Developing a Consensus on a Systems-Based Approach to Children's Vision and Eye Health

Endorsed by the National Center for Children's Vision and Eye Health at Prevent Blindness, the American Association of Pediatric Ophthalmology and Strabismus, American Association of Ophthalmology, the American Academy of Optometry, the American Association of Certified Orthoptists, the American Academy of Pediatrics and the National Optometric Association.

Purpose of this Consensus Statement: Early detection and treatment of a vision disorder is critical to the long-term vision health of the child, and vision screenings serve a useful role in identifying children in need of further evaluation by an eye care professional. As part of a comprehensive public health approach to eye health, the National Academies of Sciences, Engineering and Medicine (NASEM) recommends the development of a "single set of evidence-based clinical . . . and practice guidelines and measures that can be used by eye care professionals, other care providers, and public health professionals to prevent, screen for, detect, monitor, diagnose, and treat eye and vision problems."[1]

While efforts to develop a single set of inter-organizational guidelines have begun, national, state and local organizations devoted to early childhood vision care have- up to this point- published their own screening and referral guidelines, which often vary in the recommendations provided. These differences can make it unclear to screening providers which guidelines to follow for their work with specific groups of children. This consensus statement provides context for variation in vision screening approaches associated with a wide variety of venues – schools, preschools, public health agencies, primary healthcare providers, medical homes, child care, and community settings. There are considerable areas of agreement between national recommendations and position statements and, when the aim of each is considered in light of the environment in which the vision screening occurs, further alignment can be seen. All agree early detection and treatment of a vision disorder is critical to the long-term vision health of a child, and vision screenings serve a useful role in identifying children in need of eye care and in promoting further evaluation by an eye care professional.

Historically, one of the first sets of vision screening guidelines was published and has been regularly updated jointly by the American Academy of Pediatrics (AAP), the American Academy of Ophthalmology (AAO), the American Association for Pediatric Ophthalmology and Strabismus (AAPOS), and the American Association of Certified Orthoptists (AACO) The referral recommendations in these Joint

[1] (National Academies of Sciences, Division, Practice, & Health, 2016)

Guidelines,[2-3] while developed primarily for pediatric primary care practices, have also been utilized by other screening providers such as school nurses and Head Start personnel, even though the accompanying medical history and ocular assessment guidelines could not be incorporated by such groups. Recently, guidelines directed for use by primary healthcare providers and non-clinician providers of vision screenings were published by the National Center for Children's Vision and Eye Health (NCCVEH).[4,5,6] Both the NCCVEH and the Joint Guidelines engaged groups of nationally recognized experts, developed a rigorous process incorporating reviews of the literature whenever possible, and used expert opinion where necessary to develop their recommendations. In July of 2016, the American Academy of Optometry issued a policy statement titled *Childhood Vision Screening*, which emphasizes "the value of a continuum of eye care that includes both evidence-based vision screenings and access to comprehensive eye examinations by optometrists or ophthalmologists."[7]

In-as-much-as children obtain vision screenings in a variety of venues with trained screening providers both within and outside the medical home, the adoptees of this statement recognize that organizations which perform childhood vision screenings should adopt guidelines that are most appropriate for the environment in which their members are working. Individuals identifying vision problems in children during these screenings should not only coordinate referrals to an eye care professional, but also ensure the receipt of a comprehensive eye examination and any prescribed treatment. Eye exam outcomes should be sent to the child's primary health care provider/medical home, educational, and/or child care facility with appropriate release of medical information provided by the child's parent(s) or caregivers.[8]

Importance of Vision and Eye Health Programs for Children: Vision plays an important role in children's physical, cognitive, and social development. Up to 1 in 20 preschool-aged children has a vision disorder.[9] Uncorrected vision problems can impair child development, interfere with learning, and even lead to

[2] (Donahue, S. P., Baker, C. N., & Committee on Practice and Ambulatory Medicine, Section on Ophthalmology, American Association of Certified Orthoptists, American Association for Pediatric Ophthalmology and Strabismus, American Academy of Ophthalmology, 2016)
[3] (Donahue, S. P., Baker, C. N., & Committee on Practice and Ambulatory Medicine, Section on Ophthalmology, American Association of Certified Orthoptists, American Association for Pediatric Ophthalmology and Strabismus, American Academy of Ophthalmology, 2016)
[4] (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)
[5] (Hartmann, E. E., Block, S. S., & Wallace, D. K., for the National Expert Panel to the National Center for Children's Vision and Eye Health., 2015)
[6] (Marsh-Tootle, W. L., Russ, S. A., & Repka, M. X., for the National Expert Panel to the National Center for Children's Vision and Eye Health, 2015)
[7] (Ciner, Cotter, & Kulp, 2016)
[8] (Office for State, Tribal, Local and Territorial Support Centers for Disease Control and Prevention, 2014)
[9] (Chou, Dana, & Bougatsos, 2011)

permanent vision loss;[10,11,12,13 14,15] early detection and treatment are critical. Visual functioning is a strong predictor of academic performance in children,[16,17,18] and vision disorders of childhood may continue to affect health and well-being throughout the adult years.[19]

The economic costs of children's vision disorders are significant, amounting to $10 billion annually in the United States.[20] This estimate takes into account the costs of medical care, vision aids and devices, out – of-pocket costs to caregivers, special education, vision screening programs, federal assistance programs, and quality of life losses. Families shoulder 45% of these costs – not including the economic loss associated with diminished quality of life.[12]

Ensuring timely receipt of a vision screening or eye exam for young children is not the sole consideration when it comes to preventing vision problems in children. Disparities exist in the prevalence of vision problems[21,22] and access to eye care for several high-risk populations. There is a greater risk of under-diagnosis and under-treatment of vision problems in children from low-income families as well as minority populations, including African American, Asian, and Hispanic children.[23,24]

Data from the 2009-2010 National Survey of Children with Special Healthcare Needs suggest that children with special healthcare needs who also have difficulty seeing experience significant obstacles accessing eye care and frequently do not receive needed care and services.[25] These children generally: (1) are from a racial or ethnic minority group; (2) are uninsured (currently and in the past year) or have public insurance; (3) have parents who maintain an annual household income below the federal poverty level; (4) have parents with a lower level of educational attainment; and/or (5) live in non-English speaking households.[25] Disparities in disease prevalence and limited access to vision screening and professional eye examinations in these populations result in a higher prevalence of vision problems.

[10] (Ying, et al., 2014)
[11] (Wen, et al., 2011)
[12] (Roch-Levecq, Brody, Thomas, & Brown, 2008)
[13] (Atkinson, et al., 2002)
[14] (Ibironke, et al., 2011)
[15] (US Preventive Services Task Force, 2011)
[16] (Maples, 2003)
[17] (Basch, 2011)
[18] (VIP-HIP Study Group, Kulp M. T., Ciner, E., Maguire, M., Moore, B., Pentimonti, J., Pistilli, M., Cyert, L., Candy, R., Quinn, G., & Ying, G., 2016)
[19] (Davidson & Quinn, 2011)
[20] (Wittenborn, et al., 2013)
[21] (Tarczy-Hornoch, et al., 2011)
[22] (Giordano, et al., 2009)
[23] (Ganz, Xuan, & Hunter, 2007)
[24] (Tarczy-Hornoch, et al., 2013)
[25] (O'Connor, 2012)

Summary: Vision screenings occur in a variety of venues, including primary care offices, public health clinics, schools, childcare facilities, or community health program settings. Attention to vision and eye health in young children is critical to long-term vision outcomes. At present, many children in the United States do not receive timely vision screenings or professional eye care,[21] and there is wide variation among state laws and regulations related to vision and eye health. The National Academies of Sciences, Engineering and Medicine recently called for increased consensus and uniformity in clinical practice guidelines among diverse stakeholders (including eye care professionals, other care providers, and public health professionals) addressing children's vision and eye health;[18] this consensus statement is a step in that direction. Activities to improve surveillance, vision screening, access to professional eye care, coordination with the medical home – and encouraging state and local efforts to provide vision and eye health activities within public health and primary healthcare settings – are critical steps for improving children's vision and eye health in the United States.

BIBLIOGRAPHY

Atkinson, J., Anker, S., Nardini, M., Braddick, O., Hughes, C., Rae, S., . . . Atkinson, S. (2002). Infant vision screening predicts failures on motor and cognitive tests up to school age. *Strabismus, 10*(3), 187-198.

Basch, C. E. (2011). Vision and the achievement gap among urban minority youth. *Journal of School Health, 81*(10), 599-605. doi:10.1111/j.1746-1561.2011.00633.x

Chou, R., Dana, T., & Bougatsos, C. (2011). Screening for visual impairment in children ages 1-5: Update for the USPSTF. *Pediatrics, 127*(2), e442-479. doi:10.1542/peds.2010-0462

Ciner, E., Cotter, S., & Kulp, M. (2016). *American Academy of Optometry Policy Statement. Childhood Vision Screening.* Retrieved from http://www.aaopt.org/: http://www.aaopt.org/sites/default/files/userfiles/2016/2016_Childhood%20Vision%20Screening%20Position%20Paper.pdf

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, 91*(1), 6-16. Retrieved from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4274336/pdf/opx-92-06.pdf

Davidson, S., & Quinn, G. E. (2011). The impact of pediatric vision disorders in adulthood. *Pediatrics, 127*(2), 334-339. doi:10.1542/peds.2010-1911

Donahue, S. P., Baker, C. N., & Committee on Practice and Ambulatory Medicine, 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

Donahue, S. P., Baker, C. N., & Committee on Practice and Ambulatory Medicine, Section on Ophthalmology, American Association of Certified Orthoptists, American Association for Pediatric Ophthalmology and Strabismus, American Academy of Ophthalmology. (2016). Visual system assessment in infants, children, and young adults by pediatricians. *Pediatrics, 137*(1), e20153596. Retrieved from http://pediatrics.aappublications.org/content/pediatrics/early/2015/12/07/peds.2015-3596.full.pdf

Ganz, M., Xuan, Z., & Hunter, D. G. (2007). Patterns of eye care use and expenditures among children with diagnosed eye conditions. *Journal of AAPOS, 11*(5), 480-487. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2077983/pdf/nihms-33049.pdf

Giordano, L., Friedman, D. S., Repka, M. X., Katz, J., Ibironke, J., Hawes, P., & Tielsch, J. M. (2009). Prevalence of refractive error among preschool children in an urban population: The Baltimore Pediatric Eye Disease Study. *Ophthalmology, 116*(4), 739-746. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2680482/pdf/nihms95551.pdf

Hartmann, E. E., Block, S. S., & Wallace, D. K., for the National Expert Panel to the National Center for Children's Vision and Eye Health. (2015). Vision and eye health in children 36 to <72 months: Proposed data system. *Optometry and Vision Science, 91*(1), 24-30. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4274341/

Ibironke, J. O., Friedman, D. S., Repka, M. X., Katz, J., Giordano, L., Hawse, P., & Tielsch, J. M. (2011). Child development and refractive errors in preschool children. *Optometry and Vision Science, 88*(2), 252-258. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3079532/pdf/nihms259842.pdf

Maples, W. C. (2003). Visual factors that significantly impact academic performance. *Optometry, 74*(1), 35-49.

Marsh-Tootle, W. L., Russ, S. A., & Repka, M. X., for the National Expert Panel to the National Center for Children's Vision and Eye Health. (2015). Vision and eye health in children 36 to <72 months: Proposed data definitions. *Optometry and Vision Science, 92*(1), 17-23. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4274339/pdf/opx-92-17.pdf

National Academies of Sciences, Engineering & Medicine; Health & Medicine Division; Board on Population Health & Public Health Practice, Committee on Public Health Approaches to Reduce Vision Impairment & Promote Eye Health. (2016). *Making eye health a population health imperative: Vision for tomorrow.* (A. Welp, R. B. Woodbury, M. A. McCoy, & S. M. Teutsch, Eds.) Washington D.C.: National Academies Press. Retrieved from https://www.ncbi.nlm.nih.gov/books/NBK385157

O'Connor, K. S. (2012). An overview of health care access, use, unmet needs and key system performance measures for CSHCN by vision status. Washington D.C.: Presentation to the Children's Vision and Eye Health Federal Intra-Agency Task Force Meeting.

Office for State, Tribal, Local and Territorial Support Centers for Disease Control and Prevention. (2014). *10 essential public health services: An overview.* Retrieved April 1, 2016, from Centers for Disease Control and Prevention: http://www.cdc.gov/nphpsp/documents/essential-phs.pdf

Roch-Levecq, A. C., Brody, B. L., Thomas, R. G., & Brown, S. I. (2008). Ametropia, preschoolers' cognitive abilities, and effects of spectacle correction. *Archives of Ophthalmology, 126*(2), 252-258. Retrieved from http://jamanetwork.com/jounals/jamaophthalmology/fullarticle/420351

Tarczy-Hornoch, K., Cotter, S. A., Borchert, M., McKean-Cowdin, R., Lin, J., Wen, G. .., & MEPEDS. (2013). Prevalence and causes of visual impairment in Asian and non-Hispanic white preschool children: Multi-Ethnic Pediatric Eye Disease Study. *Ophthalmology, 120*(6), 1220-1226. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4848010/pdf/nihms432898.pdf

Tarczy-Hornoch, K., Varma, R., Cotter, S. A., McKean-Cowdin, R., Lin, J. H., Borchert, M. S., . . . Giordano, L. (2011). Risk factors for decreased visual acuity in preschool children: The Multi-Ethnic Pediatric Eye Disease and Baltimore Pediatric Eye Disease Studies. *Ophthalmology, 118*(11), 2262-2273. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3208077/pdf/nihms-309569.pdf

US Preventive Services Task Force. (2011). Vision screening for children 1 to 5 years of age; US Preventive Services Task Force recommendation statement. *Pediatrics, 127*(2), 340-346. doi:10.1542/peds.2010-3177

VIP-HIP Study Group, Kulp M. T., Ciner, E., Maguire, M., Moore, B., Pentimonti, J., Pistilli, M., Cyert, L., Candy, R., Quinn, G., & Ying, G. (2016). Uncorrected hyperopia and preschool early literacy: Results of the Vision in Preschoolers-Hyperopia in Preschoolers (VIP-HIP Study. *Ophthalmology, 123*(4), 681-689. doi:10.1016/j.ophtha.2015.11.023

Wen, G., McKean-Cowdin, R., Varma, R., Tarczy-Hornoch, K., Cotter, S. A., Borchert, M., & Azen, S. (2011). General health-related quality of life in preschool children with strabismus or amblyopia. *Ophthalmology, 118*(3), 574-580. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3017225/pdf/nihms222801.pdf

Wittenborn, J. S., Zhang, X., Feagan, C. W., Crouse, W. L., Shrestha, S., Kemper, A. R., . . . Saaddine, J. B. (2013). The economic burden of vision loss and eye disorders among the United States. *Ophthalmology, 120*(9), 1728-1735. doi:10.1016/j.ophtha.2013.01.068

Ying, G. S., Maguire, M. G., Cyert, L. A., Ciner, E., Quinn, G. E., Kulp, M. T., . . . Moore, B. (2014). Prevalence of vision disorders by racial and ethnic group among children participating in Head Start. *Ophthalmology, 121*(3), 630-636. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4128179/pdf/nihms603561.pdf