulsion/ seizure + tw -1	38021	72299	1083	75	52
Exp hospital admission + tw -2	80411	9529	5655	549	41
Combine 1 + 2	267	149	<b>11</b>	<b>23</b>	<b>2</b>
Limit Child	<b>152</b>	<b>39</b>	0	0	0
Abstracts Reviewed	1	0	0	0	0
Papers Reviewed	0	0	0	0	0
Papers Used	0	0	0	0	0

### Follow Up Of A Child With An Afebrile Seizure

MESH Heading/ Text Words	Medline	Embase	Cinhal	Cochrane	Best Evidence
Exp convulsion/ seizure + tw -2 ( for Medline first convulsion used )	373	72299	1083	75	52
Exp follow-up + tw -2	75553	1582	9582	1724	1413
Combine 1 + 2	<b>56</b>	<b>17</b>	<b>29</b>	<b>64</b>	<b>1</b>
Abstracts Reviewed	4	0	0	0	0
Papers Reviewed	4	0	0	0	0
Papers Used	1	0	0	0	0

**Febrile Seizure Risk Of Meningitis And Clinical Features**

MESH Heading/ Text Words	Medline	Embase	Cinhal	Cochrane	Best Evidence
Exp febrile seizure + tw -1	1283	1401	66		52
Exp meningitis + tw -2	33801	22352	642	<b>46</b>	10
Combine 1 + 2	<b>99</b>	<b>102</b>	<b>5</b>	<b>0</b>	<b>0</b>
Abstracts Reviewed	14	0	0	0	0
Papers Reviewed	7	0	0	0	0
Papers Used	3	0	0	0	0

**Complex Febrile Seizures**

MESH Heading/ Text Words	Medline	Embase	Cinhal	Cochrane	Best Evidence
Complex febrile seizures	<b>32</b>	<b>13</b>	<b>0</b>	<b>0</b>	<b>0</b>
Abstracts Reviewed	3	0	0	0	0
Papers Reviewed	1	0	0	0	0
Papers Used	0	0	0	0	0

**Age and Meningitis**

MESH Heading/ Text Words	Medline	Embase	Cinhal	Cochrane	Best Evidence
Exp meningitis + tw -1	28475	320894	642	46	1
Exp age -2	557108	111135	26071	1794	
Exp incidence -3	64869	44478	1365	1074	
Combine 1+2+3 Limit child	199 <b>189</b>	<b>43</b>	<b>1</b>	<b>22</b>	0
Abstracts Reviewed	4	0	0	0	0
Papers Reviewed	2	0	0	0	0
Papers Used	2	0	0	0	0

**Antibiotics and Meningitis Risk**

MESH Heading/ Text Words	Medline	Embase	Cinhal	Cochrane	Best Evidence
Exp meningitis +tw -1	28475	18986	642	46	10
Partially treated tw -2	157	148	5	1	0
Combine 1+2	<b>48</b>	<b>14</b>	<b>1</b>	<b>20</b>	1
Abstracts Reviewed	0	0	0	0	0
Papers Reviewed	0	0	0	0	0
Papers Used	0	0	0	0	0

### Contraindications For Lumbar Puncture

MESH Heading/ Text Words	Medline	Embase	Cinhal	Cochrane	Best Evidence
Exp lumbar puncture + tw	4442	3260	267	16	7
Contraindi cation	6228	4951	344	93	111
Combine 1+ 2	<b>14</b>	<b>16</b>	<b>2</b>	<b>1</b>	<b>0</b>
Abstracts Reviewed	2	2	0	0	0
Papers Reviewed	0	1	0	0	0
Papers Used	0	0	0	0	0

### Causes Of Fever In Children Presenting With Febrile Seizures

MESH Heading/ Text Words	Medline	Embase	Cinhal	Cochrane	Best Evidence
Exp febrile seiz +tw -1	1283	1435	66	4	1
Exp differential diagnosis +tw -2	236064	61046	3935	7	7
Aetiology tw -3	16125	332195	363	141	
Combine 2 or 3 -4	251194				
Combine 1+4	103	170	<b>2</b>	0	0
Limit child	<b>94</b>	<b>62</b>	0	0	0
Abstracts Reviewed	3	3	0	0	0
Papers Reviewed	0	0	0	0	0
Papers Used	0	0	0	0	0

**O - Tests For Infection**

MESH Heading/ Text Words	Medline	Embase	Cinhal	Cochrane	Best Evidence
Exp febrile seizure/convulsio n + tw -1	1283	1401	66	4	1
Exp diagnostic tests/ investigations + tw -2	236064	125937	1845	55	
Combine 1 + 2	<b>22</b>	<b>33</b>	<b>1</b>	<b>0</b>	

**O continued**

MESH Heading/ Text Words	Medline	Embase	Cinhal
Exp blood cell count/full blood count -3	75615	28014	835
Combine 1 + 3	<b>9</b>	<b>7</b>	<b>0</b>
Exp blood culture/ bacteraemia -4	44987	14634	465
Combine 1 + 4	<b>13</b>	<b>23</b>	<b>1</b>
Exp c-reactive protein -5	6127	8952	93
Combine 1 + 5	<b>0</b>	<b>9</b>	<b>0</b>

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<b>O continued</b>			
Exp glucose -6		59143	1188
Combine 1+ 6		<b>15</b>	<b>0</b>
Exp lumbar puncture/spinal puncture -7	4442	3268	167
Combine 1 + 7	<b>53</b>	<b>48</b>	<b>3</b>
Abstracts Reviewed ( Total under O)	23	9	5
Papers Reviewed	4	1	1
Papers Used	4	0	0

### Management Of The Child With No Focus Of Infection

MESH Heading/ Text Words	Medline	Embase	Cinhal	Cochrane	Best Evidence
Exp feb seiz/conv + tw -1	1243	1401	66	2	1
Pyrexia unknown origin tw - 2	1377	138	0	0	
Focus infection tw -3	514	422	17	5	
Combine 1+2 and 1+3	<b>2</b>	<b>2</b>	<b>0</b>	<b>0</b>	
Abstracts Reviewed	1	5	0	0	0
Papers Reviewed	0	0	0	0	0
Papers Used	0	0	0	0	0

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## Prognosis

MESH Heading/ Text Words	Medline	Embase	Cinhal	Cochrane	Best Evidence
Exp Febrile conv + tw -1	1283	1401	66	4	1
Exp Prognosis -2	356878	122710	14044	186	
1 + 2	<b>210</b>	<b>136</b>	<b>1</b>	<b>0</b>	<b>0</b>
Abstracts Reviewed	23	9	0	0	0
Papers Reviewed	9	1	0	0	0
Papers Used	6	0	0	0	0

**Follow Up**

MESH Heading/ Text Words	Medline	Embase	Cinhal	Cochrane	Best Evidence
Exp seizure/con vulsion + tw -1	1283	72299	66	4	1
Follow up tw -2	243083	1585	9582	1724	
Combine 1 + 2	104	17	0	0	0
Limit 0 - 18 yrs	<b>101</b>	<b>17</b>	0	0	0
Abstracts Reviewed	1	0	0	0	0
Papers Reviewed	1	0	0	0	0
Papers Used	0	0	0	0	0

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# **Appendix 4**

## **Delphi Process**

## **Incorporating consensus into guideline development**

### **Performing Consensus Processing**

*Systematic reviews and meta-analyses are the gold standard for research and are used to summarize research evidence. Their conclusions can be readily incorporated into a guideline. In Paediatrics, however, as in many other disciplines, there is a dearth of available research evidence (Smyth 2001) and systematic reviews are not available to answer many of the clinical questions, especially those related to the decision-making processes. It is therefore important to be able to identify and critically appraise other levels and sources of evidence and use this information for producing recommendations so long as the process used to develop this recommendation is made clear to the guideline users.*

Guidelines should ideally be based on the current available evidence and high quality evidence may currently be accumulating but we would be mistaken if we did not accept that other influences such as clinical experience have an effect on decision-making. We must be aware that 'the art of medicine is unlikely to be managed away for many years to come' (Naylor 1998).

Consensus methods can be used in guideline development as a means by which evidence can be combined with clinical acumen and experience to produce a practical and useable clinical tool. They can be described as qualitative rather than quantitative research methods used 'to determine the extent to which experts or lay people agree about a given issue' (Mays and Pope 1996). Qualitative methods are useful for studying decision-making processes and despite being criticized for lacking scientific rigor (Mays and Pope 1996) they can be used to complement evidence-based medicine (Newton 2001). The guideline development group decided to use the Delphi method for the consensus process used in the development of this guideline.

## **Delphi**

### **Introduction**

This method was named after the Greek oracle thought to have the power to predict the future (Murphy 1998). It was initially developed as a research technique by the RAND Corporation in the 1950's to synthesize expert opinion on new technologies (Murphy 1998). The method was originally used for military purposes but is now much more widely used and is still more commonly by nurses than by doctors. With the increasing interest in improving quality of care and clinical guidelines, the Delphi method is being adopted as a way to combine evidence with expert opinion and experience (Naylor 1998). The technique can be used to deal with a complex problem by a multiple iteration survey (Duffield 1988), (Bowles 1999). The key features of this procedure include anonymity, iteration, controlled feedback, and statistical group response (Pill 1971). Guidelines are an important component of clinical governance and to be useful to the clinician they have to be able to aid management decisions such as treatment, investigations, admission, discharge and follow-up. There are few areas in medicine which have an evidence base to answer all of these questions for a particular symptom or disease. Delphi consensus is a formal transparent process to aid this important part of guideline development until a research base is available to address the particular questions.

The first round of the Delphi consists of a group of invited individuals being presented with information in the form of statements (Duffield 1988). These individuals have a particular interest in the subject under discussion or they have in-depth knowledge about it. The relevant individuals then provide an opinion on this information based on their own knowledge, experience and often information provided (Jones 1995). In the second round the questionnaire is mailed out to the respondents again but this time, the panel is able to alter their judgement in light of the group's responses. The panel ranks the level of agreement or disagreement with each of the statements after receiving feedback on the group's responses. This process continues and the participants continue to re-rank their agreement or disagreement with the statements until an accepted degree of consensus is reached (Jones 1995, Duffield 1988). Finally, the responses are statistically analyzed to determine which statements reached consensus of agreement or disagreement (Murphy 1998). At no

time does the group meet and therefore this method allows access to a large number of people and maintains anonymity. The Delphi method has however been adopted and altered over the years so that the technique can be used in a number of different circumstances (Crisp 1997).

### **Details of the Delphi process used in the development of the guideline for children with seizure**

The guideline development group selected members of the Delphi panel. Panel members were selected to reflect their involvement in the care of children with seizure. The aim was to compose a multi-professional panel and to select members whose input would be valued either for their expert knowledge base in the area, or their practical involvement with children or their expertise in interpreting evidence-based medicine.

### **Delphi process**

#### **First round**

Panellists were sent: the literature review and derived management statements; complete copies of all the articles cited, the critical appraisal abstraction sheet and grade of evidence; a response form detailing each statement with a 1-9 Likert scale and space for comments.

The panellists were asked to rate their level of agreement with each statement and to comment. This first round 'pack' was piloted (n=4) and revised where necessary to improve clarity and remove ambiguity. A reminder letter and a subsequent telephone call were made to non-responders.

Definition of consensus was predetermined. Often consensus is accepted when 75% of participants agree, and lack of consensus when more than 25% disagree. For nominal groups, rules have been developed to assess agreement when statements have been ranked on a nine-point scale. We chose to apply this to the Delphi method since the same scale was used. One sixth of the ratings furthest from the median were removed (17%). This is done so that outliers (who may not have understood the question, or are unique in their views) do not overly influence the results. Consensus within the panel (known as 'relaxed' agreement for a nominal group) is defined as all

remaining panellists' responses falling within three boxes of each other on the Likert scale Consensus agreement with the statement as presented to the panel is defined as all remaining responses falling in boxes 7-9 (thus agreement both within the panel members and with the statement as given, known as 'strict agreement' for a nominal group).

### **Second and third rounds**

All statements that achieved 'strict' consensus were removed from subsequent rounds and used for guideline construction where evidence was lacking. Statements that did not gain consensus and modified or new statements were used in the second round. After the extreme one sixth of responses were removed, the range, inter-quartile range and median of the remaining responses were reported back to the panellists. Panellists were asked to re-consider the statements in the light of the responses and comments of the rest of the panel. A third round consisted of statements that had still not achieved consensus.

### **Incorporation of Delphi into the guideline**

Statements that had reached Delphi consensus were used in the algorithm where evidence was lacking but never in preference to evidence. There was only one recommendation where evidence was lacking and the Delphi panel were unable to achieve consensus. This was the level of temperature needed in order to diagnose a febrile seizure and is fully described in the main guideline

The following statements were based on Delphi consensus

- *All children presenting with an afebrile seizure should have their blood pressure measured at the time of presentation.*
- *Following a first afebrile seizure, children conforming to the stated criteria (Table 2 in algorithm) should be admitted to an acute paediatric facility for observation and further investigation.*

- *Children who do not conform to the stated criteria for admission following an afebrile seizure (Table 2 in algorithm) should have a paediatric outpatient referral.*
- *All children following a febrile seizure below 18 months should be admitted to a paediatric observation area for a period of at least 2 hours*
- *A child presenting with a complex febrile seizure with no clinical signs of meningitis should be observed closely and reviewed within 2 hours*
- *Those children with a simple febrile seizure, >18 months of age and with no serious features from the history or examination findings indicating meningitis (see algorithm), and who have had prior antibiotic treatment should be admitted to an acute paediatric facility for a period of observation (at least 2 hours)*
- *The following are contraindications to LP*
  1. *Drowsiness or impairment of consciousness (falling conscious level, Glasgow coma scale of <13)*
  2. *Signs of septicaemic shock (poor perfusion, low BP, and tachycardia)*
  3. *Clinical diagnosis of invasive meningococcal infection with typical haemorrhagic rash*
  4. *Signs of raised intracranial pressure (pappiloedema, coma, high BP, low pulse)*
  5. *Focal neurological signs*
- *In a child with a simple febrile seizure, where a source for infection other than a UTI is suspected, a urine sample should be obtained to check for infection.*
- *A child who has had a simple febrile seizure where no source for infection has been found clinically, should have a urine sample (clean catch, SPA or catheter specimen) taken for microscopy and culture.*

- *Children with no focus for infection can be admitted for a short period of observation (minimum 2 hours) OR*

*Children with no focus for infection can be discharged home if the child looks well, parents/carers have ready access to health care if required and they are happy with this decision.*

- *Parents of children sent home from A&E with a diagnosis of first simple febrile seizure should be encouraged to contact their own GP or community nurse specialist if they feel they need further information or care.*

## **Discussion**

The evidence found in the literature for management statements was rarely based on randomised trials, and therefore formal consensus development was especially relevant. A formal method of consensus development was used since it is explicit and repeatable and carries more credibility. The Delphi method was chosen in preference to a conference method (such as the nominal group technique) since a larger number of participants can be included. Optimal group dynamics and logistics limit numbers in a discussion group, and financial constraints might preclude national breadth due to travel costs. In the conference method, there is no anonymity and strong individuals can dominate the discussion and sway decisions. Disadvantages of Delphi are that ambiguous statements could not be clarified by discussion and it is time consuming, with the complete process from invitation to participate, three rounds and final feedback taking just under a year. Care must be taken not to 'fatigue' the panel for whom each round in this exercise took a great deal of time and effort.

Only those who wished to participate can be included, which may result in only those who are already interested in the topic participating. A multidisciplinary group is best placed to develop guidelines since individual biases may be better balanced. For example in our study we could postulate that paediatricians may prefer to keep children out of hospital, A&E doctors may wish to get children through the department quickly and nursing staff may prioritise children and parents' comfort.

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For guidelines developed in this way evaluation of their implementation is particularly important to assess validity. Since good outcome measures are not readily available in this clinical situation, measures of process of care may be used as a proxy. See implementation data in the technical report.

**Table 1:** Delphi panellists

Clinician	<i>Number</i>
Paediatric District General Hospital Consultant	11
Paediatric Teaching Hospital Consultant	3
Paediatric Specialist Registrar/SHO post	4
Membership	
Paediatric Neurologist	1
Paediatric nurse	2
A&E nurse	2
A&E trainee	1
Paediatric A&E nurse	1
Paediatric A&E consultant	1

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## References

1. Bowles M, The Delphi technique. *Nursing Standard* 1999;14 45:32-36
2. Crisp J Peppetier D, Duffield D Adams A, Nagy S The Delphi method?  
*Nursing Research* 1998;46 issue 2:116-18
3. Duffield C. The Delphi technique. *The Australian Journal of Advanced Nursing* 1988;6(2):41-45.
4. Jones J, Hunter D. Consensus methods for medical and health services research. *British Medical Journal* 1995;311:376-80.
5. Mays N and Pope C *Qualitative Research In Health Care*. London BMJ Publishing Group Naylor CD What is appropriate care ? *New England Journal of Medicine* 1996;338 26:1918-1920
6. Murphy MK, Black NA, Lamping DL, McKee CM, Sanderson CFB, Askham J, et al. Consensus development methods, and their use in clinical guideline development. *Health Technology Assessment* 1998;2(3):0-88.
7. Naylor CD. What is appropriate care? *New England Journal of Medicine*. 1998; 338:26
8. Newton T Qualitative research and evidence based dentistry:linking evidence to practice 2001;2 Issue 4:104-6
9. Pill J. The Delphi method:substance, context, a critique and an annotated bibliography. *Socio-Economic Planning Science* 1971;5:57-71.
10. Smyth R Research with children. *British Medical Journal* 2001;322:1377-1378

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# **Appendix 5**

## **Delphi panel members**

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## **Delphi Panel Members**

H Allen (Paed. SpR), J H Baumer (Paed. cons.), R Bell (Paed. cons.), D Beverley (Paed. cons.), A Chambers (Paed. nurse), C Cramp (Paed. cons.), J Dawling (Paed. SpR), H Dixon (Paed. SpR), S Edees (Paed. cons.), M Everard (Paed. cons.), A Gregory (Paed. SpR), P Hardy (Paed A&E SpR), S Hartland (Paed. A&E nurse), H Huynh (Paed. SpR), K Jackson (Paed. nurse), J Jenkins (Paed. cons.), B Lloyd (Paed. cons.), I Mecrow (Paed. cons.), J Moorcraft (Paed. cons.), R Morton (Paed. cons.), R Newton (Paed. Neuro.), J Nixon (Paed. A&E nurse), K Palmer (Paed. cons.), A Raffles (Paed. cons.), C Simpson (Paed. nurse), C Smith (Paed. SpR), E Szondy (Paed. nurse), T Tinklin (Paed. cons.), C Upton (Paed. cons.), R Watkins (Paed. SpR), L Williams (Paed. A&E cons.)

**Key:** Paed. = Paediatric, Cons. = Consultant, SpR = Specialist Registrar, A&E = Accident and Emergency, Neuro. = Neurologist

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# **Appendix 6**

## **Rejected Papers**

## Rejected Papers

1. Temperature age and recurrence of febrile seizures

Stuijvenburg M et al. *Archives of Pediatrics & Adolescent Medicine*, 1998;152(12):1170-5.

*The aim of this paper was to predict recurrence of febrile seizures during subsequent episodes of fever. The study sample (all children with previous febrile seizures) were split into two groups. During subsequent febrile episodes half were treated with ibuprofen and half with placebo. Conclusions were then drawn about the group as a whole. Use of anti-pyretics introduced bias and made it impossible to compare the two groups.*

2. Effects of an educational programme on parents with febrile convulsive children. Huang MC et al. *Pediatric Neurology* 1998;18(2):150-5.

This was a non-blinded randomised controlled trial to look at the effects of an educational programme which entailed returning to the hospital for a morning on average up to three months after the initial febrile seizure. Parental knowledge, attitude, concern and practice towards febrile convulsions were assessed by questionnaire before and after the intervention. Method of sample recruitment not stated (likely bias as the most motivated parents take part). Effect of the knowledge on the next febrile seizure not evaluated. Although the results show that education improves parental knowledge this degree of intervention (i.e. a dedicated morning of education and first aid) would not be available in most settings.

3. Significance of the EEG after the first afebrile seizure.

Panayiotopoulos CP *Archives Disease Childhood*.  
Personal opinion.

4. Simple febrile convulsions: evidence for best practice.

Hawksworth DL. *Journal of Child Health Care* 2000;4(4):149-53.

Overview

5. Anticonvulsant blood levels: historical review with a paediatric focus

Snodgrass SR et al. *Journal of Child Neurology* 2000;15(11):734-46.

Overview

6. Febrile Seizures: Treatment and prognosis.

Knudsen FU. *Epilepsia* 2000;41(1):2-9.

## Overview

7. *Convulsions with fever as a presenting feature of bacterial meningitis among preschool children in developing countries.* Akpede GO. *Development Medicine and Child Neurology*.1992;34(6):524-9.  
*Retrospective case note review of children attending A&E with fever and convulsions. Children 1 month to 6 years included all of who had an LP. Results 522 children included 22 had meningitis, 16 of those were not suspected clinically (note, 7 of these children were under 6 months). Definition of febrile convulsion not given and it was not stated whether it was the policy of the hospital to lumbar puncture all children presenting with convulsions and fever or whether this sample was selected out to look at. There may have been a number of children who attended with convulsions and fever who didn't get a lumbar puncture and didn't go on to develop meningitis.*
8. *National General Practice Study of Epilepsy: newly diagnosed epileptic seizures in a general population.* Saner JW et al. *Lancet* 1990;336(8726):1267-71.  
*Population based cohort study of 1091 patients (children and adults) with newly diagnosed epilepsy including febrile convulsions. Results 220 children reported with febrile convulsions. This study provided a cohort of children with febrile seizures who were followed up to assess prognosis and treatment; they are described in a separate paper in Appendix 3.*
- 9 *Knowledge, attitudes and practices of parents of children with febrile convulsions.* Parmar RC et al. *Journal of Postgraduate Medicine* 2001;47 (1) :19-23.  
*A survey by questionnaire of parental views and knowledge of febrile seizures following discharge from hospital. Results suggest inadequate information is given to parents following a febrile seizure.*
10. *When not to do a lumbar puncture.* Addy DP. *Archives of Disease in Childhood* 1987;62(9):873-75.  
*Personal opinion/ review.*
- 11 *Recurrence risk after a first febrile convulsion.* Bessisso MS al. *Saudi Medical Journal* 2001;22(3):254-8.  
*Hospital based study rather than population which are better to look at prognosis. Follow up was only for one year.*
- 12 *Simple febrile convulsions. A prospective incidence study and an evaluation of investigations initially needed.* Heijbel J et al. *Neuropadiatrie* 1980;11(1):45-56.  
*A prospective study, aims not clearly stated and method for including all children with febrile convulsions not clear.*
- 13 *Lumbar puncture for first febrile seizure?* Rosenburg NM et al. *Pediatric Emergency Care* 1992;8(5):300-1.  
*Case reports.*
- 14 *The initial hospital management of childhood febrile convulsions: an audit.* Dawson KP et al. *Journal of Quality in Clinical Practice.* 1994;14(2):111-4.  
*Audit: the abstract suggested this audit addressed the need for hospital admission following a febrile convulsion, this aspect wasn't covered.*
15. *Febrile convulsions.* Surpure JS. *Clinical Pediatrics* 1980;19(5):361-2.  
*Retrospective case note review, small numbers (32).*
- 16 *Parents fear regarding fever and febrile seizures.* Stuijvenberg M *Acta Paediatrica.* 1999;88(6):618-22.  
*Survey of parental perception of febrile seizures particularly fear of fever. Didn't address the effects of a particular educational intervention.*

- 17 *Unprovoked seizures after complex febrile convulsions. Sapir D, Yael L, Shaul H et al. Brain and Development 2000;22(8):484-6.*  
*Aim: delineate the significance of each risk factor; partial seizure, prolonged seizure and multiple seizures in 24 hours in complex febrile convulsions with the development of subsequent epilepsy. Retrospective case note review, all notes of children with febrile convulsions reviewed and those with complex febrile convulsions identified. Results not felt to be valid due to, small numbers and the inclusion of children with complex seizures who subsequently developed epilepsy but also had development delay and so other risk factors for epilepsy.*
- 18 *Unprovoked seizures in children with febrile seizures: Short-term outcome. Berg AT, Shinnar, Shlomo. Neurology 1996;47(2):562-568.*  
*Median follow up only 29 months. Better studies found to answer the clinical question of the risk of unprovoked seizures after febrile seizures (most with longer follow up).*
- 19 *Which laboratory tests should be performed on children with apparent febrile convulsions? An analysis and review of the literature. Wears R, Luten R, Lyons R. Pediatric Emergency Care 1986;2(3):191-6.*  
*Review.*
- 20 *Seizures associated with fever: clinical data as predictors for normal biochemical blood levels. Van Stuijvenberg M, van Gijssel EN, Steyerberg EW et al. European Journal of Paediatrics 1998;157(7):592-8.*
- 21 *Risk of recurrence and outcome after the first febrile seizure. Tarkka R, Ranatala H, Uhari M, Pokka T. Pediatric Neurology 1998;18(3):218-20.*  
*Results not felt to be valid as the study population was taken from a population used in a previous study to assess the affect of diazepam and or paracetamol on recurrence of febrile seizures during febrile episodes compared to placebo. Although the results showed no statistical difference between the groups this may have been for other reasons making this group unsuitable to assess the risk factors for recurrence.*
- 22 *Seizures with fever after unprovoked seizures: an analysis in children followed from the time of a first febrile convulsion. Berg AT, Darefsky AS, Holford TR, Shinnar S. Epilepsia 1998;39(1):77-80.*  
*Very small numbers - only 12 children with unprovoked seizures after a first febrile convulsion identified and only 7 of those had subsequent seizures with fever.*
- 23 *Perils and pitfalls of lumbar puncture in the emergency department. Holdgate A, Cuthbert K. Emergency Medicine. 2001;Vol 13(3):351-358.*  
*Review article.*
24. *Incidence of bacteremia, urinary tract infections, and unsuspected bacterial; meningitis in children with febrile seizures. Teach SJ, Geil PA. Pediatric Emergency Care 1999;15(1):9-12.*  
*Retrospective case note review. The aim of this study was to report the incidence of bacterial meningitis initially unsuspected in the emergency room. The paper excludes children who had evidence of meningoencephalitis in the emergency room but does not say whether these children had a lumbar puncture done as a routine or because clinical signs indicated it. The paper states that no children with meningitis were missed who were not suspected in the emergency room but the total number of lumbar punctures done was not stated and the paper acknowledges that the test was not done on everyone. No follow up to pick up missed cases.*

25. *Is the long-term outcome of children following febrile convulsions favourable?* W Kolfen, Pehle K, Kronig S. *Development Medicine and Child Neurology* 1998; Vol 40(10):667-71.

*Case control study. Clear definition of the source population not given. Hospital rather than population based. Source population a children's hospital therefore these may have been the more severe cases. No comment as to how controls were assessed to make sure they were not cases. Results not felt to be valid.*

26. *Children with first time simple febrile convulsions are at low risk of serious bacterial illness.* Trainor JL, Hampers LC, Krug SE. *Academic Emergency Medicine* 2001;8(8):781-7.

*Aim to examine the rates of serious bacterial illness in children presenting with simple febrile seizures. Many limitations to the study design. Control group with fever without febrile convulsion needed to fully test the hypothesis in question.*

27. *Parents view of lumbar puncture in children with febrile seizures.* Deng CT. *Medical Journal of Malaysia* 1994;49:263-8.

*Results not applicable to the UK population.*

### **Foreign Language**

*There was one article found in the literature search and not included as it was in a foreign language. Conditions for children and their parents in the hospital. Parents' reaction in connection with the admission of the child with the diagnosis of the first febrile convulsion. Hansen A, Abitbol V, Ibsen KK, et al. Source Ugeskrift for Laeger. 146(9):689-91, 1984 Feb 27. In Danish.*

### **Useful for background reading but beyond the scope of the main guideline**

- 1 *Development of scales to measure psychosocial care needs of children with seizures and their parents.* Austin J, Dunn D, Huster G, Rose D. *Journal of Neuroscience Nursing.* 1998;30(3):155-60.  
*Beyond the scope of the guideline, applies to children with established epilepsy.*
- 2 *Psychosocial care needs of children with new onset seizures.* Mcnelis A, Musick B, Austin J, Dunn D, Creasy K. *Journal of Neuroscience Nursing.* 1998;30(3):161-165.  
*Work done on children with established epilepsy on treatment.*
- 3 *Psychosocial care needs of parents of children with new onset seizures.* Shore C, Austin J, Musick B, Dunn D, McBride A, Creasy K. *Journal of Neuroscience Nursing.* 1998;30(3):169-174.  
*As above.*
- 4 *Predisposing and causative factors in childhood epilepsy.* Nelson KB, Ellenberg JH. *Epilepsia.* 1987;28 Suppl 1:S16-24.
- 5 *A meta-analytic review of the preventive treatment of recurrences of febrile seizures.* Centre for reviews and dissemination reviewers, University of York.

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- 6 *Antipyretic efficacy of ibuprofen and acetaminophen in children with febrile seizures.* Van Esch A, Van Steensel-Moll HA, et al. Archives of Paediatrics and Adolescent Medicine 1995;149(6):632-7.
- 7 *Ibuprofen is probably better than paracetamol in reducing fever in children.* BestBETs Best Evidence Topics. Simon Carley Manchester Royal Infirmary.
- 8 *Diagnostic testing of seizure disorders.* Gilliam F et al. Neurologic Clinics 1996;14(1):61-84.
- 9 *Is the long term outcome of children following febrile convulsions favourable.* W Kolfen, Pehle K, Kronig S. Development Medicine and Child Neurology. 1998;40(10):667-71.
10. *Febrile convulsions in 220 children - neurological sequelae at 12 years follow-up.* Macdonald BK. European Neurology 1999;41(4):179-86.

# **Appendix 7**

## **AGREE Appraisal Document**

Appraisal of a guideline for post seizure management in A&E using the 'AGREE appraisal instrument

Scope and Purpose

1. The objectives of the guideline are specifically described

1		2		3	✓	4	
---	--	---	--	---	---	---	--

2. The clinical questions covered by the guideline are specifically described

1		2		3	✓	4	
---	--	---	--	---	---	---	--

3. The patients to whom the guideline is meant to apply are specifically described

1		2		3		4	✓
---	--	---	--	---	--	---	---

4. The guideline development group contains individuals from all the professional groups

1		2		3	✓	4	
---	--	---	--	---	---	---	--

5. The patients views and preferences have been sought

1		2		3	✓	4	
---	--	---	--	---	---	---	--

Comments

Parent but not patient views sought

Rigour of development

6. Systematic methods were used to search for the evidence

1		2		3		4	✓
---	--	---	--	---	--	---	---

7. The criteria for selecting the evidence are clearly described

1		2		3		4	✓
---	--	---	--	---	--	---	---

8. The methods used for formulating the recommendations are clearly described

1		2		3	✓	4	
---	--	---	--	---	---	---	--

9. The health benefits, side effects and risks have been considered in formulating the recommendations

1		2		3	✓	4	
---	--	---	--	---	---	---	--

14/05/04

10. There is an explicit link between the recommendations and the supporting evidence

1		2		3		4	✓
---	--	---	--	---	--	---	---

11. The guideline has been externally reviewed by experts prior to its publication

1		2		3		4	
---	--	---	--	---	--	---	--

Comments

Submitted to the QPC

12. A procedure for updating the guideline is provided

1		2	✓	3		4	
---	--	---	---	---	--	---	--

Comments

Date for review only given

Clarity and presentation

13. The recommendations are specific and unambiguous

1		2		3	✓	4	
---	--	---	--	---	---	---	--

14. The different options for management of the condition are clearly presented

1		2		3		4	✓
---	--	---	--	---	--	---	---

15. Key recommendations are easily identifiable

1		2		3	✓	4	
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Applicability

16. The target users of the guideline are clearly defined

1		2		3		4	✓
---	--	---	--	---	--	---	---

17. The potential organisational barriers in applying the recommendations have been discussed

1		2	✓	3		4	
---	--	---	---	---	--	---	--

18. The potential costs of applying the recommendations have been discussed

14/05/04

1		2	✓	3		4	
---	--	---	---	---	--	---	--

19.The guideline is supported with tools for application

1		2		3		4	✓
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20.The guideline presents key review criteria for monitoring and or audit purposes

1		2		3		4	✓
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21.The guideline has been piloted among end users

1		2		3		4	✓
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Editorial Independence

22.The guideline is editorially independent from the funding

1		2		3		4	✓
---	--	---	--	---	--	---	---

23.Conflicts of interest of guideline development members have been recorded

1		2		3		4	✓
---	--	---	--	---	--	---	---