Visual Dysfunction: Occupational Therapy

Indexing Metadata/Description

› Title/condition: Visual Dysfunction: Occupational Therapy
› Synonyms: Visual impairment: occupational therapy; visual defect: occupational therapy; low vision: occupational therapy
› Anatomical location/body part affected: Parietal lobe of brain (visual attention), occipital lobe of brain (vision), temporal lobes of brain (visual perception), eyes, cranial nerves (II-VI)
› Description

• Vision is the process whereby the brain identifies, interprets, and responds appropriately to visual data. It is how the appearance of an object (e.g., shape, color, location and spatial organization) is perceived by an individual.
• Light rays enter the eye and are transformed into electrical signals in the retina; these signals are transmitted via the optic nerve to the cortex, where they are processed.
• Visual dysfunction can affect visual acuity, visual fields, color vision, night vision, and/or ocular motility, as well as visual perception and visual motor integration, and can impact mobility and functional skills and abilities.
• Categories of visual dysfunction:
  – Low vision – bilateral vision loss that cannot be resolved with corrective lenses or medical/surgical intervention, includes decreased acuity, visual field loss, or both.
  – Visual dysfunction may be age-related (e.g., cataracts, glaucoma, age-related macular degeneration, diabetic retinopathy), but it can occur at any age.
  – Changes in vision may occur following a neurological event (e.g., traumatic brain injury [TBI] or stroke).
  – Ocular motor dysfunction – the eye mobility functions that allow the eyes to move in a smooth and coordinated manner are impaired. Areas of ocular motor function that can be affected include:
    - Alignment of the eyes (binocular vision) – if the eyes are not aligned, diplopia (i.e., double vision) may occur. This is the simultaneous perception of two images of a single object, displaced horizontally, vertically, or diagonally in relation to each other.
    - Vergence – ability to focus the eyes on a single point by simultaneous movement of the pupils toward (convergence) or away from (divergence) one another to adjust for different distances between the eyes and the visual target.
    - Accommodation – the ability to change the focus from distant to near or near to distant objects. Involves pupil constriction, vergence, and change in convexity of the lens.
    - Scanning – the ability to see visual data in an organized manner, most commonly from left to right.
    - Saccades – rapid eye movements from one point to another that affect tracking and reading. These high speed movements bring new objects into central vision, where images can be seen in more detail.
  – Unilateral visual neglect – a dysfunction in visual perception and attention to stimuli presented on one side of the body due to a brain lesion (e.g., stroke, tumor); failure to recognize or respond to stimuli on one side. The neglect is contralateral to the side of
the brain lesion and may be seen during activities, for example when a patient eats the food on only one side of his or her plate(2)
- Unilateral neglect is more than just a visual condition, and may be referred to as hemispatial inattention. A patient with hemispatial inattention also may not respond to a voice when the person is on the affected side or a tactile stimulus on the affected side and may not be able to recall memories of objects or places that would normally be on that side.
  - Visual field deficits(5) – blind segments in one or more visual fields
  - Homonymous hemianopsia – blind areas in the right visual field of both eyes or left visual field of both eyes(5)
  - Homonymous quadrantanopia – blind areas in right or left visual field that affect superior or inferior quadrants of both eyes(5)
  - Bitemporal hemianopsia – loss of vision in temporal fields of both eyes(5)
  - Visual perceptual dysfunction – impairment in the ability to integrate visual data taken in through the eyes with the sensory system for higher cognitive function(6)

→ ICD-9 codes

• 368 visual disturbances
  - 368.0 amblyopia unspecified
  - 368.1 subjective visual disturbances
  - 368.2 diplopia
  - 368.3 other disorders of binocular vision
  - 368.4 visual field defects
  - 368.5 color vision deficiencies
  - 368.6 night blindness
  - 368.8 other specified visual disturbances
  - 368.9 unspecified visual disturbance

• 369 blindness and low vision
  - 369.0 profound vision impairment both eyes
  - 369.1 moderate or severe vision impairment better eye; profound vision impairment of lesser eye
  - 369.2 moderate or severe vision impairment both eyes
  - 369.3 unqualified visual loss both eyes
  - 369.4 legal blindness as defined in USA
  - 369.6 profound vision impairment one eye
  - 369.7 moderate or severe vision impairment one eye
  - 369.8 unqualified visual loss one eye
  - 369.9 unspecified vision loss

• 377 disorders of optic nerve and visual pathways
  - 377.0 papilledema
  - 377.1 optic atrophy
  - 377.2 other disorders of optic disc
  - 377.3 optic neuritis
  - 377.4 other disorders of optic nerve
  - 377.5 disorders of optic chiasm
  - 377.6 disorders of other visual pathways
  - 377.7 disorders of visual cortex
  - 377.9 unspecified disorder of optic nerve and visual pathways

• 378 strabismus and other disorders of binocular eye movements
  - 378.0 esotropia
  - 378.1 exotropia
  - 378.2 intermittent heterotropia
  - 378.3 other and unspecified heterotropia
  - 378.4 heterophoria
  - 378.5 paralytic strabismus
  - 378.6 mechanical strabismus
- 378.7 other specified strabismus
- 378.8 other disorders of binocular eye movements
- 378.9 unspecified disorder of eye movements

ICD-10 codes

- H53 visual disturbances
  - H53.0 amblyopia ex anopsia
    - H53.00 unspecified amblyopia
    - H53.01 deprivation amblyopia
    - H53.02 refractive amblyopia
    - H53.03 strabismic amblyopia
  - H53.1 subjective visual disturbances
    - H53.12 transient visual loss
    - H53.13 sudden visual loss
    - H53.14 visual discomfort
    - H53.15 visual distortions of shape and size
    - H53.16 psychophysical visual disturbances
    - H53.19 other subjective visual disturbances
  - H53.2 diplopia
  - H53.3 other and unspecified disorders of binocular vision
  - H53.4 visual field defects
    - H53.40 unspecified visual field defects
    - H53.41 scotoma involving central area
    - H53.42 scotoma of blind spot area
    - H53.43 sector or arcuate defects
    - H53.45 other localized visual field defect
    - H53.46 homonymous bilateral field defects
    - H53.47 heteronymous bilateral field defects
    - H53.48 generalized contraction of visual field
  - H53.5 color vision deficiencies
  - H53.6 night blindness
  - H53.7 vision sensitivity deficiencies
  - H53.8 other visual disturbances
  - H53.9 unspecified visual disturbances

G-Codes

- Mobility G-code set
  - G8978, Mobility: walking & moving around functional limitation, current status, at therapy episode outset and at reporting intervals
  - G8979, Mobility: walking & moving around functional limitation; projected goal status, at therapy episode outset, at reporting intervals, and at discharge or to end reporting
  - G8980, Mobility: walking & moving around functional limitation, discharge status, at discharge from therapy or to end reporting

- Carrying, Moving & Handling Objects G-code set
  - G8984, Carrying, moving & handling objects functional limitation, current status, at therapy episode outset and at reporting intervals
  - G8985, Carrying, moving & handling objects functional limitation, projected goal status, at therapy episode outset, at reporting intervals, and at discharge or to end reporting
  - G8986, Carrying, moving & handling objects functional limitation, discharge status, at discharge from therapy or to end reporting

- Self Care G-code set
  - G8987, Self care functional limitation, current status, at therapy episode outset and at reporting intervals
- G8988, Self care functional limitation, projected goal status, at therapy episode outset, at reporting intervals, and at discharge or to end reporting
- G8989, Self care functional limitation, discharge status, at discharge from therapy or to end reporting

**Other PT/OT Primary G-code set**
- G8990, Other physical or occupational primary functional limitation, current status, at therapy episode outset and at reporting intervals
- G8991, Other physical or occupational primary functional limitation, projected goal status, at therapy episode outset, at reporting intervals, and at discharge or to end reporting
- G8992, Other physical or occupational primary functional limitation, discharge status, at discharge from therapy or to end reporting

**Other PT/OT Subsequent G-code set**
- G8993, Other physical or occupational subsequent functional limitation, current status, at therapy episode outset and at reporting intervals
- G8994, Other physical or occupational subsequent functional limitation, projected goal status, at therapy episode outset, at reporting intervals, and at discharge or to end reporting
- G8995, Other physical or occupational subsequent functional limitation, discharge status, at discharge from therapy or to end reporting

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<thead>
<tr>
<th>G-code Modifier</th>
<th>Impairment Limitation Restriction</th>
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<tbody>
<tr>
<td>CH</td>
<td>0 percent impaired, limited or restricted</td>
</tr>
<tr>
<td>CI</td>
<td>At least 1 percent but less than 20 percent impaired, limited or restricted</td>
</tr>
<tr>
<td>CJ</td>
<td>At least 20 percent but less than 40 percent impaired, limited or restricted</td>
</tr>
<tr>
<td>CK</td>
<td>At least 40 percent but less than 60 percent impaired, limited or restricted</td>
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<tr>
<td>CL</td>
<td>At least 60 percent but less than 80 percent impaired, limited or restricted</td>
</tr>
<tr>
<td>CM</td>
<td>At least 80 percent but less than 100 percent impaired, limited or restricted</td>
</tr>
<tr>
<td>CN</td>
<td>100 percent impaired, limited or restricted</td>
</tr>
</tbody>
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**Reimbursement**
- Reimbursement for therapy will depend on insurance contract coverage
- No specific issues or information regarding reimbursement have been identified

**Presentation/signs and symptoms**
- Age-related vision changes
  - Macular degeneration – decreased visual acuity, central scotoma, difficulty reading and recognizing faces, decreased contrast sensitivity
  - Diabetic retinopathy – scotomas, poor contrast and color discrimination, impaired night vision, fluctuations in acuity
  - Cataracts – diplopia, impaired night driving, poor contrast sensitivity, decreased acuity
  - Glaucoma – decreased night vision, impaired ocular mobility, central visual field deficits
  - Presbyopia – difficulty seeing close objects or small print clearly. Typically noticed after age 40 and can be treated with corrective lenses
- Ocular motor dysfunction
  - Decreased saccadic (ability of eye to rapidly look from one place to another) eye movements that impact reading, driving, and walking
  - Decreased vertical eye movements – the ability to look up and down
– Diplopia
– Convergence insufficiency – inability to stay focused on one point
– Problems with accommodation – inability to quickly change focus from far to near
– Eye misalignment, problems with binocularity (ability to use both eyes to work together to focus on an image)

• Neurologic-related/visual perceptual
  – Visual neglect
  – Light sensitivity
  – Nystagmus (i.e., involuntary rapid eye movements)
  – Inability to fixate on objects, poor visual attention
  – Headaches, especially after visual tasks

• Functional impairments (may be related to low vision, neurological issues, or combination of both)
  – Inability to recognize faces
  – Bumping into objects
  – Difficulty reading
  – Getting lost
  – Impaired mobility
  – Driving problems
    - Examples include not being able to see road signs clearly, difficulty judging distances and speed, problems seeing in low light or at night, difficulty adapting to glare from headlights, and loss of side vision

• In children
  – Avoiding academic tasks
  – Complaints of dizziness, nausea, headaches after visual work
  – Falling asleep while reading
  – Blurred vision
  – Difficulty with reading and reading comprehension
  – Poor memory
  – Decreased attention and concentration
  – Difficulty with form discrimination, which is the ability to differentiate and recognize shapes and forms
  – Inability to recognize and identify pictures
  – Poor visual searching ability
  – Decreased visual motor integration (e.g., poor eye-handcoordination)

Causes, Pathogenesis, & Risk Factors

› Causes
  • Aging of ocular anatomy
  • Diabetic retinopathy – damage to the nerves and blood vessels of the retina
  • Cataracts – opacity or clouding of the lens of the eye
  • Retinopathy of prematurity
  • Stroke (for additional information on treatment and assessment of unilateral visual neglect in patients with stroke, see Clinical Review...Stroke Rehabilitation: Unilateral Neglect; Topic ID Number: T708897)
  • Multiple sclerosis (for additional information on assessment and treatment of patients with multiple sclerosis, see Clinical Review...Multiple Sclerosis: Occupational Therapy; Topic ID Number: T708894)
  • Parkinson disease
  • TBI (for additional information on assessment and treatment of patients with TBI, see the series of Clinical Reviews on this topic)
• Cerebral palsy (CP)\(^{(1)}\) (for additional information on assessment and treatment of patients with CP, see the series of Clinical Reviews on this topic)
• Optic nerve hypoplasia\(^{(11)}\)
• Glaucoma\(^{(11)}\) – damage to the optic nerve typically (but not always) caused by high intraocular pressure (for additional information on treatment and assessment of patients with glaucoma, see *Clinical Review...Glaucoma: Occupational Therapy*; Topic ID Number: T708886)
• Perinatal hypoxic-ischemia\(^{(38)}\)
• Epilepsy (for additional information on assessment and treatment of patients with epilepsy, see *Clinical Review...Epilepsy: Occupational Therapy (OT)*; Topic ID Number: T709002)

› Pathogenesis
• Impairment can be caused by problems within the eye (e.g., degeneration of the macula – the central part of the retina), with the connections to the brain (e.g., optic nerve), or in an area of the brain involved with, processing and interpretation (e.g., visual cortex, visual association cortex)
• The retina translates visual images into electrical signals that are sent to the brain;\(^{(7)}\) visual dysfunction occurs when there is a disruption in the delivery of signals to the brain due to injury, neurological dysfunction, weakness, or disease
• Lesions in the visual pathways including the optic nerve, optic chiasm, tracts traveling to the lateral geniculate nucleus, the optic radiation, visual cortex in the occipital lobe, and visual association cortices in the posterior temporal lobe and posterior parietal lobe can disrupt signals from the retina to the brain
• A patient may have both low vision and neurologically related visual impairments (e.g., status post stroke with age-related low vision)\(^{(3)}\)

› Risk factors: Risk factors for visual dysfunction vary according to underlying diagnosis
• Over 65 years of age – prevalence of vision impairment is 2 out of 3 persons\(^{(12)}\)
• Risk factors for macular degeneration\(^{(13)}\)
  – Advanced age – persons over 60 years of age have increased risk
  – Cigarette smoking
  – Family history of macular degeneration
  – Having light or blue eyes
  – Ethnicity: higher incidence in Caucasian
  – Gender: higher incidence in females
  – Poor diet: low in omega-3 fatty acids and leafy green vegetables and high in omega-6 fatty acids
  – Hypertension
  – Obesity
• Risk factors for cataracts\(^{(45)}\)
  – Increasing age
  – Diabetes
  – Excessive exposure to sunlight
  – Smoking
  – Obesity
  – High blood pressure
  – Previous eye injury or inflammation
  – Previous eye surgery
• Risk factors for diabetic retinopathy\(^{(46)}\)
  – Poor blood sugar control
  – Duration of diabetes
  – High blood pressure
  – Smoking
  – Pregnancy

**Overall Contraindications/Precautions**
› Adults with visual impairments may be at risk for falls\(^{(14,15,36)}\)
Proceed with caution in patients with unilateral neglect, as they may not have awareness of any stimuli or sensory input presented to the affected side and are at increased risk for injury (e.g., arm getting caught in wheelchair).

Patients with homonymous hemianopsia are at increased risk of bumping into or failing to notice things on the side of the hemianopsia and can be startled when approached from the hemianopic side.

If patient reports a sudden appearance of many floaters (i.e., spots, strings, or hairs that seem to float in the visual field), sudden flashes of light, or a shadow over a portion of the visual field, these may be signs of retinal detachment, which requires immediate medical attention.

Sudden loss of vision is an emergency - most causes are serious. Anyone who experiences a sudden loss of vision should see an ophthalmologist or go to the emergency department immediately.

See specific Contraindications/precautions to examination and Contraindications/precautions under Assessment/Plan of Care.

**Examination**

- **History**
  - **History of present illness/injury**
    - **Mechanism of injury or etiology of illness**
      - Document cause and onset of vision problems, if known, and general progression since onset.
    - **Course of treatment**
      - **Medical management:** Document current lens correction (if applicable), optical devices, including prisms, used or prescribed. Ask about previous surgical procedures, such as laser eye surgery or cataract surgery.
      - **Medications for current illness/injury:** Determine what medications the physician has prescribed; are they being taken? Are they effective?
        - Medications for glaucoma include beta-adrenergic antagonists (e.g., timolol, levobunolol), prostaglandin analogs (e.g., latanoprost, travoprost, bimatoprost), adrenergic agonists (e.g., brimonidine, dipivefrin), and carbonic anhydrase inhibitors (e.g., dorzolamide, brinzolamide).
      - **Diagnostic tests completed:** Review the results of vision assessments that have been completed.
        - **Vision tests**
          - Snellen notation – for visual acuity; numerator represents distance at which letters were seen and denominator represents distance in which a person with standard vision could see same line. 20/20 is considered normal vision.
          - Reading test – standard vision is average newsprint size at standard distance of 1 meter, 40 in.
          - Amslergrid – the patient is asked to stare at a dot on a grid with one eye. This test detects visual field losses or damage to the macula should patients perceive wavy lines or missing squares on the grid.
          - Grading acuity tests – detecting parallel lines with various widths.
          - Scanning laser ophthalmoscope (SLO) – tests for macular perimetry by scanning an invisible infrared beam into retina to obtain an image of the retina.
      - **Electrodiagnosis**
        - Electroencephalography (EEG) – provides information on electrical activity in different parts of the brain such as the occipital lobe (visual cortex).
        - Visual evoked potential or response (VEP or VER) – tests function of visual pathways by measuring the electrical signal recorded at the scalp over the occipital cortex in response to photo stimulus. The light-evoked signal is small in amplitude and hidden within the normal EEG signal, so is amplified by repetitive stimulation and time-locked, signal-averaging techniques.
        - Visual evoked potential mapping (VEPM) – assesses large areas of the brain.
      - **Imaging studies** – may be used to assess for lesions within the brain or optic pathways caused by trauma, vascular events, or neurologic conditions.
        - Computed tomography (CT)
        - Magnetic resonance imaging (MRI)
        - Positron emission tomography (PET)
      - **Home remedies/alternative therapies:** Document any use of optical devices such as video magnification (closed circuit television), pocket magnifiers, and increased contrast lighting and whether or not they help.
- **Previous therapy**: Document whether patient has had occupational or physical therapy for this or other conditions and what specific treatments were helpful or not helpful

- **Aggravating/easing factors**: Document factors that improve vision, such as enlarged print, lighting, and colors, as well as factors that increase symptoms (e.g., photosensitivity)

- **Body chart**: Use body chart to document location and nature of symptoms

- **Nature of symptoms**: Document nature of symptoms (constant vs. intermittent, blurry vision; double vision; changes from day to day) Document nature of perceptual impairment:
  - Metamorphopsia – in which objects appear distorted, larger or smaller than actual size
  - Perceptual completion – in which an object appears complete even when part of the object falls in part of the visual field that is damaged

- **Rating of symptoms**: Use a visual analog scale (VAS) or 0-10 scale to assess symptoms and/or pain at their best, at their worst, and at the moment.

- **Pattern of symptoms**: Document changes in symptoms throughout the day and night, if any (am, mid-day, pm, night); also document changes in symptoms due to weather or other external variables

- **Sleep disturbance**: Document number of awakenings/night

- **Other symptoms**: Document other symptoms patient may be experiencing that could exacerbate the condition and/or symptoms that could be indicative of a need to refer to physician

- **Respiratory status**: Document patient’s respiratory status; is there a need for supplemental oxygen? Does the patient have any history of respiratory compromise? Conditions associated with blurred vision and shortness of breath include hypotension, type 2 diabetes mellitus, myasthenia gravis, and transient ischemic attacks

- **Barriers to learning**
  - Are there any barriers to learning? Yes__ No__
  - If Yes, describe _________________________

- **Medical history**

  - **Previous history of same/similar diagnosis**: Document previous history of visual problems and surgical intervention for visual dysfunction. Document whether the patient has worn glasses or contact lenses in the past

  - **Comorbid diagnoses**
    - Ask patient about other problems, including diabetes, secondary complications of diabetes, cancer, heart disease, hypertension, stroke, TBI, neurological complications, ocular disease, respiratory disease, complications of pregnancy, psychiatric disorders, orthopedic disorders, etc.
    - Ask about macular scotomas, commonly associated with low vision. Macular scotomas are areas in the retina that have decreased sensitivity to light, impacting the visual field

  - **Medications previously prescribed**: Obtain a comprehensive list of medications prescribed and/or being taken (including over-the-counter drugs and supplements)
    - Some medications can cause vision problems as a side effect
    - Antihistamines
    - Anticholinergics
    - Digitalis derivatives
    - Certain antihypertensives (guanethidine, reserpine, and thiazide diuretics)
    - Indomethacin
    - Phenothiazines
    - Antimalarials
    - Ethambutol

    - A variety of medications can result in color vision deficits
      - Rassi et al. describe several drug types frequently prescribed to older adults that can potentially alter color perception:
        - Lanoxin (Digoxin) – a cardiac stimulant
        - Lasix – a diuretic
        - Hydroxychloroquine (Plaquenil) – an antimalarial sometimes prescribed for rheumatoid arthritis
        - Sildenafil (Viagra)
- Tamoxifen - used to reduce breast cancer risk
- The authors pointed out that it is not uncommon for seniors to be unaware of their color deficits and that this has implications for rehabilitation professionals working with seniors, including:
  - Color coding interventions for seniors with low vision to facilitate localization and identification of objects may not be effective
  - Many older adults rely on the color of their pills to identify and discriminate them
  - Assistive technology devices to facilitate ADLs often use buttons and controls that require color discrimination
- **Other symptoms:** Ask patient about other symptoms he or she may be experiencing. Ask about any redness, swelling, headache, pain, itching, dryness, discharge/drainage, or a sense that something is in the eye.

**Social/occupational history**

- **Patient’s goals:** Ask patient, family, and/or caregiver about the impact of the visual impairment on the patient’s daily tasks. Document what the patient, family, and/or caregiver hope to accomplish with therapy

- **Vocation/avocation and associated repetitive behaviors, if any**
  - Document patient’s work or school situation and visual needs in his or her place of employment/school
  - Document if patient drives and/or has noted any difficulties with driving, such as with glare and depth perception

- **Function limitations/assistance with ADLs/adaptive equipment**
  - Document patient’s participation in sport activities/recreation

- **Living environment**
  - Document environmental factors that affect vision, such as amount of lighting for a task, amount of contrast, amount of movement in a visual scene, pattern or clutter in background, length of time in a visual task

- **Relevant tests and measures:** (While tests and measures are listed in alphabetical order, sequencing should be appropriate to patient medical condition, functional status, and setting)
  - **Arousal, attention, cognition (including memory, problem solving)**
    - Assess level of alertness, orientation, visual attention, and sustained attention
    - Assess visual cognition, pattern recognition, visual memory
    - Assess ability to follow instructions, memory, organization skills, planning, and safety awareness skills
  - **Assistive and adaptive devices**
    - Assess use of low vision assistive devices
  - **Balance**
    - Assess balance, both standing (eyes open and eyes closed) and sitting
  - **Ergonomics/body mechanics**
    - Observe any postural compensatory techniques, such as forward neck flexion or rounded shoulders
• **Functional mobility** (including transfers, etc.)
  – Observe mobility and transfers, assess need for mobility devices (e.g., cane, walker)

• **Perception** (e.g., visual field, spatial relations)
  – Visual screening tools for ocular motor control, such as eye alignment, binocular fusion, range of motion (ROM), fixation, localization, and control\(^{24}\)
    - Hirschberg technique – fixation on a pen light and observing light reflection in eyes to see where the light is reflected on cornea. This helps to detect if there is any ocular misalignment\(^{24}\)
    - Cover test – focus on a central target, with one eye covered to see if uncovered eye can fixate\(^{24}\)
    - Saccades test – alternate fixating between two objects at 6 inches apart and 16 inches from bridge of nose to observe eye’s ability to rapidly and smoothly move between objects\(^{24}\)
    - Tracking test – moving a pen light or target through 9 gaze positions to observe speed, coordination, and ROM of eyes\(^{24}\)
    - Convergence test – moving a pen light toward the bridge of nose until it reaches point of convergence, usually 3 inches from bridge of nose, to observe the eye’s ability to converge\(^{24}\)
    - Target and fixation – patient visually locates and fixates on a target\(^{24}\)
  – Test of Visual-Perceptual Skills (Non-Motor)(TVPS)\(^{23}\)
  – Motor-Free Visual Perception Test (MVPT)\(^{23}\)
  – Visual attention and scanning evaluations\(^{24}\)
    - Letter cancellation – with single letters arranged in a row, patient is asked to cross out a target letter. Patients with unilateral visual neglect will avoid scanning one side of the page, while asymmetrical performance indicates problems with visual attention\(^{24}\)
    - Line bisection test – patient is asked to draw a line through the center of two horizontal lines. Patients with unilateral visual neglect will draw the line ipsilateral to their lesion\(^{24}\)

• **Self-care/activities of daily living** (objective testing)
  – Observe performance in areas of self-care, meal preparation, home management, shopping, money management, and community activities\(^{27}\)
    - Very Low Vision Instrumental Activities of Daily Living (IADL-VLV) – assessment of completion (time and accuracy) of a series of tasks, including table search, clock reading, sign recognition, signature placement, and clothes sorting\(^{42}\)

• **Sensory testing**
  – Assess tactile sensation (e.g., sharp/dull, temperature, light touch)

• **Special tests specific to diagnosis**
  – Standardized tests
    - Pepper Visual Skills for Reading Test (VSRT)\(^{18,28}\) – assesses visual word recognition skills for reading
    - Minnesota Low Vision Reading Test (MNRead)\(^{18}\) – measures maximum reading speed in patients with low vision
    - TVPS – Revised (TVPS-R)\(^{23}\) – measures visual perceptual skills in children aged 4-12 years in areas of visual discrimination, visual memory, visual-spatial relationships, visual-form constancy, visual-sequential memory, visual figure ground, and visual closure
    - MVPT – Revised (MVPT-R)\(^{23}\) – visual perceptual assessment in areas of spatial relationships, visual discrimination, figure ground, visual closure, and visual memory for children aged 4-11 years
    - Brain Injury Visual Assessment Battery for Adults (biVABA)\(^{29}\) – confrontation field tests
    - Behavior Inattention Test\(^{24}\) – measurement of visual inattention through conventional tests and functional tasks
    - Functional Vision Performance Test (FVPT)\(^{30}\) – observer rated assessment of visual performance
  – High-technology interactive tools
    - There has been an increase in the use of computer-based assessments, diagnostic tools, and training tools\(^{49}\)
    - In a study conducted in the United States, researchers examined the relationship between study participants’ performance on 2 tools that measure target detection and reaction time: VISION COACH\(^{TM}\) and the Functional Object Detection (FOD) Safe Driving simulator\(^{49}\)
VISION COACH involves use of an interactive light board that houses 120 target light dots. Participants respond to a light when it is illuminated by pressing it with a finger as quickly as possible.

The safe driving simulator was a DriveSafety CS-250 driving simulator with 3 displays mounted side by side that provided the participants with a 110 degree geometric field of view of virtual space.

Fifty-four healthy community dwelling individuals ranging in age from 21-66 years participated in the study. Participants were divided into 3 different age groups.

Participants’ performance data were analyzed to see whether age had an effect on performance and whether the performance on the 2 tools was correlated.

A significant difference was found between the oldest and the youngest group’s performance on VISION COACH with the older age group needing a mean of 54.12 seconds to respond to 60 lights compared to a mean of 47.91 seconds for the younger group. There were no significant differences in FOD driving simulator scores between age groups.

There was a significant positive correlation between the 2 instruments, indicating that they can be used to measure similar constructs.

The authors concluded that use of interactive tools such as these can enhance the occupational therapist’s “tool box”, and that highly customizable interactive tools that deliver immediate and printable feedback can be useful to address functional deficits and can have an impact on iADLs such as driving readiness.

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**Assessment/Plan of Care**

- **Contraindications/precautions**
  - Patients with this diagnosis are at risk for falls; follow facility protocols for fall prevention and post fall prevention instructions at bedside, if inpatient. Ensure that patient and family/caregivers are aware of the potential for falls and educated about fall prevention strategies. Discharge criteria should include independence with fall prevention strategies.
  - Patients with unilateral neglect have poor awareness of their affected side. Use caution with presentation of sensory stimuli.

- **Diagnosis/need for treatment**
  - Any visual dysfunction that results in decreased ability to perform ADLs/IADLs or limits a patient’s independence or safety may indicate need for occupational therapy services.
  - Based on a study examining occupational therapy practice patterns as they relate to low vision and visual dysfunction, researchers in the United States identified a perceived need for specific practice guidelines for addressing visual dysfunction.

  - The study consisted of a survey and semi-structured interview of occupational therapists working with visually impaired individuals. A total of 82 participants responded to the survey and 8 practitioners participated in the interview.

- **Rule out**: The patient’s medical team will rule out many diagnoses prior to determining the underlying cause of the patient’s visual dysfunction.
  - Vestibular dysfunction: patients with vestibular dysfunction may present with blurred vision, oscillopsia, and/or diplopia; however, symptoms tend to worsen with head movements and resolve when the head is still.

- **Prognosis**
  - Prognosis depends on the type of visual dysfunction: low vision, ocular motor dysfunction, unilateral neglect, visual field deficits, or visual-perceptual deficits. Generally, low vision due to macular degeneration is not reversible.

- **Referral to other disciplines**
  - Vision rehabilitation specialist or neuro-ophthalmologist for further assessment and treatment for patients with acquired visual deficits.

    - Certified vision rehabilitation therapist (CVRT) – for teaching compensatory techniques, vision assistive technology.

    - Certified low vision therapist (CLRT) – for optical and non-optical devices, visual skills training, and environmental adaptations.

  - Optometrist for diagnosis and treatment of vision disorders, prescription of glasses, contact lenses, vision therapy.

  - Developmental optometrist for further assessment of visual skills and referral for vision therapy.

  - Ophthalmologist for other eye diseases, need for eye surgery.

  - Social worker for social concerns related to adjustment to vision loss.
• Optician for fitting and purchase of glasses/lenses

• Physical therapy for gait and balance issues

Other considerations

• There is a relationship between the vestibular system and visual system that is important for perceiving body motion in relation to visual fields.
  - There is an assumption that due to this relationship, normalizing postural reactions (through sensory integrative treatment) can help to improve control of the extra-ocular muscles that move the eye.

Treatment summary

• There are two treatment approaches for patients with visual dysfunction: visual processing component skills training, and compensatory skills training/environmental adaptation.
  - Visual processing component skills training
    - Training strategies such as sweeping eye movements, timed visual tracking activities, scanning, tracing exercises, repetitive writing exercises can help with reading and writing tasks for persons with visual field deficits.
    - A 35-year-old woman with a TBI from a gunshot wound participated in occupational therapy sessions two times per week for 8 weeks for reading and writing remediation using visual exercises.
    - At end of the 8-week program, patient had increased reading speed (measured by VRST), with good comprehension as well as the ability to fill out forms and applications accurately.
  - Vision rehabilitation that includes optometry, occupational therapy, and social work can increase the level of function in visual tasks.
    - In a study conducted in the United States, 97 patients with best corrected vision of 20/100 or worse, mentally competent, able to communicate in English, and able to complete intervention, were randomly assigned to one of the following:
      - Individual rehabilitation protocol
      - Family rehabilitation protocol
      - Functional Assessment Questionnaire and Functional Vision Performance Test to collect objective and subjective data on visual performance such as spot reading, short-term text reading, identifying paper currency and clock reading, were used both pretest and posttest.
      - While there was no statistically significant difference between the individual treatment group versus the family treatment group, both groups showed improvement in objective and subjective measures of function after vision rehabilitation.
    - Visual perceptual interventions may assist with improving ADL ability in children with CP
      - In a pre/post test design study in South Korea, 56 children (ages 4-7 years) were assessed pre and post intervention.
      - The intervention included visual-motor coordination, figure-ground perception, constancy, and spatial-relations activities.
      - WeeFIM scores improved with statistically significant changes post intervention.
      - Researchers in Australia found that a home web-based therapy program enhanced occupational performance and visual perception skills for children with cerebral palsy.
        - Children with spastic-type unilateral cerebral palsy, ages 8-18 participated in a program of upper limb, cognitive and visual perceptual training, and gross motor activities.
        - The Test of Visual Perceptual Skills was administered following a 20 week-long program and revealed higher scores for the intervention group.
  - Compensatory skills training or environmental adaptations
    - Home safety assessments and modifications for the visually impaired can help to prevent falls.
      - In a study conducted in New Zealand, 391 community-dwelling individuals aged 75 years and older, with visual acuity of 6/24 or worse, were randomly assigned:
        - Ninety-eight participated in exercise and home safety education and modification program
        - One hundred participated in home safety program only
        - Ninety-seven participated in exercise program only
        - Ninety-six participated in social visits by the research staff.
- Home exercise program for strength and balance retraining did not appear to be effective in reducing falls in subjects with visual impairment
- Forty-one percent fewer falls reported in subjects who participated in home safety program versus those who did not
- Researchers in Sweden found that use of optical devices along with a health promotion problem-solving model can decrease the level of dependence in ADLs in persons with low vision

- Two hundred twenty-nine patients with macular degeneration, 65 years or older, living at home and capable of group discussions, were randomized to health promotion program or individual intervention
- Assessments were made at baseline and at 28-month follow-up
- Those in the health promotion program participated in groups 2 hours a week for 8 weeks to provide skills training and group discussion on assistive devices for ADLs
- Those in individual program group participated in activities for improving reading and near and distance viewing in one or two 1-hour sessions
- Those in health promotion program used assistive devices and optical devices to a higher degree than those receiving individual intervention
- Greater use of optical devices was associated with lower level of ADL dependence
- Low vision services that allow persons with low vision to be trained in the use of low vision assistive devices may help with the acquisition and appropriate use of low vision assistive devices

- In a study conducted in the United States, 15 participants who were 55 years or older, had a low vision impairment of worse than 20/70, no cognitive impairment, no English language or communication problems, and had the potential for current use of low vision assistive devices completed in-depth interviews in groups and individually
- Focus group questions about current or potential low vision assistive devices use
- Data transcribed, analyzed, and interpreted
- Three primary topic areas: experiences and characteristics leading to successful low vision assistive device use decision making, challenges to successful low vision assistive device use decision making, and adjustment to low vision disability
- Results of focus group questions indicate that providing training and choice in use of optical devices and positive interactions with low vision specialists can help patients use and adapt to low vision assistive devices
- Use of problem-solving strategies to increase participation in ADLs/IADLs and leisure and social activities

<table>
<thead>
<tr>
<th>Problem</th>
<th>Goal</th>
<th>Intervention</th>
<th>Expected Progression</th>
<th>Home Program</th>
</tr>
</thead>
</table>

(33) Researchers in Sweden found that use of optical devices along with a health promotion problem-solving model can decrease the level of dependence in ADLs in persons with low vision.

(34) Low vision services that allow persons with low vision to be trained in the use of low vision assistive devices may help with the acquisition and appropriate use of low vision assistive devices.

(43) Results of focus group questions indicate that providing training and choice in use of optical devices and positive interactions with low vision specialists can help patients use and adapt to low vision assistive devices.
| Decreased ability to perform ADLs/IADLs due to low vision\(^{(3)}\) | Increase independence in ADLs/IADLs | **Compensatory strategies**  
Environmental adaptations, such as contrast lighting, enlarged objects/keys\(^{(9)}\)  
Access to community resources such as talking books, telephone directory exemption, radio reading services\(^{(21)}\)  
Compensatory techniques, such as using talking devices\(^{(35)}\)  
**Prescription, application of assistive devices and equipment**  
Training in use of optical devices, such as magnifying glasses, telescopes\(^{(3,9,43)}\) | Adapt compensatory techniques, environment, assistive devices as patient’s condition changes | Provide patient and family/caregivers with education and training on use of adaptations and assistive devices |
| Decreased ability to perform ADLs secondary to visual field deficit<sup>(8)</sup> | Increase independence in ADLs | **Functional training**  
Awareness of blind side,<sup>(8)</sup> teaching to visual scan to a prism placed in area of vision loss<sup>(5)</sup>  
**Prescription, application of devices and equipment**  
Use of optical devices such as mirrors and prisms to reflect light and give a reversed image<sup>(5)</sup>  
**Compensatory strategies**  
Use of markers, anchors to identify patient’s place through touch<sup>(5)</sup>  
Increase field of scanning as patient improves in awareness of visual field deficit  
Adapt compensatory techniques, environment, assistive devices as patient’s condition changes | Provide patient and family/caregivers with education about application and/or proper use of optical devices  
Progress from easiest direction for person to move his or her eyes to the most difficult<sup>(8)</sup>  
Progress from horizontal tracking, vertical tracking, and circular tracking<sup>(8)</sup>  
Home program of vision exercises |
<table>
<thead>
<tr>
<th>Decreased reading skills(^{(4)}) or participation</th>
<th>Improve reading skills and participation</th>
<th>Functional training</th>
<th>Progress difficulty of visual information through increasing amount of visual information, decreasing size of visual information as patient improves in saccades and tracking and using preferred retinal locus</th>
<th>Home program of vision exercises</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Retraining of residual visual skills, such as fixation stability, saccades, and tracking eye movements(^{(4)})</strong></td>
<td><strong>Warren’s exercises(^{(4)})</strong> – reading letters from left and right columns to increase speed and accuracy in saccades</td>
<td><strong>Training a preferred retinal locus in the peripheral retina(^{(4,16)})</strong></td>
<td>** Increased engagement in reading**</td>
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<tr>
<td><strong>Compensatory strategies</strong> Use alternate lighting, control glare, and consider use of filters to address discomfort</td>
<td><strong>Progress difficulty of visual information through increasing amount of visual information, decreasing size of visual information as patient improves in saccades and tracking and using preferred retinal locus</strong></td>
<td><strong>Increased engagement in reading</strong></td>
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<tr>
<th>Decreased driving ability(^{(4)})</th>
<th>Safe and independent driving</th>
<th>Functional training</th>
<th>Progress visual activities from visual objects to application to car, such as putting visual cues on windshield of car(^{(4)})</th>
<th>Home program of vision exercises and eye-hand-foot coordination exercises</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Training residual oculomotor skills, spotting (fixation), scanning, and eye-hand-foot coordination skills(^{(4)})</strong></td>
<td><strong>Training road sign recognition(^{(4)})</strong></td>
<td><strong>Progress to a driving rehabilitation program for practice on different roadways, speed, and noise(^{(4)})</strong></td>
<td><strong>Home program of vision exercises and eye-hand-foot coordination exercises</strong></td>
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<td><strong>Driver simulation programs(^{(49)})</strong></td>
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**Desired Outcomes/Outcome Measures**

- Maximum independence in daily activities (e.g., reading, driving) with assistive devices as needed
  - FIM, WeeFIM, MNRead, VRST, TVPS-R
  - Improved safety with ADLs/IADLs
    - FIM, WeeFIM, IADL-FLV, DGI, CTSIB, Medical Outcomes Study Short Form 36 Health Survey (SF-36)

**Maintenance or Prevention**

- Regular visits to optometrist/ophthalmologist for eye health\(^{(20)}\)
Avoidance of excessive consumption of alcohol for better eye health\(^{(20)}\)
Avoidance of smoking\(^{(20)}\)
Keep blood pressure, cholesterol level, and diabetes under control\(^{(20)}\)
Appropriate occupational and/or sport-related protective eyewear

**Patient Education**

- See Neuro-Optometric Rehabilitation Association for more information, http://noravisionrehab.com/
- American Occupational Therapy Association (AOTA) guide for living with low vision, https://www.aota.org/~/media/Corporate/Files/AboutOT/consumers/Adults/LowVision/Low Vision Tip Sheet.ashx

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**Coding Matrix**

References are rated using the following codes, listed in order of strength:

- **M** Published meta-analysis
- **SR** Published systematic or integrative literature review
- **RCT** Published research (randomized controlled trial)
- **R** Published research (not randomized controlled trial)
- **C** Case histories, case studies
- **G** Published guidelines
- **RV** Published review of the literature
- **QI** Published quality improvement report
- **L** Legislation
- **PGR** Published government report
- **PFR** Published funded report
- **PP** Policies, procedures, protocols
- **X** Practice exemplars, stories, opinions
- **GI** General or background information/texts/reports
- **U** Unpublished research, reviews, poster presentations or other such materials
- **CP** Conference proceedings, abstracts, presentation

**References**


42. Lighthill CR, Perez EE, McWilliams KB. Coming into focus: brain injury and vision therapy. Rehab Manage Interdiscip J Rehabil. 2013;26(9):20. (X)


