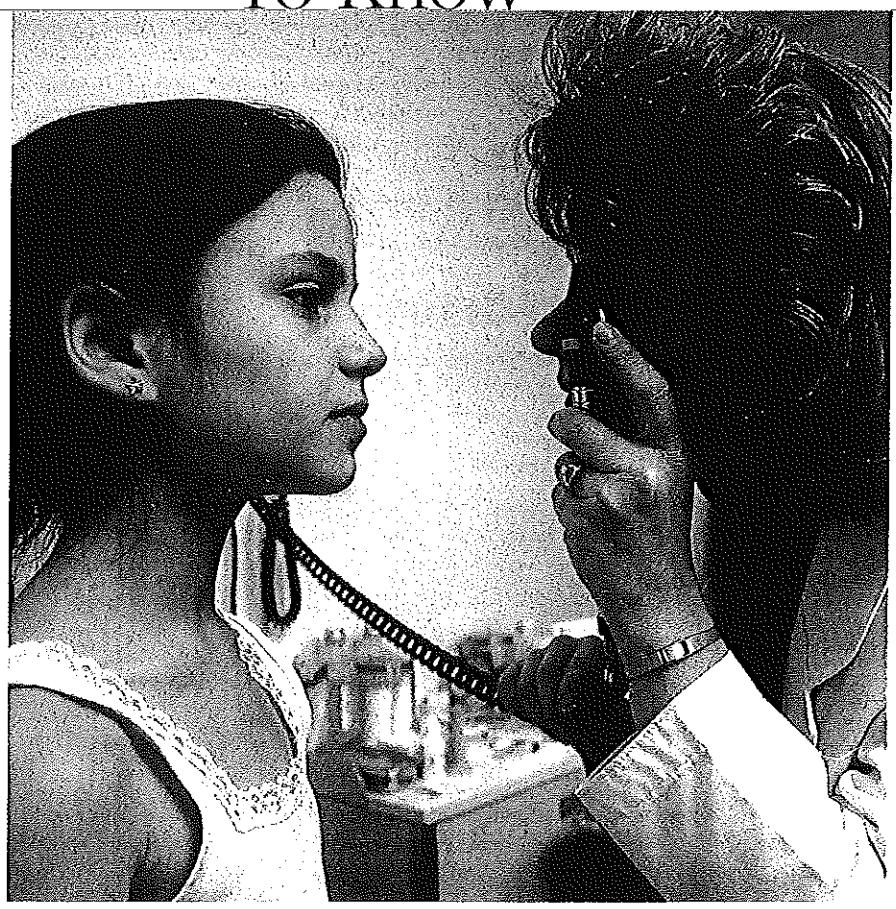
Pediatric Vision Care

What Nurse Practitioners Need To Know

By Lynn Fishman Hellerstein, OD



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Eye and vision disorders are the fourth most common disability in the United States and the most prevalent handicapping condition during childhood.[1] In spite of the high prevalence of vision disorders in this population, studies show that only about 31% of children between ages 6 and 16 have had an eye or vision examination within the past year. Among children younger than 6, only 14% are likely to have had an eye or vision examination.[2] Only Kentucky has passed a law that requires every child to have a comprehensive eye examination before entering public school.[3]

There are several reasons why so few children receive professional eye care. In some instances, it is because parents cannot pay for the needed services. Many parents are unaware that early professional eye examinations can prevent unnecessary vision loss and avoid learning-related vision disorders. However, overreliance on vision screenings performed at school or in office settings is perhaps a more influential reason. While these screenings are certainly useful, they do not fully investigate the health of the eye or the efficiency of the total visual system. In some cases, the child is assumed to be too young to undergo professional screening or is not referred for further indicated care. For example, one study of 102 private pediatric practices in the United States found that vision screenings were attempted for only 38% of 3-year-old children and 81% of 5-year-old children. The study also determined that only 26% of children who failed the vision screening guidelines issued by the American Academy of Pediatrics were referred for a professional eye examination.[4]

Many associations and groups, including the American Public Health Association and the American Optometric Association, recognize the limitations of vision screenings and encourage regular eye and vision examinations.[5] Healthy People 2010, a national

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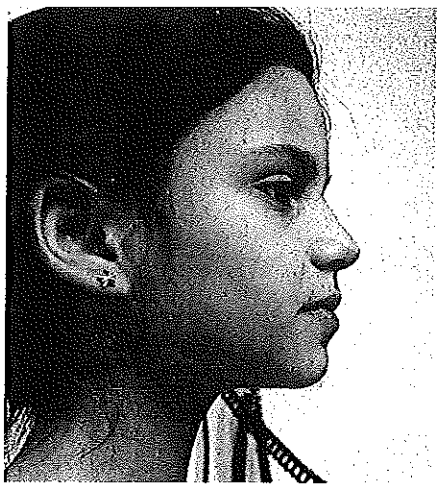

disease prevention initiative of the U.S. Department of Health and Human Services, also recognizes the importance of preventive vision care.[6] Project Universal Preschool Vision Screening (PUPVS), funded by the federal Maternal and Child Health Bureau (MCHB) and Lions Clubs International Foundation, aims to ensure that all U.S. children receive vision screenings at the earliest age possible, but no later than age 3 — and that all children who screen positive for problems are referred to an appropriate eye care specialist for follow-up.[7] Table 1 compares recommendations for a pediatric comprehensive eye and vision examination with vision screening. Note that the American Optometric Association, American Public Health Association and Prevent Blindness America all recommend comprehensive eye examinations before age 1 and before entering school.

Extensive research at the Yale Institute of Child Development conclusively demonstrated how important the first few years of life are on the development of vision.[8] Rapid changes occur in most components of the vision system during this time, including visual acuity, accommodation, binocular vision, visual motor skills and visual perception. During this very early critical phase of vision development, interferences may lead to serious lifelong effects on vision as well as areas of performance that depend on efficient visual skills. Successful treatment can be obtained more quickly with early intervention.

Common Problems and Consequences

An extensive review of the literature produced the following prevalence figures for eye and vision problems in children: amblyopia, 2% to 3%; strabismus, 3% to 4%; refractive errors, 15% to 30%; and ocular disease (including eyelid diseases, retinal pathology, etc.), less than 1%.[9] Vision disorders in children are summarized in Table 2.[10]

In addition to what is represented in the table, many children pass vision screenings and still have learning-related vision problems. Sight is not the same as vision. Eyesight is a physical process of focusing light within our eyes, whereas vision is our ability to understand what we see. There is no doubt about the importance of the role vision plays in learning in general and reading in particular.[11] Vision problems most often go undetected when a child is assumed to have "perfect" eyesight because he or she passed a school screening eye chart test with "20/20 vision." Children needlessly struggle for years in school because they have undetected, learning-related vision problems. Some are misdiagnosed as having attention deficit-hyperactivity disorder, labeled "dumb" or misdirected to a resource room when their academic or behavior struggles actually stem from correctable vision problems.

An estimated 10 million children are affected by vision problems, according to the National Parent Teacher Association. And the American Optometric Association estimates that at least 20% of students identified as problem learners have undetected vision problems.[12] A study conducted by Roger A. Johnson, PhD, showed that 70% of juvenile offenders in the population he studied had undetected and untreated vision problems.[13] A recent study highlighted at a conference at the Harvard University Graduate School of Education shows that visual perception and eye movement abilities are strong predictors of academic scores.[14] The impact of vision on learning is significant and, therefore, early vision evaluation and treatment are essential.

The types of visual problems experienced by children differ according to age. For infants up to 18 months, concerns include congenital malformations, neurologic disorders, significant refractive error, strabismus and amblyopia. (See the glossary printed with this article for descriptions of these conditions.) Visual concerns in toddlers and preschoolers (18 months to 5 years) include moderate refractive error, ocular pathologies, neurologic disorders, developmental delays, accommodative esotropia and amblyopia. School-aged children (6 to 18) are the most easily screened. Visual concerns about children in this age group include changing refractive errors, oculomotor dysfunctions, high phorias or tropias, binocular dysfunctions, and learning-related visual disorders.

What You Need to Know

In general, today's most common vision screenings are intended to identify children who have eye or vision problems that threaten their sight or impair their ability to develop

Table 1

Recommendations for Eye Examination in Children

American Optometric Association	American Public Health Association	Prevent Blindness America	American Academy of Ophthalmology
Comprehensive eye examination: • At 6 months • At 3 years • Before starting school • Every 2 years thereafter	*Comprehensive eye examination:* • At approximately 6 months • At 2 years • At 4 years	*Professional eye examination:* • Beginning shortly after birth • At 6 months • Before entering school (age 4 or 5) • Periodically throughout the school years	*Screening evaluation by pediatrician or other medical provider:* • Newborn to 3 months • 6 months to 1 year • 3 years (approximately) • 5 years (approximately) • At routine school checks or after the appearance of symptoms

Source: The American Optometric Association. Appears with permission.

Table 2

Vision Disorders in a Clinical Population of Children

DISORDER	PREVALENCE Ages 6 months to 5 years, 11 months	PREVALENCE Ages 6 years to 18 years
Hyperopia	33.0%	23.0%
Astigmatism	22.5%	22.5%
Myopia	9.4%	20.2%
Nonstrabismic binocular disorders	5.0%	16.3%
Strabismus	21.1%	10.0%
Amblyopia	7.9%	7.8%
Accommodative disorders	1.0%	6.0%
Peripheral retinal abnormalities requiring referral or follow-up	0.5%	2.0%

and learn normally. Thus, they are only able to detect a small percentage of children who require comprehensive vision care. Nevertheless, they are an important tool in the health care of children and are an established part of the system. School nurses and nurse practitioners, as well as nurse practitioners in primary care and pediatric offices, are in a unique position to maximize the effectiveness of these screenings.

The vision screening should evaluate more than visual acuity at distance. A child may be able to discern letters 20 feet away, but this does not indicate the degree to which eyes are able to work together to read materials within arm's length. Further, even when a child cannot respond to a visual screening, a comprehensive vision evaluation by an optometrist or ophthalmologist, without communication from the child, can be successfully administered. These eye specialists have the technology and the instruments to evaluate the eye and visual status of a child with minimal cooperation or communication from him or her. For example, photorefractive screenings can help determine high refractive error and strabismus.[15] As this technology evolves and becomes digitized, photorefractive screening for infants and preschoolers may eventually be the method of choice for children who do not have the opportunity to receive a comprehensive eye and vision examination.

The American Academy of Pediatrics and the American Academy of Family Physicians have issued guidelines for in-office vision screenings by nurse practitioners and nurses.[16,17] Additionally, the American Optometric Association has issued guidelines for vision screening by school nurses.[18]

Another screening battery for school-aged children is the Coors Vision Screening Guidelines.[19] The Coors Guidelines provide a multidisciplinary concept for vision screening because they were written by representatives and approved by the following professional organizations: Colorado Optometry Association, Colorado Medical Association, Colorado Department of Education and Colorado Department of Health. One of the most important aspects of the Coors Guidelines is the signs and symptoms checklist. The checklist is actually one of the screening tests; if signs and symptoms are present, a referral for a comprehensive vision evaluation by an eye specialist is indicated.

Areas to visually screen for include visual acuity (to detect inadequate refractive error or amblyopia), ocular alignment (to detect strabismus, high phorias, binocular dysfunctions), ocular motor (to detect abnormalities in eye movement control) and ocular and lid pathology. Vision development and visual information processing skills (visual discrimination, spatial awareness, memory and integration with other senses) can be probed through a checklist of signs and symptoms such as those in Table 3. Any child at risk for a learning-related vision problem should receive a comprehensive vision evaluation.[20]

In addition to the standard medical history, it is important to obtain a complete ocular and visual history of the child and his or her family. This should include:

- the child's visual history (previous glasses, patching, medication, surgery, therapy)
- family history of vision problems (refractive error, amblyopia, strabismus, blindness)

Children with illnesses and developmental delays are at higher risk for vision problems.[21] Other high-risk children include those who were premature or had a low birthweight, children with a family history of visual defects, infections such as rubella or sexually transmitted disease, difficulty in labor, and diagnosed genetic anomalies such as Down Syndrome, Fragile X or cerebral palsy.

Screening Pearls

Here are a few pearls of practical advice for administering in-office vision screening:

- Prepare the child by talking about and practicing the screening games.
- Make sure the child does not peek, squint or tilt his or her head.
- If the child doesn't verbalize well, change directions and ask him or her to match symbols rather than verbalize symbols.
- Watch the child, not the chart.
- Have *fun.*
- When in doubt, *refer* to an optometrist or ophthalmologist.
- Children should have a comprehensive vision evaluation before school and preferably at age 1 and age 3.
- Meet with eye care providers in your area to establish rapport and assistance in vision screening and referrals. The American Optometric Association and the College of Optometrists in Vision Development and Optometric (COVD) Extension Program can provide optometric referrals for family eye care providers.
- For children with suspected learning-related vision problems, refer to a developmental or behavioral optometrist who is certified in vision development and vision therapy. COVD is the certifying body for developmental optometrists and information and referrals may be found on COVD's Web site (www.covd.org).

Treatment Options

Once a child undergoes a comprehensive eye and vision evaluation by an optometrist or ophthalmologist, the choice of treatment depends on the type of problems diagnosed by the provider. These treatment choices range from medications and surgery (for select pathologies) to glasses, prisms and vision therapy.[22] Numerous published studies illustrate that vision therapy is an effective treatment for vision disorders.[23-25]

Early detection and correction can save a child from a lifetime of visual impairment and its consequences on quality of life. A solid program of vision screening provided in the primary care office, school setting, early childhood care or educational center serves an important role

Table 3

Signs and Symptoms of Vision Problems

INFANT	PRESCHOOLER	SCHOOL-AGED
• Difficulty seeing • Holds objects close to face • Eyes don't appear straight or seem to cross or drift • Eyes appear to be unusual • Eyelids droop or one eyelid tends to close • Injury to eyes • White pupil • Lack of eye contact by 3 months • Lack of visual fixation or follow by 3 months • Eyes "shake" • Persistent tearing • Light sensitivity	• Eyes don't appear straight or seem to cross or drift • Tendency to bump into objects • Red eyes or lids • Rubs eyes frequently • Excessive tearing • Head turn or tilt • Encrusted eyelids • Avoids coloring, puzzles, or detailed activity • Difficulty with eye-hand-body coordination	• Blurred or double vision • Holds reading material closer than normal • Frequent headaches • Eyestrain, fatigue • Head turn or tilt • Rubs eyes • Squints • Avoids close work • Difficulty reading (loss of place, needs finger or marker, confuses small words) • Reverses letters and numbers • Difficulty with handwriting, misaligns numbers • Consistently performs below potential • Poor eye-hand-body coordination

Glossary of Terms

Accommodation (eye focusing): The ability to focus the eyes to see clearly up close, to change focus from distance to near and back again, and to maintain clear focus for an extended period of time. Poor eye focusing ability can make it difficult to concentrate on reading from a book for a long period of time.

Amblyopia (lazy eye): Reduced vision in an eye, not correctable with eyeglasses, as a result of the eye not receiving adequate use during early childhood. Most often results from misalignment of a child's eyes or a significant difference in image quality seen with the two eyes. Over time, the eye with the least clear image is ignored or suppressed.

Binocular vision (eye coordination): The ability of both eyes to work together as a team. Each eye sees a slightly different image and the brain, through a process called fusion, blends the images into one three-dimensional picture. Good eye coordination, a skill that must be developed, keeps the eyes in alignment. Poor eye coordination comes from a lack of adequate vision development or improperly developed control of eye muscles.

Ocular motility (eye tracking): The ability to smoothly and accurately move the eyes along a line of print or follow a moving target with our eyes. Poor eye tracking can result in skipping words, losing one's place on a page, having to re-read materials, or difficulty copying from the chalkboard.

Strabismus (crossed eyes): An inability of the two eyes to aim at the same place at the same time. This can result in an eye turning in, out, up or down. A child with crossed eyes may experience periods of double vision and, if untreated, this condition can lead to amblyopia.

Visual-motor integration (eye-hand-body coordination): The ability to integrate visual information with gross and fine motor movements. Inadequate visual motor integration can result in clumsiness and difficulty with handwriting.

Visual perception (visual information processing): The process by which the brain interprets and understands the visual information received by the eyes. Aspects of visual perception include visual memory, size and form perception, directionality and color perception. Poor visual perception may contribute to letter reversals or difficulty with comprehension when reading.

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in augmenting periodic comprehensive vision evaluations. Frequent follow-up and support can make the difference for a child receiving appropriate vision care. Prompt vision remediation enhances the ability of children to perform to their full potential. ❖

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