

VISUAL IMPAIRMENTS: UNDERSTANDING THE TERMINOLOGY & FUNCTIONAL IMPLICATIONS FOR MOBILITY

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Introduction

Clinicians working in seating and mobility need to understand the impact of visual impairments on their client's functional abilities. At least 25% of North America's growing population of seniors has a significant visual impairment due to cataracts, glaucoma, macular degeneration or diabetic retinopathy. There are also adults with acquired neurological impairments with concurrent visual impairments, such as Multiple Sclerosis or Acquired Brain Injury.

Terminology	Explanation	Impairments
Visual Acuity	Ability to resolve fine detail at near and various distances Usually reported for distance viewing, not reading Normal: 20/20, 20/200 is legal blindness level, many people function at 20/400 with magnification	Central scotoma, giving blind spot in highest definition area of macula Poor acuity due to nystagmus Poor acuity due to refractive errors, and not adequately corrected with glasses
Refractive Errors	Occurs when image is not properly focused on the retina, due to lens shape, or shape of eye	Myopia- short sighted, blurred vision at far Hyperopia- far sighted, blurred vision at near Astigmatism- blurred vision at near and far
Central Vision	Area of the retina which takes in most detail, around the macula, and heaviest concentration of cones, which see colour	Central scotomas or blind spots- can occur in children, and also occurs in Macular degeneration
Peripheral Fields	Ability to see to the sides, which uses rods, seeing movement, shades of gray, around the periphery of retina	Homonymous hemiaopia or other field losses- occur with CVA, cerebral palsy and head injury With Retinitis Pigmentosa, progressive loss of peripheral vision occurs - less than 20% of visual field is also classed as legal blindness
Ocular Alignment	Allows binocular vision and depth perception As visual maturity usually occurs by age 10, treatment needs to be before this age.	Strabismus- eye muscle imbalance, causes suppression of information, due to amblyopic or diplopia (double vision)
OD	Right Eye	
OS	Left Eye	
OU	Both Eyes together	
CF & #	Counting Fingers at so many feet away, or inches	
LP	Light Perception	
NLP	No Light Perception	
Legally Blind	20/200 or worse	

Selected Common Eye Health Disorders

Conditions of Anterior Segment	Description	Medical intervention
Ptosis	Drooping eyelid, due to Upper lid innervations from Cranial nerve- seen in ABI, MS	limited
Conditions of Lens		
Cataract	An opacity occurring in the normally transparent lens causing reduced visual acuity- can be caused by aging or trauma- occurs in 6% of seniors	Surgery, may have complications
Subluxation or Dislocation of the Lens	Can occur as a result of trauma or associated with hereditary syndrome such as Marfans- causes reduced visual acuity	Surgery, may have complications
Conditions of posterior segment		
Optic Nerve Atrophy	Loss of nerve fibers in the optic nerve- congenital or due to disease	No treatment available
Diabetic Retinopathy	Retinal hemorrhages and exudates due to disease of retinal vasculature secondary to diabetes, causes fluctuating vision	Laser surgery to remove exudates, control of diabetes as prevention- occurs in 90% of those with disease more than 20 years
Retinopathy of Prematurity	Retinal disease due to oxygen used to treat prematurity, causing scarring, detachment, etc.	No treatment available
Age Related Macular Degeneration	“Wet” type results in rapid loss of central vision due to exudates “Dry” is slower to progress Causes 33% of blindness in Canada	“Wet” can be treated with Visudyne laser treatment- not covered by OHIP No treatment for “dry”
Retinal Detachment	Retina detaches from the choroid and leads to loss of vision if not repaired	Emergency surgery required to re-attach retina- may not get peripheral vision back
Conditions of Visual pathways		
Glaucoma	Visual field defects caused by damage to retinal nerve fibers at optic nerve head due to increase intraocular pressure	Medications or surgery to control intra ocular pressure- effects 7% of seniors
Conditions of the Visual Cortex		
Multiple Sclerosis	Demyelization of optic nerves can cause significant vision loss	No treatment, except through accommodation, vision aids. Prognosis is difficult to predict
Cortical Visual Impairment	Damage to visual processing centre, due to head injury or birth trauma, impairs ability to interpret what is seen by intact eye structures	Condition fluctuates, so accommodations need to be flexible to offer more or less support as needed

Questions Used in Determining the Functional Implications for Mobility

What optic structures are impaired, and to what severity?

What is the impact on the field of vision, and the sharpness/acuity of vision?

How stable is the condition, and what is the range of fluctuation?

What is the impact on: detecting movement, detecting depth and distance, near and distance vision?

What corrective measures have been put in place, and with what results?

For what environment is the mobility aid needed, and is the client's vision adequate for safety within that environment?

Services and Intervention

Primary medical intervention

- Ophthalmologists diagnose eye condition and provide what ever medical treatment is available
- Residual problems result in visual impairment and require referral to other services

Secondary intervention

- Optometrists measure acuity levels, etc. and provide corrective glasses or contact lenses. If these are not adequate for functional needs, need additional optometric assessment by an optometrist specialized in low tech aids
- Low technology vision aids: Magnifiers, telescopes, glasses mounted or hand held, for near, mid and distance use
- High technology vision aids: screen magnification and reading, optical character recognition, Closed circuit televisions (CCTV) for everyday reading and writing needs, in Ontario provided by Assistive Devices Program Sight Enhancement or Substitution Regional Assessment Centres, for more information see http://www.health.gov.on.ca/english/providers/program/adp/adp_mn.html

Tertiary intervention

- Orientation and mobility training- usually provided by a Vision Resource Teacher or Canadian National Institute for the Blind (CNIB) O&M trainer
- Accommodation within the school system, provided by a Vision Resource or Itinerant Teacher, including a learning media assessment
- Accommodation within the home environment, usually provided by a CNIB rehabilitation worker
- Additional aids for ADL- www.independentliving.com and www.maxiaids.com, or local electronics store, central CNIB store - order by telephone

Accommodating the Aging Eye

- If the client is not light sensitive, increasing light can improve function. Use task lighting, spot lights, especially in places where seeing detail is needed: reading chair, card playing are, cookbook location in kitchen.
- Increase contrast: alter background colours on place mats, desk surfaces, to help find objects on them. Avoid glare and contra lighting by controlling the overhead lighting and sunlight.
- Bring items closer for magnification, or enlarge them.
- Night vision decreases due to fewer rods in the macula and less responsive muscles in the iris, so slower dark adaptation. Cataracts also scatter light and reduce the amount reaching the retina, causing the lights of an approaching vehicle to be blinding.

Tips for Safety Behind the Wheel

- Protect your eyes during the day by wearing sunglasses (neutral gray lenses are best) and a hat with a brim when the sun is shining; prevents prolonged dark adaptation.
- Clean the windshield of the vehicle, inside and out, at least weekly; a grimy windshield scatters light and intensifies glare
- Clean the headlights – just a thin layer of grime reduces the light they cast by about 90% – and make sure the headlights are properly aligned.
- Adjust the rear view mirror manually, if needed, to eliminate the reflected glare of headlights behind you.
- Make sure your glasses are clean
- Avoid looking directly at approaching vehicles at night; direct your eyes 20 degrees to the right to the white line on the right side of the road, use your peripheral vision to see ahead for those few moments
- Reduce your speed at night and increase the distance between you and the vehicle ahead of you. You should be able to stop inside the area illuminated by your headlights. Otherwise, if you overdrive your headlights, you create a blind crash area in front of your vehicle

Tips for Staying Safe at Home

- Nightlights are inexpensive and highly preventative of falls, especially for older people who make nighttime trips to the bathroom.
- In unfamiliar surroundings, such as staying at friends or at a hotel, leave a bathroom light on, or travel with a night light.
- Keep paths and stairways clear of objects, including slippers. Loose rugs are problematic; get rid of them or fasten them down with carpet tape.
- Have your eyes checked at least once a year and go to your eye doctor or your local emergency department with any signs of sudden vision loss.

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Scheiman, M. (1997) *Understanding and Managing Vision Deficits: A Guide for Occupational Therapists* Thorofare, NJ: Slack, Inc.

Web Resources

University of Toronto Vision Technology Service: www.atrc.utoronto.ca/service/vts.html

Texas School of the Blind and Visually Impaired: www.tsbvi.edu

Canadian National Institute of the Blind: www.cnib.ca

Independent Living Aids: www.independentliving.com

Maxi Aids: www.maxiaids.com

Speaker Bio

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