1. Describe 3 components of a standardized eye chart for optotype-based screening.

2. Describe 3 steps to consider when using devices for instrument-based screening.

Threshold vs. Critical Line for Optotype-Based 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
Research supports using single, LEA Symbols optotypes surrounded with bars at 5 feet for children aged 3 to 5 years.

Many of you use threshold eye charts as a test of visual acuity – this session will focus on threshold eye charts.

**Importance of Appropriate Test of Visual Acuity**

- “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)

**National and International Distance Visual Acuity Eye Chart Recommendations**

- **1980 - National Academy of Sciences-National Research Council (NAS-NRC)**
  - Recommended Standard Procedures for the Clinical Measurement and Specification of Visual Acuity

- **1984 - International Council of Ophthalmology (ICO)**
  - Visual acuity measurement standard.
  - www.icoph.org/dynamic/attachments/resources/ico/measurement/04-01.pdf

- **2003 - World Health Organization Prevention of Blindness & Deafness (WHO)**
  - Consultation on Development of Standards for Characterization of Vision Loss and Visual Functioning

- **2010 - American National Standards Institute, Inc.**
  - Performance standard for the optical design of optotypes used in clinical visual acuity measurement systems
**Tips:**
- Line outside optotypes = inverted pyramid, NOT rectangle
- 20/32 vs. 20/30
- 10 feet vs. 20 feet

**2 Challenges With “Snellen Charts”**
- Do not meet national/international eye chart design guidelines
- Are not standardized
- Some optotypes are easier to guess than others

**“Sailboat” Chart Lacks Scientific Evidence**
- Does not meet national/international eye chart design guidelines
- Optotypes of different sizes on same line
- NEVER on recommended list of eye charts from American Academy of Pediatrics
- Chart’s history and developer unknown
- No supporting research to validate

**2 Challenges With Tumbling E**
1. Children’s orientation and direction challenges with directional optotypes
   a. Emerging cognitive skill
   b. Up/down emerges before left/right
   c. Usually in place by ages 8 or 10 years
2. Ability to guess optotype at threshold

**“Because of the difficulty in inducing children and stupid illiterates to name the position of the Snellen E, or to hold its duplicate in the hand in the same direction as the character on the chart, the author constructed a set of test-type for illiterates in 1886”...**

**References:**
3 Challenges With Allen Pictures
1. Asking young children to make a “whole” picture from “parts”
2. Cultural bias
3. Calibrated against Snellen 30-ft E, not Landolt C (international standard)

Lighthouse Chart
- Optotypes easy to guess
- Poor visual acuity results when compared with international Landolt C standard
- Not on list of charts recommended by:
  - American Academy of Pediatrics
  - American Association of Certified Orthoptists
  - American Association for Pediatric Ophthalmology and Strabismus
  - American Academy of Ophthalmology

Preferred Optotypes for Pediatric Eye Charts

LEA Symbols
- Only pediatric eye chart with optotypes that blur equally at threshold
- Culturally neutral
- Children call optotypes what they want
  - i.e., Square may be an iPad
  - Circle may be hula-hoop

Beware of...

“Linear-Spaced” Eye Charts
- 100% spacing between optotypes (1 optotype-width)
- Unequal spacing BETWEEN lines


“Wide-Spaced” Eye Charts

- Between-optotype spacing >100%
- Unequal spacing BETWEEN lines
- Basically contains lines of single optotypes


No Single Optotypes or Flashcards Without Surround Bars for Typically Developing Children

- Visual acuity results, on average, 3 lines worse on charts with lines vs. single, non-crowded optotypes
  - For example, 20/32 with single, isolated optotype and 20/80 with line chart


Instrument-Based Vision Screening

- Instruments
  - Require no child response or interaction
  - Machines, such as Titmus
    - Not considered an instrument
    - Use slides or cards
      - Require child response or interaction


Current Recommendations

<table>
<thead>
<tr>
<th>Child Ages for Optotypes and Instruments</th>
<th>OPTOTYPE</th>
<th>INSTRUMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preverbal children</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Preterm infants</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>6 months to 3 years</td>
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<tr>
<td>3 to 5 years</td>
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<td>X</td>
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<tr>
<td>&gt;5 years</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

Current Recommendations

- Children aged 3 to 5 years:
  - Instrument-based screening has not been shown to be superior or inferior to optotype-based screening.

Instrument-Based Screening

- Most experts believe cannot convert instrument measurement to visual acuity
- If use instruments, have test of visual acuity as back-up
  - Forgot to charge battery
  - Device malfunctions
  - Cannot achieve a reading

- Head Start children in Vision in Preschoolers Study
  - Could “nearly always” participate in instrument-based screening if unable to participate in optotype-based screening, and vice versa


- Welch Allyn SureSight
  - Calibrated every 18 months
  - Set in child mode
  - Set in “minus” calibration until you can upgrade to recent software
  - Upgrade software to Version 2.25

- PediaVision Spot
  - Updated with most recent software
  - Discuss referral criteria with local eye care professional

- Plusoptix S09, S12R, or S12C
  - Updated with most recent software
  - Discuss referral criteria with local eye care professional

Thank You for Your Time and Attention!!!!