Complete Summary

GUIDELINE TITLE

Practice parameter: evaluating a first nonfebrile seizure in children. Report of the Quality Standards Subcommittee of the American Academy of Neurology, the Child Neurology Society, and the American Epilepsy Society.

BIBLIOGRAPHIC SOURCE(S)

Hirtz D, Ashwal S, Berg A, Bettis D, Camfield C, Camfield P, Crumrine P, Elterman R, Schneider S, Shinnar S. Practice parameter: evaluating a first nonfebrile seizure in children: report of the quality standards subcommittee of the American Academy of Neurology, Child Neurology Society, and American Epilepsy Society. Neurology 2000 Sep 12;55(5):616-23. [66 references]

GUIDELINE STATUS

This is the current release of the guideline.

According to the guideline developer, this guideline has been reviewed and is still considered to be current as of July 2006. This review involved new literature searches of electronic databases followed by expert committee review of new evidence that has emerged since the original publication date.

COMPLETE SUMMARY CONTENT

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SCOPE

DISEASE/CONDITION(S)

First nonfebrile seizure in children, including partial (simple or complex partial, or partial with secondary generalization), generalized clonic, or tonic seizures.

GUIDELINE CATEGORY

Diagnosis
Evaluation

CLINICAL SPECIALTY

Family Practice
Neurology
Pediatrics

INTENDED USERS

Physicians

GUIDELINE OBJECTIVE(S)

- To review the available evidence concerning the value of diagnostic testing after a first nonfebrile seizure in children, and to provide recommendations based on this evidence

TARGET POPULATION

Children aged 1 month to 21 years who have experienced their first nonfebrile seizure

Note: The guideline excluded children diagnosed with epilepsy (defined as two or more seizures without acute provocation), children with myoclonic or atonic seizures, children with significant head trauma immediately preceding the seizure, and children with previously diagnosed central nervous system (CNS) infection or other known acute precipitating causes. Children with neonatal seizures ($\leq$28 days), first seizures lasting 30 minutes or more (status epilepticus), and febrile seizures were also excluded.

INTERVENTIONS AND PRACTICES CONSIDERED

1. Laboratory studies, including complete blood count (CBC), serum electrolytes, blood urea nitrogen (BUN), creatinine, glucose, calcium, magnesium, and arterial blood gas analysis
2. Toxicology screening
3. Lumbar puncture (also known as cerebral spinal fluid examination or spinal tap)
4. Electroencephalogram (EEG)
5. Neuroimaging studies, including computed tomography (CT) and magnetic resonance imaging (MRI) (emergent and nonurgent studies)

MAJOR OUTCOMES CONSIDERED

- Predictive value of diagnostic instruments for determining risk for seizure recurrence
- Predictive value of diagnostic instruments for determining seizure etiology

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Hand-searches of Published Literature (Primary Sources)
Hand-searches of Published Literature (Secondary Sources)
Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

An initial MEDLINE literature search was performed for relevant articles published from 1980 to August 1996, using the following key words: epilepsy, seizures, convulsions, magnetic resonance imaging, computed tomography, electroencephalography, blood chemical analysis, neurological examination, and diagnostic errors. Standard search procedures were used, and sub-headings were applied as appropriate. In addition, the database provided by *Current Contents* (Institute for Scientific Information [ISI]) was searched for the most recent 6-month period. These searches produced 279 titles of journal articles in English, and 79 in non-English languages. An updated MEDLINE search was performed in June 1997 and again in November 1998.

Titles and abstracts were reviewed for content regarding first nonfebrile seizures in children and adults. Articles from the searches were identified for review and additional articles from the references in these primary articles were included. Articles were excluded if they contained only data on adults with established epilepsy, but references were reviewed pertaining to adults with first seizures only, to both children and adults with first seizures, and to children with both new and established seizures. Two of the articles published in non-English languages met our criteria and were included. Of the articles reviewed from searches, bibliographies, and committee member suggestions, 66 met the above criteria and were included as references. The age ranges included in the studies were variable, and most pediatric studies included up to age 16 to 19 years. In most reports, results were not broken down according to subsets of age groups.

NUMBER OF SOURCE DOCUMENTS

Articles identified through searches: 279 English articles; 79 non-English articles

Articles meeting inclusion criteria: 66 articles

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Classification of Evidence:

Class I. Must have all (a through 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 outcome.
d. There must be a satisfactory description of the technology used for evaluations (e.g., electroencephalogram, magnetic resonance imaging).

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 inclusion/exclusion criteria, and information such as age, sex, and characteristics of the seizure.

Class III. Must have a or b:

a. A small cohort or case report.
b. Relevant expert opinion, consensus, or survey.

A cost-benefit analysis or a meta-analysis may be Class I, II, or III, depending on the strength of the data upon which the analysis is based.

METHODS USED TO ANALYZE THE EVIDENCE

Review of Published Meta-Analyses
Systematic Review

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

A new three-tiered scheme of classification of evidence was developed specifically to be used for evaluation of diagnostic studies. This classification scheme was approved by the Quality Standards Subcommittee of the American Academy of Neurology and differs from one that has been used for the assessment of treatment efficacy studies, which largely pertains to randomized trials. Each of the selected articles was reviewed, abstracted, and classified by at least two reviewers. Abstracted data included patient numbers, ages and gender, timing of subject selection (prospective, retrospective, or referral), case-finding methods, exclusion criteria, seizure characteristics, neurologic abnormalities prior to or after the seizure, evaluations and results, and recommendations of the authors. Methods of data analysis were also noted.

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Not stated

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Strength of the Recommendations:

Standard. A principle for patient management that reflects a high degree of clinical certainty (usually requires one or more Class I studies that directly address the clinical question, or overwhelming Class II evidence when circumstances preclude randomized clinical trials).

Guideline. A recommendation for patient management that reflects moderate clinical certainty (usually requires one or more Class II studies or a strong consensus of Class III evidence).

Practice Option. Strategy for patient management for which clinical utility is uncertain (inconclusive or conflicting evidence or opinion).

Practice Parameters. Results, in the form of one or more specific recommendations, from a scientifically based analysis of a specific clinical problem.

COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

METHOD OF GUIDELINE VALIDATION

External Peer Review
Internal Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

Not stated

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

Each clinical practice recommendation is stratified by type of procedure, based on the strength of the evidence. Definitions of the strength of the recommendations (Standards, Guidelines, Practice Options, Practice Parameters) and classification of the evidence (Class I through Class III) are provided at the end of the Major Recommendations field.

Summary

In the child with a first nonfebrile seizure, diagnostic evaluations influence therapeutic decisions, how families are counseled, and the need for hospital

admission and/or specific follow-up plans. This practice parameter has reviewed the published literature concerning the usefulness of studies following a first nonfebrile seizure in children, and has classified the strength of the available evidence. There is sufficient Class I evidence, which involves a well-executed prospective study, to provide a recommendation with the highest degree of clinical certainty--i.e., a **Standard**, that an electroencephalogram be obtained in all children in whom a nonfebrile seizure has been diagnosed--to predict the risk of recurrence and to classify the seizure type and epilepsy syndrome. The decision to perform other studies, including lumbar puncture, laboratory tests, and neuroimaging, for the purpose of determining the cause of the seizure and detecting potentially treatable abnormalities, will depend on the age of the patient and the specific clinical circumstances. Children of different ages may require different management strategies.

Laboratory Studies

The fact that a first nonfebrile seizure occurred in the absence of any suggestive history or symptoms in a child who is older than age 6 months and has returned to baseline has not been shown to be sufficient reason to perform routine laboratory testing in the child with a first nonfebrile seizure. However, the number of children reported is too small to be confident that in rare circumstances, routine laboratory screening such as blood glucose determination might not provide important information, even without specific clinical indications. There were only two reports of positive toxicology screens, but no studies that systematically evaluated the yield from doing routine toxicology screening in children with first seizures. If no cause for the seizure has been identified, it is important to ask questions regarding possible toxic ingestions or exposures.

Recommendations:

- Laboratory tests should be ordered based on individual clinical circumstances that include suggestive historic or clinical findings such as vomiting, diarrhea, dehydration, or failure to return to baseline alertness. (Smith, Martland, & Lowry, 1996; Eisner et al., 1986; Turnbull et al., 1990; Nordli & Pedley, 1995) **(Option)**
- Toxicology screening should be considered across the entire pediatric age range if there is any question of drug exposure or substance abuse **(Option)**.

Lumbar Puncture

There is no evidence regarding the yield of routine lumbar puncture following a first nonfebrile seizure. The one study available (Class II) is limited in size and age range. Recommendations based on age and clinical symptoms are available for Class III publications. In the very young child (<6 months), in the child of any age with persistent (cause unknown) alteration of mental status or failure to return to baseline, or in any child with meningeal signs, lumbar puncture should be performed. If increased intracranial pressure is suspected, the lumbar puncture should be preceded by an imaging study of the head.

Recommendations:

- In the child with a first nonfebrile seizure, lumbar puncture is of limited value and should be used primarily when there is concern about possible meningitis or encephalitis **(Option)**.

Electroencephalogram

The majority of evidence from Class I and Class II studies confirms that an electroencephalogram helps in determination of seizure type, epilepsy syndrome, and risk for recurrence, and therefore may affect further management decisions. Experts commonly recommend that an electroencephalogram be performed after all first nonfebrile seizures. It is not clear what the optimal timing should be for obtaining an electroencephalogram. Although an electroencephalogram done within 24 hours of the seizure is most likely to show abnormalities, physicians should be aware that some abnormalities such as postictal slowing that can be seen on electroencephalogram done within 24 to 48 hours of a seizure may be transient and must be interpreted with caution.

There is no evidence that the electroencephalogram must be done before discharge from the emergency department; the study may be arranged on an outpatient basis. Epileptiform electroencephalogram abnormalities may be useful in confirming that the event was a seizure; however, an electroencephalogram abnormality by itself is not sufficient to make a diagnosis that an epileptic seizure occurred, nor can its absence rule out a seizure. The electroencephalogram is necessary to determine the epilepsy syndrome and the diagnosis of an epilepsy syndrome may be helpful in determining the need for imaging studies. The electroencephalogram is also useful in predicting the prognosis for recurrences.

It is not clear what the optimal timing should be for obtaining an electroencephalogram. Although an electroencephalogram done within 24 hours of the seizure is most likely to show abnormalities, physicians should be aware that some abnormalities such as postictal slowing that can be seen on electroencephalogram done within 24 to 48 hours of a seizure may be transient and must be interpreted with caution.

Recommendations:

- The electroencephalogram is recommended as part of the neurodiagnostic evaluation of the child with an apparent first unprovoked seizure **(Standard)**

Neuroimaging Studies

Although abnormalities on neuroimaging are seen in up to one third of children with a first seizure, most of these abnormalities do not influence treatment or management decisions such as the need for hospitalization or further studies. Of available reported imaging results, from Class I and Class II studies of children, an average of about 2% revealed clinically significant findings that contributed to further clinical management, the majority of which were performed because the seizure was focal or there were specific clinical findings beyond the fact that a seizure had occurred (see the table in the guideline document).

Thus, there is insufficient evidence to support a recommendation at the level of standard or guideline for the use of routine neuroimaging, i.e., imaging performed for which having had a seizure is the sole indication, after a first nonfebrile seizure in children. However, neuroimaging may be indicated under some circumstances either as an emergent or nonurgent procedure.

The purpose of performing an *emergent* neuroimaging study in the context of a child's first seizure is to detect a serious condition that may require immediate intervention. The possible effects of emergency medication used to treat the seizure must be taken into consideration.

The purpose of performing a nonurgent neuroimaging study, which can be deferred to the next several days or later, is to detect abnormalities that may affect prognosis and therefore have an impact on long-term treatment and management. Factors to be considered include the age of the child, the need for sedation to perform the study, the electroencephalogram results, a history of head trauma, and other clinical circumstances such as a family history of epilepsy.

Recommendations:

- If a neuroimaging study is obtained, magnetic resonance imaging is the preferred modality. (Yang et al., 1979; Resta et al., 1994; O'Dell et al., 1997; Berg et al., 1999; Kuzniecky, 1996; Iannetti et al., 1996; Radue & Scollo-Lavizzari, 1994) **(Guideline)**

Emergent neuroimaging should be performed in a child of any age who exhibits a postictal focal deficit (Todd's paresis) not quickly resolving, or who has not returned to baseline within several hours after the seizure. (Vining & Freeman, 1986; Ferry, 1992) **(Option)**

- Nonurgent imaging studies with magnetic resonance imaging should be seriously considered in any child with a significant cognitive or motor impairment of unknown etiology, unexplained abnormalities on neurologic examination, a seizure of partial (focal) onset with or without secondary generalization, an electroencephalogram that does not represent a benign partial epilepsy of childhood or primary generalized epilepsy, or in children under 1 year of age. (Nordli & Pedley, 1995; King et al., 1998) **(Option)**

<u>Definitions</u>:

Classification of Evidence:

Class I. Must have all (a through 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 outcome.
d. There must be a satisfactory description of the technology used for evaluations (e.g., electroencephalogram, magnetic resonance imaging).

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.
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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.

A cost-benefit analysis or a meta-analysis may be Class I, II, or III, depending on the strength of the data upon which the analysis is based.

Strength of Recommendations:

Standards. Generally accepted principles for patient management that reflect a high degree of clinical certainty (i.e., based on Class I evidence or, when circumstances preclude randomized clinical trials, overwhelming evidence from Class II evidence that directly addresses the issue, decision analysis that directly addresses the issue, or strong consensus of Class III evidence).

Guidelines. Recommendations for patient management that may identify a particular strategy or range of management strategies and that reflect moderate clinical certainty (i.e., based on Class II evidence that directly addresses the issue, decision analysis that directly addresses the issue, or strong consensus of Class III evidence).

Practice options. Other strategies for patient management for which the clinical utility is uncertain (i.e., based on inconclusive or conflicting evidence or opinion).

Practice parameters. Results, in the form of one or more specific recommendations, from a scientifically based analysis of a specific clinical problem.

CLINICAL ALGORITHM(S)

None provided

EVIDENCE SUPPORTING THE RECOMMENDATIONS

REFERENCES SUPPORTING THE RECOMMENDATIONS

References open in a new window

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The type of supporting evidence is identified and graded for each recommendation (see "Major Recommendations").

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

Appropriate use of diagnostic tools to determine the cause of first nonfebrile seizures in children, allowing prompt treatment or providing important prognostic information.

POTENTIAL HARMS

Not stated

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

This statement is provided as an educational service of the American Academy of Neurology. It is based on an assessment of current scientific and clinical information. It is not intended to include all possible proper methods of care for a particular neurologic problem or all legitimate criteria for choosing to use a specific procedure. Neither is it intended to exclude any reasonable alternative methodologies. The American Academy of Neurology recognizes that specific patient care decisions are the prerogative of the patient and the physician caring for the patient, based on all of the circumstances involved.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Getting Better

IOM DOMAIN

Effectiveness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

Hirtz D, Ashwal S, Berg A, Bettis D, Camfield C, Camfield P, Crumrine P, Elterman R, Schneider S, Shinnar S. Practice parameter: evaluating a first nonfebrile seizure in children: report of the quality standards subcommittee of the American Academy of Neurology, Child Neurology Society, and American Epilepsy Society. Neurology 2000 Sep 12;55(5):616-23. [66 references]

ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

2000 Sep (reviewed 2006 Jul)

GUIDELINE DEVELOPER(S)

American Academy of Neurology - Medical Specialty Society
American Epilepsy Society - Disease Specific Society
Child Neurology Society - Medical Specialty Society

SOURCE(S) OF FUNDING

American Academy of Neurology (AAN)

GUIDELINE COMMITTEE

Quality Standards Subcommittee

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

Subcommittee Members: Gary Franklin, MD, MPH (Co-Chair); Catherine Zahn, MD (Co-Chair); Milton Alter, MD, PhD; Stephen Ashwal, MD; John Calverley, MD; Richard Dubinsky, MD; Jacqueline French, MD; Gary Gronseth, MD; Deborah Hirtz, MD; Robert Miller, MD; James Stevens, MD; and William Weiner, MD

FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

ENDORSER(S)

American Academy of Pediatrics - Medical Specialty Society

GUIDELINE STATUS

This is the current release of the guideline.

According to the guideline developer, this guideline has been reviewed and is still considered to be current as of July 2006. This review involved new literature searches of electronic databases followed by expert committee review of new evidence that has emerged since the original publication date.

GUIDELINE AVAILABILITY

Electronic copies: A list of American Academy of Neurology (AAN) guidelines, along with a link to a Portable Document Format (PDF) file for this guideline, is available at the AAN Web site.

Print copies: Available from the AAN Member Services Center, (800) 879-1960, or from AAN, 1080 Montreal Avenue, St. Paul, MN 55116.

AVAILABILITY OF COMPANION DOCUMENTS

- Practice statement definitions. St. Paul (MN): American Academy of Neurology.
- Practice statement development. St. Paul (MN): American Academy of Neurology.

PATIENT RESOURCES

None available

NGC STATUS

This NGC summary was completed by ECRI on November 4, 2001. The information was verified by the guideline developer as of December 20, 2001.

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