CVI Profile

Manifestations of CVI That Affect Performance Outcomes

A review of the research reveals that CVI can affect function in a variety of ways. The effects can result from visual acuity deficits and impaired visual field function due to anomalies of the visual brain, and can also include visual processing and attention difficulties (Martin, Sabtos-Lozano, Maetin-Hernandez, et al., 2016). It may not be possible to identify subtle manifestations of CVI in very young children right away. Often effects of CVI may not become evident until children reach school age (Cavézian, Vilayphonh, De Agostini et al., 2010). CVI manifests differently in each child, thus each child's CVI Profile will be unique.

The Companion Guide includes a list of potential behavioral manifestations of CVI that caregivers and interventionists can refer to as they spend time with each child. Those that are evident can be noted, and their effects on the performance of key skills within each development domain can be documented. For young children, interventions and accommodations can be embedded into daily routines to promote the use of vision for children with CVI for different domains of development.

CVI Profile Functional Categories

Clarity of Vision

- Visual acuity - the ability to see details clearly can be compromised, but vision can be normal or near normal in some children with CVI. Visual acuity reaches 20/100 to 20/20 by about 6 months of age in typical infants.
- Contrast sensitivity – the ability to see differences in adjacent shades of grey, which reaches adult levels by 3 years of age, can be compromised.
- Accommodation issues – the ability to see details clearly at very close distances, which improved significantly by 3 months of age in typical infants, can be compromised.

Area of Vision

- Visual field – the area of vision can be compromised. In typical infants, the effective visual field expands between 2 and 4 months of age and reaches adult levels between 17 and 30 months of age but using standardized test, adult levels are not reached until the age of 10-12 years. For adults, with both eyes open and looking straight ahead at point of fixation, visual fields extend about 95 degrees to each side, 50 degrees above and 60 degrees below when looking straight ahead. Children born prematurely with periventricular leukomalacia may have a reduced lower visual field.
- Preferred viewing distance – many young children prefer to look at things within arm's reach at early ages due to immature visual capabilities and attention. This is not a characteristic of only children with CVI. In children with typical vision, this preferred distance increases over time as children's visual systems mature.
- Preferred area of visual attention – some children tend to typically look in a certain area of vision when observing the environment and things within it.
- Visual neglect – inattention to things in an intact portion of the visual field.
- Blindsight – ability to respond to objects that are not consciously seen. In children, this may be to objects moving in the periphery of the 'non-seeing' visual field.

Following People or Objects Visually Due to Eye Movement Limitations or Visual Field Restrictions

- Smooth pursuit eye movements - cannot follow moving objects in circular, horizontal, or vertical directions
- Inattention - cannot attend to objects at the periphery of the intact visual field.
- Cannot follow objects as they move across midline

Locating People or Objects Visually/Visual Search Capabilities

- Cannot locate and attend to an object or person when enters the intact field of view
- Shift of gaze - cannot move eyes from one object to another due to oculomotor issues (optic ataxia) where the child may not be able to use vision to guide his or her movements with accuracy.
- Simultanagnosia - only able to locate and identify a few objects/people at a time when presented with a group of objects or people
- Figure-ground - perception of objects against complex background or complex patterns within objects is compromised

- Cannot detect differences in textures of adjacent surfaces accurately. (e.g., line where carpeted floor ends and wood floor starts may be erroneously thought to be a drop-off)

Response to Faces

- Cannot recognize faces or facial expressions. This may be completely absent or partially affected
- Cannot recognize specific faces when out of typical context. This may be completely absent or partially affected
- Cannot recognize specific facial features or objects on faces. This may be completely absent or partially affected
- Cannot follow fast-moving facial expressions

Recognition of Objects or Symbols

- Cannot perceive specific pictures, shapes, symbols, or letters/words/numbers for older children. This may apply to one picture or letter for example or to all pictures or letters.

Responses to Movement

- Responds more consistently to moving objects
- Responds more consistently to stationary objects
- Cannot follow fast movement in specific or all parts of visual field. Speed of movement required to be visible varies with each child.

Accuracy of Visual Motor Planning and Control

- Cannot coordinate eye-hand movements to achieve movement goal (associated with a dorsal stream disorder)
- Cannot make eye-hand judgments about object size (e.g., hand does not conform accurately to size of object in planned grasp) (associated with a ventral stream disorder)

Imitation and Copying

- Cannot imitate specific movements such as gestures or movements with toys
- Cannot imitate drawing motions
- Cannot trace symbols without immediate modeling of action
- Cannot copy shapes, forms, freehand without immediate modeling (letters or words for older children)
- Cannot trace or copy lines in specific orientations (e.g., horizontal, vertical, slanted)

Color

- Can see primary colors only
- Shows preference for specific color(s)
- Cannot see less saturated colors
- Cannot name colors although can perceive them (i.e., color anomia)

Depth Perception

- Stereopsis can be compromised- The experience of depth is created when the two eyes send slightly different signals to the brain.
- Cannot process depth perception cues despite intact stereopsis

Illumination

- Vision improves in bright light
- Vision improves in dim light
- Cannot adapt in timely fashion from bright to dim light or vice versa
- Aversion to light (photophobia)
- Light gazing - drawn to maintain gaze for extended period at strong sources of light)
- Responds to 'pop out' effect of strong light cue coming from an object

Response to Sounds

- Cannot identify the direction of sound source (sound localization)
- Shows preference for slow paced speech with modulated pitch to engage child's attention and convey meaning

Response to Environment

- Appears less stressed in quiet environment (e.g., quiets or stills in calm and quiet environment) or becomes more stressed (e.g., fussy or fearful) in busy environment due to sensory overload
- Functions more effectively in less crowded environment where objects or people are clearly defined and spaced apart

Effects of Visual Novelty

- Pays little attention to novel items
- Requires novel items and presentation modes due to stimulus habituation effects

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