

A PRACTICAL GUIDE FOR PRIMARY CARE PHYSICIANS

Instrument-Based Vision Screening In Children

SUMMARY:

In January 2016 a new joint policy statement from the American Academy of Pediatrics (AAP), American Academy of Ophthalmology (AAO), American Association for Pediatric Ophthalmology and Strabismus (AAPOS) and the American Association of Certified Orthoptists (AACO) regarding the pediatric eye examination was published. The updated policy statement, published in the journal *Pediatrics*, incorporates earlier and routine visual assessments using instrument-based screening to help identify children who may benefit from early intervention to improve vision (or correct vision problems). Instrument-based screening technology is revolutionizing early detection and prevention of amblyopia by allowing screening of more children and at a younger age.

This guide for primary care physicians is produced by the Children's Eye Foundation of AAPOS to provide information regarding instrument-based screening. Early detection and treatment of amblyopia is key to preventing unnecessary blindness, and primary care physicians play a critical role in its detection through vision screening in the preschool and school age groups.

This guide is organized to answer 5 essential questions. The Summary (pages 1-2) provides abbreviated answers. For more complete answers, read the full-length version on pages 3-7.

- 1) Why is pediatric vision screening important?
- 2) What does the 2016 joint policy statement say about instrument-based vision screening?
- 3) Is instrument-based screening and assessment reimbursed as a covered service?
- 4) How do I incorporate instrument-based vision screening in my pediatric practice?
- 5) Does AAPOS have an instrument-based vision screening handout for parent(s)/guardian(s)?

1) Why is pediatric vision screening important?

Vision screening is the best way to detect potential problems early. Uncorrected vision problems can impact a child's development, learning, quality of life, and can lead to permanent vision loss. Early detection and treatment is critical. Amblyopia is the most common cause of visual impairment among young children and remains a common cause of vision loss in adults. It is often fully treatable if caught early, yet because of the difficulty detecting the condition, hundreds of thousands of children in the US – and millions worldwide – suffer needless and permanent vision loss every year.

2) What does the 2016 joint policy statement say about instrument-based vision screening?

The updated joint policy statement recommends that instrument-based screening, when incorporated into the office practice, should be first attempted between 12 months and 3 years of age and at annual well-child visits thereafter until acuity can be tested directly. Direct testing of visual acuity can often begin by 4 years of age, using age-appropriate symbols (optotypes). Children found to have an ocular abnormality or who fail a vision assessment should be referred to a pediatric ophthalmologist or an eye care specialist appropriately trained to treat pediatric patients.

3) Is instrument-based screening and assessment reimbursed as a covered service?

The United States Preventive Services Task Force (USPSTF) recommends instrument-based vision screening, with “B” level evidence rating, for all children at least once between the ages of 3 and 5 years. The Affordable Care Act (ACA) requires that health plans must cover, without copay or deductible, the preventive services that have an A or B rating. CPT 99177 is now available for the use of photoscreening devices that produce an immediate result in the office, enabling pediatricians to seek payment for its use. CPT 99174 is for use following remote interpretation of the images. The AAP is encouraging payers to revise their policies to provide coverage and payment for vision screening and assessment. With reimbursement, the investment can pay for itself in a short period of time, even for small practices. There may also be federal tax advantages available under the Americans with Disability Act for the purchase of a photoscreening device.

4) How do I incorporate instrument-based vision screening in my pediatric practice?

Most commercially available automated photoscreeners and autorefractors provide estimates of refractive error and, in some cases, ocular alignment. Many of these devices permit the pediatrician to select the pass/refer criteria for their office setting. In choosing an automated screening instrument most suitable for a specific pediatric practice, it is imperative that the pediatrician be familiar with the basic concepts of sensitivity and specificity and how various instruments perform with respect to referral criteria input. A table comparing devices is available on the American Academy of Ophthalmology's Pediatric Ophthalmology Education Center: www.aao.org/pediatric-center-detail/vision-screening-performance-data-resource-2.

Successful implementation also requires that practices work closely with families of children who fail a screening to ensure referred children access needed eye care and get comprehensive eye exams.

5) Does AAPOS have an instrument-based vision screening handout for parent(s)/guardian(s)?

Yes. See the "To Parent(s)/Guardian(s)" attachment on page 7 at the end of the full-length version of this guide. It is essential that parent(s)/guardian(s) understand the results of vision screening performed on their child, and that practices have a process in place to ensure prompt follow-up with an ophthalmologist for children that fail a screening. The handout includes a section where you can add the result of a vision screening performed that day.

In summary, automated screening makes possible a future where all children get screened during their annual well-child visits. The result will be the early referral of more children at risk for amblyopia and strabismus, and thus a shift in the curve of care delivery to a preventative stage where disease is manageable, affordable, and correctable. Tremendous progress is possible toward the elimination of the #1 cause of needless and permanent vision loss in children and young adults.

FIVE ESSENTIAL THINGS PRIMARY CARE PHYSICIANS NEED TO KNOW

- 1) Why is pediatric vision screening important?
- 2) What does the 2016 joint policy statement say about instrument-based vision screening?
- 3) Is instrument-based screening and assessment reimbursed as a covered service?
- 4) How do I incorporate instrument-based vision screening in my pediatric practice?
- 5) Does AAPOS have an instrument-based vision screening handout for parent(s)/guardian(s)?

1) Why is pediatric vision screening important?

Vision problems in children are common, and there are often no symptoms. Vision problems are difficult to detect, especially in young children, except through vision screening by a school nurse, pediatrician or other qualified professional. Amblyopia is the leading cause of preventable blindness in children. 5 to 10 percent of preschoolers and 25 percent of school-aged children have vision problems that impact learning and quality of life. Unfortunately, only a minority of children receive vision screening that could detect their amblyopia risk at an age when treatment can provide the best outcome. Early detection of amblyopia and timely treatment of amblyopia and associated conditions is critical for preventing permanent vision loss. The effectiveness of amblyopia treatment declines starting at age 5. Besides identifying children who may benefit from early interventions to simply improve or correct vision, evaluation of the visual system can also help identify retinal abnormalities, cataracts, glaucoma, retinoblastoma, strabismus and neurologic disorders, including amblyopia.

2) What does the 2016 joint policy statement say about instrument-based vision screening?

Instrument-Based Screening is Now Recommended for Children Ages 1 – 5 years.

The new policy increases the emphasis on earlier and routine visual assessments using instrument-based screening to help identify children who may benefit from early interventions to correct vision.

In January 2016, the American Academy of Pediatrics (AAP), AAO, AAPOS and AACO issued an updated clinical report and policy statement in the journal *Pediatrics* on vision screening and eye examination which reflects updated guidelines.¹

Instrument-based screening, which has been endorsed by the AAP, AAO, AAPOS, AACO and the U.S. Preventive Services Task Force, is discussed in the joint clinical report as a valid method for screening very young children. These instruments can detect the most common conditions producing visual impairment in children: amblyopia, high refractive error and strabismus. Instrument-based screening devices for vision screening are available commercially and have had extensive validation, both in field studies and in pediatricians' offices.

Who should be screened using instrument-based screening, and how often?

- ✓ Instrument-based screening, when incorporated into the office practice, can be attempted beginning at age 12 months and used annually as noted below. A previous study has demonstrated better eventual outcomes for children undergoing their first photoscreening before 2 years of age and identified with a vision problem.²

- ✓ Instrument-based screening can be repeated at each annual preventive medicine encounter through 5 years of age or until visual acuity can be assessed reliably using optotypes. Using these techniques in children younger than 6 years can enhance detection of conditions that may lead to amblyopia and/or strabismus compared with traditional methods of assessment.
- ✓ Instrument-based screening may be a helpful alternative in screening developmentally delayed children of any age.
- ✓ Instrument-based screening can be relatively quick and requires less attention from the child compared with traditional visual acuity screening, and is especially useful in the preverbal, preliterate, or developmentally delayed child. Patients with ocular abnormalities or those who fail vision assessment should be referred to a pediatric ophthalmologist.

When should pediatricians be screening children's eyes?

Examination of the eyes and visual system should begin in the newborn nursery and continue throughout both childhood and adolescence during routine well-child visits in the medical home. The 2016 Bright Futures-AAP *Recommendations for Preventive Pediatric Health Care*, or Periodicity Schedule, also reflects the new AAP guidance on vision screening. The schedule is published in the January 2016 issue of *Pediatrics* at www.aap.org/periodicityschedule (Table 1).

TABLE 1 Periodicity Schedule for Visual System Assessment in Infants, Children, and Young Adults					
Assessment	Newborn to 6 mo.	6-12 mo.	1-3 y	4-5 y	6 y and older
Ocular history	X	X	X	X	X
External inspection of lids and eyes	X	X	X	X	X
Red reflex testing	X	X	X	X	X
Pupil examination	X	X	X	X	X
Ocular motility assessment	—	X	X	X	X
Instrument-based screening ^a when available	—	^b	X	X	^c
Visual acuity fixate and follow response	X ^f	X	X	—	—
Visual acuity age-appropriate optotype ^d assessment	—	—	X ^e	X	X

^a Current Procedural Terminology code 99174 or 99177
^b The American Academy of Ophthalmology (AAO) has recommended instrument-based screening at age 6 mo. However, the rate of false positive results is high for this age group, and the likelihood of ophthalmic intervention is low. A future AAO policy statement will likely reconcile what appears to be a discrepancy.
^c Instrument-based screening at any age is suggested if unable to test visual acuity monocularly with age-appropriate optotypes.
^d Current Procedural Terminology code 99173
^e Visual acuity screening may be attempted in cooperative 3-y old children.
^f Development of fixation on and following a target should occur by 6 months of age; children who do not meet this milestone should be referred.

3) Is instrument-based screening and assessment reimbursed as a covered service?

Use CPT codes 99177, 99174 and 99173 when submitting claims for reimbursement for screening. CPT code 99177 is now available for the use of photoscreening devices that produce an immediate result in the office, enabling pediatricians to seek payment for its use. CPT 99174 is for use following remote interpretation of the images. CPT code 99173 is specific for visual acuity screening using an eye chart. Whether done with a photoscreening instrument or with a visual acuity chart, vision screening is a separately identifiable service and should not be bundled into the global code of well-child care. The AAP is encouraging payers to revise their policies to provide coverage and payment for vision screening and

assessment. The recent US Preventive Services Task Force (USPSTF) statement supporting the use of these technologies for preschool vision screening should prove useful in ensuring adequate payment for these services. The USPSTF recommends instrument-based vision screening, with “B” level evidence rating, for all children at least once between the ages of 3 and 5 years. The Affordable Care Act (ACA) requires that health plans must cover, without copay or deductible, the preventive services that have an A or B rating. There may also be federal tax advantages available under the Americans with Disability Act for the purchase of a photoscreening device.

4) Considerations for incorporating instrument-based vision screening in pediatric practice

Instrument-based screeners have evolved extensively over the past decade. Several different instruments are now commercially available. Other related terms for this technology include: automated screening, autorefractor, objective screening, and photoscreening.

“The new automated instrument-based screening devices have shown good sensitivity and specificity in detecting amblyopia risk factors and can be quick and easy to use in young children.” Millicent Peterseim, MD, Chair of the AAOPOS Vision Screening Committee, and a pediatric ophthalmologist at the Storm Eye Institute in Charleston, SC.

What is the instrument-based screening process?

The instrument-based screening process usually takes less than a minute to perform. Only brief cooperation is required; time enough for the child to look at the camera. Results indicate whether the child passed or failed screens for the most common vision abnormalities. These instruments work by detecting risk factors for amblyopia (anisometropia, high bilateral hyperopia, astigmatism and strabismus) rather than lost visual acuity from amblyopia itself. These devices estimate the refractive error of the child by means of automated software. Some also have algorithms to estimate ocular alignment and, therefore, detect strabismus. The estimates of refractive error and eye alignment made by the screening instruments are compared to pre-programmed referral criteria unique to the instrument to determine if a child passes or should be referred as a result of the screening. The procedure varies by screener mechanism and manufacturer. A table comparing devices is available on the American Academy of Ophthalmology’s Pediatric Ophthalmology Education Center: www.aao.org/pediatric-center-detail/vision-screening-performance-data-resource-2.

Which instrument is the best to purchase?

Most commercially available automated photoscreeners and autorefractors are similar in that they provide estimates of refractive error and, in some cases, ocular alignment. Many have programs that can be further refined by the pediatrician to set specific pass/refer criteria for the local practice setting and pediatric population. In choosing an automated screening instrument most suitable for a specific pediatric practice, it is imperative that the pediatrician be familiar with the basic concepts of sensitivity and specificity and how various instruments perform with respect to referral criteria input.

“The consideration should be: when I buy this instrument, what criteria shall I put in to maximize what I want to detect—i.e., sensitivity or specificity? The choice does not depend on the instrument, but on the referral criteria,” said Sean Donahue, MD PhD Professor of Ophthalmology, Neurology, and Pediatrics, Vanderbilt University Medical Center, and Chief, Pediatric Ophthalmology, Vanderbilt Children’s Hospital, Nashville, TN

The sensitivity and specificity of these devices to detect amblyopia risk factors is most influenced by the referral criteria that are programmed into the instrument by the manufacturer or the operator. Typically, when a high sensitivity (ie, high rate of detection of at-risk children) is chosen, an increase in over referrals (i.e., low specificity) results. Conversely, when a high specificity is set, there is often a low sensitivity (i.e., reduced detection of at-risk children). The most common ocular abnormalities seen during the early childhood years are strabismus, anisometropia, and a high magnitude of uncorrected refractive errors: hypermetropia, myopia, and astigmatism. Referral criteria that best detect these amblyopia risk factors may vary depending on the screening instrument used and the desired levels of sensitivity and specificity. AAPOS has developed refractive criteria to help primary care physicians appreciate the levels of refractive error known to increase risk of amblyopia (Table 2).

TABLE 2

Amblyopia Risk Factor Targets Recommended by the American Association for Pediatric Ophthalmology and Strabismus

REFRACTIVE RISK FACTOR TARGETS				
Age, mo	Astigmatism, D	Hyperopia, D	Anisometropia, D	Myopia, D
12-30	>2.0	>4.5	>2.5	> -3.5
31-48	>2.0	>4.5	>2.0	> -3.0
> 48	>1.5	>3.0	>1.5	> -1.5
NON-REFRACTIVE RISK FACTOR TARGETS				
All ages	Media opacity >1 mm			
	Manifest strabismus >8 prism D in primary position			

D. diopters, From Donahue et al.³

Referral Criteria for Currently Available Instrument-Based Screeners:

A table comparing devices is available on the American Academy of Ophthalmology's Pediatric Ophthalmology Education Center: www.aao.org/pediatric-center-detail/vision-screening-performance-data-resource-2.

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Yes. See the "To Parent(s)/Guardian(s)" attachment on page 7 of this guide. It is essential that parent(s)/guardian(s) understand the results of vision screening performed on their child, and that practices have a process in place to ensure prompt follow-up with an ophthalmologist for children that fail a screening. This handout explains vision screening and why it is important. It also includes a section where you can add the result of a vision screening performed that day. We encourage translating this into easy-to-understand language, to respect cultural and literacy needs.

Acknowledgements:

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References:

1. The policy statement *Visual System Assessment in Infants, Children and Young Adults by Pediatricians* is available at www.pediatrics.org/cgi/doi/10.1542/peds.2015-3596, and the clinical report *Procedures for the Evaluation of the Visual System by Pediatricians* is at www.pediatrics.org/cgi/doi/10.1542/peds.2015-3597. Both were published in the January 2016 issue of Pediatrics.
2. Kirk VG, Clausen MM, Armitage MD, Arnold RW. Preverbal photoscreening for amblyogenic factors and outcomes in amblyopia treatment: early objective screening and visual acuities. *Arch Ophthalmol*. 2008;126(4):489-492pmid:18413517
3. Donahue SP, Arthur B, Neely DE, Arnold RW, Silbert D, Ruben JB; POS Vision Screening Committee. Guidelines for automated preschool vision screening: a 10-year, evidence-based update. *J AAPOS*. 2013;17(1):4-8
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To: Parent(s)/Guardian(s)

As part of your child's well-child visit, eye and vision health was checked to make sure they are healthy. This is important even if there aren't any signs of eye problems. Finding and treating eye problems early can save a child's sight. The American Academy of Pediatrics (AAP), American Academy of Ophthalmology (AAO), American Association for Pediatric Ophthalmology and Strabismus (AAPOS) and the American Association of Certified Orthoptists (AAO) **recommend instrument-based vision screening, starting between 12 months and 3 years of age and repeated during routine well-child visits.**

6

All Children Need Routine Vision Screenings to Detect Silent Symptoms.

- ✓ Vision screening is the best way to catch problems early. Uncorrected problems can impact a child's development, learning, quality of life, and can lead to permanent vision loss. Early detection and treatment is critical. New screening tests, using digital photos, make earlier detection possible.
- ✓ As a result of new research, AAP recommends vision screening in all children, starting at age 1-3.

EARLY DETECTION THROUGH SCREENING IS CRITICAL TO SAVING SIGHT.

Prompt Treatment Offers the Best Chance for Successful Treatment.

- ✓ Vision problems in young children are common. 1 in every 20 children has a significant eye disorder.
- ✓ The most common problems are amblyopia (lazy eye), strabismus (misaligned eyes) and refractive errors.
- ✓ Often vision problems in children are not obvious. Vision screening is the best way to catch problems early.
- ✓ Healthy eyes and vision are very important to a child's early development and education. Growing children constantly use their eyes, both at play and in the classroom.

Amblyopia is the #1 Cause of Permanent Vision Loss in Children.

- ✓ The good news is that most childhood eye conditions, like amblyopia, can be corrected or treated successfully, especially if caught early. After age 5, research shows that treatment is less effective.

Instrument-Based Vision Screening is Quick and Easy for Children.

- ✓ It is as simple as taking a photo with a digital camera. It only takes a few seconds.

SEE A PEDIATRIC OPHTHALMOLOGIST IF A PROBLEM IS DETECTED.

- ✓ Fortunately most children have normal, healthy eyes. Tell your doctor if your family has a history of eye or vision problems. Know the signs of an eye or vision problem.
- ✓ If the screening finds a problem, your child will be referred to a pediatric ophthalmologist for a full eye exam. **The most important thing a parent can do is follow through on the exam and if required, get treatment.**
- ✓ Ask questions to understand. Tell your doctor if you have financial concerns or need transportation assistance. There are organizations that can help. **If your child has a vision condition, do not lose precious time.**
- ✓ To learn more about children's eye and vision health, go to www.childrenseyefoundation.org.

The Results of Your Child's Vision Screening Performed Today:

Child's Name: _____ Exam Date _____

Doctor's Name: _____ Phone _____

Your Child's Results: Screening tool used: _____

____ Passed. Nothing more needs to be done at this time.

____ The vision screening instrument detected a possible problem. We recommend you take your child to a pediatric ophthalmologist for a complete eye exam.

Observations: _____
