



CHRISTIANA CARE
HEALTH SYSTEM

Rehabilitation Services
Department of Speech-Language Pathology

COGNITIVE CHANGES AFTER STROKE

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Brain basics

Frontal Lobe

- Motor control (premotor cortex)
- Problem solving (prefrontal area)
- Speech production (Broca's area)

Parietal Lobe

- Touch perception (somatosensory cortex)
- Body orientation and sensory discrimination

Temporal Lobe

- Auditory processing (hearing)
- Language comprehension (Wernicke's area)
- Memory / information retrieval

Occipital Lobe

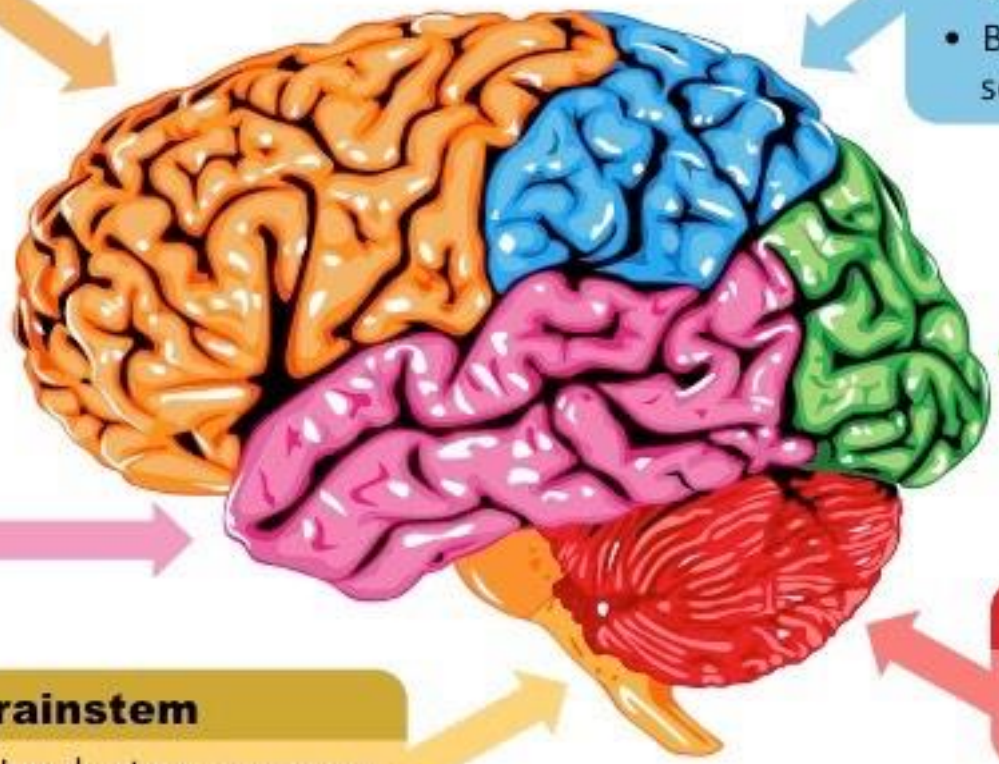
- Sight (visual cortex)
- Visual reception and visual interpretation

Brainstem

- Involuntary responses

Cerebellum

- Balance and coordination

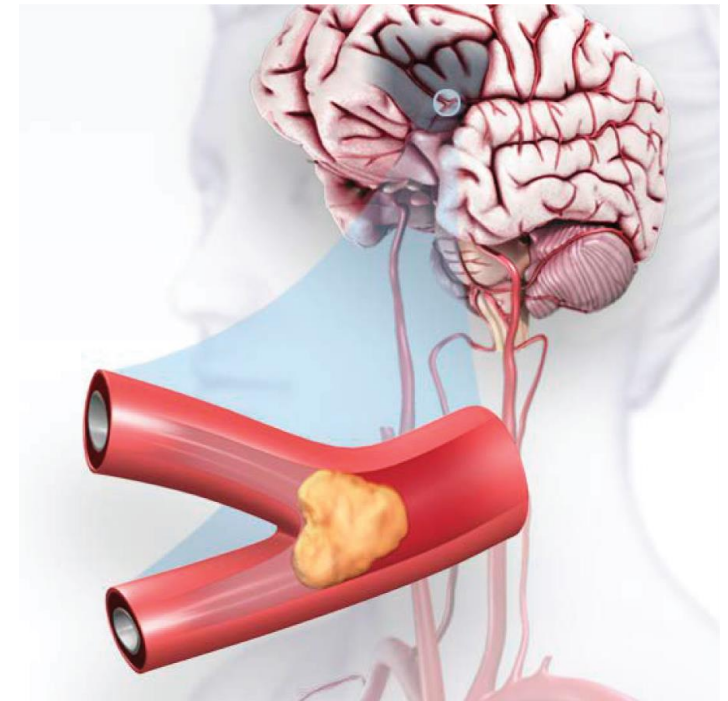


Damage to the brain

- Stroke
- Traumatic brain injury
- Brain tumors
- Brain surgery
- Brain infections
- Other neurological diseases (i.e. dementia)

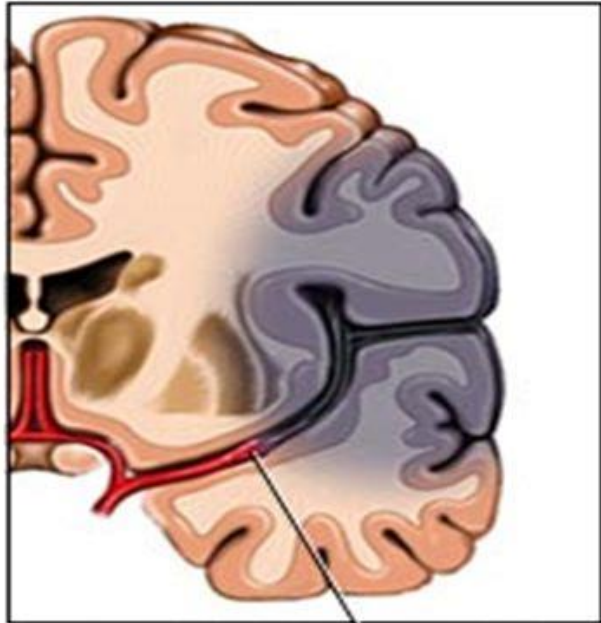
When stroke happens

- **Stroke:** a disease that affects the arteries leading to and within the brain.
- A stroke occurs when a blood vessel that carries oxygen and nutrients to the brain is either blocked by a clot or bursts (ruptures). When that happens, part of the brain cannot get the blood (and oxygen) it needs, so it and brain cells die.
- Number 5 cause of death in the U.S. and a leading cause of disability



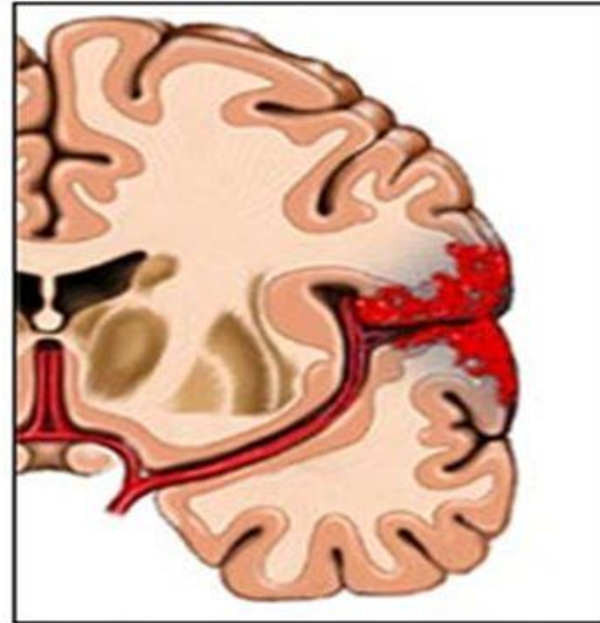
2 major types of Stroke

Ischemic stroke



A clot blocks blood flow to an area of the brain

Hemorrhagic stroke



Bleeding occurs inside or around brain tissue

What is cognition?

Cognition incorporates multiple domains of thinking, including:

- Orientation
- Memory
- Attention
- Problem solving
- Executive functioning
- Visuospatial ability
- Language



Risk factors that can impact cognition

- Hypertension
- Diabetes
- Hyperlipidemia
- Cigarette smoking
- Obesity



- Heavy alcohol consumption
- Older age
- Seizures
- Prior stroke
- Depression

(Babiak, 2018; Gottesman & Hillis, 2010; del Ser et al, 2005)

Cognition and stroke

- Cognitive impairment affects more than 1/3 of stroke survivors at 3 and 12 months after stroke.
- More common with right hemispheric stroke.
- The cognitive domains most likely to be affected in patients with stroke are memory, orientation, and attention.
- Deficits vary in type and severity and can have different impacts on the success of daily life activities.
- Many cognitive deficits resulting from stroke improve in the first few weeks to months

(Winstein et al, 2016; Cumming et al, 2013; Sachdev et al, 2017; Gottesman & Hillis, 2010; Viscogliosi et al, 2011)

Cognition and stroke

- Cognitive impairment after stroke is associated with:
 - Higher mortality
 - Greater rates of institutionalization
 - Higher health-care costs
 - Decreased participation in rehabilitation (Viscogliosi et al, 2011)
- Older age and low levels of education are predictors of worse cognitive outcome after stroke.
- Up to 10% of stroke patients may have had some form of cognitive impairment before their stroke. (Sachdev et al, 2017)
- One in 10 people following a stroke develop dementia, and that number triples if there is recurrent stroke (Pendelbury & Rothwell, 2009). Dementia will continue to get worse over time.

MEMORY



Memory

- **Memory:** recall and recognition of visual and verbal information
- **Short-term memory:** temporary storehouse for information
- **Working memory:** temporary storage and manipulation of memory
- **Long-term memory:** recalling events and feelings from the past
- Estimate of 23-55% of people have memory impairment up to 3 months after stroke, and 11-31% continue to have impairment 1 year after stroke (das Nair & Lincoln, 2007).
- Many memory problems are caused by problems with concentration

Signs of problems

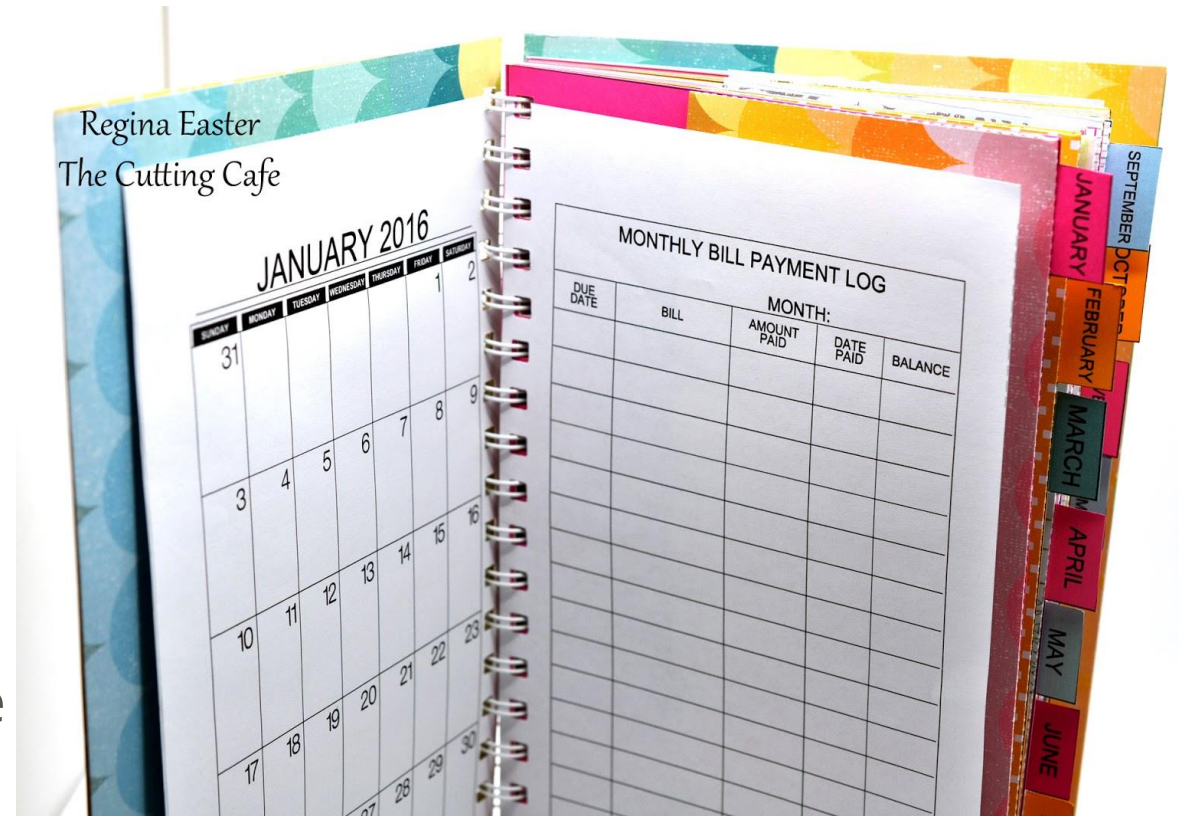
If you have difficulty remembering:

- What someone just said to you
- What you did today
- Important dates or when you have an appointment
- Where you've put something



Ways to help memory

- Internal memory aids
 - Association
 - Visualization/mental imagery
 - Repetition/rehearsal
 - Mnemonics
- External memory aids
 - Write things down
 - Using calendars, planners, phone
 - Set alarms/reminders
 - Keep things in the same place



ATTENTION



Attention

- Sustaining, alternating, dividing attention on a particular task
- Cognitive slowing (decreased processing speed) is a common complaint after stroke (Cumming et al, 2013).
- Barker-Collo et al (2009): "Impaired attention is the most prominent stroke-related neuropsychological change, with rates up to 46% to 92% reported in acute stroke survivors"
- Distractibility and attention can lead to falls and can impact return to driving

Signs of problems

If you have difficulty:

- Filtering out what's going on around you
- Staying focused on a single task
- Returning to a task once you have been interrupted
- Doing more than one thing at once
- Processing things quickly



Ways to help attention

- Limit background noise
- Remove distractions
- Try to do one thing at a time
- Plan-Do-Check: write out a to-do list for what you want to accomplish, check off each step when it's complete
- Know your limits: plan for shorter activities, take breaks as needed



EXECUTIVE FUNCTIONING



Executive functioning

- Planning and sequencing: determining the steps to get a job done
- Organizing thoughts
- **Initiation:** getting a task started
- **Self-monitoring:** evaluating how you are doing on a task, identifying errors
- **Cognitive flexibility:** discerning pertinent information from extraneous details
- **Judgment and abstract reasoning:** inferencing, safety awareness, deduction tasks
- **Problem solving:** budgeting, banking, sales and discounts, time management

Signs of problems

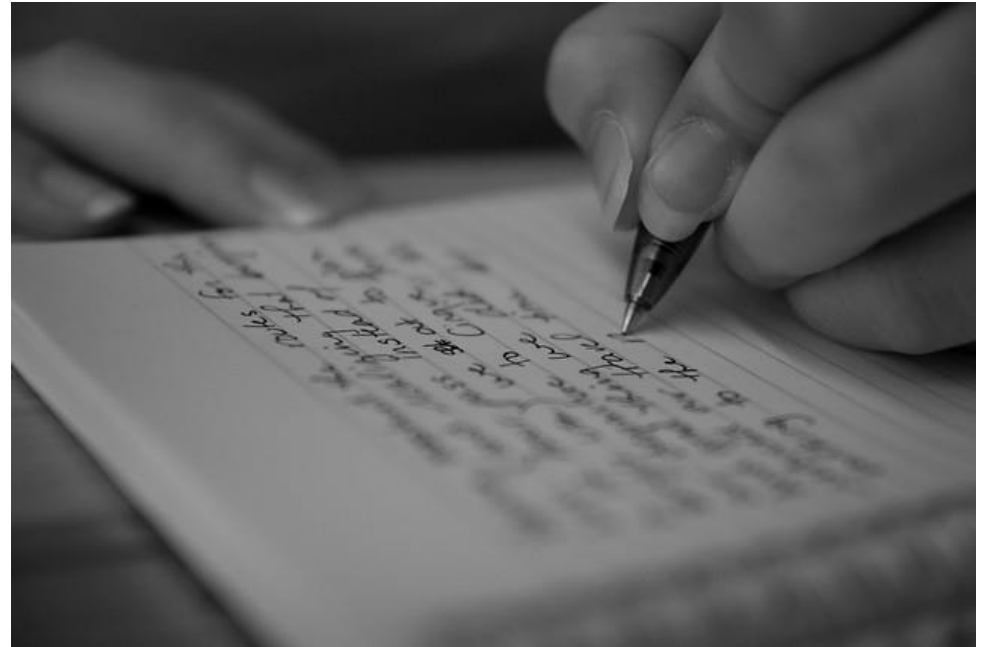
If you have difficulty:

- Planning how to complete a task (i.e. making a cup of tea)
- Beginning or finishing a task on your own (i.e. getting dressed)
- Solving problems on your own
- Decreased awareness of difficulties you are having



Ways to help executive functioning

- Keep to a routine
- Plan-Do-Check: write out a to-do list for what you want to accomplish, check off each step when it's complete
- Talk it through: talk through a task with someone before you do it to think through the steps
- Reflect: keep a daily journal



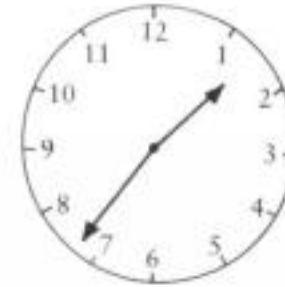
VISUOSPATIAL ABILITY



Visuospatial ability

- Our ability to process and interpret visual information about where objects are in space.
- **Hemispatial neglect:** failure to attend or respond to stimuli on one side of the body. Often seen with right hemisphere stroke
- This is not because of sensory or motor impairments
- Can affect a person's independence with activities of daily living

MODEL



PATIENT'S COPY



MODEL



PATIENT'S COPY



Signs of problems

If you have difficulty:

- Judging depth perception- can increase risk of falls
- Driving- navigating turns, changing lanes, parking
- Missing things that are placed on the affected side of your body (i.e. not eating half of your plate, not reading part of a page)
- Bumping into things without realizing
- Completing tasks such as visual search, drawing, construction, reading a map



Ways to help visuospatial functioning

- Go to the eye doctor to make sure visual acuity has not been affected
- Use a marker or ruler along the edge of a paper to make sure you are seeing the whole page
- Consider seeing an occupational therapist (OT) for therapy
- Practice visual scanning tasks at home (word searches)

W	V	E	R	T	I	C	A	L	L	Week
R	O	O	A	F	F	L	S	A	B	Find
A	C	R	I	L	I	A	T	O	A	Random
N	D	O	D	K	O	N	W	D	C	Sleuth
D	R	K	E	S	O	O	D	D	K	Backward
O	E	E	P	Z	E	G	L	I	W	Vertical
M	S	I	I	H	O	A	E	R	A	Diagonal
A	L	R	K	R	R	I	R	E	R	Wikipedia
K	O	D	I	D	E	D	R	C	D	Horizontal
H	E	L	W	S	L	E	U	T	H	Word Search

LANGUAGE



Difficulty
SPEAKING

Difficulty
UNDERSTANDING

APHASIA

Language Disability Due To Damage to the Brain

Difficulty
READING

Difficulty
WRITING

READING



Reading

- Reading difficulties often present as a consequence of aphasia.
- Difficulties can range from mild to severe, in oral reading and/or comprehension of printed material, and at the single word and/or text level
- Cognitive deficits can affect reading at the text level- being able to attend to the text and infer meaning from it. Working memory and metacognitive skills allows the reader to monitor comprehension. (Purdy et al, 2019)



Ways to help reading

- Start simple- paragraphs, short articles. Work your way up to reading a book if that is your goal
- Use index cards to hide text above and below the target text (i.e. 3 sentences at a time)
- Stop at the end of the paragraph and verbally summarize the main points of what you've just read
- Highlight names of main characters and key words
- Take notes- write important plot developments in the margin of the book, or write a paragraph at the end of each chapter summarizing the chapter
- Listen to the audio version of the book while you read it at the same time
- Join a book club or agree to read the same material with a friend or family member, then get together to discuss.

Brain drains

Brain drains: things that may overwhelm your brain and make it hard to think clearly

- Being tired
- Distractions
 - Things you see
 - Things you hear
 - People talking
- Increased emotions (good and bad)
- Brain overload- choose harder tasks when your brain is fresh and rested



Tips for family and friends

- Be patient and encouraging
- Give simple instructions, one thing at a time
- Don't do everything for them
- Help them get support
- Help to limit brain drains



(UK Stroke Association, 2018)

Benefits of healthy living

The following lifestyle habits may contribute to improvements in cognition after stroke:

- Manage hypertension
- Increase physical activity
- Improve diet
- Stop smoking
- Challenge your brain
- Social interaction
- Listen to music

(Cumming et al, 2013)



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Stimulating your brain

- Reading
- Crossword puzzles
- Word searches
- Card and board games
- Writing in a journal
- Taking a class
- Learning a new hobby



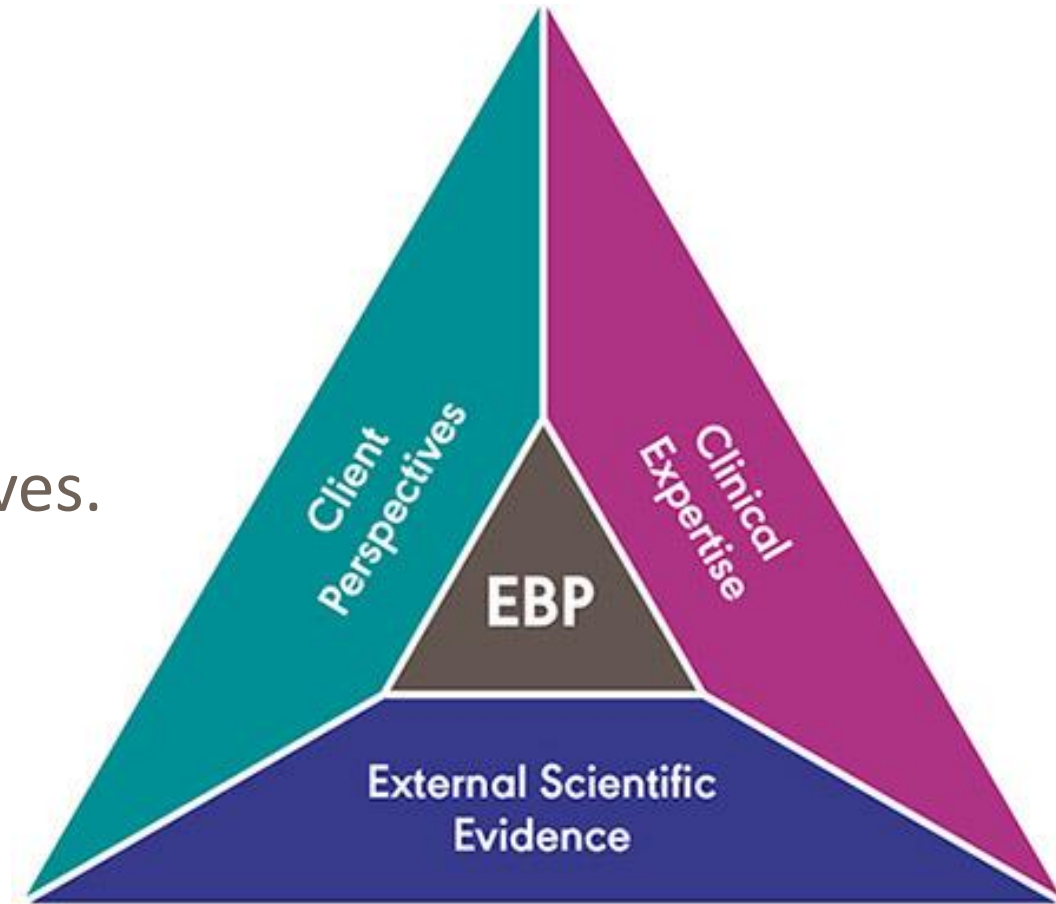
Role of the Speech-Language Pathologist (SLP)

- Complete both formal and informal cognitive assessments.
- Train strategies to improve memory and other cognitive deficits.
- Provide education and counseling to patients and families about ways to modify cognitive demands at home or work to facilitate performance.
- Make referrals to neuropsychologists or other professionals if indicated.

Evidence-based practice

Evidence-based practice is the integration of:

- clinical expertise/expert opinion
- external scientific evidence
- client/patient/caregiver perspectives.



Am I a candidate for speech therapy?

- Since your stroke, if you have:
 - Difficulty functioning independently with lifestyle management activities (i.e. paying the bills, organizing/taking medications, planning for/remembering appointments)
 - Decreased memory, judgment, problem solving, and/or attention which may impact your safety
 - Disruption of your ability to complete job-related tasks which may impact your employment
- Talk with your doctor about referring you for a cognitive evaluation.

CCHS Outpatient Services



Rehabilitation Services

- | | | |
|---|---|---|
| <input type="checkbox"/> Concord Health Center | Scheduling (302) 320- 7610
FAX# (302) 320- 7615 | PA Referrals (610) 361- 1195
FAX# (610) 361- 1199
(<u>evaluation</u> and therapy services, FEES) |
| <input type="checkbox"/> Wilmington Hospital
6 th Floor | Scheduling (302) 320 – 6920 (all services available)
FAX (302) 320 – 6750 (scheduling) | |
| <input type="checkbox"/> Christiana Hospital
MAP 2, suite 1205 | Scheduling (302) 623- 4050 (video swallow, FEES, CA followup, voice therapy)
FAX (302) 623- 4059 | |
| <input type="checkbox"/> Springside – Glasgow
Rehabilitation | Scheduling (302) 838 - 4700 (evaluation and therapy services only)
FAX (302) 838 - 4710 | |
| <input type="checkbox"/> Middletown
Rehabilitation | Scheduling (302) 449- 3050 (evaluation and therapy services only)
FAX (302) 449- 3055 | |

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