



Complete Summary

GUIDELINE TITLE

Reassessment: neuroimaging in the emergency patient presenting with seizure (an evidence-based review). Report of the Therapeutics and Technology Assessment Subcommittee of the American Academy of Neurology.

BIBLIOGRAPHIC SOURCE(S)

Harden CL, Huff JS, Schwartz TH, Dubinsky RM, Zimmerman RD, Weinstein S, Foltin JC, Theodore WH, Therapeutics and Technology Assessment Subcommittee of the American Academy of Neurology. Reassessment: neuroimaging in the emergency patient presenting with seizure (an evidence-based review): report of the Therapeutics and Technology Assessment Subcommittee of the American Academy of Neurology. *Neurology* 2007 Oct 30;69(18):1772-80. [17 references]
[PubMed](#)

GUIDELINE STATUS

This is the current release of the guideline.

This guideline updates a previous version: Quality Standards Subcommittee of the American Academy of Neurology, American College of Emergency Physicians, American Association of Neurological Surgeons, and American Society of Neuroradiology. Practice parameter: neuroimaging in the emergency patient presenting with seizure: summary statement. *Neurology* 1996 Jul;47(1):288-91.

COMPLETE SUMMARY CONTENT

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SCOPE

DISEASE/CONDITION(S)

Seizure

GUIDELINE CATEGORY

Diagnosis
Evaluation
Management
Screening
Technology Assessment

CLINICAL SPECIALTY

Emergency Medicine
Infectious Diseases
Internal Medicine
Neurological Surgery
Neurology
Nursing
Pediatrics
Radiology

INTENDED USERS

Advanced Practice Nurses
Allied Health Personnel
Health Care Providers
Health Plans
Hospitals
Managed Care Organizations
Nurses
Patients
Physician Assistants
Physicians

GUIDELINE OBJECTIVE(S)

- To reassess the usefulness of neuroimaging as a screening procedure for altering management of the emergency patient presenting with a seizure, and to determine which clinical and historical characteristics indicate the need for a neuroimaging study for such patients
- To update the previous practice parameter from 1996 and employ improved methodology for the development of clinical practice guidelines

TARGET POPULATION

Adult- and pediatric-age emergency patients who present with seizure

INTERVENTIONS AND PRACTICES CONSIDERED

Diagnosis/Evaluation/Screening

1. Neuroimaging studies
 - Computed tomography

- Magnetic resonance imaging was considered but not recommended
2. Assessment of neuroimaging study results
 - Adult emergency patient with first seizure
 - Pediatric emergency patient with first seizure
 - Emergency patient with chronic seizure
 - Special populations (children <6 months of age presenting with first seizure, children <18 years of age with immediate posttraumatic seizures, adults with acquired immunodeficiency syndrome presenting with first seizure)
 3. Factors associated with abnormal neuroimaging results
 - Clinical and historical features of the neurological examination

MAJOR OUTCOMES CONSIDERED

- New structural lesion requiring surgery or change in care
- Abnormal imaging findings requiring surgery
- Hospitalization
- Seizure recurrence
- Clinical and historical features associated with abnormal imaging findings

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

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

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

A literature search was performed using Ovid Medline for relevant articles published from 1966 until November 2004 using the following key words: diagnostic imaging, neuroimaging, seizures, epilepsy, emergency medical services, emergencies, craniocerebral trauma, neurocysticercosis, HIV infection, and status epilepticus. These last three were specifically searched since these are common conditions known to be associated with structural brain lesions and seizures, especially first seizures. The search was limited to reports in humans and abstracts available in English. Standard search procedures were used and subheadings were applied as appropriate. The initial search yielded 73 articles. A second search was performed shortly after the first search using the above terms but specific for studies in children; this yielded an additional 19 articles for a total of 92 articles.

This list was refined by reviewing the citation abstracts with exclusion of the following types of articles: review articles without primary data, case reports, articles for which the abstract did not indicate that a neuroimaging evaluation of seizures in an urgent or emergent setting was performed. Twenty-five of 92 articles met inclusion criteria and were selected for complete review. From these 25 articles, further selection was made for inclusion in the analysis if they reported features important for generalizability and for key elements in evaluating the usefulness of a screening procedure. Criteria for further selection were that the report included the source of patients (emergency department), age and

gender of the population studied, clinical criteria for performing an imaging study, study design (prospective or retrospective), sampling method, type of neuroimaging procedure (cranial CT or MRI of the brain), and completeness (the number of patients who underwent imaging out of the total study population). Fifteen reports met these criteria and are included in the analysis. At least four committee members reviewed each abstract and classified each article; disagreements were resolved by discussion and consensus.

NUMBER OF SOURCE DOCUMENTS

15

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

AAN Classification of Evidence for Rating of Screening Articles

Class I: A statistical, population-based sample of patients studied at a uniform point in time (usually early) during the course of the condition. All patients undergo the intervention of interest. The outcome, if not objective, is determined in an evaluation that is masked to the patients' clinical presentation.

Class II: A statistical, non-referral-clinic-based sample of patients studied at a uniform point in time (usually early) during the course of the condition. Most patients undergo the intervention of interest. The outcome, if not objective, is determined in an evaluation that is masked to the patients' clinical presentations.

Class III: A sample of patients studied during the course of the condition. Some patients undergo the intervention of interest. The outcome, if not objective, is determined in an evaluation by someone other than the treating physician.

Class IV: Expert opinion, case reports, or any study not meeting criteria for Class I to III.

METHODS USED TO ANALYZE THE EVIDENCE

Systematic Review with Evidence Tables

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Data extraction for the analysis included the information previously stated for evaluation of a screening criterion and its generalizability, epilepsy diagnosis (first seizure or chronic epilepsy), the presence of an underlying neurologic diagnosis such as HIV infection or cysticercosis, whether the seizure was febrile or nonfebrile for studies in children, the results of the imaging studies, and the action taken upon those results. The evidence tables included this information to

the fullest extent available. The evidence was rated according to the criteria for screening (questions 1 to 4) and for diagnoses (question 5).

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Other

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

Conclusions and recommendations were made according to the American Academy of Neurology (AAN) criteria for translating the quality of screening and diagnostic evidence to recommendations.

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Classification of Recommendations

A = Established as effective, ineffective, or harmful (or established as useful/predictive or not useful/predictive) for the given condition in the specified population. (Level A rating requires at least two consistent Class I studies.*)

B = Probably effective, ineffective, or harmful (or probably useful/predictive or not useful/predictive) for the given condition in the specified population. (Level B rating requires at least one Class I study or at least two consistent Class II studies.)

C = Possibly effective, ineffective, or harmful (or possibly useful/predictive or not useful/predictive) for the given condition in the specified population. (Level C rating requires at least one Class II study or two consistent Class III studies.)

U = Data inadequate or conflicting; given current knowledge, treatment (test, predictor) is unproven. (Studies not meeting criteria for Class I–Class III).

*In exceptional cases, one convincing Class I study may suffice for an "A" recommendation if 1) all criteria are met, 2) the magnitude of effect is large (relative rate improved outcome >5 and the lower limit of the confidence interval is >2).

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

The guideline was approved by the Therapeutics and Technology Assessment Subcommittee on December 9, 2006; by the Practice Committee on July 3, 2007; and by the American Academy of Neurology Board of Directors on July 19, 2007.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

Definitions of the strength of the recommendations (A, B, C, U) and classification of the evidence (Class I through Class IV) are provided at the end of the "Major Recommendations" field.

Question 1: What is the likelihood that acute management, for the adult emergency patient presenting with a first seizure, is changed because of the results of a neuroimaging study?

Conclusion

An emergency computed tomography (CT) in adults with first seizure is possibly useful for acute management of the patient (**Class III**).

Recommendation

An emergency CT may be considered in adults with first seizure (**Level C**).

Question 2: What is the likelihood that acute management for the pediatric emergency patient presenting with a first seizure (not excluding complex febrile seizures) will change based on the results of a neuroimaging study?

Conclusion

An emergency CT in children with a first seizure is possibly useful for acute management of the patient (**Class III**).

Recommendation

An emergency CT may be considered in children with a first seizure (**Level C**).

Question 3: What is the likelihood that acute management for the emergency patient presenting with a chronic seizure will be changed by the results of a neuroimaging study?

Conclusion

The evidence is inadequate to support or refute the usefulness of emergency CT in persons with chronic seizures.

Recommendation

There is no recommendation regarding an emergency CT in persons with chronic seizures (**Level U**).

Question 4: What is the likelihood that the results of a neuroimaging study will lead to a change in acute management in special populations presenting with seizure (age <6 months, acquired immunodeficiency syndrome [AIDS], children with immediate posttraumatic seizures)?

Conclusion

An emergency CT in children less than 6 months of age and in patients with AIDS is possibly useful for acute management (**Class III**).

Recommendation

An emergency CT may be considered in children less than 6 months of age and in patients with AIDS (**Level C**).

Question 5: What factors are associated with an abnormal neuroimaging study for patients presenting with seizure in the emergency department?

Conclusion

The clinical and historical features of an abnormal neurologic examination, a predisposing history, or a focal seizure onset are probably predictive of an abnormal CT study for patients presenting with seizures in the emergency department (**Class II**).

Recommendation

An emergency CT should be considered in patients presenting with seizure in the emergency department who have an abnormal neurologic examination, predisposing history, or focal seizure onset (**Level B**).

Definitions:

AAN Classification of Evidence for Rating of Screening Articles

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Class II: A statistical, non-referral-clinic-based sample of patients studied at a uniform point in time (usually early) during the course of the condition. Most patients undergo the intervention of interest. The outcome, if not objective, is determined in an evaluation that is masked to the patients' clinical presentations.

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A = Established as effective, ineffective, or harmful (or established as useful/predictive or not useful/predictive) for the given condition in the specified population. (Level A rating requires at least two consistent Class I studies.*)

B = Probably effective, ineffective, or harmful (or probably useful/predictive or not useful/ predictive) for the given condition in the specified population. (Level B rating requires at least one Class I study or at least two consistent Class II studies.)

C = Possibly effective, ineffective, or harmful (or possibly useful/predictive or not useful/ predictive) for the given condition in the specified population. (Level C rating requires at least one Class II study or two consistent Class III studies.)

U = Data inadequate or conflicting; given current knowledge, treatment (test, predictor) is unproven. (Studies not meeting criteria for Class I–Class III).

*In exceptional cases, one convincing Class I study may suffice for an "A" recommendation if 1) all criteria are met, 2) the magnitude of effect is large (relative rate improved outcome >5 and the lower limit of the confidence interval is >2).

CLINICAL ALGORITHM(S)

None provided

EVIDENCE SUPPORTING THE RECOMMENDATIONS

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 neuroimaging studies (i.e., computed tomography) in the emergency patient presenting with seizure

POTENTIAL HARMS

Not stated

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

This statement is provided as an educational service of the American Academy of Neurology (AAN). 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 for all legitimate criteria for choosing to use a specific procedure. Neither is it intended to exclude any reasonable alternative methodologies. The AAN 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.

IMPLEMENTATION TOOLS

Quick Reference Guides/Physician Guides
Staff Training/Competency Material
Wall Poster

For information about [availability](#), see the "Availability of Companion Documents" and "Patient Resources" fields below.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Getting Better
Living with Illness

IOM DOMAIN

Effectiveness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

Harden CL, Huff JS, Schwartz TH, Dubinsky RM, Zimmerman RD, Weinstein S, Foltin JC, Theodore WH, Therapeutics and Technology Assessment Subcommittee of the American Academy of Neurology. Reassessment: neuroimaging in the emergency patient presenting with seizure (an evidence-based review): report of the Therapeutics and Technology Assessment Subcommittee of the American

Academy of Neurology. Neurology 2007 Oct 30;69(18):1772-80. [17 references]
[PubMed](#)

ADAPTATION

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

DATE RELEASED

1996 (revised 2007 Oct)

GUIDELINE DEVELOPER(S)

American Academy of Neurology - Medical Specialty Society

SOURCE(S) OF FUNDING

American Academy of Neurology (AAN)

GUIDELINE COMMITTEE

Therapeutics and Technology Assessment Subcommittee

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

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FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

The American Academy of Neurology (AAN) is committed to producing independent, critical, and truthful clinical practice guidelines (CPGs). Significant efforts are made to minimize the potential for conflicts of interest to influence the recommendations of this CPG. To the extent possible, the AAN keeps separate those who have a financial stake in the success or failure of the products appraised in the CPGs and the developers of the guidelines. Conflict of interest forms were obtained from all authors and reviewed by an oversight committee prior to project initiation. AAN limits the participation of authors with substantial conflicts of interest. The AAN forbids commercial participation in, or funding of, guideline projects. Drafts of the guidelines have been reviewed by at least three AAN committees, a network of neurologists, *Neurology*[®] peer reviewers, and

representatives from related fields. The AAN Guideline Author Conflict of Interest Policy can be viewed at www.aan.com.

The authors report no conflicts of interest.

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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

The following are available:

- AAN guideline development process [online]. St. Paul (MN): American Academy of Neurology. Available from the [American Academy of Neurology Web site](#).
- Reassessment: neuroimaging in the emergency patient presenting with seizure. AAN summary of evidence-based guidelines for clinicians. St. Paul (MN): American Academy of Neurology. 2007. 2 p. Available in Portable Document Format (PDF) from the [AAN Web site](#).
- Case study and coding. Reassessment: neuroimaging in the emergency patient presenting with seizure (an evidence-based review). St. Paul (MN): American Academy of Neurology. 2007. 4 p. Available in Portable Document Format (PDF) from the [AAN Web site](#).
- Poster. Reassessment: neuroimaging in the emergency patient presenting with seizure (an evidence-based review). St. Paul (MN): American Academy of Neurology. 2007. 1 p. Available in Portable Document Format (PDF) from the [AAN Web site](#).

PATIENT RESOURCES

None available

NGC STATUS

This NGC summary was completed by ECRI on December 1, 1998. The information was verified by the guideline developer as of February 12, 1999. This NGC summary was updated by ECRI Institute on December 22, 2008. The updated information was verified by the guideline developer on January 23, 2009.

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Date Modified: 2/23/2009

