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Why Is Preschool Vision Screening Important?

By Donna Mazyck, RN, MS, NCSN, Maryland and Anne Sheetz, RN, MPH, CNAA, Massachusetts

The goals of preschool vision screening include identifying children who (a) have a vision impairment that may prevent them from obtaining maximum benefit from their educational opportunities and (b) may have an unrecognized serious vision problem (i.e., amblyopia). The lack of universal and age-appropriate preschool vision screening continues to contribute to an unacceptable prevalence of permanent visual loss from disorders such as amblyopia, which are reversible if detected and treated early.

What Is Amblyopia?

Amblyopia, one of the primary conditions targeted for detection with early vision screening, is a condition of visual loss in one or both eyes that cannot be attributable to any underlying structural abnormality of the eye or the visual pathway. It develops in young children when something interferes with visual development, such as a crossed eye (strabismus) or a constantly blurred image (refractive error). In these conditions, the visual image from one of or both otherwise healthy eyes is no longer processed optimally by the brain. Because the eye and visual system need to have clear visual input to develop good vision, this loss of normal visual input results in vision loss, which can be profound. If not recognized and treated during the early childhood years, generally before the age of 7 or 8 years, it results in permanent vision loss. If detected and treated early, it is reversible in nearly all cases (Preferred Practice Patterns Committee, Pediatric Ophthalmology Panel, 2002).

What Are the Consequences of Untreated Amblyopia?

In addition to reduced vision, there are other serious consequences from amblyopia. Individuals with amblyopia are at increased risk of suffering a traumatic injury to their one remaining "good" eye, leading to severe visual impairment (Chua & Mitchell, 2004). The lifetime risk of such vision loss in an amblyope is estimated to be 1–2% (Rahi, Logan, Timms, Russell-Eggitt, & Taylor, 2002). The individual is now limited by the reduced vision in the amblyopic, or poorer-seeing, eye. Three quarters of these persons will become visually impaired or blind. More than half of those who suffer such an injury will not be able to continue in employment (Rahi et al., 2002) and the risk of death increases with the severity of the visual impairment (McCarty, Nanjan, & Taylor, 2001). Increased difficulties with educational activities can also be expected as amblyopic eyes have been noted to have impaired reading performance (Osarovsky-Sasin et al., 2002).

How Is Amblyopia Treated?

Amblyopia treatment is based on the underlying cause. Refractive errors and misaligned eyes may be corrected with glasses. Media opacities, such as cataracts and some cases of strabismus, may require surgery. The key component of treating amblyopia is switching fixation preference, that is, making the brain process information from the amblyopic eye. This is typically done with patching of the good eye or blurring the vision in the good eye with eye drops. All forms of treatment must be implemented as early as possible, preferably in the early childhood period. Treatment of cataracts and other conditions that prevent any image from reaching the eye and brain must be instituted during the first few months of life.

How Common Is Amblyopia?

Amblyopia is not a rare event, affecting 3–5% of the population (Flom & Neumaier, 1966; Presland & Novak, 1996; Thompson, Woodruff, Hiscox, Strong, & Minshull, 1991; Williams, Harrad, Harvey, & Sparrow, 2001). It is the most common cause of monocular visual impairment in children and young adults (Chua & Mitchell, 2004). Even among those 49–59 years old, amblyopia was found to be the leading cause of mild to moderate and severe visual impairment (Wang, Foran, & Mitchell, 2000).

What Are the Current Requirements?

Many current policies and recommendations address preschool vision screening. Universal and serial preschool vision screening has been recommended by the American Academy of Pediatrics (AAP), the American Academy of Ophthalmology and the American Association of Pediatric Ophthalmology and Strabismus as an important way to detect amblyopia (American Academy of Pediatrics Committee on Practice and Ambulatory Medicine and Section on Ophthalmology, American Association of Certified Orthoptists, American Association of Pediatric Ophthalmology and Strabismus, 2003). Specifically, the AAP recommends age-appropriate vision assessment at all health supervision visits and outlines specific protocols (American Academy of Pediatrics, Committee on Practice and Ambulatory Medicine, Section on Ophthalmology, 1996). Vision screening is required as a component of the Early Periodic Screening and Diagnostic Testing for Medicaid recipients (AAP Periodicity Guidelines, 2005) and for participation in Head Start (U.S. Department of Health and Human Services, Administration for Children and Families, Child Health and Development Services, 2005). In 2005, the U.S. Preventive Services Task Force issued an

updated statement and again recommended vision screening to detect amblyopia and other visual deficits in children younger than 5 years.

What Are the Current Preschool Vision-Screening Practices?

Despite numerous programs and standards, studies looking at vision screening in the United States have consistently documented low preschool vision-screening rates (Wall et al., 2002). A cross-sectional study of pediatricians in 1991 showed that vision screening was attempted on only 66% of children aged three to five years, with Hispanics less likely to be screened than other ethnic groups (Wasserman, Croft, & Brotherton, 1992). In a separate study of 29 pediatric and family physician practices, despite a training session, vision screening of four-year-olds remained low, with only 21% of the practices reported to be screening nearly all of the children in that age group (Hered & Rothstein, 2003). The National Health Interview Survey in 2002 compiled information on vision testing of children younger than six years. The question asked was, "Has ___ EVER had his/her vision tested by a doctor or other health professional?" The baseline data obtained from this national survey revealed that only 36% of these children were reported to have ever had their vision tested (Centers for Disease Control and Prevention, 2005). Recognizing the importance of vision screening for young children, a Healthy Vision 2010 target of 52% of children aged five years and younger was established (National Eye Institute, National Institutes of Health and Human Services, 2005).

What Preschool Vision-Testing Procedures Are Most Effective and Efficient?

Many preschool vision-screening guidelines and protocols exist. The National Eye Institute (NEI) funded the Vision in Preschooler (VIP) study, which examined 11 different vision-screening tests to determine their relative effectiveness in detecting important vision conditions, including amblyopia (Vision in Preschoolers Study Group, 2004). The best tests detected nearly 90% of children with the most important conditions. The Massachusetts preschool vision-screening protocol and methodology was selected based on the results of the VIP study, the Maternal and Child Health Bureau, the NEI Task Force on Vision Screening recommendations (Hartmann et al., 2000) and numerous other studies. It includes the Random Dot E for stereopsis (amblyopia) and the HOTV or LEA symbols for acuity. It is important that a vision-screening program be flexible enough to allow for new recommendations that will likely develop from studies such as the NEI's VIP.

Two Examples of States' Implemented Preschool Vision-Screening Programs

Massachusetts Preschool Vision Screening Program: Legislative Mandate

This law requires that all children, in both public and private schools, show proof of having passed a vision screening within the 12 months prior to kindergarten entry. This effectively requires a vision screening for all children at the four-year-old well-child visit, the prekindergarten visit. For children who do not pass the screening, proof of a comprehensive eye examination by an ophthalmologist or optometrist must be presented, as well as proof of follow-up if recommended by the eye physician. The law also addresses the problem of poor methodology and screener competence. By law, the vision screening must be conducted by personnel approved by the department of public health and trained in the specified vision-screening protocol.

Massachusetts Preschool Vision Screening Program: Implementation

With the support of a legislative mandate, implementation of the program was initiated in 2004. The program was designed to educate primary care physicians (PCPs) with the objective of improving the rate and quality of vision screening in the medical home. In Massachusetts, nearly all children are covered by health insurance and have a primary care provider, making the primary care visit the best site to capture young preschoolers, an otherwise geographically diverse group. Within this model, school nurses play a critical role as a safety net, as it is upon entry into kindergarten that the statutory mandate becomes effective. School nurses are in a position to share vision-screening protocols, provide feedback to PCPs, and screen children who have not received a screening with the Massachusetts preschool vision-screening protocol. School nurses can also ensure that, when required, follow-up has been obtained and documented as required in the statute.

Critical to successful implementation of this program are ongoing education activities, directed at primary care providers and school nurses. Since 2002, the School Health Institute, under the direction of the Massachusetts Department of Public Health, has been educating school nurses and providers regarding the importance of early vision screening. In 2004, educational materials were mailed to all providers in the state. Conferences have also been developed in collaboration with the Massachusetts chapter of the AAP, the American Association of Family Physicians, and the Massachusetts Medical Society. Training materials have been made available online at <http://www.mass.gov/dph/fch/schoolhealth/screening.htm>. Plans are under way

to send a CD of the training procedures to all primary care practices serving children.

Maryland Vision Screener Education

The Student Services and Alternative Programs Branch of the Maryland State Department of Education and the Maryland Optometric Association collaborated to present a series of regional professional development opportunities for school nurses who perform vision screening. The emphasis of the educational program was early childhood. Early detection of vision problems in children is most effective for treatment.

The program included a background on the challenges and opportunities presented with childhood vision, including low screening rates for preschoolers, low vision examination rates for school-age children and regulatory measures to address childhood vision (Ferebee, 2004).

Other aspects of the program included instruction on eye anatomy and common eye problems, objectives of vision screening and vision-screening procedures. The school nurses also had an opportunity to work with vision-screening equipment. Maryland law and regulations regarding vision screening in schools was also shared with the school nurses. These programs were offered regionally across the state over a two-year period. Funding from a grant enabled each school district to receive a stereopsis screening tool. The program was well received by school nurses, who stated they were better equipped to perform vision screening for young children.

Summary

Preschool vision screening with referral for treatment as needed offers a unique opportunity to promote both vision health and the child's educational experience. School nurses should consider conducting preschool vision screening regardless of whether there is a statewide mandate. The school nurse's role as a manager is vital to ensure screening is done correctly and that necessary referrals are completed.

For more information about your state's vision-screening requirements or how to start a program, please contact your state school nurse consultant. To locate contact information for your state school nurse consultant, please visit the National Association of State School Nurse Consultants' website at www.nassnc.org and click on "About Us" to gain access to a listing of our members.

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