Vision Impairment Conference for Educators 2014

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Presentation overview

- Review of the 5 major causes of low vision
- Formal vision checklists, before and during PLVC consultations
- Suggested tests to use in your vision screening
- Tips to assist with your assessment
- How you can assist the optometrist
Department of Education and Training (DET), Qld

- Approximately 800 children with VI
- 55 Braille users (Personal communication 2013)
- Multidisciplinary PLVC provides part of the verification process
- Students needs to have a visual acuity of 6/18 or worse to receive support services
- Possibly VF defects or a progressive pathology will also be acceptable
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<td>CVI</td>
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<td>Albinism</td>
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<td>Nystagmus</td>
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<td>Optic atrophies</td>
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<td>% for 5 major causes of LV</td>
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<td>Other causes</td>
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<td>Totals</td>
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Formal checklist (prior to PLVC) consultation

- Student identification and screening environment
- Distance vision
- Near vision
- Colour vision
- Spectacles & LV devices
- Other: VF defects, head posture, illumination preferences, GH & medications, additional disabilities
Suggested distance vision tests

- Lea chart
- Bailey-Lovie chart
Key points distance VA testing

- Routinely use 3 m test distance not 6m
- Measure BEs together first (sets base line)
- Then aim for poorer eye VA
- Use observation of “turned eye” as guide to poorer eye
- Remember to convert VA to 6m equivalent
VA conversions

- $1/60 = 6/360$
- $1.5/60 = 6/240$
- $3/18 = 6/36$
- $2/36 = 6/108$
- Please note these are not as accurate as using logMAR conversion, but are accurate/acceptable for screening purposes
Suggested near VA charts

- Maclure: graded text
- Lea: linear presentation
- or isolated symbols
Key points near VA testing

• Test BE’s first (as for distance VA)
• Record working distance
• Make some statement regarding fluency
• If using Lea chart, specify if using isolated or crowded presentation
• Note: WD indicates how much accommodation the student is using
Near VA recording

• N6 slowly at 10cm using Maclure grade 4 text (suggest using slightly lower grade)
• So student is using 10 dioptres (D) of accommodation
• ie 100/10 = 10D
• If using 5cm WD, then 100/5 = 20 D of accommodation
• Students with normal vision use approx 25cm WD, ie 100/25 = 4 D of accommodation
Suggested CV tests

• City university CV test

• Farnsworth Panel D15

• Strictly speaking should do monocular CV testing
Suggested CV tests

• Ishihara difficult for children and only tests for R/G CVD
Glasses to correct refractive errors

- Retrospective analysis of 872 children attending the PLVC from 1985 to 2002
- Fewer than 25% had refractive errors within ±1.00D (longsightedness and shortsightedness)
Glasses to correct refractive errors

• There is a much greater spread of refractive errors in children with low vision.

• This suggests that the emmetropization process is also impaired where visual quality is reduced.
LV students may need spectacles
Low vision devices/aids

• Distance: monoculars and technical devices
• Can determine magnification needed
• Eg: VA = 6/180, aim for 6/12; magnification required 6/180 ÷ 6/12
• ie 15x
• Available monoculars 10x more common, so expect that you will only achieve about 6/18
Low vision devices/aids

- Monoculars mainly for recreational use
- Technology options now more appropriate
- Smartboards, laptops, ipads, iphones
Low vision devices/aids

- Near: hand and stand magnifiers, with or without LEDs (ie internal illumination)

- Technology options taking over:
  - ipads, lap tops, computer software
  - video magnifiers
Near magnification

• Equivalent viewing distance (EVD)
• EVD = desired print size/ current print size x current viewing distance
• EG: N5/N10 x 12 cm = 6cm=100/6 (D) =16D approx
• Remember that a 12 cm WD = 8.5D of accommodation, so near spectacles supplementing the accommodation may be all that is required
Data gathering, observations during consultation

• Visual fields: limited, base on knowledge of eye condition if no visual field results from a eye care practitioner or refer to QUT for computerised VF investigation

• Also other technological investigation can be done at QUT at no cost to the student (OCT, corneal topography, pentacam ect)
Data gathering, observations during consultation

- Head turn/tilt
- Responses to illumination
- General health
- Additional disabilities
- Medication
- Other
How can you help my consultation?

• Completing the formal vision screening checklist
• Where possible I would like the information ahead of time, especially when on outreach clinics
• It is very difficult for the optometrist if there is no prior medical information available
How can you help my consultation?

• If AVTs cannot get medical information locally or via the family, then you can approach Kristine or Kerry for assistance
• Emphasise any concerns you may have regarding a student
• Always consider the consultations a multi input consultation
Optometrical consultation summary

- Read prior information on student
- Brief review with AVT
- CH
- Vision and VA measurement
- Retinoscopy
- Subjective refraction
- Advice on spectacles and LV devices
- Answer Qs
Key issues in PLV consultation

- Parents/teachers want to know - how much can my child see?
- Most issues are related to educational task
- Reading small print
- Reading whiteboards, blackboards
- Glare issues in the classroom
- Sporting and recreational activities
- Driving a car!
Formal recommendations

• This is a multi disciplinary assessment between the AVT, optometrist, therapists, student and family
• Need to have mutual agreement between all parties for this to be successful
• Covers many areas: including spectacles and LV devices, general recommendations, related to board and near work
Overview of some of the past research into reading

• The majority of educational activities are at near

• Many factors influence reading - cognitive ability, experience, motivation

• Some useful guidelines for educators in making recommendations
Reading rates

Normal vision silent RRs

- 60–80 wpm - 6 years (grade 1)
- 195 wpm - 12 years (grade 7)
- 250 wpm - 17 years (grade 12)

Minimum RRs for VI students

- 60 wpm acceptable up to grade 3
- 70 wpm acceptable up to grades 4 - 6
- 90 wpm for older students
Other factors that affect reading

- Acuity reserve - AR (is print size to be read relative to the threshold print size)
- The reading process
  - adopted
- The difficulty of the reading material
Reading performance study (2002) - 75 subjects

- To examine the relationships between clinical vision measures & reading performance
- Distance & near VA
- Contrast sensitivity
- Reading rate
- Age
Results

- Age and near VA were the only clinical measures to significantly correlate with reading rate (RR).

- RR increased by a mean of about 10 wpm / year in VI students compared to 14 wpm / year for children with normal vision.
Reading rates for students with VI

- RR varied from 28 to 254wpm
- Mean RR 146.5
- MORRs achieved on print sizes ranging from N5 to N64 at 10cm.
- Optimum AR ranged from 2.5x – 7x above the near VA (mean 4X)
Inverse relationship between AR & near VA

- Subjects with poor near VA could achieve maximum reading rate with smaller AR’s
Print size versus working distance study (2003)

23 subjects

- Did students increase their working distance as the print size increased?

- The assumption - that if the size of what the students must read is "blown up" a more normal WD will be used
Results for PS versus WD

• Students did not adjust the WD in strict proportion to the PS (PS increased to N64)

• Majority chose close WD's (10 cm to 20 cm) irrespective of the PS of the reading material
The majority of students with vision impairment (VI) are integrated into regular classrooms.

Anecdotally, teachers say VI students cannot read continuously for longer than 15-20 minutes.

A common practice to off-set this problem is to provide enlarged copies of near work for VI students.
Sustained reading rates results

• Low vision: mean RR 104 wpm (25 - 186 wpm)
• Normal vision: mean RR 195 wpm (91 - 340 wpm)
• 15.4% (n=4) of the low vision subjects were unable to complete the 30 minute task due to fatigue, eyestrain, headaches or blurred vision (stopped between 15 to 25 minutes)
Other results

• **Near VA:** low vision ranged between N3 to N12

• **Working Distance:**
  low vision (mean) = 11.5 cm
  normal vision (mean) = 28.4 cm

• **Reading aids:** 4 out of 25 (16%) utilized low vision aids (high add spectacles)
  None used hand/stand magnifiers

• **Comprehension:** was 100% for both normal and low vision subject groups
Discussion

• The average RR for students with VI was almost half that of the students with normal vision
• 104 wpm (low vision) compared to 195 wpm (normal vision)
• 80.7% of VI students were able to maintain a stable sustained RR for 30 minutes
• RRs were within those deemed suitable for integrated classroom activity
Discussion

• LV students used approximately 9 dioptres of accommodation for the 30 minute reading task (range 6-16 D)
• Normal vision students used 3.5D (range 3 to 4.2D)
• While fatigue was not a significant factor for 80.7% of the students with LV, many were using a mean AR below the minimum recommended for maximum RR
Discussion

• Mean AR: (low vision) 2.08x (normal vision) 4.8x

• Surprisingly only relatively few subjects (16%) were using their prescribed low vision devices
Conclusions

• Students with LV can maintain sustained near vision tasks

• Low vision devices should be prescribed to minimize their accommodative demands and increase their ARs to assist in preventing visual fatigue
Conclusions

• Generally the LV population in this study revealed a greater dislike of reading than their sighted peers and spent less time outside of school hours reading for leisure.
Examined the effects of prolonged reading and visual functions in students with VI

Increased lag of accommodation and reduced accommodative responses

Subjects who had binocular vision did shown significant decreases in RR during and following prolonged reading

Possibly due to high demands on convergence?
QUT PhD thesis 2010 (Arathy Kartha Ganga)
Points for teachers

- Take note of the vision levels for VI children – especially at near & WD
- Ensure that the print that the child needs to read is a minimum of 2X greater than the near visual acuity
- Prescribe and encourage the use of LV devices (spectacles) most common LVD
- Advise against routinely enlarging the print size for reading (esp A4 to A3)
Points for teachers

- Students with LV will prefer to read for shorter periods
- Their slower RRs limits the amount of material that can be read at any one time
- Avoid glare situations in the classroom
- Take care with seating for children with VF loss
- Consider ergonomics for posture
- Technology should be an option where the best near print VA is N18 or worse
Case studies
Case study, KH (F) -12/2/13

• Aged 11 years oculocutaneous albinism
• CH: review in year 6
• Uses clear specs only, didn’t think tinted ones helped
• Sits to the front of the class, no issues with board work
• Specs worn FT in the classroom
• Computer OK
• Uses slope desk, trialling slope board on flat desk
• Uncorrected Vision 6/24 -2
• RX: R plano/-2.00x180  L +0.50/-2.00x20  6/24+1
KH (cont)

• Near VA: N5 with and without specs, better with specs (Maclure G6) and BL near word chart (threshold) @ 9cm
• Subjective: R -1.00/-2.25x180 (6/24)
• L -0.50/-2.25x10 (6/24)
• BEs 6/24+3
• Add 3.00 D N5 at 9cm (subjectively better)
• ESF 8x monocular 6/5+4 (has binoculars at home)
• Summary: New spectacles multifocals/2 pairs, tinted dist specs
KH (cont)

- Other strategies: reading, evaluate reading efficiency with range of print sizes, high contrast, allow breaks
- Work sheets for board work, verbalise what is on the board
- Use of technology
- Use USB for homework or have homework emailed home
Case study, CB (F) 21/2/2013

- 10 yrs old, optic atrophy unknown cause
- Review, brought by teacher
- Diagnosed with diabetes last year, insulin injections 2x/day, BGL6x/day
- Not often at school owing to poor health
- Head position always down
- Seizure activity, better controlled
- Sunglasses indoors and outdoors
CB (cont)

- No luck with Lea paddles
- No response to toys or her face in a mirror
- Did react to toy with light and sound
- Static ret: R and L +0.75
- Summary: Assume some useful vision, brace neck to support head
CB (cont)

- Other strategies: uses vision but also tactile and auditory exploration
- Allow time for responses
- Use shiny materials and stimulate movement to help focus attention
- Hold object in front of student to get attention
Case study - JL (M) 19/2/13

• 5 years; ONH
• Currently doing atropine occlusion of LE
• Very stressed when at school with treatment
• Possible surgery for null point nystagmus
• In prep, copes better without atropine
• Current Rx: R -2.00/-1.00x150 L +0.50/-0.50x55
• VA: R 6/90  L 6/19 Lea at 3m
• Marked eccentric viewing, head turned to the left
• N5 (isolated spaced shapes) at 7cm at near, no marked head turn
• Over ret: approx +1.00?
• CUCVT: all correct except plate 5
• Summary: very efficient with mother’s iphone and ipad
• Head turn only marked at distance
• Change to short term patching after review with ophthal as atropine penalisation very stressful
• Glare a big issue with above treatment
Thank you
Any questions?