

## Module 7: Cognition, Vision and Perception

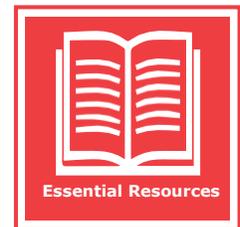
### Learning Objectives

Upon completion of this module, nurses will be able to:

- Explain cognition, perception and visual changes following stroke
- Describe how impaired cognition, perception and visual disturbance following stroke impact the stroke survivor's ability to function independently following stroke
- Describe strategies for helping the stroke survivor with cognitive, perceptual and visual problems
- Describe how to assess for Capacity and Consent

Please refer to the following content when reading this module:

1. Taking Action for Optimal Community and Long-Term Stroke Care: A Resource for Healthcare Providers  
Section 4.1 – [\*Vision and Visual Perception\*](#)
2. Taking Action for Optimal Community and Long-Term Stroke Care: A Resource for Healthcare Providers, Section 5.3 - [\*Cognition\*](#)





## Cognition Post-Stroke

Cognition refers to how we know things and how we think. It is defined as conscious mental activities, the activities of thinking, understanding, learning and remembering (Merriam Webster Dictionary, n.d.).

Two-thirds of stroke survivors experience cognitive impairment or decline post-stroke (Teasell et al., 2020)

Cognitive slowing is a common complaint after stroke (Cumming et al. 2013) and the majority of patients exhibit marked slowing of information processing (Hochstenbach, Mulder, Vanlimbeek, Danders, & Schoonderwaldt, 1998; Rasquin, Verhey, Louisberg, & Ladder, 2005). Processing speed is relevant because it affects functional outcome after stroke (Barker-Collo, Feigin, Parag, Lawes, & Senior, 2010) and can predict dependency in stroke survivors (Narasimhalu et al., 2011). Attention and executive functioning tend to be more affected than memory skills post-stroke (Cumming et al. 2013).

Cognitive problems are invisible barriers. They are not as easily seen as physical problems. A stroke survivor with cognitive problems may not appear to have any impairment. Yet, cognitive problems can have a major impact on a survivor's function and level of independence (Heart and Stroke Foundation [HSF], 2015a, section 5.3).

## Cognitive Impairment

Cognitive impairment is not dementia; however, many survivors with cognitive problems may also have dementia as a diagnosis. Proper assessment and knowledge of each presenting cognitive problem will ensure a proper approach in the provision of care.

## Vascular cognitive impairment (VCI)

Vascular cognitive impairment is a syndrome with cognitive impairment affecting at least one cognitive domain (e.g. attention, memory, language, perception, or executive function) and with evidence of clinical stroke or subclinical vascular brain injury. Vascular cognitive impairment encompasses a large range of cognitive deficits, from relatively mild cognitive impairment of vascular origin to Vascular Dementia, the most severe form of vascular cognitive impairment (Canadian Stroke Best Practice Recommendations [CSBPR], Lanctôt et al., 2020), Vascular dementia is the second most common type of dementia after Alzheimer's disease (Registered Nurses' Association [RNAO], 2005).

## Delirium

Delirium is a temporary, but complex neuropsychiatric syndrome characterized by an acute onset and fluctuating course of altered level of consciousness, inattention and disorganized thinking. of cognitive impairment, disorientation, disturbance in attention, and decline in level of consciousness or perceptual disturbance (RNAO, 2016, p.31). A prevalent disorder, it is reported to affect up to 50% of hospitalized older adults, with higher incidences seen in areas such as ICU's and among those undergoing surgical procedures (RNAO, 2016, p.31)

Delirium symptoms fluctuate, often worse at night in the dark and on awakening. Alertness may fluctuate from lethargic to hypervigilant. Perception may be distorted with illusions, delusions, and hallucinations, making it difficult to distinguish between reality and misperceptions. Relatives and caregivers can accurately identify cognitive decline, and their concerns must always be taken seriously.

Nurses should maintain a high index of suspicion for delirium in the older adult and be able to distinguish delirium from dementia and depression (RNAO, 2016).

Clinicians should bear in mind that an older person with multiple comorbidities, and dementia in general, are at high risk for delirium associated with medical problems, medications and surgery. For a listing of medications that may cause cognitive impairments, refer to Appendix N of *RNAO's (2016) Screening for Delirium, Dementia and Depression in Older Adult*. Perceptual and cognitive deficits impact on both quantity and type of required nursing care.

## Cognition and rehabilitation

To be eligible for stroke rehabilitation, patients should be able to follow one-step commands (with communication support if required) and have sufficient attention, and short-term memory, to progress through the rehabilitation process. General exclusion criteria are individuals with severe cognitive impairment preventing them from learning and participating in therapy. (CSBPR Eligibility and admission criteria for stroke rehabilitation p. 1 & 2 – stroke rehabilitation assessment)

Early identification and treatment of cognitive deficits will assist in the development of adaptive strategies for the survivor and family so they can maximize the return of function. It is important to remember that some skills will improve over time, while some problems may remain ongoing challenges for the survivor.

Common stroke rehabilitation interventions for vascular cognitive impairment may include compensation strategies and direct remediation/cognitive skill training.

Compensation strategy training focuses on teaching strategies to manage impairments and is often directed at specific activity limitations to promote independence e.g. changes in the physical and or social environment.

Remediation/cognitive skill training focus on providing intensive specific training to directly improve the impaired cognitive domain e.g. drill and practice exercises, mnemonic strategies, or computer/ tablet-based tools directed at specific deficits.

Strategies should be individualized and based on the person's needs (CSBPR, Lanctôt et al., 2020).

## Location of Cognitive Functions in the Brain

Location of Cognitive Functions in the Brain	
<b>Frontal Lobe</b>	<ul style="list-style-type: none"> <li>• Ideation</li> <li>• Planning</li> <li>• Executive functions in general organization, problem-solving, selective attention</li> <li>• Speech (left: Broca's area)</li> <li>• Motor execution</li> <li>• Short-term memory</li> <li>• Motivation</li> <li>• Judgement</li> <li>• Personality</li> <li>• Emotions</li> </ul>
<b>Temporal Lobe</b>	<ul style="list-style-type: none"> <li>• Emotions</li> <li>• Memory</li> <li>• Visual memory (right)</li> <li>• Verbal memory (left)</li> <li>• Interpretation of music (right)</li> <li>• Receptive language (left: Wernicke's area)</li> </ul>
<b>Occipital Lobe</b>	<ul style="list-style-type: none"> <li>• Visual reception</li> <li>• Visual recognition of shapes and colours</li> </ul>
<b>Parietal Lobe</b>	<ul style="list-style-type: none"> <li>• Visuospatial functions (right)</li> <li>• Reception and recognition of tactile information</li> <li>• Praxis (left)</li> </ul>

Location of Stroke and Impact on Cognitive Functions	
Left Hemisphere	Right Hemisphere
<ul style="list-style-type: none"> <li>• Decreased understanding of written and spoken language (expressive and receptive aphasia)</li> <li>• Difficulty with number skills</li> <li>• Difficulty with reasoning and grasping general concepts</li> <li>• Decreased organization and sequencing abilities</li> <li>• Bilateral motor apraxia</li> <li>• Bilateral ideational apraxia</li> </ul>	<ul style="list-style-type: none"> <li>• Decreased insight</li> <li>• Difficulty with attention and concentration</li> <li>• Unilateral spatial neglect</li> <li>• Visuospatial impairments</li> <li>• Unilateral body neglect</li> <li>• Left-sided motor apraxia</li> <li>• Decreased understanding of facial expressions and other nonverbal communication</li> <li>• Decreased understanding of verbal humour, sarcasm, hints and jokes</li> </ul>

The above impairments may impact the stroke survivor in the following ways:

- Trouble making a point, wander off topic, give too much or too little information
- Difficulty following directions or understanding maps
- Short term memory problems, poor judgment and impulsive behaviours
- May appear rude, lack concentration, have difficulty remembering materials read
- May not attend to or see items on the left (left neglect)

## Cognitive Domains

Cognitive impairments are divided into various domains which include:

- Attention
- Memory
- Executive Functioning
- Perseveration and Praxis
- Language

### Attention

Attention is being able to concentrate on one thing for a period of time and includes alertness and the ability to detect and react to interventions. Attention is a fundamental function in a variety of mental processes (Teasell et al. 2020). Attention encompasses the following: focused attention, sustained attention, selective attention, alternating and divided attention.

---

Attention training may have a positive effect on specific, targeted outcomes but overall attentional training may not be helpful for improving attentional deficits. *(Teasell et al. 2020)*

---

### Memory

Memory is a complex process that involves the ability to register, process and store new information and retrieve information that has been previously stored.

Memory problems have a significant interference with daily functions and is therefore a major focus in rehabilitation. Patients with significant memory impairment often have difficulty with remembering what they did that day. They may not remember if they had participated in normal routine activities of the day. They may engage in confabulation where they will tell a story about an event that is not true. This is the brain's way of compensating for memory gaps.

The different types of memory include procedural, working, semantic, and episodic memory.

---

Assessing specifics about severity and types of memory deficits is the role of the **Occupational Therapist, Speech-Language Pathologist and/or Neuropsychologist**. These team members will provide strategies relevant to each patient.

---

## Executive function

Executive function involves the ability to initiate, plan, sequence, implement and accomplish goal-directed activities in a flexible manner (Cicerone et al., 2000).

The following are required for effective executive functioning:

- Insight - knowing and understanding abilities and limitations
- Inhibition/impulse control -stopping inappropriate actions
- Judgment - making good choices and decisions while being aware of own capabilities
- Sequencing - being able to arrange things or perform actions in the right order
- Problem-solving- knowing how to recognize a problem and find a good solution, including having the mental flexibility to find alternative solutions and extrapolating information to novel situations
- Self-monitoring – being able to monitor our own progress and adapt our behaviour/approach to expected or unexpected circumstances.

(HSF, 2015a, StrokeEngine)

## Perseveration

Perseveration is the uncontrollable repetition of a particular response, such as a word, phrase, or gesture, despite the absence or cessation of a stimulus. This may be observed in stroke survivors as a word repetition or 'getting stuck' on a movement (e.g., brushing teeth).

## Praxis

Apraxia is a disorder of voluntary (purposeful) skilled movement that cannot be attributed to sensorimotor dysfunction (e.g., weakness, tremor, spasticity, loss of joint position sense) or comprehension deficits. It refers to a loss of skill known as praxis (Heilman & Gonzalez, 2003). It includes the knowledge of the function of items (e.g., purpose of a toothbrush vs. a comb) and the knowledge of the movement required to execute the activity, but the inability to purposefully and appropriately complete the activity. It occurs in up to 30% of all stroke survivors in the acute phase. *The left parietal and frontal premotor areas are most commonly associated with apraxia.*

Apraxia strategy training may be beneficial for improving activities of daily living post-stroke (Saikaley et al.p. 100,2019).

## Language

Language is the ability to understand both written and verbal information and to be able to communicate both verbally and nonverbally.

---

The *Speech-Language Pathologist* on the team will assess each patient's communication abilities and provide relevant strategies.

---

## Capacity and Consent

Often the involvement of a *Social Worker* is necessary to establish capacity to consent and to inform the family of concerns.

According to the *Health Care Consent Act* (Government of Ontario, 1996), capacity is a person's ability to understand the information presented that is relevant to making a decision and to appreciate the reasonably foreseeable consequences of a decision or lack of decision. It is not the quality of a patient's choices that are being considered, just the determination of capacity.

Capacity can fluctuate and it is important to consider possible treatable causes (e.g., drug toxicity or infection). It is also important to note that a person may be capable of making one decision but incapable of making another. The healthcare professional who is seeking a decision determines a person's capacity at that time. Often the team's input is sought when a patient's capacity is at question.

Capacity assessors are in place to assess financial capacity. However, if a team is having a difficult time assessing capacity, or if there are differences in thought, a capacity assessor may be requested to render their opinion. There is a fee associated for this.

On the interdisciplinary team, it is usually the *Social Worker's* responsibility to acquire information as to who a patient's legal substitute decision maker (SDM) is, using the Substitute Decision's Act. If a person is incapable of making a healthcare decision, the legal SDM would be called upon to do so. In the event that an SDM does not exist, or is not accessible or available, Public Guardian and Trustee would need to be approached. The *Social Worker* is the resource for communicating with Public Guardian and Trustee or referring to a capacity assessor.

## Screening Cognition

All Stroke survivors should be screened by a member of the interprofessional team within 48 hours of the stroke survivor becoming awake and alert, using validated tools (e.g., Montreal Cognitive Assessment, Modified Mini-Mental Status Examination, Line Bisection Test) for alterations in cognitive, perceptual and language function (RNAO, 2011).



## Screening for cognitive impairment

It is essential to identify and interact appropriately with patients with cognitive and perceptual deficits in order to maximize rehabilitation potential. The goal of the rehabilitation nurse and the entire team is to maximize functional gain for the patient and to develop strategies to compensate for these deficits.

Cognitive impairments can sometimes be very apparent through conversation and observation. A patient demonstrating these deficits needs further assessment (RNAO, 2005). Observations may include recognizing when the patient drifts off topic, demonstrates decreased listening, is less aware of other people's verbal and nonverbal communication, is easily distracted and having difficulty shifting from one topic to the next, and/or responding to another person's conversation, believing they are being spoken to.

Screening for vascular cognitive impairment should take into account any immediate factors that may impact assessment results such as communication and sensorimotor deficits (e.g., speech and language, vision, hearing), delirium, hypoarousal, and other medical conditions that may have temporary impact on cognition (CSBPR, Lanctôt et al., 2020, section 2.2).

The nurse's awareness of the patient's previous lifestyle will assist with identifying cognitive impairment versus behavioural choices through adequate history taking and conversations with family members.

When completing the assessments, the patient needs to be alert to participate in the cognitive screen. The patient must have sufficient attention to participate in assessment (i.e., focused and sustained attention).

With any changes in medical status and/or environment, a reassessment of the patient's cognition is warranted (RNAO, 2005, p. 47).

Nurses can identify immediate safety concerns. Patients with cognitive impairment are at greater risk for falls. The risk of falling is increased following stroke due to leg weakness, impaired balance, visual disturbances, cognitive impairment and sensory loss. During inpatient rehabilitation, the incidence of falls has been reported to range from 16%-39% (CSBPR, Teasell et al., 2020, Section 6.3).

Where impairments are identified, stroke survivors should be referred to a trained healthcare professional for further assessment and management such as an **Occupational Therapist and/or Speech-Language Pathologist** (RNAO, 2005).

## Screening for delirium

Nurses should maintain a high index of suspicion for delirium in the older adult. Relatives and caregivers can accurately identify cognitive decline; their concerns must always be taken seriously (RNAO, 2003).

Diagnostic criteria for delirium include the following:

- Disturbance of consciousness with reduced ability to focus, sustain or shift attention (e.g., reduced awareness of the environment)
- A change in cognition or development of a perceptual disturbance not accounted for by a preexisting dementia
- Development over a short period of time (usually hours to days) and tending to fluctuate during the course of the day
- Occurrence in the presence of a medical condition (e.g., stroke, UTI)

(RNAO, 2003)

## Screening for depression

It is important to remember that cognitive impairment can be associated with depression; therefore, screening for depression should also be completed by a trained professional, using a validated screening tool to maximize detection of depression (CSBPR, Lanctôt et al., 2020). Symptoms of depression can be manifested as cognitive deficits, including difficulties with orientation, memory, language, and distractibility (RNAO, 2005).

## Common Screening Tools for Cognitive and Perceptual Deficits

The *Occupational Therapist* and *Speech Language Pathologist* may use and report on the following screening and assessment tools:

- The Montreal Cognitive Assessment (MoCA) assesses cognitive domains. It assesses short term memory recall, visuospatial abilities and executive function. Attention, concentration and working memory are evaluated as well as orientation to time and space. This tool is recommended by the Canadian Stroke Best Practice Recommendations.
- The Mini-Mental State Examination (MMSE) tests a number of different mental abilities, including a person's memory, attention and language. In addition, there is a language modified MMSE for patients with language impairment and a visual modified version for those with visual impairment. Although the Mini-Mental State Examination is widely utilized and is sensitive in patients with moderate to severe levels of cognitive impairment, it is not as sensitive in patients with mild cognitive impairment or in patients with right hemispheric brain involvement (RNAO, 2005).
- Motor-Free Visual Perception Test 3rd Edition (MVPT-III) is a tool which assesses a patient's visual perceptual ability. It is especially useful for those who may have learning, motor or cognitive disabilities.
- Clock Drawing Test assesses executive function (e.g., planning, organization), memory, visual perceptual skills and visuospatial skills. Preliminary research indicates an association between specific scoring elements of the clock drawing test and poor driving performance (Dawson et. al., 2013, section 5.11, p. 89).
- Line Bisection Test is a quick measure to detect the presence of unilateral spatial neglect. To complete the test, one must place a mark with a pencil through the centre of a series of horizontal lines. Usually, a displacement of the bisection marks the side of the brain lesion is interpreted as a symptom of unilateral visual neglect.(Teasell and al. 2020, p. 44)

(Canadian Partnership for Stroke Recovery, n.d.)



It is easy to be deceived into overestimating the abilities of a stroke survivor with cognitive problems. Sometimes the survivor has some awareness or insight towards the problem and will attempt to avoid detection of the deficit in their attempt to appear "normal". Detailed assessment of cognitive and perceptual problems and education for the survivor and their support network is essential to ensure that there is not frustration or anger directed at the survivor who is struggling with these problems.

Nursing interventions to assist the patient to manage cognitive, perceptual and/or vision deficits involve compensatory strategies. Management of the environment is essential to success. Strategies would include the following:

- Eliminate distractions (e.g., turn off the television or radio)
- Approach the patient with direct eye contact when engaging with him/her
- Provide information in written format so it can be reviewed frequently or as needed
- Provide the patient with limited amount of information at a time
- Provide short simple instructions

- Provide information when the patient is rested and alert
- Promote awareness of self through orientation strategies (e.g., reinforcement of the patient's name, personal situation in regard to place and time, significant family members and past history and/ or posting pictures and names of family members)
- Correct misinformation by giving cues and reorientation
- Post schedule boards for social events and appointments (e.g., calendar, white board for activities, clock in the room and/or posting the date and schedule for the day)
- Limit changes to routine and/or schedule

## Orientation

The nurse can assist the patient towards orientation with the following:

- **Self-orientation** - ask personally relevant questions: What is your name? When were you born? Where do you live? Whom do you live with? Do you have a family? What are their names? What type of work do you/did you do? What do you do in your spare time?
- **Place orientation** - ask geographical or location relevant questions: Where are you now? What city/province are we in? What is your address?
- **Time orientation** - ask time relevant questions: What time is it now? What is today's date? What season is it? What is the next holiday? Who is the prime minister? How long have you been here? How long have we been talking?

## Memory

The nurse can utilize strategies to assist with memory such as ensuring that the patient is attending to the information being provided. The use of repetition is essential. Information should be simple and clear, and new information should be linked to something relevant.

The nurse should reinforce the use of memory aids such as a day planner or journal, monthly calendar of events with dates marked off when completed, and posted notes and lists as reminders.

Cueing devices such as alarm clocks, bell timers and watch alarms may be helpful. Media devices such as telephone applications and iPad are also sometimes helpful.

Structured environments with drawers labeled for contents as well as signage on cabinets, doors and hallways will assist in orientation and memory.

## Higher-level executive function

Deficits in this area will be evidenced by the stroke survivor being impulsive, denying problems or deficits, having difficulty with making specific plans, and often being socially inappropriate. They may perseverate or get "stuck" on an idea. They are unable to deal with problems effectively.

---

The nurse must be aware that making poor choices when well informed does not necessarily mean that the stroke survivor has higher-level executive function deficits. They are demonstrating personal choice based on what they value. On the other hand, survivors with higher-level executive function deficits may make choices that are inconsistent with choices that they would have made prior to the stroke event.

---

The patient with higher-level executive function deficits will be vulnerable in regard to their personal situation and need to be protected both financially and in regard to their personal decisions. Involvement of a *Social Worker* will be important.

Research is lacking regarding the effectiveness of cognitive rehabilitation for the remediation and treatment of executive functioning skills post-stroke. Executive function intervention may involve meta cognitive strategy training and/or formal problem-solving strategies, under the supervision of a trained therapist (CSBPR, Lanctôt et al., 2020). The use of compensatory strategies and external support may also be considered.

Setting up compensatory strategies for the stroke survivor to manage with their cognitive impairment upon discharge is very important and will likely need full team involvement:

- Environmental cueing such as safety checklists should be located at the front door, medication reminders on the fridge, etc.
- Strategies for management include safety considerations, such as driving, and financial management
- Realistic goals, structured routines and environment
- Provision of feedback cues in regard to self-monitoring, simplifying tasks and engaging in one task at a time are essential
- Utilization of current technologies for assistance in reminding patients for schedules, medications and appointments may be helpful





## Vision and Perception Post-Stroke

Vision is the dominant sense. Vision is the process of deriving meaning from what is seen. Research estimates that 80-85% of our perception, learning, cognition and activities of daily living (ADLs) are mediated through vision (Politzer, n.d.). Visual acuity is the clarity or sharpness of vision.

Perception was defined by Titus, Fall, Yerxa, Robertson, & Mack (1991) as the ability to organize, process and interpret incoming visual information and/or tactile-kinesthetic information, and to act appropriately on the basis of the information received.

The visual system is commonly impaired after stroke and up to two-thirds of stroke survivors will experience visual and/or perceptual deficits. Most at risk are those people with strokes in the occipital lobe, parietal lobe, optic nerve or parts of the brain that control eye movements.

### Visual impairment

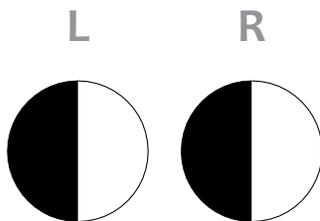
Typical visual impairments include visual field deficits, loss of ocular alignment or diplopia (double vision), and change in visual acuity. Further complex visual impairments include spatial relations impairments, visual agnosia and neglect of visual information contralateral to the injury (Aloisia, 2004; Suchoff et al. 1999).

Visual changes with stroke can be categorized as either sensory, motor or perceptual.

#### Sensory

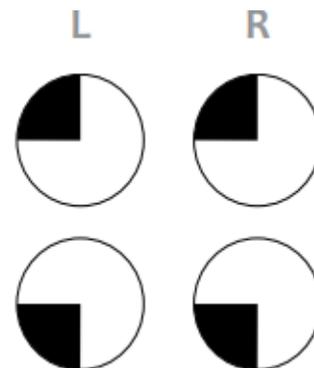
This includes visual acuity and visual fields:

- The patient can have decreased visual acuity (i.e., clarity, ability to see details and colour).
- A visual field defect is missing an area when looking straight ahead. One could be missing a part of their visual field or they could present with homonymous hemianopsia, which is a loss of half of the visual field on the same side of each eye. Quadrantanopia is a loss of vision in the upper or lower quadrant of vision on the same side of each eye.



Loss of vision in left hemifield

Homonymous Hemianopsia



Quadrantanopia  
(upper and lower)

## Motor

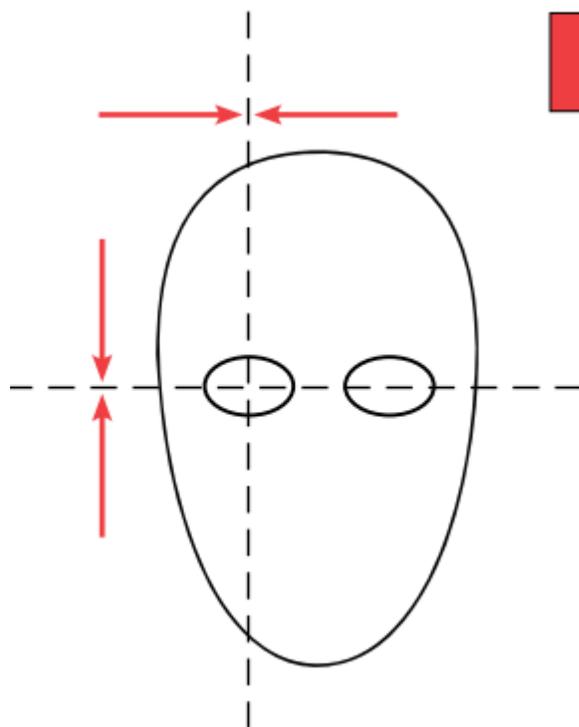
Ocular motor control provides perceptual stability by controlled and stable eye movements. It allows for visual efficiency: fixate (look), follow (track), fuse (eye coordination) and focus. Common impairments include diplopia, nystagmus and impaired eye movements.

- Diplopia or double vision can be perceived by a patient as blurry vision.
- Nystagmus is involuntary rhythmic, oscillating motions of the eyes, resulting in the patient seeing fixed objects as shaking or moving.
- Impaired eye movements interfere with a person's ability to move eyes to glance from one object to another or follow a moving object, impacting safe mobility and reading.

## Perceptual (attention to visual space)

Visual Information Processing includes spatial perception, eye-hand-body coordination, visual memory, visualization, and visual attention.

- Visual Midline Shift Syndrome (VMSS) - The vertical or horizontal centre point is perceived as having shifted either to the left, right, above or below the reality of true centre. A person with VMSS may interpret a midpoint off true centre resulting in them *leaning to one side or pitching forward or backward*. The midline shift usually shifts away from the neurologically affected side, causing changes in balance, posture and gait.



### Visual Midline Shift Test

#### Visual Midline Shift to Right

Adapted from Padula & Argyris, 1996, page 168.  
(<https://padulainstitute.com/education/articles/post-trauma-vision-syndrome>)

Post Traumatic Vision Syndrome is a constellation of ocular motor, attentional, and cognitive problems after brain lesion.

Visual agnosia is impairment in recognition of *visually* presented objects, not due to a deficit in vision (acuity, visual field, and scanning). Once holding the object, the person may be able to use their sense of touch to identify it.

Impairment in spatial relations can cause difficulties for a person to orient themselves and objects in space e.g. orienting self in relation to a doorway, or orienting front/back of clothes.

## Perceptual Deficits

Perceptual deficits impact the brain's ability to interpret and make sense of the information that is received in the brain. Visual deficits are due to primary sensory impairments whereas perceptual deficits are not. Perception is primarily controlled by the right hemisphere. A person can have a visual deficit and/or a perceptual deficit depending on the location and size of the brain damage.

Numerous perceptual impairments can result from a stroke. Right-sided hemispheric lesions in the parietal lobe often result in varying degrees of neglect.

### Unilateral spatial neglect (USN)

USN is one of the most common perceptual impairments. USN is the failure to report, respond or orient to sensory stimuli presented to the side contralateral to the lesion. It can include inattention to objects, parts of objects, parts of scenes, personal space and body parts.

- USN is present in 23% of stroke patients
- It is more common in right-sided lesions (42 %) than left-sided lesions (8%) and more persistent with right-sided strokes
- Greatest recovery from USN occurs in the first six months post-stroke
- USN is associated with poor rehabilitation outcomes with diminished functional outcomes at discharge especially in mobility and ADLs
- Lengths of hospital stays are longer and rates of improvement are slower (Wee & Hopman, 2008)

### Types of neglect

Neglect may be of the body or *personal space* (tendency to neglect the opposite side of the lesion, in reference to the midline the body), *peripersonal* (space within a patient's normal reach) or *extra personal* (environment beyond a patient's reach). Neglect is evidenced by colliding with the environment, such as the door frame on the involved side (extra personal), ignoring food on one side of the plate (peripersonal) or attending to only one side of the body (personal). The *Occupational Therapist* will complete different tests for each of these types of neglect.

Treatment of visual neglect and perceptual disorders can be treated through remedial (restoration of function) or compensatory (adapting external environment) approaches. A combination of several methods may be most effective in treatment. There is evidence for the use of treatment strategies such as visual scanning techniques, virtual reality/computer-based interventions, and mirror therapy to improve perceptual impairments caused by neglect (CSBPR, Teasell et al., 2020).

---

### **Visual/perceptual deficits can negatively impact:**

- Postural control and balance
- Performance of ADLs
- Ability to interact with a dynamic environment
- Safety

### **Untreated visual perceptual deficits may result in:**

- Decreased functional recovery-mobility, ADLs, IADLs (e.g., cooking, cleaning, banking, shopping)
  - Increased length of stay
  - Alternate discharge destination due to decreased independence
  - Risk for functional deterioration at one year follow-up
- 

Visual and perceptual deficits and neglect are the most commonly overlooked and under treated conditions of stroke. Many patients are unaware of having these deficits.

Nurses can identify patients with vision difficulty by observing for reports of the following symptoms:

- Blurred or double vision
- Headache
- Dizziness or nausea
- Decreased attention or concentration
- Uncomfortable in crowds
- Difficulty reading or understanding content
- Poor visual memory
- Behavioural changes
- Asymmetric posture



The nurse can identify and alert other members of the rehabilitative team to a stroke survivor with a visual, perceptual and/or unilateral neglect by observing the following behaviours:

- Impaired ADLs function (e.g., forgetting to dress, bathe and/or groom the affected side of the body)
- Lack of awareness of body posture and position (e.g., arm dangling from wheelchair, lying on arm)
- Requiring assistance with mobility as the survivor may not attend to obstacles on left side which then increases the risk of falls and injury
- Misplacing and losing items in the room or bed with poor search strategy to locate items
- Forgetting to turn off water taps

- Not being able locate all food on tray and/or plate (e.g. , eating from only one side of the plate)
- Being unable to perceive all the written words on a page affecting his/her ability to read
- Patient self-report (e.g., descriptions of patient's own experience and frustration)

Visual field testing, as per the National Institutes of Health (n.d.) Stroke Scale, will help to determine if the stroke patient presents with several conditions, including homonymous hemianopsia, impaired eye movements, and a form of unilateral neglect. The testing will not identify all potential visual or perceptual impairments. The *Occupational Therapist* and *Physician* can help identify visual and perceptual deficits.

Observe an experienced colleague perform visual field testing on a stroke patient to appreciate the exact method with which to assess impairments accurately.

The ***Occupational Therapist*** on your team can complete a detailed assessment utilizing standardized assessments (e.g., MoCA, MVPT-111, Behavioral Inattention Test, Line Bisection and Comb and Razor Test)) and provide strategies to assist the patient who has visual and/or perceptual deficits. Other team members such as the ***Physiotherapist, Speech-Language Pathologist and Physician*** can also provide valuable information.

An ***Optometrist*** with a special interest in vision rehabilitation, if available, can complete a detailed assessment of visual deficits and provide valuable recommendations.

Perceptual deficits that may not be noticeable in the hospital can create safety problems in the home. All patients should be screened for cognition and perceptual deficits by an *Occupational Therapist* and, if language challenges are present, by a *Speech-Language Pathologist*.



All stroke survivors should have their vision assessed for possible vision deficits post-stroke as they can have profound effects on one's abilities and eventual rehabilitation potential and outcomes.

Symptoms may become worse when the person is fatigued, over stimulated or performing more complex activities. Adequate rest periods should be provided.

Visual and/or perceptual impairments can improve with time, natural recovery and rehabilitation. Persistent deficits can be compensated to maximize functioning.

The nurse should consult with the *Occupational Therapist* for treatment advice. Treatment may include visual scanning techniques, computer-based scanning, virtual reality therapy (e.g., Nintendo Wii), mirror therapy, limb activation techniques coupled with mirror therapy, sensory feedback (**strategies to improve awareness and attention to neglected space**), neuro-optometric rehab (e.g., patching, prisms), vision therapy, and functional training (e.g., ADL, kitchen activities).

Patients, families and caregivers should receive education on visual-spatial neglect and treatment recommendations. (CSBPR, Teasell et al., 2020)

---



Prisms are a compensatory tool used to treat visual/perceptual disorders. They serve to shift images from the blind or neglected field into the seeing field.

---

Where possible, nurses should engage the patient in practicing the compensatory techniques as determined by the *Occupational Therapist*.

## Compensations

- Reinforce safety strategies and provide ongoing education
- Encourage compliance with vision specialist recommendations (e.g., eye patching)
- Encourage use of low vision aids (e.g., magnifiers)
- Correct errors when they occur
- Reinforce full scanning of environment and personal space. Practical tools may include teaching lighthouse effect (scan left to right and back) and use of red tape on left or bookmark to guide reading.
- Encourage wear of corrective lenses for appropriate activities and ensure that they have been cleaned (e.g., reading glasses for reading, distance glasses for daily wearing)



## Environmental Adaptions

- Remove clutter
- Improve lighting
- Organize
- Reduce background pattern, add contrast colours



Consider a recent patient admitted to a stroke unit who demonstrated impairment in cognition, vision and/or perception.

- How did you recognize these deficits?
- How could you, as a nurse, assist in helping the patient be more familiar with their environment?
- What strategies could be put in place to assist the patient towards orientation and greater function in self-care?
- What information and/or education in regard to these strategies would assist the family in dealing with these deficits and planning for discharge?

## References

- Aloisio, L. Visual dysfunction. In G. Gillen & A. Burkhardt (Eds.). (2004). *Stroke rehabilitation: A function-based approach* (2nd ed.). St. Louis, MO: Mosby.
- Barker-Collo, S., Feigin, V.L., Parag, V., Lawes, C.M., & Senior, H. (2010). Auckland stroke outcomes study part 2: Cognition and functional outcomes 5 years poststroke. *Neurology*, 75(18), 1608-1616.
- Canadian Partnership for Stroke Recovery. (n.d.). *Assessments*. Retrieved from <https://strokengine.ca/en/assessments-by-topic/>
- Cicerone, K. D., Dahlberg, C., Kalmar, K., Langenbahn, D. M., Malec, J. F., Bergquist, T. F., Felicetti, T., Giacino, J. T., Harley, J. P., Harrington, D. E., Herzog, J., Kneipp, S., Laatsch, L., & Morse, P. A. (2000). Evidence-based cognitive rehabilitation: recommendations for clinical practice. *Arch. Phys.Med.Rehabil.*, 81(12), 1596-1615.
- Cumming, T. B., Marshall, R. S., & Lazar, R. M. (2013). Stroke, cognitive deficits, and rehabilitation: still an incomplete picture. *Int J Stroke*, 8(1), 38-45.
- Dawson, D., Knox, J., McClure, A., Foley, N., & Teasell, R., on behalf of the Stroke Rehabilitation Writing Group. (2013). Stroke rehabilitation. In M.P. Lindsay, G. Gubitz, M. Bayley, & S. Phillips (Eds.) on behalf of the Canadian Stroke Best Practices and Standards Advisory Committee. *Canadian best practice recommendations for stroke care* (Chapter 5). Ottawa, ON: Heart and Stroke Foundation and the Canadian Stroke Network. Retrieved from [http://www.ipts.org.il/Uploads/dbsAttachedFiles/SBP2013\\_Stroke-Rehabilitation-Update\\_July-10\\_FINAL.pdf](http://www.ipts.org.il/Uploads/dbsAttachedFiles/SBP2013_Stroke-Rehabilitation-Update_July-10_FINAL.pdf)
- Government of Ontario. (1996). *Health care consent act*. Retrieved from <http://www.ontario.ca/laws/statute/96h02>
- Heart and Stroke Foundation. (2015a). Chapter 5 – Body Function (Mental and Emotional): Cognition. In *Taking Action for Optimal Community and Long-Term Stroke Care: A Resource for Healthcare Providers*. Toronto, ON
- Heart and Stroke Foundation. (2015b). Chapter 4 – Body Function (Sensory): Vision and Visual Perception. In *Taking Action for Optimal Community and Long-Term Stroke Care: A Resource for Healthcare Providers*. Toronto, ON
- Heilman, K.M. & Gonzalez Rothi, L.J. Apraxia. In K.M. Heilman & E. Valenstein (Eds.). (2003). *Clinical neuropsychology* (4th ed.). New York, NY: Oxford University Press.
- Hochstenbach, J., Mulder, T., VanLimbeek, J., Donders, R., & Schoonderwaldt, H. (1998). Cognitive decline following stroke: A comprehensive study of cognitive decline following stroke. *Journal of Clinical and Experimental Neuropsychology*, 20(4), 503-517
- Lanctôt KL, Lindsay MP, Smith EE, et al. Canadian stroke best practice recommendations: mood, cognition and fatigue following stroke, 6th edition update 2019. *International Journal of Stroke*. 2020;15(6):668-688. Retrieved from <https://journals.sagepub.com/doi/full/10.1177/1747493019847334>
- Merriam Webster Dictionary. (n.d.). *Cognition*. Retrieved from <http://www.merriam-webster.com/dictionary/cognition>
- National Institutes of Health. (n.d.) *NIH stroke scale*. Retrieved from [https://www.ninds.nih.gov/sites/default/files/nih\\_stroke\\_scale\\_booklet\\_508c.pdf](https://www.ninds.nih.gov/sites/default/files/nih_stroke_scale_booklet_508c.pdf)
- Narasimhalu, K., Ang, S., DeSilva, D.A., Wong, M.C., Chang, H.M., Chia, K.S.,..., & Chen, C.P. (2011). The prognostic effects of post stroke cognitive impairment non dementia and domain-specific cognitive impairments in nondisabled ischemic stroke patients. *Stroke*, 42(4), 833-838.

- Padula, W. V., & Argyris, S. (1996). Post trauma vision syndrome and visual midline shift syndrome. *NeuroRehabilitation*, 6(3), 165-171.
- Politzer, T. (n.d.). *Introduction to vision and brain injury*. Retrieved from <https://nora.memberclicks.net/vision-and-brain-injury>
- Rasquin, S.M.C., Verhey, F.R.J., Louisberg, R., & Lodder, J. (2005). Cognitive performance after first ever stroke related to progression of vascular brain damage: A 2 year follow CT scan study. *Journal Neurology, Neurosurgery & Psychiatry*, 76(8), 1075-1079.
- Registered Nurses' Association of Ontario (RNAO). (2016). *Screening for delirium, dementia and depression in older adult*. Toronto, ON: Author. Retrieved from <http://rnao.ca/bpg/guidelines/screening-delirium-dementia-and-depression-older-adult>
- Registered Nurses' Association of Ontario (RNAO). (2005). *Stroke assessment across the continuum of care*. Toronto, ON: Author. Retrieved from <http://rnao.ca/bpg/guidelines/stroke-assessment-across-continuum-care>
- Registered Nurses' Association of Ontario. (2011). *Stroke assessment across the continuum of care: 2011 guideline supplement*. Toronto, ON: Author. Retrieved from [http://rnao.ca/sites/rnao-ca/files/storage/related/7708\\_STROKE\\_Supplement\\_FA.PDF](http://rnao.ca/sites/rnao-ca/files/storage/related/7708_STROKE_Supplement_FA.PDF)
- Saikaley, M., Iruthayarajah, J., Orange, J., Welch-West, P., Salter, K., Macaluso, S., Teasell, R. (2019). Chapter 14: Aphasia and apraxia. *Evidence-Based Review of Stroke Rehabilitation*. Retrieved from <http://ebrsr.com/evidence-review/14-aphasia-and-apraxia>
- Suchoff, I.B., Kapoor, N., Waxman, R. & Ference, W. (1999). The occurrence of ocular and visual dysfunctions in acquired brain-injured patient sample. *Journal of the American Optometric Association*, 70(5), 301-308.
- Teasell, R., Salbach, N.M., Foley, N., Mountain, A., Cameron, J.I., deJong, A., Acerra, A.C., ...& Lindsay, M.P. Canadian stroke best practice recommendations: rehabilitation, recovery, and community participation following stroke. Part one: rehabilitation and recovery following stroke. *International Journal of Stroke*, 0(0): 1-26, 2020 Retrieved from <https://journals.sagepub.com/doi/pdf/10.1177/1747493019897843>
- Teasell, R., Hussein, N., Saikaley, M. Iruthayarajah, J., Longval, M. Rehabilitation of cognitive impairment post stroke. In R. Teasell, N. Hussein, R. Viana, M. Madady, S. Donaldson, A. McClure, & M. Richardson (Eds.). (2020). *Stroke rehabilitation clinician handbook* (Section 5). London, ON: Evidence-Based Review of Stroke Rehabilitation. Retrieved from [http://www.ebrsr.com/sites/default/files/EBRSR%20Handbook%20Chapter%205\\_Rehab%20of%20Cognitive%20Impairment.pdf](http://www.ebrsr.com/sites/default/files/EBRSR%20Handbook%20Chapter%205_Rehab%20of%20Cognitive%20Impairment.pdf)
- Titus, M.N.D., Gall, N.G., Yerxa E.J., Robertson T.A., & Mack, W. (1991). Correlation of perceptual performance and activities of daily living in stroke patients. *American Journal of Occupational Therapy*, 45(5), 410-418.
- Wee, J.Y. & Hopman, W.M. (2008). Comparing consequences of right and left unilateral neglect in a stroke rehabilitation population. *American Journal of Physical Medicine and Rehabilitation*, 87(11), 910-920.