Complete Summary

GUIDELINE TITLE

Practice parameter: evaluation of the child with global developmental delay: report of the Quality Standards Subcommittee of the American Academy of Neurology and The Practice Committee of the Child Neurology Society.

BIBLIOGRAPHIC SOURCE(S)

Shevell M, Ashwal S, Donley D, Flint J, Gingold M, Hirtz D, Majnemer A, Noetzel M, Sheth RD. Practice parameter: evaluation of the child with global developmental delay: report of the Quality Standards Subcommittee of the American Academy of Neurology and the Practice Committee of the Child Neurology Society. Neurology 2003 Feb 11;60(3):367-80. [123 references] PubMed

GUIDELINE STATUS

This is the current release of the guideline.

COMPLETE SUMMARY CONTENT

SCOPE

DISEASE/CONDITION(S)

Non-progressive global developmental delay

GUIDELINE CATEGORY

Diagnosis
Evaluation

CLINICAL SPECIALTY

Family Practice
Neurology
Pediatrics

INTENDED USERS

Physicians

GUIDELINE OBJECTIVE(S)

To make evidence-based recommendations concerning the evaluation of the child with a non-progressive global developmental delay

TARGET POPULATION

Children, typically less than 5 years of age, with global developmental delay

INTERVENTIONS AND PRACTICES CONSIDERED

1. Detailed history and examination
2. Referral for auditory and ophthalmologic screening
3. Metabolic studies (urine organic acid screen, quantitative serum amino acids, serum lactate and ammonia levels, capillary or arterial blood gas, thyroid function studies) in children who did not have universal newborn screening
4. Electroencephalogram (EEG) in patients with a history of suspected seizures or epilepsy syndrome
5. Screening for autism or a language disorder, as indicated
6. Evaluation for close family members with global developmental delay (GDD)
7. Evaluation for features suggestive of a specific diagnosis
    - Tests for Down, fragile X, Rett syndrome, other genetic disorders, hypothyroidism in patients with historical or physical findings suggestive of these disorders
    - Magnetic resonance imaging (MRI) and/or computed tomography (CT) scan in patients with historical (intrapartum asphyxia) or physical findings or focal seizures to suggest central nervous system (CNS) injury or malformation
    - Lead screening in children who have identifiable risk factors for excessive environmental lead exposure
    - Comprehensive evaluation with magnetic resonance imaging, metabolic testing, electroencephalography, cytogenetic screen, genetics consultation in patients with loss or regression of developmental milestones, history of parental consanguinity, prior unexplained loss of a child, or multiple miscarriages
    - Stepwise evaluation

MAJOR OUTCOMES CONSIDERED

Diagnostic yield of investigations and tests in children with global developmental delay

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

Literature searches were conducted with the assistance of the University of Minnesota Biomedical Information Services for relevant articles published from 1980 to 2000. Databases searches included MEDLINE, Healthstar, ERIC, and CINAHL. Depending on the particular diagnostic test/ancillary service of interest, key words/phrases included the following: mental retardation, developmental delay, developmental disability, neurodevelopmental delay, physical therapy, occupational therapy, speech therapy, audiology, ophthalmology, and psychometric evaluation. Searches were restricted to the English language under the subheading of infant and child.

Individual committee members reviewed titled and abstracts so identified for content and relevance. Articles dealing with investigations in developmental delay with reference to determining a possible etiology were selected for further detailed review. From the bibliographies of several articles selected for review, additional articles thought to be relevant were identified at the discretion of committee members. A bibliography of the 160 articles identified and reviewed for preparation of this parameter is available at the American Academy of Neurology Web site. Relevant position papers were also sought from professional organizations, including the consensus statement of the American College of Medical Genetics on the evaluation of mental retardation.

NUMBER OF SOURCE DOCUMENTS

160 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

Evidence Classification Scheme for a Diagnostic Article

Class I: Evidence provided by a prospective study in a broad spectrum of persons with the suspected condition, using a "gold standard" for case definition, where the test is applied in a blinded evaluation, and enabling the assessment of appropriate tests of diagnostic accuracy.

Class II: Evidence provided by a prospective study of a narrow spectrum of persons with the suspected condition, or a well-designed retrospective study of a broad spectrum of persons with an established condition (by "gold standard") compared to a broad spectrum of controls, where test is applied in a blinded evaluation, and enabling the assessment of appropriated tests of diagnostic accuracy.

Class III: Evidence provided by a retrospective study where either persons with the established condition or controls are of a narrow spectrum, and where test is applied in a blinded evaluation.

Class IV: Any design where test is not applied in blinded evaluation OR evidence provided by expert opinion alone or in descriptive case series (without controls).

METHODS USED TO ANALYZE THE EVIDENCE

Meta-Analysis
Systematic Review with Evidence Tables

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Each article was reviewed, abstracted, and classified by a committee member. A four-tiered classification scheme for diagnostic evidence recently approved by the Quality Standards Subcommittee was utilized as part of this assessment.

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

Guideline developers provided consensus-based recommendations for the order and timing of testing but not to the relative diagnostic yield of the specific tests themselves.

Depending on the strength of the evidence it was decided whether specific recommendations could be made (for specific diagnostic tests) and, if so, the level of strength of these recommendations. Evidence pertinent to each diagnostic test, followed by the committee's evidenced-based recommendations, is presented in the original guideline document. The committee selected a value of 1% as a clinically meaningful cutoff point for diagnostic yield. Thus if the diagnostic yield of a test was less than 1%, it was felt that this test should not be performed on a routine basis whereas tests with yields greater than 1% should be considered.

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Translation of Evidence to Recommendations

Level A rating requires at least one convincing Class I study or at least two consistent, convincing Class II studies.

Level B rating requires at least one convincing Class II study or overwhelming Class III evidence.

Level C rating requires at least two convincing Class III studies.

Rating of Recommendation

A = established as effective, ineffective, or harmful for the given condition in the specified population.

B = probably effective, ineffective, or harmful for the given condition in the specified population.

C = possibly effective, ineffective, or harmful for the given condition in the specified population.

U = data inadequate or conflicting. Given current knowledge, treatment is unproven.

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

Draft guidelines were reviewed for accuracy, quality, and thoroughness by the American Academy of Neurology (AAN) members, topic experts, and pertinent physician organizations.

Final guidelines were approved by the American Academy of Neurology Quality Standards Subcommittee on April 16, 2002, the American Academy of Neurology Practice Committee on August 3, 2002, and the American Academy of Neurology Board of Directors on October 19, 2002. It was published in *Neurology* 2003;3:367-380.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

Definitions of the ratings of recommendations (A, B, C, U), translation of evidence to recommendations (A-C), and the classification scheme for a diagnostic article (Class I-IV) are provided at the end of the "Major Recommendations" field.

Recommendations

What is the diagnostic yield of metabolic genetic investigations in children with global developmental delay?

Recommendations

1. Given the low yield of about 1%, routine metabolic screening for inborn errors of metabolism is not indicated in the initial evaluation of a child with global developmental delay provided that universal newborn screening was performed and the results are available for review. Metabolic testing may be pursued in the context of historical (parental consanguinity, family history, developmental regression, episodic decompensation) or physical examination findings that are suggestive of a specific etiology (or in the context of relatively homogeneous population groups) in which the yield approaches 5% (***Level B recommendation; Class II and III evidence***). If newborn screening was not performed, if it is uncertain whether a patient had testing, or if the results are unavailable, metabolic screening should be obtained in a child with global developmental delay.
2. Routine cytogenetic testing (yield of 3.7%) is indicated in the evaluation of the child with developmental delay, even in the absence of dysmorphic features or clinical features suggestive of a specific syndrome (***Level B recommendation; Class II and III evidence***).
3. Testing for the fragile X mutation (yield of 2.6%), particularly in the presence of a family history of developmental delay, may be considered in the evaluation of the child with global developmental delay. Clinical preselection may narrow the focus of who should be tested without sacrificing diagnostic yield. Although screening for fragile X is more commonly done in males because of the higher incidence and greater severity, females are frequently affected and may also be considered for testing. Because siblings of fragile X patients are at greater risk to be symptomatic or asymptomatic carriers, they can also be screened (***Level B recommendation; Class II and Class III evidence***).
4. The diagnosis of Rett syndrome should be considered in females with unexplained moderate to severe mental retardation. If clinically indicated, testing for the *MECP2* gene deletion may be obtained. Insufficient evidence exists to recommend testing of females with milder clinical phenotypes or males with moderate or severe developmental delay (***Level B recommendation; Class II and Class III evidence***).
5. In children with unexplained moderate or severe developmental delay, additional testing using newer molecular techniques (e.g., fluorescence in situ hybridization [FISH], microsatellite markers) to assess for subtelomeric chromosomal rearrangements (6.6%) may be considered (***Level B recommendation; Class II and Class III evidence***).

What is the role of lead and thyroid screening in children with global developmental delay?

Recommendations

1. Screening of children with developmental delay for lead toxicity may be targeted to those with known identifiable risk factors for excessive environmental lead exposure as per established current guidelines (***Level B recommendation; Class II evidence***).

2. In the setting of existing newborn screening programs for congenital hypothyroidism, screening of children with developmental delay with thyroid function studies is not indicated unless there are systemic features suggestive of thyroid dysfunction (***Level B recommendation; Class II evidence***).

What is the diagnostic yield of electroencephalogram (EEG) in children with global developmental delay?

Recommendations

1. An electroencephalogram can be obtained when a child with global developmental delay has a history or examination features suggesting the presence of epilepsy or a specific epileptic syndrome (***Level C recommendation; Class III and IV evidence***).
2. Data are insufficient to permit making a recommendation regarding the role of electroencephalogram in a child with global developmental delay in whom there is no clinical evidence of epilepsy (***Level U recommendation; Class III and IV evidence***).

What is the diagnostic yield of neuroimaging in children with global developmental delay?

Recommendations

1. Neuroimaging is recommended as part of the diagnostic evaluation of the child with global developmental delay (***Level B recommendation; Class III evidence***). As the presence of physical findings (e.g., microcephaly, focal motor findings) increases the yield of making a specific neuroimaging diagnosis, physicians can more readily consider obtaining a scan in this population (***Level C recommendation; Class III evidence***).
2. If available, magnetic resonance imaging (MRI) should be obtained in preference to computed tomography (CT) scanning when a clinical decision has been made that neuroimaging is indicated (***Level C recommendation; Class III evidence***).

Are vision and hearing disorders common in children with global developmental delay?

Recommendations

1. Children with global developmental delay may undergo appropriate vision and audiometric assessment at the time of their diagnosis (***Level C recommendation; Class III evidence***).
2. Vision assessment can include vision screening and a full ophthalmologic examination (visual acuity, extraoculo-movements, fundoscopic) (***Level C recommendation; Class III evidence***).
3. Audiometric assessment can include behavioral audiometry or brainstem auditory evoked response testing when feasible (***Level C recommendation; Class III evidence***). Early evidence from screening studies suggests that transient evoked otoacoustic emissions should offer an alternative when

audiometry is not feasible (***Level A recommendation; Class I and II evidence***).

Recommendations for a Staged Approach to the Evaluation of the Child with Global Developmental Delay

Although there is insufficient evidence to recommend the optimal sequence of tests to determine the etiology of global developmental delay, taking into account diagnostic yield and potential treatability, the guideline committee members propose the following consensus-based schedule of testing as outlined in the algorithm in the original guideline document. Consensus-based recommendations relate to the order and timing of testing but not to the relative diagnostic yield of the specific tests themselves (refer to table 5 titled "Diagnostic yield of tests in children with global developmental delay" in the original guideline document).

All children should undergo a detailed history and physical examination, which may in itself suggest specific diagnostic possibilities. For all children with global developmental delay, auditory and visual integrity should be ascertained. If a child was born in a locale without universal newborn screening, a screening metabolic evaluation including capillary blood gas, serum lactate and ammonia levels, serum amino acids and urine organic acids, and thyroid function studies (thyroxine [T4] and thyroid stimulating hormone) may be considered. If a history of events suggestive of possible seizures, paroxysmal behaviors, or an underlying epilepsy syndrome is elicited, one can consider an electroencephalogram. In addition, screening for autism or a language disorder should be considered in any child presenting with global developmental delay (GDD). If there is a family history of a close family member (sibling, aunt/uncle, or first cousin) with global developmental delay on a known basis, testing specific for the known disorder may be ordered. When there is a family history of unexplained developmental delay, cytogenetic testing (which may include testing for subtelomeric rearrangements) may be obtained.

In the absence of a familial history of global developmental delay, specific historical or physical findings can be utilized to direct testing. Observed dysmorphic features may prompt specific testing for such entities as Down syndrome (karyotype), fragile X *(FMR*1), Rett syndrome (*MECP*2), Prader-Willi/Angelman (FISH), or hypothyroidism. Historical documentation of intrapartum asphyxia or ascertainment of physical findings such as microcephaly, cerebral palsy, or focal findings or focal seizures may suggest acquired central nervous system (CNS) injury or an underlying cerebral malformation and thus prompt neuroimaging study (magnetic resonance imaging preferable to computed tomography). Risk factors for lead exposure or findings suggestive of lead intoxication mandate lead screening.

Parental consanguinity, documentation of loss or regression of developmental milestones, or unexplained prior parental loss of a child are likely to be caused by a definable disease process and thus a comprehensive evaluation may be considered. This can include careful metabolic evaluation together with neuroimaging studies, electroencephalogram, cytogenetic studies, and genetic and ophthalmologic consultations.

The absence of any clinical features that suggest a specific diagnosis is less likely to be associated with a definable disease and thus a stepwise approach is recommended. This may include initial neuroimaging (magnetic resonance imaging preferred) and cytogenetic and fragile X screening. If these tests are negative, consideration may be given to metabolic evaluation, testing for subtelomeric rearrangements, and genetic consultation.

Definitions:

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Class II: Evidence provided by a prospective study of a narrow spectrum of persons with the suspected condition, or a well-designed retrospective study of a broad spectrum of persons with an established condition (by "gold standard") compared to a broad spectrum of controls, where test is applied in a blinded evaluation, and enabling the assessment of appropriated tests of diagnostic accuracy.

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Level C rating requires at least two convincing Class III studies.

Rating of Recommendation

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B = probably effective, ineffective, or harmful for the given condition in the specified population.

C = possibly effective, ineffective, or harmful for the given condition in the specified population.

U = data inadequate or conflicting. Given current knowledge, treatment is unproven.

CLINICAL ALGORITHM(S)

An algorithm is provided in the original guideline document for the evaluation of the child with global developmental delay.

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

- These guidelines may assist physicians in making appropriate clinical decisions regarding the evaluation of the child with global developmental delay.
- A specific etiology can be determined in the majority of children with global developmental delays. Refer to the "Major Recommendations" field or the original guideline document for specific diagnostic yields of various tests.

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.

IMPLEMENTATION TOOLS

Clinical Algorithm
Patient Resources
Quick Reference Guides/Physician Guides
Slide Presentation

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)

Shevell M, Ashwal S, Donley D, Flint J, Gingold M, Hirtz D, Majnemer A, Noetzel M, Sheth RD. Practice parameter: evaluation of the child with global developmental delay: report of the Quality Standards Subcommittee of the American Academy of Neurology and the Practice Committee of the Child Neurology Society. Neurology 2003 Feb 11;60(3):367-80. [123 references] PubMed

ADAPTATION

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

DATE RELEASED

2003 Feb 11

GUIDELINE DEVELOPER(S)

American Academy of Neurology - Medical Specialty Society
Child Neurology Society - Medical Specialty Society

SOURCE(S) OF FUNDING

American Academy of Neurology (AAN)

GUIDELINE COMMITTEE

Quality Standards Subcommittee of the American Academy of Neurology Practice Committee of the Child Neurology Society

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

American Academy of Neurology (AAN) Quality Standards Subcommittee Members: Gary Franklin, MD, MPH (Co-Chair); Catherine Zahn, MD (Co-Chair); Milton Alter, MD, PhD (exofficio); Stephen Ashwal, MD (facilitator); Richard M. Dubinsky, MD; Jacqueline French, MD; Gary H. Friday, MD; Michael Glantz, MD; Gary Gronseth, MD; Deborah Hirtz, MD; Robert G. Miller, MD; David J. Thurman, MD, MPH; and William J. Weiner, MD

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FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

GUIDELINE STATUS

This is the current release of the guideline.

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:

- American Academy of Neurology (AAN) guideline summary for clinicians: evaluation of the child with global developmental delay. St. Paul (MN): American Academy of Neurology (AAN); 2003 Feb. 2 p. Electronic copies: Available in Portable Document Format (PDF) from the AAN Web site. See the related QualityTool summary on the Health Care Innovations Exchange Web site.

- Appendix A: information regarding selected tests. St. Paul (MN): American Academy of Neurology. 2003. 4 p. Electronic copies: Available in Portable Document Format (PDF) from the AAN Web site.
- Practice parameter: evaluation of the child with global developmental delay slide presentation. St. Paul (MN): American Academy of Neurology (AAN); 2003 Feb. Electronic copies: Available in a Power Point presentation from the AAN Web site. See the related QualityTool summary on the Health Care Innovations Exchange Web site.
- AAN guideline development process [online]. St. Paul (MN): American Academy of Neurology. Electronic copies: Available from the American Academy of Neurology (AAN) Web site.

PATIENT RESOURCES

The following is available:

- American Academy of Neurology (AAN) guideline summary for parents and caregivers: testing for the cause of global developmental delay. St. Paul (MN): American Academy of Neurology (AAN); 2003 Feb. 2 p.

Electronic copies: Available in Portable Document Format (PDF) from the AAN Web site. See the related QualityTool summary on the Health Care Innovations Exchange Web site.

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NGC STATUS

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