

# An Eye on Vision

## 20 Questions About Vision Screening and Eye Health

**P. Kay Nottingham Chaplin, EdD**

**Kira Baldonado, BA**

**Geoffrey E. Bradford, MS, MD**

**Susan Cotter, OD, MS, FAAO**

**Bruce Moore, OD**

*Current evidence-based and best practice vision screening and eye health approaches, tools, and procedures are the result of revised national guidelines in the past 3 years and advances in research during the last 16 years. To help the busy school nurse with little time to keep up with changes in children's vision practices and a growing body of literature, the National Center for Children's Vision and Eye Health at Prevent Blindness is providing answers to 20 questions received most often from the field. Question topics are: (1) arranging the screening environment, (2) occluders to cover the eyes during vision screening, (3) optotype-based screening at distance, (4) optotype-based screening at near, (5) instrument-based screening, (6) muscle imbalance screening, (7) referrals, and (8) vision screening certification.*

**Keywords:** vision screening; distance visual acuity screening; near visual acuity screening; occluders; vision screening certification; LEA SYMBOLS®; Sloan letters

**C**urrent evidence-based and best practice vision screening and eye health approaches, tools, and procedures are the result of revised national guidelines in the past 3 years and advances in research during the last 16 years. In providing

answers to 20 questions, the National Center for Children's Vision and Eye Health used published, peer-reviewed research; vision screening and eye health national guidelines; and consensus-based best practices from eye care professionals and public health experts. The answers may differ from your state or district vision screening recommendations and mandates.

This article is the first of "An Eye on Vision" Frequently Asked Questions section that will appear in future editions of *NASN School Nurse*. An email address to submit vision screening and eye health questions appears at the end of this article.

### Arranging the Screening Environment

- 1. At what height do I hang the threshold chart (chart with at least 10 lines of letters, numbers, or symbols [optotypes] decreasing in size)?**

**ANSWER:** Lines 20/50, 20/40, and 20/32 should be at the student's eye level.

- 2. When measuring vision screening distance and placing tape on the floor to make a line, does the student stand with toes or heels to the line?**

**ANSWER:** The screening distance is between the chart and the student's eyes. If you place tape on the floor

indicating where the student should stand, the student stands with the arches of each foot on the line so that the end of the screening distance from the chart is in alignment with the student's eyes.

### Occluders

- 3. How should each eye be occluded (covered) during vision screening?**

**ANSWER:** Let's begin with what should **not** be used as an occluder to cover a student's eyes during monocular vision screening. No hands, tissues, paper, or plastic cups for preschoolers and students from ages 3 years through 18 years and no cover paddles for preschoolers and students younger than age 10 years. Why? Children can easily peek around these methods of covering an eye, which they will attempt to do if you cover their better seeing eye.

Recommended occluders you **should** use are: adhesive patches and 2-inch wide hypoallergenic surgical tape for preschoolers and students of all ages (Cotter, Cyert, Miller, & Quinn for the National Expert Panel to the Children's Vision and Eye Health, 2015; Donahue et al., 2016). An option for preschoolers and students up to age 10 years is specially

**Figure 1.** Occluder glasses



constructed occluder glasses (see Figure 1). For students ages 10 years and older, acceptable occluders are “lollypop” (see Figure 2) and “Mardi Gras” mask (see Figure 3) cover paddles.

**4. Is it okay if an adult helping me screen vision covers the child’s eyes or holds the occluder?**

**ANSWER:** No, it is not a good practice for an adult to cover the child’s eyes or hold the occluder over the child’s eyes. The child can peek with these occlusion approaches if the adult stands behind the student or inaccurately holds the occluder.

**Optotype-Based Screening: Visual Acuity at Distance**

**5. Can I screen a student at 5 feet with a 10-foot LEA SYMBOLS® chart?**

**ANSWER:** No, you should not screen a child at 5 feet with a 10-foot chart. Optotypes are precisely sized to be used at the screening distance

designated on a chart. Recalculating the measurements of an eye chart to accommodate a shorter distance is not a good practice.

**6. I use an eye chart that includes an umbrella picture for preschoolers. Is this eye chart acceptable?**

**ANSWER:** No. A chart with an umbrella optotype is not acceptable. Recommended optotypes for preschoolers are LEA SYMBOLS® (see Figure 4) or HOTV letters (see Figure 5).

**7. I heard Snellen charts are no longer appropriate for older school-aged children. Is this true?**

**ANSWER:** You heard correctly. Snellen charts do not adhere to national and international guidelines for optimal eye chart design. Threshold letter charts meeting these guidelines for children ages 7 years and older include a 20/32 line, not a 20/30 line, and use Sloan letters as optotypes (NASN, 2017; Nottingham Chaplin & Bradford, 2011; Prevent Blindness, 2015). Figure 6 is an example of a Sloan Letters chart (the smaller charts at the bottom provide options such as using the right small chart when screening the right eye and using the left small chart when screening the left eye when you reach the 20/50 line).

**8. Are machines that test visual acuity appropriate for vision screening?**

**ANSWER:** There are no national guidelines that recommend using visual acuity machines or mechanical devices, such as those used in motor vehicle testing facilities when you apply for a driver’s license, for screening vision of students at any age. According to the Prevent Blindness Position Statement on School-Aged Vision Screening and Eye Health Programs (Prevent Blindness, 2015), machines prevent the screener from observing a student’s face and eyes during screening and insufficient data exist to support machines as a preferred vision screening practice for school-aged students.

The National Expert Panel to the National Center for Children’s Vision and Eye Health (Cotter et al., 2015) concluded that vision testing devices that optically simulate distance and near vision (e.g., those used at many motor vehicle testing facilities) do not meet recommended minimum standards for screening the vision of children ages 3, 4, and 5 years.

**Optotype-Based Screening: Visual Acuity at Near**

**9. What chart should I use for screening visual acuity at near?**

**ANSWER:** There are no current national guidelines that specifically recommend near vision screening or describe how near vision screening should be conducted. If you are mandated to screen visual acuity at near, use charts containing the same optotypes as those recommended for distance charts: Sloan Letters for children aged 7 years and older (See Figure 7 for example) and either LEA SYMBOLS® (see figure 8 for example) or HOTV letters (see Figure 9 for example) for children ages 3, 4, 5, and 6 years. Use a near vision chart with an attached 16-inch cord to help maintain the distance between the chart and the student’s eyes. When using the chart, keep the ball at the end of the cord near the child’s eye at the temple and ensure the cord stays tight to prevent the student from moving toward or away from the chart, which

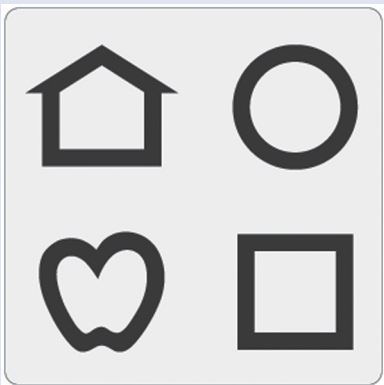
**Figure 2.** “Lollypop” cover paddles



**Figure 3.** “Mardi Gras” or Lorgnette Spectacle Occluder



**Figure 4.** LEA SYMBOLS®



can artificially increase or decrease the visual acuity value.

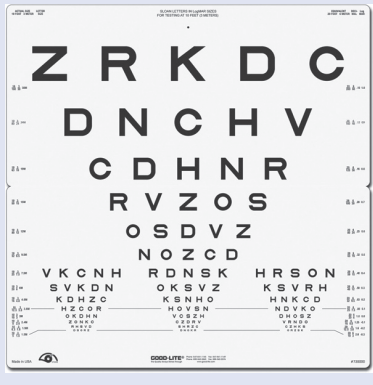
**10. Do I screen at near with the student’s eyes open or one eye at a time?**

**ANSWER:** There are no current national guidelines that specifically recommend near vision screening or describe how near vision screening should be conducted. If you are mandated to screen visual acuity at near, one approach is to screen with both eyes open using the line a child must pass on a distance chart according to the child’s age (i.e., 20/32 line for students aged 7 years and older) to identify any blurring of near acuity. Another approach is to

**Figure 5.** HOTV letters



**Figure 6.** Sloan Letters chart



refer to the Prevent Blindness Position Statement on School-Aged Vision Screening and Eye Health Programs, which recommends screening monocularly using the same procedures you would use when using a distance threshold chart (Prevent Blindness, 2015).

**11. My state vision screening guidelines call for conducting plus-lens testing for near visual acuity screening. What are your thoughts about plus-lens testing?**

**ANSWER:** Plus-lens testing (e.g., using +2.50 hyperopia glasses and the 20/32 line of a distance chart) is not a near vision screening test and lacks high quality evidence to support its use. The Prevent Blindness Position Statement on School-Aged Vision Screening and Eye Health Programs

states that plus-lens testing is not an evidence-based approach for detecting children with significant refractive error and is an unacceptable vision screening technique (Prevent Blindness, 2015). If your state requires near visual acuity screening, experts recommend a near vision chart, with an attached cord, displaying age-appropriate and recommended optotypes (see Figures 7, 8, and 9 as examples).

**12. When do I refer children when I screen for near visual acuity?**

**ANSWER:** There are no current national guidelines that specifically recommend near vision screening or describe how near vision screening should be conducted. If you are mandated to screen visual acuity at near, follow the same referral criteria that you use when screening for distance visual acuity. If you do monocular threshold screening at near, refer students with a two-line difference between the eyes, even in the passing lines (e.g., 20/32 in one eye and 20/20 in the other eye for a 7-year-old student).

**Instrument-Based Screening**

**13. How does screening with instruments differ from screening with eye charts?**

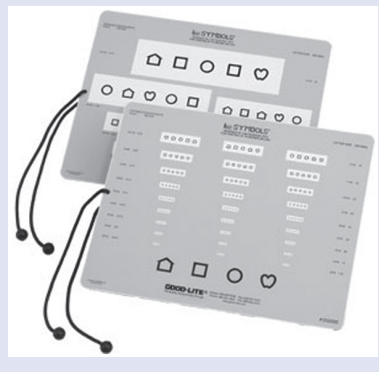
**ANSWER:** Optotype-based vision screening (eye charts or computer software programs that display optotypes) measures visual acuity as interpreted by the brain. Visual acuity is defined as the quantifiable measurement (e.g., 20/40) of the sharpness or clearness of vision when identifying black optotypes on a white background using specific optotype sizes at a standardized distance.

Instrument-based vision screening does **not** measure visual acuity, and instrument-based vision screening is **not** the same as vision screening machines addressed in Question 8. Instruments analyze digital images of the eyes to provide information about amblyopia risk factors, including

**Figure 7.** Sloan Letters near chart



**Figure 8.** LEA SYMBOLS® near chart



estimates of significant refractive error (astigmatism, hyperopia, and myopia), estimates of anisometropia (difference of refraction between the eyes), and estimates of eye misalignment.

You may be asking yourself if you should do both optotype- and instrument-based screening to measure different aspects of vision. In an ideal world, you would do both. However, limited time and resources often impact the practicality of such dual screening.

**14. Can I use an instrument for distance and near visual acuity screening?**

**ANSWER:** Instruments, such as the Plusoptix S12C Vision Screener or the Welch Allyn® Spot™ Vision Screener,

do not measure distance and near visual acuity. The main goal of these instruments is to identify amounts of hyperopia, astigmatism, myopia, and anisometropia that are thought to place a child at risk for amblyopia. Some of these instruments also provide information on eye misalignment and whether there is anisocoria (when pupils are different in size).

Eye charts and computer software programs that display optotypes provide information about visual acuity or the sharpness or clarity of vision as determined by the brain. Instruments do not provide this information.

**15. At what ages can I use instruments for vision screenings?**

**ANSWER:** The joint vision screening guidelines from the American Academy of Pediatrics, the American Association for Pediatric Ophthalmology and Strabismus, the American Academy of Ophthalmology, and the American Association of Certified Orthoptists (AAP/AAPOS/AAO/AACO) note that visual acuity testing remains the gold standard for screening the vision of cooperative children ages 3 years and older (Donahue et al., 2016).

According to the AAP/AAPOS/AAO/AACO joint guidelines (Donahue et al., 2016), instrument-based screening can begin at age 12 months, with better success at 18 months. Instruments or tests of visual acuity (eye charts or computer software programs that display optotypes) can be used with children ages 3, 4, and 5 years.

The National Expert Panel to the National Center for Children’s Vision and Eye Health (Cotter et al., 2015) states that instrument-based screening is useful for children ages 3, 4, and 5 years who are shy, noncommunicative, or preverbal.

The recommendation for visual acuity screening continues again at age 6 years, according to the AAP/AAPOS/AAO/AACO guidelines. Instrument-based screening is an option for children ages 6 years and older who

cannot participate in optotype-based screening (Donahue et al., 2016).

Instrument-based pass/fail criteria vary according to age. Referral criteria will differ for infants, preschool-aged children, and those school-aged children who cannot participate in optotype-based screening. Depending on the device you use, you may need to change referral criteria when screening different age groups.

Some websites may include text suggesting you can use a device beginning at age 6 months through high school. Sufficient published, evidence-based research is currently unavailable to support instrument-based vision screening as an approved approach for students 6 years and older. However, this age range may change as sufficient research with older school-aged children emerges.

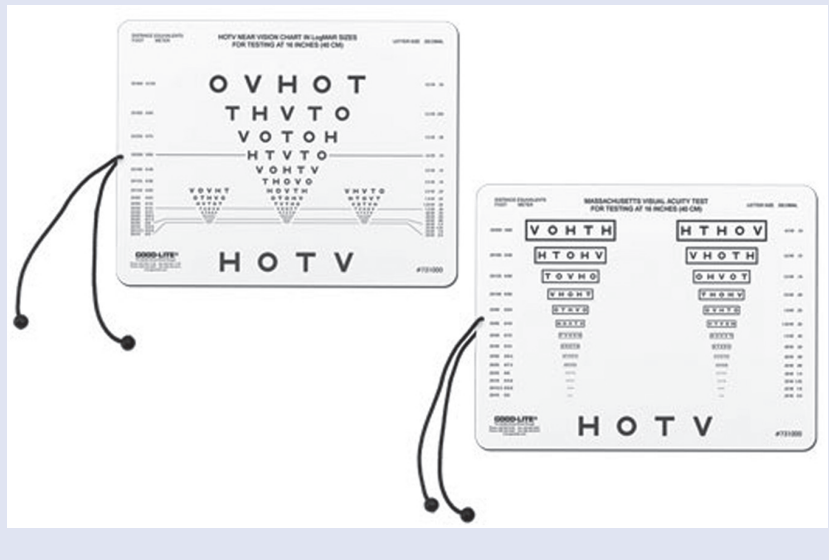
**16. My documentation requires a 20/XX visual acuity number for each eye. How do I record instrument-based screening?**

**ANSWER:** Instrument-based screening results cannot and should not be converted to a 20/XX visual acuity number. Instrument-based screening results are recorded as pass/refer. Describing the referral reason (e.g., astigmatism) is unnecessary because you approach the line between screening and diagnosis, which you want to avoid. Are you able to change your documentation requirements? It is preferred that the approach for documentation be revised to accommodate simply a pass/refer outcome.

**17. If I cannot capture a reading with an instrument and I don’t receive an error message—such as “pupils too small”—do I refer that student?**

**ANSWER:** If you successfully captured readings on 10 or 15 students, the “wheel” on the instrument’s results screen continues to spin on the 11th or 16th student, you receive no error message, and the device times out, refer the student. Something about the

**Figure 9.** HOTV letters near chart



eye may be preventing the instrument from receiving information from the eye.

### Muscle Imbalance Screening

**18. We are mandated to conduct the cover/uncover, corneal light reflex, and Maddox rod and penlight tests for eye muscle imbalance screening. What are your thoughts for using these tests for mass school vision screening?**

**ANSWER:** The National Center for Children’s Vision and Eye Health at Prevent Blindness does not recommend the use of “eye doctor” tests by vision screeners in community-based programs, such as the school environment, unless screeners are professionally trained to conduct screening with these tools and interpret results (Cotter et al., 2015). Screening using cover/uncover, penlight, and Maddox rod and penlight tests would be considered “eye doctor” tests.

### Referrals

**19. We struggle with getting parents to take their children for an eye examination after their children**

**are referred from vision screening. Could you offer advice to help parents understand the importance of arranging and attending a follow-up eye examination?**

**ANSWER:** Parents/caregivers experience various barriers to arranging and attending a comprehensive eye examination after their children are referred from a vision screening. Barriers include challenges with finances, time, transportation, and language; a lack of trust of eye care providers; and cultural concerns about the need for eye care and use of corrective lenses. One approach is to establish a parent/caregiver peer-to-peer network, where parents can provide suggestions for overcoming these and other barriers.

Other approaches include calling or texting parents in addition to supplying the referral letter and asking the child’s primary or favorite teacher to talk with the parents/caregivers.

You could also ask the student’s family or caregivers to seek assistance from the student’s pediatric primary health care provider for addressing barriers to the follow-up eye examination.

### Vision Screening Certification

**20. My guidelines state I must be certified to screen vision. Where can I go to get certified?**

**ANSWER:** While you may have access to a good local training program for vision screening, Prevent Blindness and its affiliate programs (Prevent Blindness, n.d.) provide the only *nationally recognized* vision screening certification and recertification courses. Prevent Blindness, and many of its affiliates, provide options of online and in-person formats. The certification course includes: (a) an overview of children’s vision disorders, (b) information about how to use scientifically validated developmentally and age-appropriate vision screening tools, (c) information about eye exam referral procedures that recognize cultural and literacy needs, and (d) an overview of parent education and engagement approaches. The courses can be tailored to meet state-specific vision screening tools.

Some state departments of health or education have their own advisory committees that establish state certification programs and protocols for children’s vision screening. These programs and protocols vary among states. It is important that state protocols are regularly updated to include use of evidence-based and age-appropriate vision screening tools and procedures based on national guidelines and sound scientific research.

### Summary

Answers to these 20 questions may differ from your state or district vision screening recommendations and mandates. If you have a question about how these answers impact your state or district guidelines or mandates, direct those questions to the appropriate person in your state or district.

If you have vision and eye health questions that were not answered in this paper, submit those questions to

Nottingham@preventblindness.org, and they may be selected for upcoming editions. ■

## References

- Cotter, S. A., Cyert, L. A., Miller, J. M., & Quinn, G. E. for the National Expert Panel to the National Center for Children's Vision and Eye Health. (2015). Vision screening for children 36 to <72 months: Recommended practices. *Optometry and Vision Science*, 92(1), 6-16. Retrieved from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4274336/pdf/opx-92-06.pdf>
- Donahue, S. P., & Baker, C. N., American Academy of Pediatrics Committee on Practice and Ambulatory Medicine, American Academy of Pediatrics Section on Ophthalmology, American Association of Certified Orthoptists, American Association for Pediatric Ophthalmology and Strabismus, & American Academy of Ophthalmology. (2016). Procedures for the evaluation of the visual system by pediatricians. *Pediatrics*, 137(1), e20153597. Retrieved from <http://pediatrics.aappublications.org/content/pediatrics/early/2015/12/07/peds.2015-3597.full.pdf>
- NASN. (2017). *Vision and eye health. Tips for appropriate eye chart design*. Retrieved from <https://www.nasn.org/nasn-resources/practice-topics/vision-health>
- Nottingham Chaplin, P. K., & Bradford, G. E. (2011). A historical review of distance vision screening eye charts: What to toss, what to keep, and what to replace. *NASN School Nurse*, 26(4), 221-228.
- Prevent Blindness. (n.d.). *Prevent Blindness children's vision screening certification course*. Retrieved from <https://www.preventblindness.org/prevent-blindness-childrens-vision-screening-certification-course>
- Prevent Blindness. (2015). *Prevent Blindness position statement on school-aged vision screening and eye health programs*. Retrieved from <https://nationalcenter.preventblindness.org/star-pupils-childrens-program>

**P. Kay Nottingham Chaplin, EdD**  
**Education and Outreach Coordinator for the National Center for Children's Vision and Eye Health (NCCVEH) at Prevent Blindness**  
**Director - Vision and Eye Health Initiatives for the Good-Lite Company and School Health Corporation**  
**Westover, WV**

Dr. Nottingham Chaplin has worked in vision screening for 17 years, is a

member of the Advisory Committee to the NCCVEH, and a consultant to the Vision Screening Committee of the American Association for Pediatric Ophthalmology and Strabismus. She participates on national webinar panels and has provided more than 170 local, district, regional, state, and national presentations throughout the United States on evidence-based vision screening as 1 of 12 components of a strong vision and eye health system of care.

**Kira Baldonado, BA**  
**Director, National Center for Children's Vision and Eye Health (NCCVEH) at Prevent Blindness**  
**Chicago, IL**

Kira has been with Prevent Blindness since 2003 and has served as director of the NCCVEH since 2011. She coordinates the strategic programmatic efforts of the NCCVEH, including the work of the NCCVEH Advisory Committee, state-level initiatives, national partnerships, and federal agency relationships. Kira is a certified children's vision screening instructor for Prevent Blindness.

**Geoffrey E. Bradford, MS, MD**  
**Professor of Pediatrics and Ophthalmology, West Virginia University Eye Institute**  
**Morgantown, WV**

Dr. Bradford is a fellowship-trained pediatric ophthalmologist specializing in pediatric medical, surgical, and optical disorders as well as pediatric and adult strabismus at the West Virginia University Eye Institute. He was a contributor to the 2016 joint vision screening guidelines for pediatric primary health care providers from the American Academy of Pediatrics, the American Association of Certified Orthoptists, the American Association for Pediatric Ophthalmology and Strabismus, and the American Academy of Ophthalmology.

**Susan Cotter, OD, MS, FFAO**  
**Professor at the Southern California College of Optometry at Marshall B. Ketchum University**  
**Fullerton, CA**

Dr. Cotter is a pediatric optometrist and clinician scientist at the Southern California College of Optometry at Marshall B. Ketchum University with primary research interests related to clinical management strategies for strabismus, amblyopia, non-strabismic binocular vision disorders, and childhood refractive error. She is the incoming co-chair for the Pediatric Eye Disease Investigator Group (PEDIG), a National Eye Institute-funded clinical research network of 300+ pediatric eye care providers who perform clinical investigations related to pediatric eye conditions. Dr. Cotter was the first author of the 2015 NCCVEH National Expert Panel's vision screening guidelines and recommended practices for children ages 3, 4, and 5 years.

**Bruce Moore, OD**  
**Professor Emeritus, New England College of Optometry**  
**Boston, MA**

Dr. Moore spent the first 22 years of his career at the Boston Children's Hospital Department of Ophthalmology and the Harvard Medical School, where he practiced, taught, and carried out research in pediatric optometry. He served as the Marcus Professor of Pediatric Studies at the New England College of Optometry from 1997 to 2017. Dr. Moore was a principal investigator in the National Eye Institute-funded Vision in Preschoolers (VIP) Study and is a member of the Executive Committee for current National Eye Institute-funded Vision in Preschoolers-Hyperopia in Preschoolers (VIP-HIP) Study.