

***Working with Infants and Toddlers with Visual Impairments and Their Families***  
***April 25 – Roanoke, Virginia***

**ASSESSING AND FACILITATING THE USE OF FUNCTIONAL VISION IN  
YOUNG CHILDREN WHO ARE VISUALLY IMPAIRED**

**HOW DOES A DOCTOR TEST VISION IN YOUNG CHILDREN?**

- **Eye Specialists:** Ophthalmologist - Optometrist - Optician
- **Clinical Eye Examination**

**WHAT IS A VISUAL IMPAIRMENT?**

- **Visual disorders in children**
- **Visual acuity:** Measure of the eye's ability to distinguish object details and shape. Assessed by the smallest identifiable letter/number/picture that can be seen at a specified distance, usually 20 ft (distance vision) or 16 inches (near vision). A visual acuity of 20/20 is considered "normal" vision.
- **Legal definition of blindness:** 20/200 or less visual acuity in the better eye with the best correction; or, presence of a field defect to such an extent that visual field is 20 degrees or less.
- **Legal definition of partially seeing:** Visual acuity better than 20/200 but less than 20/70 in the better eye with correction.

**WHAT IS FUNCTIONAL VISION?**

- The child's present level of functioning with vision, in different environmental situations, with age-appropriate tasks. Functional vision assessment takes place over time, in many conditions, in many environments, using motivating materials and people.
- The minimum and maximum thresholds under which visual function takes place and when it ceases to exist (for example, how low the contrast can be before environmental adaptation, what levels of light and glare causes visual discomfort for someone with photophobia) Functional vision is not "constant" in all situations.
- The environmental, physical and psychological factors that enhance or hinder visual function. Functional vision is individual – two children with identical diagnosis and acuities may function differently due to individuality

in cognition, sensory integration, perception, psychological and physical makeup.

- Visual efficiency is the efficiency with which one can accomplish visual tasks (for example, whether a task is visually easy or difficult to accomplish, given certain visual conditions). Fatigue levels and the individual's ability to sustain the task are extremely important. (Corn, 1986, 1989)

## **WHAT IMPACTS A CHILD USING HIS FUNCTIONAL VISION?**

- **Implications of the eye disease**
- **Health status/Medications**
- **Behavior state/Arousal and attention**
- **Movement and motor control**
- **Selectivity in visual attention**
- **Environmental Factors**
  - Illumination
  - Contrast
  - Space
  - Color
  - Time
  - Familiar/Unfamiliar Environment
  - Context
  - Changes in the environment
  - Auditory conditions/distractions
- **Behavioral factors**
  - Motivation
  - Behavioral state
  - Fatigue
  - Experience

## WHAT AREAS DO YOU ASSESS WHEN YOU EVALUATE FUNCTIONAL VISION?

All of the areas described previously (i.e., health status, medications, environmental conditions that facilitate or hinder visual function) are part of the evaluation of functional vision. In addition, the child's visual capacity is evaluated such as:

- **Appearance of eye:** Are there structural defects such as coloboma, fixed pupil, cataract or any other irregularities? Does one eye look smaller; does the eyelid droop? (Defects on the outer portion of the eye may interfere with how the light passes through the pupil, white pupil can indicate cataract or retinoblastoma.)
- **Presence of behaviors:**
  - Head tilt/position: may indicate a problem in visual field, the child may tilt his head to use the best part of his visual field, or the child may be seeing better with one eye, or the child may be hearing better with one ear.
  - Squint: may indicate that the child is sensitive to light or that the light source is too bright, or it may be that the child is refracting himself.
  - Facial straining: may indicate that the child is attempting to use his vision.
  - Gaze aversion: may indicate too much sensory input or that the object is too close if the child does not have convergence.
  - Light gazing or light flicking: usually indicates that the child is receiving some visual input from light or can distinguish light and dark.
- **Presence or absence of nystagmus:** sensory nystagmus is non-induced, may consist of fine jerky movements, which are either horizontal or vertical, but can also be roving. Sensory nystagmus is not seen at birth but can develop by 2-3 months of age.
- **Muscle imbalance:** eye turn or inability of the eyes to work together, denotes binocularity, depth perception, muscle or nerve problem.
- **Blink reflex:** reflexive blinking of eye in response to threat, which may indicate light perception to gross object perception.
- **Pupillary response:** response to light (may indicate some light perception; a lack of response is not always an indication of total blindness, may indicate a structural defect, cortical visual impairment, a neurological impairment or absence of efficient central vision).
- **Light perception:** is the child aware of light?
- **Visual awareness:** the child demonstrates awareness level of visual input but may not be able to visually fixate.
- **Visual fixation:** ability for eyes to fixate on object.
- **Shift of gaze:** efficiency of fixation as well as awareness and response to objects in opposite areas of the visual field.
- **Convergence:** ability of eyes to turn inward when looking at near range (if one eye focuses on a near target and the other eye turns in or out, the one that is focusing on the target may be the preferred eye.)

- **Visual pursuit/tracking:** ability of the eyes and/or head and eyes to follow a moving object; develops first horizontally, then vertically and finally circularly.
- **Visual scanning:** ability to search with eyes and/or head and eye movements.
- **Visual field:**
  - Central field: 25 degree field of view of the eye. This area is important for detail vision; losses in the central area of vision will affect color and detail vision, reading, etc.
  - Peripheral field: remaining 180-degree field of view of the eye. This area is important for mobility purposes; losses in the periphery will affect gross movement detection and ability to function in conditions of dim lighting.
- **Near vision:** The distance and size of object the child looks at, follows, or reaches for is an indication of child's visual acuity, range of visual field, and accuracy of eye-hand integration.
- **Distance vision:** The ability to follow an object at far distances indicates fixation ability and a rough estimate of acuity at far points.
- **Visual perception:** Likeness/differences, matching, sorting, ordering, category grouping, recognition of missing parts, identification of missing parts.
- **Travel vision/mobility:** How the child gets around obstacles in his environment, what types of objects (size, location, color, etc) is he able to see at a distance.

## **HOW DO I KNOW IF A CHILD WITH A VISUAL IMPAIRMENT SEES SOMETHING?**

Look for the following responses noting the size of object, distance that the object is from the child, and location of the object in the child's visual field:

- Awareness responses: opens eyes or blinks to light, quiets to light or objects, smiles or frowns to light or objects, increases or decreases behavior.
- Visual abilities: visual fixation, tracking, shift of gaze for light or objects
- Motor responses: head righting, head turn, visual reach, swiping at or grasping objects, turning head to look for objects, movement to light or objects
- Pointing, matching or naming objects or pictures

## **HOW DO YOU HELP PROMOTE THE USE OF FUNCTIONAL VISION IN YOUNG CHILDREN WHO ARE VISUALLY IMPAIRED?**

- **Movement and positioning of child**

If a child has a motor impairment, it is important to attend to the child's postural control, positioning and handling that organizes the child's postural

system to provide proximal stability and alignment so that the eyes have the possibility of moving from a stable base. Use several positions and balance the alerting quality of an upright position with positions that do not tax motor skills so that vision can be utilized. Positions that require weight-bearing into the feet and/or hands have shown to help organize vision for those children with cortical visual impairment. Also, handling the child at midline and positioning the child in midline helps organize the child. Movement and handling can also help bring a child to a more active alert state so that they can use their vision. For example, it may be better to work on dynamic movement skills and then position for use of vision.

For the child who is “minimally responsive” to any form of stimuli, Langley (1998) outlines handling techniques and sensory cues that (1) organize the child’s posture to provide proximal stability for eye mobility, (2) align head and neck, when appropriate, (3) facilitate optimal arousal and attending behaviors to enhance visual awareness, fixation and other components of visual functioning, and (4) recruit postural adjustments and movement patterns that can serve as a contingent response to visual behaviors.

- **Movement and positioning of materials**

Positioning of materials will be important so that the child can have opportunities to see the materials. To do this, it is important to match the visual orientation of the child to the orientation of the materials. For example, if using a mobile over a baby’s crib, choose one that orients the pictures or objects facing the child and suspend them at a distance that matches the child’s vision. In sitting positions, generally position materials to encourage an upright head posture. Although midline positions may assist in normalizing postural tone, some child will need to tilt their head or use one eye over the other to use their vision the best. If a child needs to get close to materials, bringing the materials upright on stool or slant board will prevent the child from stooping over, blocking light and increasing neck fatigue. Explore the best location and distance for placement of materials for each child.

Remember that object movement is very alerting when presented in the peripheral fields (side vision). Children with CVI may sometimes rely more on the use their side vision and do better when materials are first presented to the side and then brought more to central location. Remember that looking at midline in a near position requires good convergence so some children with motor disabilities have difficulty maintaining a fixation on materials placed too close at midline.

- **Select or adapt toys and materials that match visual and sensory needs**

Factors associated with early visual attention in infants include “faceness”, especially the faces of caregivers, brightness, patterned objects and pictures,

novelty, and upright posture. For young infants, work on visual attention to family, visual attention to their hands and feet, and visual attention to objects and toys depending on motivation. For children who have CVI, objects that are functional and familiar may be the most attractive as well as objects presented contingently. It is important to match the sensory needs of the child watching for cues if the child becomes over stimulated. With children who have seizures, it is necessary to understand any type of sensory input that may increase or cause seizures.

- **Present materials first visually, then reinforce with sound or touch...pair vision and other cues to attract attention (auditory, movement, touch) if necessary**

While children who have CVI may need to have sensory information provided in isolation (e.g., presenting object visually without auditory clutter), other children do better when touching an object or when attracted to look at the object with sound or verbal cue. Try presenting objects visually first, and then add increasing levels of prompts or adaptations. For example, when helping a child visually attend to his spoon while being fed, choose a brightly colored spoon and present it in the best location for the child, move the spoon slightly to see if that can attract attention, add telling the child “look for your spoon” or “here is your spoon”, add a tactual cue of helping him to reach for it or touch the spoon to his lip.

- **Mediate environmental factors to enhance the opportunity for the child to see**

All children have thresholds for specific environmental cues below and above which they will not be able to function with their vision. The use of one cue may be more effective than another for a specific a task or a combination of cues may also be considered for visual efficiency.

If a child does not appear to be seeing something:

- **Evaluate lighting:** increase or decrease lighting, try task lighting or highlighting materials with flashlight, check for glare.
- **Increase contrast:** change backgrounds or provide a visual background such as putting a dark sheet on the couch to place the toy on, use light-box to provide contrast to materials, change materials so that color provides a better contrast, adapt materials to increase contrast.
- **Change the size of the objects or materials:** use a bigger object if necessary, or, if a child has to get very close, a smaller object or picture may be better so that the child can see the whole object.

- **Change the distance or the angle:** move the object and child closer together, encourage the child to hold materials at different angles, let the child hold the object as close to his eyes as needed.
- **Allow enough time for a visual response:** be sure to give the child enough time to focus on the object, especially if the child has a motor impairment; if a child needs to be very close to an object, he will need more time to visually scan and look at the object; don't "chase" the child's vision but allow the object to be stationary and allow the child time to organize and look at it.
- **Change materials:** if a child is not looking, explore if it is because he is not interested or motivated in the materials, use cause-and-effect materials, use familiar or favorite materials or add movement to increase motivation. For infants, looking at mother's face, at their own hands and feet may be more motivating than toys.
- **Present only one type of sensory input at a time – or – pair with other sensory input:** If a child is not responding, check to see what other sensory input you may be providing. Some children do better when only have to look at an object (and not touch or hear the object) while others do better by adding other sensory information.
- **Use cause-and-effect when presenting visual information:** using a contingency approach can increase visual attention; for example, when presenting a sound toy that the child likes, activate the toy and let the child look, then keep the toy quiet and move it slightly so that the child has to find it again, when the child looks at it, activate the sound of the toy to reinforce looking.
- **Check for visual clutter:** are there too many materials on the table causing visual clutter or visual crowding, is the picture too "busy", are there too many choices?
- **Check for auditory clutter:** check to see if the child is listening to other things going on in the environment, check for ambient noises from refrigerators, air-conditioners, etc., and be aware of auditory cues that you are giving to the child.
- **Use familiar landmarks or larger visual clues to help child visually search and locate an object:** if the child cannot see an object, give him additional information to help him locate it. For example, if she cannot find his shoes, tell him they are beside the door. This gives the child a visual cue that he can see to help him locate a smaller object he cannot see.

## WHAT TYPES OF ACTIVITIES SHOULD BE USED TO HELP A CHILD USE THEIR VISION?

Identify the visual skills to be reinforced and then determine how they can be used in the context of daily routines and the developmental tasks of the child. Visual skills are not used in isolation, they are used to communicate, explore, reach, move, and to perform everyday activities.

Sample visual behavior	Example Play Activities	Example Feeding Activities	Example Bath time or Bedtime Activities
Visual awareness and fixation to light	<p>Play a social game with your baby's hands and feet while illuminating them with a flashlight.</p> <p>Choose toys with lights, highlight toys with lamp or flashlight or place toys on a light box.</p>	<p>Position yourself so that a light is shining on your face (facing a bright window) so your baby can look at your face when being fed. When bottle feeding, switch the sides that you hold your baby so he can orient to left and right.</p>	<p>When entering the bathroom, tell your baby that you are going to turn the lights on and then turn them on.</p> <p>Position your baby at different ends of the crib so that he will turn to the light from the window or light source.</p>
Visual fixation to people or objects	<p>Put wrist rattles with bright colors on his wrist or feet so that it will encourage fixation on hands/feet.</p> <p>Know what visual components are attractive to your child and choose materials or adapt common objects with those components to enhance fixation.</p>	<p>Closely position your child so that he is looking into your face when playing to increase opportunity for fixating on your face.</p> <p>While being fed, have your child fixate on a colored spoon before it is placed in his mouth. Once your child is finger feeding, place crackers in different locations on his tray, using a highly contrasting place mat if needed.</p>	<p>Use floating toys to give your child something to visually fixate on and find in the bath.</p> <p>Allow your child opportunity to see the wash cloth or colorful bathing mitt in front of his face (and giving him anticipation cue) that you are going to wash his face, legs, etc.</p>
Visual tracking	<p>Choose toys that have movement that naturally elicit tracking...toys that move slowly when activated, bubbles, etc.</p>	<p>Gain the child's attention to baby food and move the spoon slowly toward the child to reinforce tracking...use slow movement if the child has trouble following.</p>	<p>Move floating toys on the water to reinforce tracking skills...help the child splash and make them move.</p> <p>Call your child's name in the morning when</p>

			coming into the bedroom to reinforce tracking.
Shift of gaze: glances from one object to another	Present 2 choices of toys to your child and help him shift gaze between the two by making a noise or having him touch or hold them...use lingered gaze to indicated choice.	Present 2 choices (spoon/bottle, choices of food/drink) and use lingered gaze for preference or use shift of gaze from spoon to your face to indicate readiness for more.	In the bath, while washing hands or feet, give tactual cues (play "little piggies") to help the baby to shift gaze from one hand to another or one foot to another.
Visual scanning: looking for a specific object or examining details	Play "peek-a-boo" and move your face to one side when the baby's face is covered so that he will have to visually scan to find you.  Choose toys with visual details for the child to look at.	Put more than one item on the tray so that the baby needs to search and scan for his spoon or cup.	In the bathroom, use a brightly colored shower curtain with pictures for the child to search and look for.  At bedtime, read a favorite book and let the child search for a repeating picture.
Visual perception: Likeness and difference Matching Sorting Ordering Category grouping	Choose books with clear pictures or photographs, pay attention to visual clutter and the amount of detail. Also, notice glare and reposition if needed. Child can use pointing and naming of pictures.	Use kitchen utensils and objects for identification and classification.	At bedtime, you can choose a book that looks at things that are alike, different, etc.

When reinforcing the child's use of functional vision, it is important to be aware of the development of visual efficiency to understand the developmental context. For example, if you are working on visual fixation/attention with a child who is 4-8 months old, you may be working with a mirror for social gaze and smile. If the child is 12 – 18 months old, you may be working with pointing or patting simple pictures in a book. (See Langley, 1998, Developmental Inventory of Visual Efficiency. In Individualized, systematic assessment of visual efficiency (ISAVE). Louisville: American Printing House.)

Also, while it is important to reinforce all visual skills a child may have, it is equally important to provide learning opportunities that will compensate for limited vision. Strategies using active learning, real-life objects and routine-based interventions are very important for a child with a visual impairment.

Compensatory skills using all senses should be integrated in all developmental domains as well as the reinforcement functional vision. (See handout: General Considerations in Working with Young Children who are Visually Impaired)

## WEB RESOURCES

- Pediatric Visual Diagnosis Fact Sheet <http://blindbabies.typepad.com/resources>
- Albinism [www.albinism.org](http://www.albinism.org)
- Cortical Visual Impairment <http://sun1.aph.org/cvi/index.html>
- Developing Visual Skills for Children who face Cortical Visual Impairments [www.lburkhart.com/handcvi.htm](http://www.lburkhart.com/handcvi.htm)
- Optic Nerve Hypoplasia [www.focusfamilies.org](http://www.focusfamilies.org)
- Retinopathy of Prematurity [www.ropard.org](http://www.ropard.org)

## RESOURCES:

- Corn, A. (1989). Instruction in the use of vision for children and adults with low vision: A proposed program model. *RE:view*, 21 (1), 26-38.
- Downing, J., Bailey, B. (1990). Developing vision use within functional daily activities for students with visual and multiple disabilities. *RE:view*, 21 (4), 209-218.
- Erin, J., Fazzi, D., Gordon, R., Isenberg, S. & Paysse, E. (2002) Vision Focus: Understanding the medical and functional implications of vision loss. In R. Pogrud & D. Fazzi (Eds.) *Early focus: Working with young children who are blind or visually impaired and their families*. (2<sup>nd</sup> Ed) ( pp 52-106). New York: AFB Press.
- Harrell, L., & Akesson, N. (1987). *Preschool vision stimulation: It's more than a flashlight!* New York: American Foundation for the Blind.
- Heiner, D. (1986). *Learning to look: A handbook for parents of low vision infants and young children*. East Lansing: International Institute for Visual Impaired, 0-7, Inc.
- Langley, M.B. (1998). *Individualized, systematic assessment of visual efficiency (ISAVE)*. Louisville: American Printing House.
- Langley, M.B. (1981). *Functional vision inventory for the multiple and severely handicapped*. Chicago: Stoelting Company.
- Levack, N. (1991). *Low vision: A resource guide with adaptations for students with visual impairments*. Austin: Texas School for the Blind and Visually Impaired.
- Morgan, E. (1995). *Resources for family centered intervention for infants, toddlers, and preschoolers who are visually impaired*. Logan, UT: HOPE, Inc.
- Topor, I. (1999). Functional vision assessments and early interventions. In D. Chen, D. (Ed.) *Essential elements in early intervention: Visual impairment and multiple disabilities*. (pp. 157-206) New York, AFB Press.
- Utley, B., Duncan, D., Strain, P., & Scanlon, K. (1983). Effects of contingent and noncontingent vision stimulation on visual fixation in multiply handicapped children. *Journal of the Association for the Severely Handicapped*, 8, 29-42.

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