

# EVIDENCE-BASED CLINICAL PRACTICE GUIDELINE

# COMPREHENSIVE PEDIATRIC

# EYE AND VISION EXAMINATION

## OVERVIEW

The American Optometric Association (AOA) convened an expert panel to develop a new evidence-based guideline that recommends annual comprehensive eye exams for children. This guideline is intended to help educate caregivers and ensure doctors of optometry are empowered to provide the best care for their young patients.

With this guideline, parents and other healthcare professionals know 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

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# 1. AN EPIDEMIC OF UNDIAGNOSED EYE AND VISION PROBLEMS

**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.

Further evidence is provided in the [Health and Medicine Division of the National Academies of Sciences, Engineering, and Medicine \(NASEM\) report](#).

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. Eye and vision care needs to be given the same level of importance and attention as other standard medical practices such as dental care and vaccinations.

Annual, comprehensive exams by a doctor of optometry can diagnose and address a spectrum of conditions not captured by routine “eye chart” tests, and these annual exams should include tests that are best at detecting a problem at each stage of a child’s life.

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## 2. A PATIENT’S STORY *(Contributed by Leonard Press, O.D.)*

**“IT’S SIMPLY NOT ABOUT KIDS FAILING OR SUCCEEDING. MANY BRIGHT CHILDREN ACHIEVE BELOW THEIR LEVEL OF COMPETENCY BECAUSE THEY ARE LIMITED BY THEIR VISION ISSUES, AND COULD BENEFIT FROM AN ANNUAL COMPREHENSIVE EYE EXAM.”**

One example is the case of a boy whose vision problems were missed by screenings during his childhood. His parents were always advised that his eyes were fine. He passed all the school vision screenings because he taught himself how to focus hard enough with his left eye to identify the required letters on the eye chart. He described it as the feeling of crossing his eyes to an intense extra focus. This effort would be impossible to sustain day-to-day. His left eye wasn’t seeing as well as the right. The boy assumed that if the problem was serious, the vision screeners or his pediatrician would have figured it out.

It wasn’t until he was a teenager, when a reading teacher said to his mom, “He is such a bright kid and he struggles so much with reading. You need to take him to be evaluated. I’m convinced that there must be something wrong with his visual abilities.”

By the time I saw him for a comprehensive eye exam, the sight between his left and right eye was dramatically different. As children get older, the visual system becomes less adaptable, I couldn’t prescribe the full power for each eye without giving him double vision and headaches. He was prescribed one-third of his full farsighted power in the left eye to awaken it, and allowed time for the brain to adapt. The approach to optimize the outcomes was to slowly increase the power, and at some point, contact lenses will be prescribed so that both eyes can work together more effectively.

The take home message is... it’s simply not about kids failing or succeeding. Many bright children achieve below their level of competency because they are limited by their vision issues, and could benefit from an annual comprehensive eye exam.



**IDA CHUNG, O.D., MSHE, FCOVD, FAAO**  
 Assistant Dean of Learning  
 Western University of Health Sciences  
 College of Optometry  
 Pomona, CA

“As optometrists, we don’t just look at eye health, we also evaluate the whole visual system of the patient, including learning-related vision problems.”



**REENA PATEL, O.D., FAAO**  
 Assistant Professor  
 Southern California College of Optometry  
 at Marshall B. Ketchum University  
 Fullerton, CA

“A face-to-face baseline comprehensive eye examination is extremely critical when an infant is 6 months old because so much of vision development is occurring at that age. If a child has not had an eye examination between 6-12 months, they should be seen at the first opportunity.”



**MICHAEL EARLEY, O.D., PHD, FAAO**  
 Associate Dean Academic Affairs  
 The Ohio State University  
 Columbus, OH

“The biggest issue is that kids don’t say anything. Kids don’t know what their vision is supposed to look like. They don’t volunteer these things or complain, which is why we have to do a comprehensive exam. A lot of parents think if there’s something wrong with their eyes, the child will say something or a pediatrician will catch it, but that’s just not the case.”



**LEONARD PRESS, O.D., FAAO, FCOVD**  
 Director  
 The Vision & Learning Center  
 Fair Lawn, NJ

“By identifying problems early on, there is more opportunity to limit progression of disease and functional vision problems that can become difficult to treat and costly down the road.”

### 3. 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**

The AOA followed the Institute of Medicine (IOM), now the Health and Medicine Division of the National Academies of Sciences, Engineering, and Medicine (NASEM), standards for a guideline development group and convened a multidisciplinary panel to develop a new evidence-based guideline so that optometrists and caregivers know which tests and interventions are proven to optimize a child’s eye health and vision care, and how frequently children should have a comprehensive exam to ensure their visual health.

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 follows these standards in guideline development as verified by the National Guideline Clearinghouse that posts the highest-caliber evidence-based guidelines available.

This guideline grades the quality of the evidence supporting each recommendation based on a scientifically rigorous review of hundreds of peer-reviewed research papers. **A major change since the last version of the guideline (published in 2002) is the recommendation for annual – rather than biannual – examinations due to the potential for rapid progression of certain eye conditions.**

Among the updates 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 a comprehensive baseline eye exam between the ages of 6 and 12 months, immediately after the critical period when the eye undergoes rapid and profound changes and is therefore most vulnerable to interference with normal 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 exam prior to entering the first grade and annually thereafter

## 4. COMPREHENSIVE PEDIATRIC EYE EXAMS ARE ESSENTIAL

Children often don't know how they should see or feel, and so may not report if something is wrong. If a child's eyes and vision suffer, so too will their general health and ability to engage in normal childhood activities.

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†
<b>REFRACTIVE ERROR - INABILITY TO CORRECTLY FOCUS</b> Myopia (nearsightedness) Hyperopia (farsightedness) Astigmatism (eyeball has an oval shape) Anisometropia (eyes have different refractive errors)	Blurry vision Eye strain Headaches
<b>AMBLYOPIA - DECREASED VISION IN ONE OR BOTH EYES DUE TO A HIGH REFRACTIVE ERROR, STRABISMUS AND/OR FORM DEPRIVATION</b> Unilateral (one eye is weak) Bilateral (both eyes are weak)	Poor vision in affected eye(s)
<b>STRABISMUS - MISALIGNMENT OF THE EYES</b> Esotropia (eye deviates inward [towards each other]) Exotropia (eye deviates outward [away from each other]) Hypertropia (eye deviates upward) Hypotropia (eye deviates downward)	Crossed eyes Squinting or drifting eye Double vision Poor depth perception
<b>NON-STRABISMIC BINOCULAR VISION PROBLEMS AND ACCOMMODATIVE DISORDERS</b> Binocular disorders (disorders of convergence and divergence) Oculomotor dysfunction (poor eye tracking) Accommodative disorders (poor eye focusing) Convergence insufficiency (poor eye teaming)	Crossed eyes Squinting or drifting eye Double vision Poor depth perception
<b>OCULAR DISEASE</b> 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 to retina 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)	Poor vision Peripheral vision loss Night blindness

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

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

## 5. ROUTINE SCHOOL SCREENING ISN'T ENOUGH

While routine school vision screenings may appear helpful, they give parents a false sense of security as there are a range of vision problems that may be missed. In their initial stages, many vision conditions lack obvious signs or symptoms and can go completely unnoticed, causing delays in the detection and treatment of a potentially serious or life-limiting condition.

School screenings

**PROVIDE**



of the eye tests needed to help children see

... and

**MISS** UP TO



of children with vision problems

Of the children found to have eye problems through screening



**NEVER**  
visit the doctor and get help

## 6. PROTECTING YOUR CHILD'S EYES: EVIDENCE-BASED STEPS YOU CAN TAKE

### 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.



#### **ACTION STEPS FOR PARENTS AND CAREGIVERS:**

To minimize the risk of eye injury, parents and caregivers need to educate children about eye injury risks at home, school, and during sports or play, and the value of protective eyewear and safety precautions. Parents and caregivers should further encourage the use of eye protection where appropriate and supervise activities that carry a risk of eye injury.

### 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. One of the most common problems for concussed children is convergence insufficiency, present in approximately half of cases, wherein the child's eyes do not work together when trying to focus on a nearby object.



**ACTION STEPS FOR PARENTS AND CAREGIVERS:** When a concussion is suspected, a comprehensive eye and vision exam should be scheduled to confirm if visual dysfunction exists that requires treatment. A comprehensive eye exam should be scheduled 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 at night may interfere with good sleep hygiene, especially in adolescents.



**ACTION STEPS FOR PARENTS AND CAREGIVERS:** To minimize these risks, parents and caregivers should encourage children to wear sunglasses and/or clear prescription lenses that block at least 99% of UV light. Children can reduce the potential for eye damage from UV radiation and blue light by not looking directly at the sun, and wearing sunglasses 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.



**ACTION STEPS FOR PARENTS AND CAREGIVERS:** To delay or slow the progression of myopia, parents and caregivers 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 Early Myopia (Nearsightedness) Control

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).



**ACTION STEPS FOR PARENTS AND CAREGIVERS:** Parents and caregivers of children with myopia or considered to be at risk of developing myopia should seek advice from their doctor of optometry about options available for myopia control and the potential adverse effects of not addressing myopia early.

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## 7. CONCLUSION

Children are at risk for a wide range of eye and vision disorders, but regular comprehensive eye examinations conducted by a doctor of optometry 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.

Doctors of optometry play an essential role in educating parents and caregivers about pediatric eye care, and in encouraging them to proactively protect 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.

Schedule a comprehensive eye exam with a doctor of optometry as part of a child’s back-to-school preparation.

Please visit [AOA.org](http://AOA.org) for more information and to find a doctor of optometry.