



NIH Toolbox

Assessment of Neurological and Behavioral Function

“Building the Toolbox”

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For more information, please visit www.nihtoolbox.org
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Vision Team Members



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Vision Definition



- Vision is a complex sensation that provides us with a personal conscious representation of our surrounding environment.
- The process begins when the cornea and lens refract light from objects to form a image on the retina, the thin layer of nerve cells that lines the inside surface of the eye.
- Photoreceptor cells transform the light energy into neural signals that are processed first by neurons in the retina, and then by neurons in visual parts of the brain.

Vision Subdomains



There are several important aspects of visual sensation:

- resolution of detail
- field of view
- appearance of contrast
- appearance of colors
- perception of motion
- resolution of depth
- seeing in dim light or in the presence of glare

A variety of clinical tests are used routinely to assess each of these aspects of vision, but *visual acuity and visual fields* are most commonly tested and most important.

Priorities for Assessment



There are many potential areas of interest in vision, but expert vision consultants agreed on 3 most important and useful for Toolbox:

- ✓ Visual acuity (central vision)
- ✓ Field of vision
- ✓ Visual function of everyday tasks (QOL)

Measures Selected



Visual Acuity

Dynamic Visual Acuity Test (DVA)

- Combined effort with Vestibular Balance team measure, saving administration time
- "Static" component of DVA will mirror common computer-administered acuity measure
- Symbols will be used for young children in attempt to better assess ages 3-5
- 5 minutes, computer-administered

Measures Selected



Field of Vision

Motion Detection Perimetry Test

- Test of motion detection in peripheral visual field by finding smallest circular patch of motion subject can detect
- Innovative and easy to administer
- Ages 5+
- 10 minutes, computer-administered

Measures Selected



Visual Function

Vision-Targeted Health-Related Quality of Life Survey

- Assesses subject's perception of his/her ability to perform specific types of activities in everyday life
- Incorporates more aspects of vision, including color, far and near vision
- Self-report for ages 10+*
- 5-10 minutes, computer-adaptive administration
- Combines best of existing content with new items

*Lowest appropriate age will be confirmed/refined empirically

Development Plans



Dynamic Visual Acuity

- ◆ Close collaboration between Vestibular Balance and Vision teams
- ◆ Determine age at which letter vs. symbol is most effective
- ◆ Confirm equivalent reliability, validity of static test at different screen resolutions and subject distance from screen



Development Plans



Motion Detection Perimetry

- ◆ Make changes in testing procedure to reduce test time
- ◆ Test group from general population with the new test to determine normal values
- ◆ Determine lowest appropriate age of administration

Development Plans



Vision-Targeted Health-Related Quality of Life Survey

- Select domains and put existing items into them (bin)
- Select common item stem and response options
- Select item content (winnow) from existing items
- Draft new items as needed
- Try out, calibrate, validate on adolescent, adult populations

Color Vision (sample)

In the last 7 days, how much difficulty did you have in distinguishing between colors?

- Not at all*
- A little bit*
- Somewhat*
- Quite a bit*
- Very much*
- Unable to do because of eyesight*

Vision Timelines for Toolbox



- ◆ October-December 2008
 - Complete DVA software development
 - Complete Motion Detection Perimetry development
 - Select and write items for HRQOL survey
- ◆ February 2009
 - Calibrate and validate HRQOL survey items
- ◆ April-May 2009
 - Complete validation of DVA and Motion Detection Perimetry
 - Prepare computer-adaptive version of HRQOL survey



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