VISION SCREENING

RATIONALE

Vision screening is vital in identifying visual and systemic disorders. Vision screening begins in infancy and continues throughout childhood and adolescence during well-child visits. Appropriate visual assessments can help children obtain early interventions to correct or improve vision. Eye examination and visual assessments are important in detecting conditions that can lead to visual impairment, signify serious systemic disease, poor school performance, and life-threatening conditions.[1] Ocular problems can be an early sign of general health concerns. In addition, regular vision screening assessments at an early age can reduce the risk of persistent amblyopia at 7 years of age by more than 50%.[2]

The vision screening guidelines below are based on the 2016 AAP Clinical Report – Procedures for the Evaluation of the Visual System by Pediatricians; available at: http://pediatrics.aappublications.org/content/pediatrics/early/2015/12/07/peds.2015-3597.full.pdf, unless otherwise noted.

SCREENING REQUIREMENTS

- All pediatric health care providers should be familiar with the most recent version of eye examination and screening guidelines of the American Association for Pediatric Ophthalmology and Strabismus, the American Academy of Ophthalmology, and the American Academy of Pediatrics.

- Screeners are required to attend their local Vision Screening Training led by CHDP staff or another agency approved by their local CHDP program for certification in visual acuity screening. Certification must be renewed every four years.

- Please review Table 1 from the 2016 AAP Clinical Report – Procedures for the Evaluation of the Visual System by Pediatricians; (http://pediatrics.aappublications.org/content/pediatrics/early/2015/12/07/peds.2015-3597.full.pdf). CHDP provider offices are strongly recommended to keep hard copies available for screener's use.

- Screen for visual problems at each health assessment visit. Please see Vision Screening Guideline, Table 1: Overview of Vision Screening Assessments for a description of vision screening assessments and procedures.

  o Screening should include history, external exam, red reflex testing, pupil exam, corneal light reflex, cover test, fix and follow response, and ophthalmoscopy.

  o Perform visual acuity screening for children 3 years and older.

  o Ophthalmoscopy should be done for older, cooperative children to visualize structures in the back of the eye.

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- o Instrument-based vision screening (e.g. autorefraction or photoscreening) may be used if unable to conduct an optotype-based visual acuity screening. This method can be attempted beginning at age 12 months please refer to the AAP Bright Futures [Recommendations for Preventive Pediatric Health Care](http://www.aap.org/en-us/professional-resources/practice-support/Periodicity/Periodicity%20Schedule_FINAL.pdf), http://www.aap.org/en-us/professional-resources/practice-support/Periodicity/Periodicity%20Schedule_FINAL.pdf

- Visual Acuity Screening

  - o Visual acuity screening should be done in a well-lit room, free of visual and auditory distractions. The eye chart should be at the child's eye level.

  - o Each eye should be screened separately (monocularly), ensuring child does not peek with other eye.

  - o Proper selection of age-appropriate optotypes (symbols or letters) and testing methods are important in obtaining accurate screening results. Use eye charts with lines of optotypes or matching cards with lines (crowding bars) around each optotype to obtain the most accurate visual acuity assessment. Crowding bars around the optotype make individual symbols/letters more difficult to identify when amblyopia is present, thereby increasing the sensitivity in detecting amblyopia.

- Either critical line or threshold screening may be used.

  - o Threshold screening begins by asking the child to identify optotypes at the top line of the eye chart and continue down each line until the child can no longer identify the majority of optotypes in a line. Threshold screening enables the screener to identify small differences between each eye (i.e. two-line difference). Threshold screening can be relatively time-consuming and can potentially result in loss of attention, especially for younger children. Results obtained via threshold screening may not be as accurate as those derived by critical line screening may.

  - o Critical line screening is an effective alternative to threshold screening that requires less time to administer. The "critical line" is the age-dependent line a child is expected to see normally and pass. The critical line to pass becomes smaller as age increases. Passing the critical line screening requires the child to correctly identify the majority of the optotypes present on the critical line appropriate for his or her age. Critical line screening, however, does not allow for identifying a two-line difference between eyes.

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- Screen children ages 3-5 years using LEA SYMBOLS® and HOTV letters.

    o LEA symbols and HOTV letters charts are standardized and have validated optotypes that provide the most accurate vision assessment.

    o Matching/response cards can be used with LEA symbols and HOTV letters charts for children who may be timid or non-verbal.

    o <u>Screening distance is 10 feet. This short distance will enhance interaction between the child</u> and screener without decreasing accuracy of screening results.

    o Allen figures, Lighthouse characters, and Sail Boat Chart are not standardized and not recommended for use in visual acuity screening.

    o The Tumbling E or Landolt C charts are also not recommended for vision screening because young children may not have yet developed the skill to express direction or orientation of these optotypes.

- Screen children who comfortably know their letters using Sloan letters or Snellen letters chart. May be used as early as age 5 years.

    o Sloan letter charts are standardized and therefore preferable to Snellen letters.

    o A screening distance of 10 feet is recommended.

    o Children who are unable to recognize letters should be screened using a standardized LEA symbols or HOTV letters chart.

    o Repeat screening every 1-2 years.

- Use adhesive patches or 2-inch wide hypoallergenic paper tape for effective occlusion.**Error! Bookmark not defined.,Error! Bookmark not defined.**

- Instrument-based vision screening (e.g. autorefraction or photoscreening) may be used if unable to complete an optotype-based visual acuity screening. This method can be attempted as early as 12 months of age. Instrument-based screening requires little cooperation from the child and is quick to administer. It is useful for nonverbal, preverbal, and timid children.**Error! Bookmark not defined.** Neither autorefraction nor photoscreening measure visual acuity, but both can identify ocular abnormalities that could lead to or indicate vision problems. The referral criteria may vary depending on the instrument used. Instrument-based vision screening involves

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substantial costs and may not be suitable for all provider offices. Children who can complete optotype-based screening should be screened using the appropriate method for their age.

- CHDP Providers who are considering instrument-based vision screening can refer to the American Academy of Pediatrics' Instrument-Based Pediatric Vision Screening Policy Statement[3] for further guidance at: http://pediatrics.aappublications.org/content/pediatrics/early/2012/10/24/peds.2012-2548.full.pdf

  Bright Futures*
  Please refer to Bright Futures Guidelines and Pocket Guide. (https://brightfutures.aap.org/materials-and-tools/guidelines-and-pocket-guide/Pages/default.aspx). For periodicity schedules for vision risk assessment and vision testing please refer to the AAP Bright Futures Recommendations for Preventive Pediatric Health Care (http://www.aap.org/en-us/professional-resources/practice-support/Periodicity/Periodicity%20Schedule_FINAL.pdf)

CONSIDERATIONS FOR REFERRAL, TREATMENT, AND/OR FOLLOW-UP

- Refer any eye conditions to the appropriate specialist.

- Children with the following conditions should bypass screenings and be automatically referred to an ophthalmologist or optometrist experienced in treating children for an eye examination.[4]

  o Recognized eye disorders (e.g. strabismus, ptosis)

  o Known neurodevelopmental disorders

  o Hearing impairment

  o Motor abnormalities (e.g. cerebral palsy)

  o Down syndrome

  o Cognitive impairment

  o Autism spectrum disorders

  o Speech delay

  o Systemic diseases present

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- o Taking medications that may cause eye disorders

- o First-degree relative with strabismus or amblyopia

- o Prematurity: less than 32 weeks of gestation

- o Parent believes child has vision problem

- Age-Dependent Referral Criteria for Visual Acuity Screening:

  - o **Age 3 years:** Failure to correctly identify the majority of optotypes on the 10/25 (20/50) line, or worse, in either eye.

  - o **Age 4 years:** Failure to correctly identify the majority of optotypes on the 10/20 (20/40) line, or worse, in either eye.

  - o **Ages 5 years and older:** Failure to correctly identify the majority of optotypes on the 10/15 (20/30 or 20/32 on some charts) line, or worse, in either eye.

  - o **Age 3 years and older (threshold method only):** a two-line difference between eyes, even within the passing range (e.g. a 4 year old with 20/20 in one eye and 20/32 in the other eye).

- Untestable Children and Rescreening Guidelines[4]

  - o If child is unable to cooperate during the screening, a second attempt should be made the same day (i.e. later during the same visit). If same day rescreening is not possible, reschedule as soon as possible, but no later than 6 months.

- When vision screening is unsuccessful, children should be referred to an ophthalmologist or optometrist experienced in the care of children for an eye examination.

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References

1. Donahue, S, Baker, C. Procedures for the Evaluation of the Visual System by Pediatricians. *Pediatrics.* 2016; 137 (1): 1-9.

2. Donahue, S, Baker, C. Visual System Assessment in Infants, Children, and Young Adults by Pediatricians. Pediatrics. 2015. Policy Statement.

3. American Academy of Pediatrics. Instrument-Based Pediatric Vision Screening Policy Statement. Published October 29, 2012. Accessed July 28, 2014.

4. Cotter, S, Cyert, L, Miller, J, et al. Vision Screening for Children 36 to <72 Months: Recommended Practices. *Journal of Optometry & Vision Science.* 2015; 92(1): 6-16. doi: 10.1097/OPX.0000000000000429

Table1– OVERVIEW OF VISION SCREENING ASSESSMENTS*

Assessment	Procedures
Family History and Parent Observations	Ask about family history of eye disorders such as strabismus, amblyopia, cataracts, refractive error, as well as eye surgery and use of glasses during childhood in parents or siblings. Ask parents for any observations or concerns about their child's vision.
External Exam	Using a penlight, examine the eyelids, conjunctiva, sclera, cornea, and iris. Refer to a pediatric eye care specialist if abnormalities are present, such as ptosis, nonresolving conjunctivitis, or presence of cloudy or enlarged corneas and/or photophobia.
Red Reflex	Perform in a darkened room to maximize pupil dilation. It is not necessary to use eye drops for further pupil dilation. Set direct ophthalmoscope to "0" and while viewing through it at an arm's length distance from the child, evaluate both pupils simultaneously as child looks at the light. The screener can move closer to the child to assess each eye individually. The observed red reflexes should be light orange-yellow in color in lightly pigmented eyes or a dark red in darkly pigmented brown eyes. The two red reflexes should be identical in color, brightness, and size. Bright white or yellow reflex, or a dull or absent red reflex can be a sign of significant abnormality and necessitates a referral.
Pupil Exam	Pupils should be equal, round and equally reactive to light. Unequal pupil shape or differences in diameter greater than 1 mm are often due to an eye injury, disease or neurological disorder. A difference of less than 1 mm in pupil size can occur

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Assessment	Procedures
	normally and are generally benign unless presenting along with ptosis or an ocular motility deficit.
Corneal Light Reflex	Using a penlight directed at the child's face from arm's length away, check for symmetry of the white pinpoint light reflexes while the child gazes at the light. Normally these reflexes fall symmetrically in or near the center of the pupils. Asymmetry of the reflexes is typically a sign of strabismus.
Cover Test	Have the child look at a small object, such as a small toy or sticker on a tongue depressor. As the child fixates on the target, cover each eye alternately. A shift in an eye's alignment as it fixates on the target may indicate possible strabismus.
Ophthalmoscopy	For older, cooperative children, the direct ophthalmoscope can be used to visualize structures in the back of the eye, such as the optic nerve, retinal blood vessels, and central retina. While child is looking into the distance at a target, use the ophthalmoscope to (starting at +10 lens) gradually move as close to the eye as possible while dialing less lens power until retinal vessels come into focus. Follow these vessels to view the optic nerve. A normal optic nerve is yellow-pink and generally flat. To view the foveal reflex, ask the child to look directly at the ophthalmoscope light. A normal foveal reflex should appear bright and sharp. Retinal hemorrhages can be present after a vaginal delivery but may also be a sign of severe child abuse. A swollen optic nerve may be a sign of increased intracranial pressure.
Fix and Follow Response	Evaluate the child's ability to fixate on and follow an object or toy held before the child. Perform with both eyes open first, and then repeat with each eye alternately covered. Determine if each eye can fixate on the object, maintain fixation for a short time, and then follow the object as it is moved in various directions. If the child demonstrates poor fixation and follow response when screened binocularly after 3 months of age, or demonstrates asymmetrical responses between the 2 eyes at any age, a referral is necessary for further evaluation.
Visual Acuity	Visual acuity screening should be done in a well-lit room, free of visual and auditory distractions. The eye chart should be at the child's eye level. Each eye should be screened separately (monocularly), ensuring child does not peek with other eye. Use adhesive patches or 2-inch wide hypoallergenic paper tape for effective occlusion.[1,4] Either critical line or threshold screening may be used.

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Assessment	Procedures
	Screen children ages 3-5 years using standardized LEA symbols or HOTV letters charts. LEA symbols and HOTV letters charts are standardized and have validated optotypes that provide the most accurate vision assessment. Matching/response cards can be used with LEA symbols and HOTV symbols charts for children who may be timid or non-verbal. Screening distance is 10 feet. This short distance will enhance interaction between the child and screener without decreasing the accuracy of screening results. Screen children who comfortably know their letters using Sloan letters or Snellen letters chart. Sloan letter charts are standardized and therefore preferable to Snellen letters. A screening distance of 10 feet is recommended. Children who are unable to recognize letters should be screened using a standardized LEA symbols or HOTV letters chart.
Instrument-Based Screening	Instrument-based vision screening (e.g. autorefraction or photoscreening) may be used if unable to complete an optotype-based visual acuity screening. This method can be attempted as early as 12 months of age. Instrument-based screening requires little cooperation from the child and is quick to administer. It is useful for nonverbal, preverbal, and timid children. Neither autorefraction nor photoscreening measure visual acuity, but both can identify ocular abnormalities that could lead to or indicate vision problems. The referral criteria may vary depending on the instrument used. Instrument-based vision screening involves substantial costs and may not be suitable for all provider offices. Children who can complete optotype-based screening should be screened using the appropriate method for their age.

*Table 1 is synopsis of screening recommendations outlined in the 2016 AAP Clinical Report Procedures for the Evaluation of the Visual System by Pediatricians