Vision Screening

CURRENT BEST PRACTICES
AND SCREENING RESOURCES

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Disclosure

- I have the following financial relationships with the manufacturer(s) of any commercial product(s) and/or provider of commercial services discussed in this CME activity.
  - Consultant for: Retrophin

- I do intend to discuss an unapproved/investigative use of a commercial product/device in my presentation.
Learning Goals

- Understand the importance of vision screening and the new AAP guidelines: To detect amblyopia or associated risk factors

- Familiarize yourself with different screening techniques, photoscreening devices, and which can integrate with the EMR

- Understand coding and reimbursement for screening

- **Make a commitment to start or optimize vision screening in your practice**
Why Screen Kids Early?

- Children with refractive error treated before 30 months have a higher likelihood of achieving 20/20 vision
The Burden of Amblyopia

- 2-4% of population have experienced this condition
- Most treatable at younger ages (< 5 yrs old)
- Most common cause of monocular vision loss in adults aged 20-70
  - (US Preventive Service Task Force)
- Screening rates are suboptimal based on survey of 377/690 responders in pediatric groups (2006)
  - Acuity Screening: 3 yo - 35%, 4 yo - 73%, 5 yo - 66%
  - Photoscreening: 8%
Historical Screening Results

- Staff and doctors trained in traditional acuity testing at 9 primary practices in Alabama
- Screened 2933 children aged 3-5 yrs old from May 2007- July 2008
- 3.2% failed, 11.9% untestable (27% among 3 year olds)
- Positive predictive value by age
  - 3 yo - 30%
  - 4 yo – 77.8%
  - 5 yo - 87.5%
- Only 38.7% received follow up eye exam
Instrument-based screening, if available, should be first attempted between 12 months and 3 years of age and at annual well-child visits until acuity can be tested directly.

Detects amblyopic risk factors.

Direct testing of visual acuity can often begin by 4 years of age, using age-appropriate symbols (optotypes).

Detects poor vision from amblyopia or other cause.
Yield of Vision Screening

- **Visual Acuity Testing:** 94.2% detection of cases
  - 1245 kindergarteners tested with acuity and stereo testing
    - Test time ~ 4 minutes

- **Photoscreening:** 94.25% detection of cases
  - 147,809 children over 9 years
  - 4.2% (6247 referred)
  - Follow up rate 36.1-89.5% - increased to 81.3% with introduction of coordinator
    - Test time ~ 2 minutes
Visual Acuity Testing

- Most children can do this by age 4 (some at 3)
- Monocular testing with RELIABLE occlusion is imperative
- Linear or “crowded” optotypes avoid overestimating vision
- Endpoint detection
  - “critical line” acuity – age dependent expected line
  - “threshold” acuity – smallest detectable line working down the chart – may pick up minor visual issues – more time consuming
Critical Line Acuity

- Identify the majority of optotypes on a line with 4-6 characters
- Quicker to administer
- Will pick up serious vision discrepancies

Passing Visual Acuities

- 36-47 mos: 20/50
- 48-59 mos: 20/40
- 60+ mos: 20/30, 20/32
Optotypes (Visual Targets)

- **Current recommendations**
  - HOTV
  - Lea Symbols
  - Sloan or Snellen Letters- school age children

- **Not recommended (not standardized)**
  - Allen pictures, Lighthouse characters, Sailboat chart

- **Not recommended (orientation requirements make them difficult for younger children)**
  - Tumbling E, Landolt C
Lea and HOTV Symbols

Linear Presentation

Crowding Bars
Commercially Available Kit

AAPOS Vision Screening Kit
Conforms to AAPOS/AAO/AACO/AAP Visual Acuity Standards

Contents:
- Occluder patches
- Occluder glasses
- Occluder paddle
- 10 ft. measuring cord
- Match response card
- Acuity charts:
  - Sloan letters
  - Available with choice of Lea symbols or HOTV letters
- Two instructional DVDs

Add wide paper tape or patches to this

Made by Good- Lite: $70-80 cost
### Refractive Risk Factor Targets

<table>
<thead>
<tr>
<th>Age, mo</th>
<th>Astigmatism, D</th>
<th>Hyperopia, D</th>
<th>Anisometropia, D</th>
<th>Myopia, D</th>
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<tr>
<td>12–30</td>
<td>&gt;2.0</td>
<td>&gt;4.5</td>
<td>&gt;2.5</td>
<td>&gt;−3.5</td>
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<tr>
<td>31–48</td>
<td>&gt;2.0</td>
<td>&gt;4.5</td>
<td>&gt;2.0</td>
<td>&gt;−3.0</td>
</tr>
<tr>
<td>&gt;48</td>
<td>&gt;1.5</td>
<td>&gt;3.0</td>
<td>&gt;1.5</td>
<td>&gt;−1.5</td>
</tr>
</tbody>
</table>

**Nonrefractive Risk Factor Targets**

- Media opacity >1 mm
- Manifest strabismus >8 prism D in primary position

D, diopters
Free Computer Based Acuity Screener

- The Jaeb Visual Acuity Screener
  - Available from the Jaeb Center for Health Research
  - Free of charge and unlimited use

- Specifically for use by nonophthalmic health care professionals

- Incorporates all current AAP screening guidelines

- Tests Critical Acuity for age and gives pass/fail result
Screening Setup

- Quiet area free of distractions
- **Complete occlusion** of eye with patch or tape
  - (for acuity testing)
- Vision testing traditionally done at a distance
  - 10 feet for children < 5 yrs old
  - 20 feet for children > 5 yrs old
- Automated devices at 3-5 feet, may need dim room
- Computer, tablet and smart phone devices may be done at 1-2 feet
  
  Shorter screening distances have not yet been validated in population studies
CPT codes for Vision Screening

- Acuity testing: 99173

- Instrument based screening 2016
  - Both codes are bilateral and include photoscreening or automated refraction devices
    99174 - Remote analysis and report
    99177 - On-site analysis and report
“Because family history is an important risk factor for amblyopia and strabismus, pediatric clinicians should consider referring children who have first-degree relatives with these conditions;”

AAP Policy Statement: Visual System Assessment in Infants, Children, and Young Adults by Pediatricians, Pediatrics Dec 2015
Gold Standard Vision Screening - Is it changing?

- Optotype visual acuity testing of each eye when able to perform the test

- New automated vision screeners have allowed screening for risk factors to be initiated at earlier and more treatable ages
Optotype vs Automated Screening

- **Vision in Preschoolers (VIP) study – 2004**
  - Acuity screening had sensitivity of 77%
  - Photoscreening had sensitivity of 81-88%
  - Less test time for automated screening (2 min vs 4 min)
Advantages of Automated Screeners

- Poor cooperation with traditional acuity testing
  - Behavioral: hyperactivity, autism spectrum, shyness
  - Developmental limitations: intellectual disability, preliterate
  - Dislike of covering eye for monocular testing
- Useful in smaller spaces (no need for 10 foot unobstructed view)
- Quicker than traditional acuity testing
- Screening can start younger than 3 years
- Can be used to corroborate abnormal acuity test
Sensitivity vs Specificity

- Referral criteria can be adjusted on the devices

- High sensitivity, (picking up all possible patients) causes reduction in specificity and over-referrals of normal patients

- High specificity, (decreasing the chance of false positive referrals) causes loss in sensitivity and misses some patients who have a problem
Automated PhotoScreening Devices

- **iScreen** – no EMR connectivity
  - Central analysis, needs darker room

- **PlusOptix** - EMR connection
  - On-site analysis, Stationary and portable versions

- **Spot vision screener** - No EMR connectivity
  - On-site analysis, needs darker room

- **GoCheckKids** - EMR connection
  - Central analysis, needs darker room
iScreen

- Portable digital photo-screener
- Rapid flash captures red reflex and corneal light reflex
- Hold 3 feet from child, semi dark room for a minute
- Images sent to iScreen vision central analysis for review by specialists, maintained there
- Print out reports pass/fail in less than 15 minutes
- Recharge overnight
- 30 day trial period, 2 year warranty
iScreen
PlusOptix

- Photoscreener/autorefractor
- Onsite analysis
- Portable and stationary versions
- Printable label and report for chart
- Two versions - table top and portable
- Rechargeable batteries
- No calibration or maintenance
- Free online software updates,
- Connects to EMR, printable reports
- 1 year warranty
PlusOptix

Immediate screening result

Refractive data for referral
Spot Vision Screener

- Handheld portable Digital photoscreener by Welch Allyn
- 3 foot distance, *normal illumination?*, touch screen
- Wireless printing and wi-fi enabled, manual exports via USB
- Return unit to manufacturer for software updates
- No annual calibrations required
- No EMR connections
- Instant Pass/Fail results
GoCheck Kids

- Smartphone Application for photoscreening and visual acuity checking
- Monthly subscription based on volume—
  - Pays for itself after 5 reimbursements/month (avg pediatrician may do 40 screens/month)
- Preloaded Nokia digital phone is provided (free demo version for Iphone 6)
- Automatic software updates, connects to EMR
- Comparable to other photoscreener results
  - 81% sensitivity,
  - 91% specificity
  - 3% inconclusive
Autorefractors

- Hand held autorefractor detecting refractive error in each eye at a time
- Not useful for strabismus or opacities
- Useful to detect anisometropia, a leading cause of amblyopia
- Will probably be replaced by photoscreeners
  - Retinomax- already discontinued
  - Welch- Allyn Suresight – used by eye doctors for refraction starting point
Screening Financial Analysis

- Automated screening reimbursement $25-30 per screen (when covered by insurance)

- **GoCheck Kids**: $99/pediatrician/mo (avg $80) - no upfront cost

- **iScreen**: $4200, “lease-option” bundles, equipment lease and per-image readouts

- **PlusOptix S12**: $5385-5985

- **Spot**: $6198
Reimbursements – One practice experience

- Reimburse 15% of total billed amount, some carriers won’t reimburse or have strict age guidelines

- Sample reimbursements:
  - Aetna $5-9
  - BCBS- $26
  - Cigna- $11-36
  - UHC- $29
Interested parties have expressed concern that schools cannot use a photoscreening device to conduct the required vision screening of students and assert that this technology would provide a more efficient alternative in detecting vision disorders. The goal is to allow the use of a photoscreening device in Texas schools to detect vision disorders.

- September 1 2017
Take Home Points

• Find a way to add photoscreening to your practice
• Practice good acuity screening starting at age 4 at a minimum if you cannot do the first (3 is better)
• Lobby for appropriate reimbursement and insurance coverage
• Refer any child who fails, is uncooperative (treat as a fail) or has a family history of childhood vision loss
• Find a way to close the loop – make sure patients who are referred are seen
References

References

- Visual System Assessment in Infants, Children, and Young Adults by Pediatricians, AAP Policy Statement, Dec 2015, Pediatrics
References

References


- Donahue SP, The Role of Technology in Routine Vision Screening of Infants and Young Children, May 2016, Neonatology Today 11(5),