

EVIDENCE-BASED CLINICAL PRACTICE GUIDELINE

COMPREHENSIVE PEDIATRIC EYE AND VISION EXAMINATION RESOURCE FOR PEDIATRICIANS

OVERVIEW

The American Optometric Association (AOA) convened an expert panel in 2017 to develop an evidence-based guideline that recommends annual comprehensive eye exams for children. This guideline is intended to help ensure all children's health care providers have the latest, scientifically based information to provide the best care for their young patients.

This guideline shows which tests and interventions are proven to optimize a child's eye care and the frequency with which children should receive a comprehensive eye exam to ensure their visual health.

TOPICS

1. **AN EPIDEMIC OF UNDIAGNOSED EYE AND VISION PROBLEMS**
2. **SEEING A SOLUTION**
3. **COMPREHENSIVE PEDIATRIC EYE EXAMS ARE ESSENTIAL**
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1. AN EPIDEMIC OF UNDIAGNOSED EYE AND VISION PROBLEMS

Eyes mature even as a fetus develops, and the rapid changes a child goes through in the first six years of life are critical in the development of good eyesight. This same time frame represents a “vulnerability” period – one in which children are most susceptible to harmful vision changes.

**1 IN 5 PRESCHOOLERS
HAVE VISION PROBLEMS,
AND BY THE TIME THEY
ENTER SCHOOL, 25% WILL
NEED OR WEAR
CORRECTIVE LENSES**

Children play and learn to develop skills needed for a successful life. If their eyes have problems or their vision is limited – as is the case with at least 25 percent of school-age children – their ability to participate in sports, learn in school, and observe the world around them may be significantly impaired and they can easily fall behind their peers.

Comprehensive annual exams by an eye doctor (doctor of optometry or ophthalmologist) can diagnose and address a spectrum of conditions not captured by routine screening tools, as well as provide a baseline against which to compare future tests.

Eye and vision care needs to be given the same level of importance and attention as other standard medical practices, a viewpoint that is supported by the 2016 Health and Medicine Division of the National Academies of Sciences, Engineering, and Medicine (NASEM) report ["Making Eye Health a Population Health Imperative: Vision for Tomorrow."](#)

2. SEEING A SOLUTION

**THE TOTAL ECONOMIC
COST OF VISION LOSS AND
EYE DISORDERS AMONG
CHILDREN YOUNGER THAN
18 YEARS OF AGE IN 2012
WAS ESTIMATED TO BE
\$5.9 BILLION**

In response to a request from Congress, the Agency for Healthcare Research and Quality (AHRQ), issued two reports in March 2011: *Clinical Practice Guidelines We Can Trust* and *Finding What Works in Health Care: Standards for Systematic Reviews*. The AOA followed these standards to develop a new evidence-based guideline with interventions proven to optimize a child’s eye health and vision care, including how frequently children should have a comprehensive eye exam to ensure their visual health.

Among the expert advice in the guideline to ensure optimal eye care for children is the recommendation that children be given comprehensive eye and vision exams at key milestones in their development.

- **Infants** should receive an in-person comprehensive eye and vision assessment between 6 and 12 months of age for the prevention and/or early diagnosis and treatment of sight-threatening eye conditions and to evaluate visual development
- **Preschoolers** should receive at least one in-person, comprehensive eye exam between the ages of 3 and 5 to prevent or diagnose any condition that may have long-term effects
- **School-aged children (6 to 18 years)** should receive a comprehensive in-person exam prior to entering the first grade and annually thereafter

3. COMPREHENSIVE PEDIATRIC EYE EXAMS ARE ESSENTIAL

Children may not be aware they are having vision problems. Research has shown that vision problems are associated with delayed development, poor performance in school and social settings, and low self-esteem. **The bottom line: the sooner eye problems are identified and addressed, the better the outcome in childhood and beyond.**

TABLE 1: DISORDERS/ABNORMALITIES OF VISION/VISION HEALTH IN PEDIATRIC PATIENTS

EYE AND VISION DISORDER TYPES*	SIGNS/SYMPTOMS†
<p>REFRACTIVE ERROR - INABILITY TO CORRECTLY FOCUS</p> <ul style="list-style-type: none"> Myopia (nearsightedness) Hyperopia (farsightedness) Astigmatism (eyeball has an oval shape) Anisometropia (eyes have different refractive errors) 	<ul style="list-style-type: none"> Blurry vision Eye strain Headaches
<p>AMBLYOPIA - DECREASED VISION IN ONE OR BOTH EYES DUE TO A HIGH REFRACTIVE ERROR, STRABISMUS AND/OR FORM DEPRIVATION</p> <ul style="list-style-type: none"> Unilateral (one eye is weak) Bilateral (both eyes are weak) 	<ul style="list-style-type: none"> Poor vision in affected eye(s)
<p>STRABISMUS - MISALIGNMENT OF THE EYES</p> <ul style="list-style-type: none"> Esotropia (eye deviates inward [towards each other]) Exotropia (eye deviates outward [away from each other]) Hypertropia (eye deviates upward) Hypotropia (eye deviates downward) 	<ul style="list-style-type: none"> Crossed eyes Squinting or drifting eye Double vision Poor depth perception
<p>NON-STRABISMIC BINOCULAR VISION PROBLEMS AND ACCOMMODATIVE DISORDERS</p> <ul style="list-style-type: none"> Binocular disorders (disorders of convergence and divergence) Oculomotor dysfunction (poor eye tracking) Accommodative disorders (poor eye focusing) Convergence insufficiency (poor eye teaming) 	<ul style="list-style-type: none"> Crossed eyes Squinting or drifting eye Double vision Poor depth perception
<p>OCULAR DISEASE</p> <ul style="list-style-type: none"> Ocular conditions due to prematurity (various types of visual disorders associated with premature birth) Cataract (loss of transparency of the lens) Glaucoma (increased pressure inside the eye that can cause vision changes and damage to the optic nerve) Retinitis pigmentosa (damage due to degeneration of retinal cells) Retinoblastoma (intraocular cancer) Diabetic retinopathy (damage to the retina due to diabetes) Optic nerve hypoplasia (incomplete development of the optic nerve) Cortical (cerebral) visual impairment (vision problems due to brain damage) 	<ul style="list-style-type: none"> Poor vision Peripheral vision loss Night blindness

* Not intended to be a complete list of pediatric disorders of vision/vision health. Selected subtypes/examples are shown for each disorder.

† Not intended to show signs/symptoms of all disorders/abnormalities in a disorder class. These represent signs/symptoms that may occur with specific disorders/abnormalities within the class. Specific potential signs/symptoms depend on actual disorder/abnormality and particular patient characteristics.

4. EVIDENCE-BASED STEPS FOR PROTECTING PEDIATRIC PATIENT'S EYES

Eye Injuries

Protective eyewear can effectively shield eyes and thereby preserve vision. Eye injuries to children account for approximately 70,000 emergency room visits each year, mostly involving teens between the ages of 15 and 17 years. Most injuries occur during play, participation in sports, exposure to household chemicals, accidents with tools or desk supplies, or careless use of tobacco, fireworks, or BB or pellet guns. Most of these injuries can be prevented by protective eyewear. However, only an estimated 14.5% of children wear eye protection when participating in activities that can cause eye injuries, although children 12 to 17 years old were 70% more likely to use protective eyewear than children 6 to 8 years old.

Concussions

A majority of concussions occur in the pediatric and adolescent population (ages 5 to 17 years), primarily among adolescents 11 to 17 years old. Children are particularly vulnerable to the consequences of concussion, and often have longer recovery times and poorer outcomes than adults. Approximately half of all concussed children experience convergence insufficiency, a condition in which the child's eyes do not work together when trying to focus on a nearby object. When a concussion is suspected, a comprehensive eye exam should be scheduled with a doctor of optometry to confirm that visual capacity has not been affected.

Sunlight and Artificial Light

Excessive exposure to sunlight poses a significant threat to eye health. Ultraviolet (UV) radiation from the sun (especially when reflected off snow) can cause eye damage, particularly in infants and younger children. Conditions linked to childhood UV exposure include photokeratitis, keratoconjunctivitis, retinal damage, and squamous cell carcinoma of the cornea and conjunctiva, as well as age-related conditions such as cataracts and macular degeneration. Blue light from cellphones, TV, videogames, and computer screens may cause retinal damage and may interfere with a good night's sleep, especially in adolescents. Children can reduce the potential for eye damage from UV radiation and blue light by not looking directly at the sun and wearing sunglasses with proper UV protection levels and/or clear prescription lenses and brimmed hats when outdoors.

Impact of Near Work and Reduced Time Outdoors

The prevalence of childhood myopia – difficulty seeing distant objects clearly – is on the rise. The large amount of time children spend on “near work” such as reading and their extensive use of computers, cellphones, and electronic devices that are positioned close to the face may cause this condition. At the same time, less time spent outdoors translates into less exercise for the child's distance vision.

To delay or slow the progression of myopia, parents and care-givers should plan activities that bring children outdoors, where they can exercise their long-distance vision. Research suggests that extending the amount of outdoor time may help slow the “stretching” of the eyeball (axial elongation) that is caused by near work, and thereby help prevent not only severe myopia, but also such sight-threatening conditions as myopic retinopathy and retinal detachment.

The Importance of Controlling Early Myopia (Nearsightedness)

Myopia correction and control measures should begin early in life because early-onset myopia is associated with more rapid progression and eventual development of high myopia, which increases the risk of retinal detachment, cataracts, glaucoma, and other conditions. Effective corrective measures include progressive spectacles, prismatic bifocals, and multiple- or dual-focus contact lenses. In addition, the progression of myopia may be slowed by use of low-dose atropine drops and orthokeratology (contact lenses worn overnight to gently reshape the curvature of the eye).

5. CONCLUSION

Children are at risk for a wide range of eye and vision disorders, but regular comprehensive eye examinations conducted by an eye doctor both annually and at key developmental milestones in a child's life can improve detection, diagnosis, and early prevention or treatment of eye conditions. Failure to address significant eye and vision conditions early may have long-term consequences not only on eye health, but also on educational attainment, professional opportunities, and quality of life.

Physicians can play an essential role in educating parents and caregivers about pediatric eye care, and in encouraging the proactive protection of children's eye health by adhering to the AOA's recommended schedule for comprehensive pediatric eye and vision examinations and implementing the practices recommended by the AOA in this evidence-based guideline.

A comprehensive eye exam should be an essential part of a child's back-to-school preparation.

Please visit AOA.org for more information and to help your pediatric patients find a doctor of optometry.