Vision Screening:

3 – 5 Years for Head Start

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Introduction and Disclaimer

• Nearly 17 years in vision screening field

• Former Director/Lead Trainer – Vision Initiative for Children – West Virginia University Eye Institute

• Member – Advisory Committee to the National Center for Children’s Vision and Eye Health at Prevent Blindness

• Consultant – Vision Screening Committee, American Association for Pediatric Ophthalmology and Strabismus

• Current Education and Outreach Coordinator for the National Center for Children’s Vision and Eye Health at Prevent Blindness

• Current Director – Vision and Eye Health Initiatives at Good-Lite and School Health Corporation

• Not in sales . . . Focus is encourage age-appropriate, evidence-based, and best practice vision screening as part of a strong, 12-component, Vision Health System of Care
Preschool-Aged Children: Undetected and Uncorrected Vision Disorders Can Impact Learning

5th grade – Cs & Ds. Consistently unruly in class. After VS & glasses, behaviors calmed almost immediately. 3 mo later – Bs & working on As. “You saved my nephew.”

2015 study – low-income, ages 3 through 5 yrs – found: Improvement in academic progress, confidence & behavior - increase in focus during lessons & classroom participation & interaction

317 2nd & 3rd graders – 12 high-poverty schools – Baltimore City – Children with uncorrected hyperopia did not perform as well on reading assessments compared with children without hyperopia

2015 study – ages 4 and 5 yrs with hyperopia (farsightedness ≥4.0 D) scored significantly worse on early literacy test than children with normal vision

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Diopter defined

- “Diopter” refers to the strength of a prescription lens required to give a child the clearest vision possible. The higher the number, the stronger the prescription lens.

- A child requiring 4 diopters of correction in prescription glasses, or contact lenses, would likely struggle with blurred vision, crossed eyes, or both, and would see much better with prescription glasses.


True story from Charles Short – Indiana Lions District 25C – West Lafayette, IN
• First grade reading ability found to be predictive of 11th grade reading outcomes, including:
  • Reading comprehension,
  • Vocabulary, and
  • General knowledge.


Evidence-Based Vision Screening Tools & Procedures for Children Ages 3 Through 5 Years

• Optotype-Based Screening
• Instrument-Based Screening
Cast of Characters

NCCVEH:
• National Center for Children’s Vision and Eye Health at Prevent Blindness

AAP:
• American Academy of Pediatrics
• American Association for Pediatric Ophthalmology and Strabismus
• American Academy of Ophthalmology
• American Association of Certified Orthoptists

2 Approaches to Vision Screening

1. **Optotype-based screening**
   • Tests of visual acuity using optotypes to measure visual acuity as interpreted by the brain
   • *Quantifiable measurement of the sharpness or clearness of vision when identifying black optotypes on a white background using specific optotype sizes at a standardized distance*

2. **Instrument-based screening**
   • Instruments do not measure visual acuity
   • Instruments analyze digital images of the eyes to provide information about amblyopia risk factors:
     • Estimates of significant refractive error (hyperopia, myopia, astigmatism)
     • Estimates of anisometropia
     • Estimates of eye misalignment (some, not all)
Threshold & Critical Line Screening

• Threshold screening
 ➢ Move down chart until child cannot correctly identify majority of optotypes

• Critical line screening
 ➢ Use only line child needs to pass according to child’s age

“Not so great” charts . . .
NOT Recommended by NCCVEH and/or AAP

"Sailboat"  Allen Pictures  Lighthouse or "House, Apple, Umbrella"

Snellen  Tumbling E

Why NOT Recommended?

- The use of validated and standardized optotypes and acuity charts is important for an accurate assessment of vision.
- Charts not standardized.
- Not well validated in screening environment.
- Children may not know their letters.
- Requires discrimination of direction, which is not sufficiently developed in preschool-aged children.


Importance of Appropriate Tools

- “Visual acuity scores can be significantly affected by the chart design.” (p. 1248)

- Excluding optotype size, “each visual acuity level on a test chart should present an essentially equivalent task”. (p. 740)

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National and international distance visual acuity eye chart design recommendations

- **1980 - National Academy of Sciences-National Research Council (NAS-NRC)**

- **1984 - International Council of Ophthalmology (ICO)**

- **2003 - World Health Organization Prevention of Blindness & Deafness (WHO)**

- **2010 – American National Standards Institute, Inc.**
Optotypes approximately equal in legibility
Horizontal between-optotype spacing = 1 optotype width
Vertical between-line spacing = height of next line down
Geometric progression of optotype sizes of 0.1 log units (logMAR, ETDRS)
5 optotypes per line
Optotypes black on white background with luminance between 80 cd/m² and 160 cd/m²

Similar recommendations across guidelines

Tips:
• Line outside optotypes
• 20/32 vs. 20/30
• 10 feet vs. 20 feet

Design guidelines = “ETDRS” or “logMAR” chart
Do the following eye charts fit national/international eye chart design guidelines?

Yes or No?

Preferred Optotypes for Ages 3 to 7 Years

- NCCVEH
- AAP
- Recommend LEA SYMBOLS® and HOTV letters as optotypes


Preferred Optotype Format

NCCVEH national guidelines call for using single, LEA SYMBOLS® or HOTV letter optotypes surrounded with crowding bars for children ages 3, 4, and 5 years at 5 feet

Options: Critical Line Screening at 10 feet


Also acceptable . . .

- 5 or 10 feet from chart to child’s eyes

- *New, standardized distance charts will be at 10 feet for children and adults*

- 10/xx on left side of chart with 20/xx on right side – report 20/xx
Occluders – Younger Children <10 Years

Unacceptable Occluders Ages 3, 4, and 5 years

- Hand
- Tissue
- Paper or plastic cup
- Cover paddle

Why unacceptable?
Children can easily peek

To Point or Not to Point . . . ?

- Pointing to each optotype to help children know where they are on the chart is permissible.
  - True or False?
  - ✓
- 1.8 “Line-by-line isolation or pointing may be used, but not letter by letter.”

No Pointing at Optotypes

- Holding pointer at optotype makes optotype easier to identify.
  - Instead . . . briefly point under or over top of optotype and quickly remove pointer.
- If line has a box around optotypes, stay outside the box with pointer.

“Untestable” is not a failed vision screening.

Keep track of “untestable” children.

Untestable children in VIP study were 2x as likely to have vision problems than those who passed vision screening.

If possible, rescreen untestable children same day.

If you have reason to believe that the child may perform better on another day, consider rescreening the child no later than 6 months.


NCCVEH
- Age 3 years:
  - Majority of optotypes on 20/50 line
- Ages 4 and 5 years:
  - Majority of optotypes on 20/40 line
- Ages 6 years and older:
  - Majority of optotypes on 20/32 line

AAP
- Age 3 years:
  - Majority of optotypes on 20/50 line
- Ages 4 years:
  - Majority of optotypes on 20/40 line
- Ages 5 years and older:
  - Majority of optotypes on 20/32 (or 20/30) line
  - Or 2-line difference even in passing lines (i.e., 20/20 and 20/32)


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Choices for Near Vision Screening

Can do critical line only with both eyes open or one eye at a time.

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2. Instrument-based screening
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     - Estimates of anisometropia
     - Estimates of eye misalignment
Instrument-Based Screening

- Use beginning at 12 months; better success at 18 months (AAP)
- Use instruments OR tests of visual acuity for children ages 3, 4, and 5 years (NCCVEH and AAP)
- Instruments at any age for 6 years and older if child or young adult cannot do test of visual acuity (AAP)


Instrument-Based Screening

- If use instruments, no need to also do visual acuity screening unless you want to check both VA and refractive error.
- If cannot “capture” a pass or refer result... refer child for comprehensive eye exam.
• Do not attempt to convert estimated refractive error to visual acuity value.
• Child could fail vision screening with instrument, but pass with conversion and miss opportunity for eye exam.

### Conversion Chart: Refractive State to “estimated” Visual Acuity

<table>
<thead>
<tr>
<th>Myopia</th>
<th>Hyperopia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nearsighted</td>
<td>Farsighted</td>
</tr>
<tr>
<td><strong>Minus (-) Sphere</strong></td>
<td><strong>Plus (+) Sphere</strong></td>
</tr>
<tr>
<td>Ages: All</td>
<td>Ages: 5y to 13y</td>
</tr>
<tr>
<td>-0.5</td>
<td>+2.00</td>
</tr>
<tr>
<td>-0.75</td>
<td>20/50</td>
</tr>
<tr>
<td>+1</td>
<td>20/60</td>
</tr>
<tr>
<td>-1.25</td>
<td>20/70</td>
</tr>
<tr>
<td>+1.5</td>
<td>20/100</td>
</tr>
<tr>
<td>-2.5</td>
<td>20/200</td>
</tr>
</tbody>
</table>

[1] Spherical results are based upon minus (-) cylinder convention.


Not Recommended for conversion of screening results for children screened for amblyopic risk factors.

### Instruments “Approved” by NCCVEH

- Welch Allyn® Spot™ Vision Screener
- Plusoptix S12C Vision Screener
- Welch Allyn® SureSight™ Vision Screener

Disclaimer: These tools are examples of vision screening instruments for this age group. These are not shown for the purpose of sales or promotion.
• You may see nothing in your child’s behaviors that suggests your child has a vision problem.

• Most vision problems are not like a scratch that requires a bandage.

• Screening is the only way to know if the eyes are healthy and vision is developing properly.

Parents Want to Know . . .

• What’s involved in the vision screening process?
  • How long does it take?
  • Does it hurt?
  • What happens next?
  • How to receive support from other parents who have gone through this (eye exam).

• Information from Parent Focus Group at 2013 National Head Start Association Parent Conference
How Parents Say They Want to be Engaged in Follow-up to Eye Care

Parents and caregivers will likely need both practical/logistical and social/emotional support for themselves and their children

- Financial
- Transportation
- Helping parents manage follow-up appointments
- Dealing with insurance companies
- Acceptance of problem
- Dealing with cultural understanding and assumptions
- Trusting doctors

Resources to Support Families . . .

- Financial Assistance Programs
- Parent Education
- Tips for Wearing Eye Glasses
- Eyes That Thrive: [http://www.preventblindness.org/eyes-thrive](http://www.preventblindness.org/eyes-thrive)
- [http://nationalcenter.preventblindness.org/resources-2](http://nationalcenter.preventblindness.org/resources-2)

Year of Children’s Vision

- [http://nationalcenter.preventblindness.org/year-childrens-vision](http://nationalcenter.preventblindness.org/year-childrens-vision)
- Archived vision screening webinars in Resources

Resources to Support Families . . .

- Financial Assistance Programs
- VS Referral Documents
- Parent Education

[http://nationalcenter.preventblindness.org/resources-2](http://nationalcenter.preventblindness.org/resources-2)
NASN Vision and Eye Health Resource

(National Center for Children’s Vision and Eye Health and NASN partnership)

https://www.nasn.org/nasn-resources/practice-topics/vision-health

Info for Prevent Blindness nationally recognized vision screening certification you can do online at your own pace

http://nationalcenter.preventblindness.org/prevent-blindness-childrens-vision-screening-certification-course

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