# Complete Summary

## GUIDELINE TITLE

Amblyopia.

## BIBLIOGRAPHIC SOURCE(S)

American Academy of Ophthalmology Pediatric Ophthalmology Panel. Amblyopia. San Francisco (CA): American Academy of Ophthalmology; 2002 Oct. 25 p. [113 references]

## GUIDELINE STATUS

This is the current release of the guideline.

It updates a previous version: Amblyopia. San Francisco (CA): American Academy of Ophthalmology (AAO); 1997 Sep. 30 p.

This document is valid for 5 years from the date released unless superseded by a revision. All Preferred Practice Patterns are reviewed by their parent panel annually or earlier if developments warrant.

## COMPLETE SUMMARY CONTENT

SCOPE
METHODOLOGY - including Rating Scheme and Cost Analysis
RECOMMENDATIONS
EVIDENCE SUPPORTING THE RECOMMENDATIONS
BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS
QUALIFYING STATEMENTS
IMPLEMENTATION OF THE GUIDELINE
INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES
IDENTIFYING INFORMATION AND AVAILABILITY

## SCOPE

### DISEASE/CONDITION(S)

Amblyopia including:

- Anisometropic amblyopia
- Deprivation amblyopia
- Ptosis-induced amblyopia
- Refractive amblyopia
- Strabismic amblyopia

- Unspecified amblyopia

## GUIDELINE CATEGORY

Diagnosis
Evaluation
Management
Prevention
Screening
Treatment

## CLINICAL SPECIALTY

Family Practice
Ophthalmology
Pediatrics

## INTENDED USERS

Advanced Practice Nurses
Allied Health Personnel
Health Plans
Nurses
Physician Assistants
Physicians

## GUIDELINE OBJECTIVE(S)

To prevent or reverse vision impairment caused by amblyopia while addressing the following goals:

- Identify children at risk for amblyopia.
- Detect amblyopia as early as possible.
- Educate the patient and parent/caregiver about the prevention and management of amblyopia.
- Inform the primary health care provider(s).
- Identify and treat the etiology of the amblyopia.
- Treat infants and children with amblyopia.
- Optimize visual acuity.
- Optimize binocular function.
- Facilitate treatment of strabismus.
- Minimize the side effects and impact of amblyopia treatment on the patient´s and the parent/caregiver´s quality of life. Minimize the risk of disability if the eye with better visual acuity is lost later in life.
- Improve employability where good vision in each eye or binocularity is required.

## TARGET POPULATION

Children with amblyopia

## INTERVENTIONS AND PRACTICES CONSIDERED

### Diagnosis

1. History
2. Examination
    - Assessment of visual acuity/fixation pattern
    - Pupillary examination
    - Ocular alignment and motility
    - External examination
    - Cycloplegic refraction
    - Funduscopic examination
    - Stereoacuity testing

### Management

1. Optical correction
2. Occlusion therapy
3. Penalization with cycloplegics (atropine, homatropine, or cyclopentolate) or by altering spectacle lens in the good eye
4. Surgery
    - Blepharoptosis or hemangioma surgery
    - Optical iridectomy or keratoplasty
    - Cataract surgery
    - Strabismus surgery
    - Other procedures including vitrectomy or lensectomy (Note: Eye movement exercises, vision therapy, and pleoptics are considered but not recommended)
5. Protection and care of the good eye (e.g., use of protective eyewear)
6. Follow-up evaluation
7. Counseling and referral

## MAJOR OUTCOMES CONSIDERED

- Degree of visual acuity improvement obtained after treatment
- Side effects or complications of treatment of amblyopia

# METHODOLOGY

## METHODS USED TO COLLECT/SELECT EVIDENCE

### Searches of Electronic Databases

## DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

In the process of updating and revising the original guideline, a detailed literature search of articles in the English language was conducted on the subject of amblyopia for the years 1996 to 2001.

## NUMBER OF SOURCE DOCUMENTS

Not stated

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

Strength of Evidence Ratings

Level I: Includes evidence obtained from at least one properly conducted, well-designed randomized controlled trial. It could include meta-analyses of randomized controlled trials.

Level II: Includes evidence obtained from the following:

- Well-designed controlled trials without randomization
- Well-designed cohort or case-control analytic studies, preferably from more than one center
- Multiple-time series with or without the intervention

Level III: Includes evidence obtained from one of the following:

- Descriptive studies
- Case reports
- Reports of expert committees/organization
- Expert opinion (e.g., preferred practice patterns panel consensus)

METHODS USED TO ANALYZE THE EVIDENCE

Systematic Review

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

The literature results were reviewed by the Pediatric Ophthalmology Panel and used to prepare the recommendations, which they rated in two ways.

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

The results of a literature search on the subject of amblyopia were reviewed by the Pediatric Ophthalmology Panel and used to prepare the recommendations, which they rated in two ways. The panel first rated each recommendation according to its importance to the care process. This "importance to the care process" rating represents care that the panel thought would improve the quality

of the patient´s care in a meaningful way. The panel also rated each recommendation on the strength of the evidence in the available literature to support the recommendation made.

## RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

### Ratings of importance to care process

Level A, most important
Level B, moderately important
Level C, relevant, but not critical

## COST ANALYSIS

One cost-utility analysis was reviewed; this analysis showed that the actual cost of the child´s amblyopia diagnosis and treatment is reasonable and the cost-benefit ratio is very low because the vision improvement lasts for a lifetime.

## METHOD OF GUIDELINE VALIDATION

External Peer Review
Internal Peer Review

## DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

These guidelines were reviewed by Council and approved by the Board of Trustees of the American Academy of Ophthalmology (September 2002). All Preferred Practice Patterns are reviewed by their parent panel annually or earlier if developments warrant and updated accordingly.

# RECOMMENDATIONS

## MAJOR RECOMMENDATIONS

Specific recommendations are followed by a rating indicating the level of importance to the care process (A-C) and a strength of evidence rating (I-III), both of which are defined at the end of the "Major Recommendations" field.

### Diagnosis

The initial amblyopia evaluation (history and physical examination) includes all components of the comprehensive pediatric medical eye evaluation with the addition of, and special attention to, those factors that specifically bear upon the diagnosis, course, and treatment of amblyopia.

### History

- Demographic data. [A:III]
- Documentation of identity of historian. [B:III]
- The identity of pertinent health care providers. [A:III]

- Current eye problems. [A:III]
- The chief complaint and reason for the eye evaluation. [A:III]
- Ocular history. [A:III]
- Systemic history; birth weight; prenatal, perinatal, and postnatal medical factors that may be pertinent; past hospitalizations and operations; and general health and development. [A:III]
- Review of systems. [B:III]
- Family and social history. [A:III]
- Current medications and allergies [A:III]

Examination

- Assessment of visual acuity/fixation pattern [A:III]
- Pupillary examination [A:III]
- Ocular alignment and motility [A:III]
- External examination [A:III]
- Cycloplegic refraction [A:III]
- Funduscopic examination [A:III]

Management

In general, amblyopia is amenable to treatment in children under age 10 due to the plasticity of the visual pathways; therefore, children should be considered for treatment up to age 10. [A:III] The recommended treatment should be based on the individual´s visual, physical, social, and psychological status and the potential risks and benefits for that particular patient. [A:III] Specific management recommendations are in the original guideline document.

Protection and Care of the Monocular or Functionally One-Eyed Individual

The ophthalmologist should recommend that patients of all ages should wear proper protective eyewear even if corrective lenses are not required. [A:III] For daily wear and low-eye-risk sports an American National Standards Institute Standard No. Z87.1-approved frame with polycarbonate lenses should be recommended. [A:III] For most ball and contact sports polycarbonate sports goggles should be recommended and head and face protection should be added for higher risk activities. [A:III] Functionally one-eyed individuals should be cautioned about the risk of participating in boxing, wrestling, and full contact martial arts and should be advised of the risks of guns, BB guns, pellet guns, darts, and personal use of fireworks. [A:III] Special goggles, industrial safety glasses, side shields, and full-face shields should be recommended. [A:III]

Functionally one-eyed patients above the age of 10 should be evaluated to assess visual acuity, ocular alignment, and ocular health every one to two years throughout life. [A:III] Patients should be encouraged to seek immediate ophthalmic care if they experience any problems. [A:III] Contact lenses should be prescribed with caution since their use can increase the risk of corneal infection and injury to the eye with better vision. [A:III]

Follow-up Evaluation

Follow-up evaluations include the following:

- Amount of occlusion and/or spectacle wear achieved, by report. [A:III]
- Side effects [A:III] (e.g., skin irritation, ocular redness, flushing, and psychosocial issues).
- Visual acuity or fixation of each eye. [A:III]
- Ocular alignment. [A:III]
- Cycloplegic refraction, at least yearly; 4- to 6- month intervals may be necessary. [A:III]
- Additional components of the amblyopia evaluation or other tests as indicated by the clinical course [A:III] (e.g., repeat examination of the optic discs and nerve function, neuroimaging).
- Documentation of identity of historian and child´s level of cooperation with the examination. [B:III]

A general rule is that initial follow-up evaluation for children undergoing full-time patching should be spaced at an interval of one week for each year of life (e.g., every 2 weeks for a 2-year-old child). [A:III] The frequency and composition of successive follow-up evaluations will depend on the age of the patient, severity of the amblyopia, and intensity of occlusion therapy (high vs low percentage). See the table below for recommended amblyopia follow-up evaluation intervals during the active treatment period.

Provider

The interpretation of results and management of disease, including the supervision of occlusion therapy, require the clinical training and experience of the ophthalmologist. [A:III]

Counseling/Referral

Treatment plans are formulated in consultation with the parent/caregiver and patient, if appropriate, and the plans should be responsive to their expectations and preferences. [A:III] The importance of monitoring and long-term follow-up of the problem should be explained to the parent/caregiver and patient, if appropriate. [A:III]

Table. Recommended Amblyopia Follow-Up Evaluation Intervals During Active Treatment Period [A:III]

Patient Age: 0-1 years
High-Percentage Occlusion (70% or more of waking hours): Days to 4 weeks
Low-Percentage Occlusion (less than 70% of waking hours) Penalization: 2-8 weeks
Maintenance Treatment or Observation: 1-4 months

Patient Age: 1-2 years
High-Percentage Occlusion (70% or more of waking hours): 2-8 weeks
Low-Percentage Occlusion (less than 70% of waking hours) Penalization:

2-4 months
Maintenance Treatment or Observation: 2-4 months

Patient Age: 2-3 years
High-Percentage Occlusion (70% or more of waking hours): 3-12 weeks
Low-Percentage Occlusion (less than 70% of waking hours) Penalization: 2-4 months
Maintenance Treatment or Observation: 2-4 months

Patient Age: 3-4 years
High-Percentage Occlusion (70% or more of waking hours): 4-16 weeks
Low-Percentage Occlusion (less than 70% of waking hours) Penalization: 2-6 months
Maintenance Treatment or Observation: 2-6 months

Patient Age: 4-5 years
High-Percentage Occlusion (70% or more of waking hours): 4-16 weeks
Low-Percentage Occlusion (less than 70% of waking hours) Penalization: 2-6 months
Maintenance Treatment or Observation: 2-6 months

Patient Age: 5-7 years
High-Percentage Occlusion (70% or more of waking hours): 6-16 weeks
Low-Percentage Occlusion (less than 70% of waking hours) Penalization: 2-6 months
Maintenance Treatment or Observation: 2-6 months

Patient Age: 7-9 years
High-Percentage Occlusion (70% or more of waking hours): 8-16 weeks
Low-Percentage Occlusion (less than 70% of waking hours) Penalization: 3-6 months
Maintenance Treatment or Observation: 3-12 months

Note: These follow-up intervals were generated by panel consensus.

Definitions

Importance to the care process:

Level A: defined as most important

Level B: defined as moderately important

Level C: defined as relevant but not critical

Strength of evidence:

Level I: Includes evidence obtained from at least one properly conducted, well-designed randomized controlled trial. It could include meta-analyses of randomized controlled trials.

Level II: Includes evidence obtained from the following:

- Well-designed controlled trials without randomization
- Well-designed cohort or case-control analytic studies, preferably from more than one center
- Multiple-time series with or without the intervention

Level III: Includes evidence obtained from one of the following:

- Descriptive studies
- Case reports
- Reports of expert committees/organization
- Expert opinion (e.g., preferred practice patterns panel consensus)

### 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 selected recommendations (see "Major Recommendations").

## BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

### POTENTIAL BENEFITS

- Early identification and treatment of children at risk for amblyopia may prevent or reverse vision impairment caused by amblyopia.
- Successful treatment of amblyopia improves visual acuity and binocularity, and binocular vision makes work-related activities, activities of daily life, and recreational activities easier to perform. Normal vision in each eye and binocular vision may have a beneficial effect or be required for a variety of visually demanding career fields. A retrospective study from Finland found a higher risk of complete vision loss in the normal eye among individuals with amblyopia compared with those without amblyopia, and accidental trauma was associated with more than half the cases of total vision loss. Good vision in each eye is important as life expectancy increases and the risk for degenerative eye diseases increases.
- Amblyopia treatment is an important step in the correction of strabismus, and good vision in each eye may maintain alignment of the eyes, thereby reducing the need for repeat surgery.

### POTENTIAL HARMS

The risks/side effects of occlusion are the following:

- Skin irritation

- Increased risk for accidents when the child is wearing the patch
- Precipitation of or an increase in the magnitude of strabismus
- Diplopia
- Occlusion-induced amblyopia

Cycloplegics such as atropine can cause anticholinergic side effects.

Corneal transplantation for opacification is feasible but complex because of the high risk of rejection and difficulties in monitoring infants and children.

Subgroups Most Likely to be Harmed:

Atropine should be used with caution during the first year of life because of systemic side effects and the possibility of blur-induced amblyopia.

## QUALIFYING STATEMENTS

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- Preferred Practice Patterns provide guidance for the pattern of practice, not for the care of a particular individual. While they should generally meet the needs of most patients, they cannot possibly best meet the needs of all patients. Adherence to these Preferred Practice Patterns will not ensure a successful outcome in every situation. These practice patterns should not be deemed inclusive of all proper methods of care or exclusive of other methods of care reasonably directed at obtaining the best results. It may be necessary to approach different patients´ needs in different ways. The physician must make the ultimate judgment about the propriety of the care of a particular patient in light of all of the circumstances presented by that patient. The American Academy of Ophthalmology is available to assist members in resolving ethical dilemmas that arise in the course of ophthalmic practice.
- Preferred Practice Patterns are not medical standards to be adhered to in all individual situations. The Academy specifically disclaims any and all liability for injury or other damages of any kind, from negligence or otherwise, for any and all claims that may arise out of the use of any recommendations or other information contained herein.

## 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

Living with Illness
Staying Healthy

## IOM DOMAIN

Effectiveness
Patient-centeredness
Safety

# IDENTIFYING INFORMATION AND AVAILABILITY

## BIBLIOGRAPHIC SOURCE(S)

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## ADAPTATION

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

## DATE RELEASED

1992 Feb (revised 2002 Oct)

## GUIDELINE DEVELOPER(S)

American Academy of Ophthalmology - Medical Specialty Society

## SOURCE(S) OF FUNDING

American Academy of Ophthalmology

## GUIDELINE COMMITTEE

Pediatric Ophthalmology Panel; Preferred Practice Patterns Committee

## COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

Members of the Pediatric Ophthalmology Panel: J. Bronwyn Bateman, MD, Chair; Linda M. Christmann, MD; Stuart R. Dankner, MD; Arlene V. Drack, MD; Sheryl M. Handler, MD; Lawrence Tychsen, MD; Argye Hillis, PhD, Methodologist; Philip G. Itkin, MD, American Academy of Pediatrics Representative; Theodore G. Ganiats, MD, American Academy of Family Physicians Representative

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## FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

No proprietary interests were disclosed by members of the Preferred Practice Patterns Pediatric Ophthalmology Panel for the past 3 years up to and including June 2002 for product, investment, or consulting services regarding the equipment, process, or products presented or competing equipment, process, or products presented.

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## GUIDELINE AVAILABILITY

Electronic copies: Available from the American Academy of Ophthalmology (AAO) Web site.

Print copies: Available from American Academy of Ophthalmology, P.O. Box 7424, San Francisco, CA 94120-7424; telephone, (415) 561-8540.

## AVAILABILITY OF COMPANION DOCUMENTS

None available

## PATIENT RESOURCES

None available

## NGC STATUS

This summary was completed by ECRI on December 1, 1998. The information was verified by the guideline developer on January 11, 1999. This summary was updated on March 12, 2003. The updated information was verified by the guideline developer on April 2, 2003.

## COPYRIGHT STATEMENT

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