PEDIATRIC LOW VISION-EVALUATING AND MANAGING KIDS WITH BAD EYES

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Course Goals
- Understand how vision loss effects development
- Develop the skills to evaluate and manage pediatric patients with visual impairment

VISION
- Vision is the primary learning modality and source of information for most children.
- No other sense can stimulate curiosity, integrate information or invite exploration of the world in the same way, or as efficiently and fully, as VISION does!

Background
- Loss of vision can cause global delays
  - Cognition
  - Speech
  - Motor
  - Psychological
  - Self-Care

Background
- Pediatric Low Vision Practitioner
  - Knowledge of childhood development
  - Knowledge of pediatric examination techniques
  - Knowledge of low vision
  - Knowledge of special populations

Purpose of a Pediatric Low Vision Evaluation
- To establish a baseline visual acuity measurement and visual functioning level
- To help parents and teachers better understand their child’s visual condition and visual functioning, i.e., “how” he/she sees
### Purpose of a Pediatric Low Vision Evaluation

- To determine if there is a refractive error and whether the refractive error is significant enough to warrant corrective lenses
- To provide information and assistance, as needed, in the process of determining the most appropriate learning and literacy media

- To determine if low vision devices, technology equipment, or other adaptations and accommodations will likely enhance the student’s functioning level in school and/or community
- To assess visual skills in terms of whether or not vision loss is likely to be a major factor when there are concerns about other developmental areas

- To assist the educational team members with patient management as well as trial and/or acquisition of recommended devices or equipment
- To assess if other related services are indicated (e.g., orientation & mobility)
- To assess vision in terms of acquiring an instructional permit or driver’s license when appropriate

- To provide timely reevaluation to determine if visual functioning is improving, remaining stable, or otherwise changing
- If vision is changing, to determine what those changes may indicate in terms of other programming needs; and whether the need for devices or other accommodations has changed

### Components of Pediatric Low Vision Evaluation

- Case History
- Visual Acuity
- Refraction
- Ocular Alignment & Binocularity
- Ocular Motilities
- Accommodation
- Visual Field
- Visual Information Processing
- Contrast Sensitivity
- Color Vision
- Glare
- Ocular Health

### Evaluation

- Case History
  - Obtain information/ findings
    - Clinical findings
      - Ophthalmologist
      - Educational/ Functional findings
      - Teacher of the visually impaired
      - Classroom teacher
      - Orientation & mobility specialist
      - Occupational therapist
      - Parents - developmental milestones
### Evaluation

- Establish visual goals
  - What does the student need to do?
    - School tasks/ IEP or IFSP Goals
    - Community/ vocational tasks
    - Independent travel
  - What does the student want to do?
    - Reading leisure materials
    - Avocational activities

### Evaluation

- Communication
  - Change your vocabulary
  - Children with low vision may have difficulty with anticipation
  - Talk your way though your exam so the patient will know what to expect

### Evaluation

- Visual acuity
  - Observation
    - Notice how child interacts with environment
    - Observe them in different settings

### Evaluation

- Visual Acuity
  - Informal
    - Observations made during assessment
    - Use familiar objects to evaluate VA
    - Open hand thrust in front of

### Evaluation

- Formal
  - Use testing method appropriate for developmental level
    - Teller Acuity cards
    - Cardiff Cards
    - Lea Symbols
    - Freiboom
    - VEP

### Teller Acuity Cards

- Forced-choice preferential looking
- Can over-estimate VAs
- Calibrated for near test distance
- Test at 38 cm, 55 cm, or 84 cm
  - 1 - 6 mo. test @ 38cm
  - 6 mo. test @ 55 cm
  - Acuity is the highest level where 3/4
Teller Acuity Cards

- Targets are vanishing optotypes
- Test at 1 meter or 50 cm
- Child looks/points toward the picture
- 3 cards available at each acuity level
- Present the card at child’s eye level, with center of card at examiner’s own eye level
- Record acuity as the highest level at which at least 2/3 are correct

Cardiff Acuity Test

- Chart calibrated for 10-foot test distance
- Test at 10 feet
- Identify or match symbols on each line
  - Circle, heart, square, or house
  - Symbols blur out equally
  - Matching puzzle available
  - Acuity level is
    - 3 out of 5 symbols

Lea Symbols

- Chart calibrated for 10-foot test distance
- Test at 10 feet
- Identify or match symbols on each line
  - Circle, heart, square, or house
  - Symbols blur out equally
  - Matching puzzle available
  - Acuity level is
    - 3 out of 5 symbols
**Lea Symbols**

- Available with CI bars or linear format, and near chart available

**Clinical Pearl**

- May need to measure in gaze other than primary
- No VA test used in isolation can accurately and completely assess visual functioning
  - Doctor must combine
    - Data from history & outside reports
    - Data from observations
    - Data from formal and informal acuity measures
  - Remember that resolution tests overestimate VA
    - Report should reflect how patient would perform on Snellen

**Evaluation**

- Refraction
  - Rely on objective data
  - No phoropter
  - Cycloplegic retinoscopy
  - Consider prescribing significant refractive error regardless of VA
    - Cognitive level
    - Emmetropization
  - Monitor patient after Rx

- Ocular Alignment & Binocularity Testing
  - Motor alignment
    - Test to the highest level
    - Cover test
    - Often difficult due to nystagmus
  - Sensory Fusion
  - Observe if possible
  - Confusion exists regarding stereopsis
    - Considered important in travel
    - Educate parents

**Evaluation**

- Consider impact of Rx on eye turn
- Consider strabismus surgery if poor cosmetic appearance of eye turn
- Consider psychosocial issues
  - Eye contact
  - Parental bonding
Evaluation

- **Ocular Motilities**
  - Choose familiar objects
  - Vertical tracking
  - Adequate but increased head turning with horizontal tracking may indicate:
    - Homonymous VF loss
    - Neurological midline abnormalities

- **Confrontations**
  - Non-seeing to seeing technique
  - Use food or favorite toy
  - Arc Perimeter
  - Look for repeatable findings

- **Accommodation**
  - MEM
  - Visual field testing

- **Contrast Sensitivity**

- **Color Vision**
  - Color naming
  - Cognitive level 3-4 years
  - Color preference
  - Determines if visual responses increase to certain colors
  - Useful for vision stimulation techniques
  - Red and yellow are often used

- **Glare Assessment / Filter evaluation**
  - Children rarely complain
  - Rely on doctors expertise and objective findings
  - Choose a filter have child wear it outside watch for decreased squinting or other signs e.g., facial relaxation
Evaluation
• Ocular Health Evaluation
  - May have been done by OMD
  - Parent education need two eye doctors

Management
• Correct refractive error
  - Spectacles/Contacts
  - Reading addition
  - Accommodative response study

Management
• Adaptations
  - Relative distance magnification
    - Hold the material closer to the eye
  - Angular magnification
  - Low vision device
  - Electronic magnification
  - CCTV, computer software
  - Relative size magnification
    - Enlarged print

Management
• Prescriptive Low Vision Devices
  - Be sure to choose aids with a need in mind
  - Consider cognitive ability
  - Consider motor ability
  - Consider visual ergonomics
    - Slant board
    - Classroom seating

Management
• Preschool-Early Elementary Age
  - Mild to moderate impairment
    - SRx, Reading add
    - "Paperweight" stand mag
    - Filters
    - Classroom modifications
  - Moderate to severe impairment
    - SRx
    - CCTV
    - Filters
    - Classroom modifications

Management
• Older Elementary Age
  - Mild to moderate impairment
    - Hand held Telescope
  - Moderate to severe impairment
    - Portable Video magnification
Management

- Middle school to High school age
  - Mild to moderate impairment
    - Biopic
    - Laptop
  - Moderate to severe impairment
    - Portable video magnification
    - Laptop w/ video magnification
    - Video recorder

Vision Report

- Include Information
  - Visual Acuity
  - Refractive status
  - Sensory status
  - Ocular health
  - Recommendations
    - Classroom accommodations

History

- CL is visually impaired due to optic nerve hypoplasia (small underdeveloped optic nerves) in both eyes. Optic nerve hypoplasia can appear in one or both eyes, causing anywhere from a mild to serious visual impairment in the form of decreased visual acuity and visual fields. People with this condition are also more likely to present with photophobia (light sensitivity) and nystagmus (involuntary dancing eyes).

- Because optic nerve hypoplasia involves the underdevelopment of structures located within the brain, the condition may also be found in conjunction with a constellation of hormonal imbalances and midline brain defects known as septo-optic dysplasia.

- Septo-optic dysplasia includes optic nerve hypoplasia (ONH) with any combination of absent septum pellucidum or endocrine dysfunction. The visual sequelae of this syndrome can include decreased visual acuity, strabismus and nystagmus. The endocrine dysfunction can occur in isolation or with mental retardation, cerebral palsy, developmental delay, or delayed growth.

- CL's current needs center around reading books, using the computer and being able to see the chalkboard and function efficiently while in class and when doing homework.

Refraction

- CL came into our clinic without any visual aids. A careful trial frame refraction found the best distance correction to be:
  - OD:  -4.25-1.50 x 004       10/700
  - OS:  -4.25-1.50 x 177 10/160
  - OU:  10/160

- To aid CL in viewing the chalkboard a Walter’s 4X hand held telescope is recommended and improved her distance vision to 10/50 when viewing over the left eye.

- To aid CL with near work she should use her 4x dome magnifier. Near work constitutes print smaller than 18pt font.

Recommendations

- CL's glasses are prescribed for full-time use. However, she should remove them when she is reading for prolonged periods of time.
- CL should use her telescope to spot the chalkboard and teacher for instructional purposes.
- CL should use her dome magnifier when reading small print.
- CL is able to read 18pt font print comfortably without the use of any devices.
- CL's worksheets (homework or written communications to be completed at home) should not be closely arranged nor cluttered for clarity purposes. Unnecessary crowding or details can cause confusion and decrease her efficiency.
- CL should be allowed additional testing time due to her delayed processing secondary to her visual impairment. The amount of additional time should be evaluated by the complexity of the visual task as determined by CL and her VI teacher.
Recommendations

- CL should be allowed to hold her reading materials at a closer range to allow relative distance magnification.
- CL should always wear her photochromic (transition) glasses outside as she is extremely sensitive to glare and UV rays; these glasses also provide protection.
- CL is severely visually impaired in both eyes however; she prefers to use her left due to better acuity.
- CL should be allowed to use her cane when in an unfamiliar environment.
- CL is an ambitious student and while she can read small print her reading should not exceed an hour at any given time for any given reason.
- Due to CL’s visual impairment she cannot interpret facial expressions or model classmate’s behaviors she should be given additional verbal instructions on expected behavior.

Summary

- The optometrist plays an integral role in evaluating and managing children with visual impairment
  - Diagnosis and management of ocular disease
  - Impact of visual impairment on development
  - Recommend educational intervention
    - Learning media
    - Classroom modifications
  - Provide prescriptive low vision devices

Destination… Independence