Objectives:
The Care of a client with Stroke

1. Understands potential risk factors
2. Understands the anatomy and function of the cerebral vascular system
3. Understand the pathophysiology
4. Interprets laboratory values
5. Recognize the clinical manifestations
6. Recognize general residual deficits
7. Recognize the residual deficits of Left hemispheric stroke
8. Recognize the residual deficits of Right hemispheric stroke
9. Recognize the residual deficits of a brain stem stroke
10. Select the Rehabilitation Nursing interventions to manage the care and education of a client to optimize function

World Health Organization
2002
The Atlas

- 15 million people worldwide had a stroke in 2002
- 5 million people died/year from stroke
- 5 million were left disabled
- In the USA someone dies every 3 minutes

Risk Factors

- Hypertension
- Cardiac Disease
- Arterial Fibrillation
- Diabetes mellitus
- Obesity
- Cigarette smoking
- Substance abuse
- Hyperlipidemia

(Ref: Gillen and Burkhart, 2004 and Hoeman, 2002)

- Serum Fibrinogen Inc
- Sedentary Lifestyle
- Contraceptive use
Non-modifiable Risk Factors

- Arteriovenous malformation
- Aging
- Gender (Males more frequent)
- Race (Black or Hispanic)
- Heredity
- Blood Disorders (sickle cell anemia and polycythemias)

Stroke

“Stroke is essentially a disease of the cerebral vasculature in which a failure to supply oxygen to brain cells, which are the most susceptible to ischemic damage, leads to their death.”

(Gillen and Burkhardt, 2004)
Categories of Stroke

Ischemic (80% of all strokes)
Hemorrhagic (20% of all strokes)

Ischemic Stroke

- Occlusion of blood vessels
- Deprivation of oxygen and glucose
- Impairment of grey matter function

(www.chemsoc.org)
Ischemic Stroke

I  Transient Ischemic Attack (TIA)
II  Reversible Ischemic Neurological Deficit (RIND)
III  Ischemic-Anoxia Encephalopathy
IV  Cerebral Embolism
V  Cerebral Thrombus
VI  Lacunar Infarct

TIA

• A vascular disruption
• Symptoms resolve in less than 24 hours
• Reversible defects
• Can be thrombotic or embolic
RIND

- Reversible
- Takes days to resolve symptoms

Ischemic-Anoxic Encephalopathy

- Small distal cerebral arteries do not receive adequate blood flow
- Cause from hypovolemia related to blood loss or heart pump failure
Cerebral Embolism

- Most common subtype
- Fast onset
- Often occlude the middle cerebral artery (80%)
- Posterior cerebral Artery (10%)
- Vascular emboli (less common)
Cerebral Thrombus

Causes are related to the development of abnormalities in the arterial walls (i.e.-atherosclerosis, arteritis, and external compression)

Lacunar Infarct

- Thrombotic occlusion of cerebral arteries
- Lesions small, oval shape, pitting and deep within the brain
- Develop in the pons or thalamic pathways
- Definite motor or sensory deficit
Hemorrhagic

I  Subarachnoid Hemorrhage
II  Intracerebral Hemorrhage

Subarachnoid hemorrhage

Blood from a ruptured vessel enters the subarachnoid space, often related to an aneurysm. These bursts are mainly in the carotid artery circulation

(Torstar Books INC, 1984)
Intracerebral Hemorrhage

The cause is usually hypertension and involves the small deep-penetrating blood vessels that rupture and bleed into the brain tissue.
Diagnostic Tests
Computed Tomography (CT/CTA)
www.carenewengland.org

Magnetic Resonance Imaging (MRI/MRA)
www.bocaradiology.com
Cerebral Angiogram
www.patientcareonline.com

Diagnostic Tests

• Lumbar puncture
• Transcranial and Carotid Doppler
• Electrocardiography
• Echocardiography
Blood Work

- Blood analysis/Hematological workup (WBC, Hgb, Platelet count, PT, PTT, INR)
- Fasting Lipid profile (HDL, LDL, Total Cholesterol, and Triglycerides)
- Electrolytes
- Renal screening
- Liver function tests
- C-Reactive Protein
- Pre-Albumin, Albumin

Hypercoaguable Workup

- Protein S
- Protein C
- Anti-thrombin III
- Factor V Leiden
- LAC

- Protein C Resistance
- Prothrombin gene mutation
- Anti-cardiolipin antibodies
Vasculitic Workup

- ESR
- CRP
- Homocysteine
- ANA
- Anti-DNA
- Complete levels (C3 & C4)

Clinical Manifestations of Stroke

- Dizziness
- Absent-mindedness, or temporary loss of memory or mental ability
- Numbness or weakness in the face, arm or leg
- Garbled speech
- Eye problems, including temporary loss of sight in one eye or double vision
- Recent onset of severe headaches

www.unmc.edu/olson/education/stroke.htm
Residual Deficits

- Paralysis or Paresis (weakness)
- Sensorimotor problems (imbalance, ataxia)
- Abnormal tone
- Cognitive deficits
- Emotional lability
- Depression
- Memory and Attention Span changes
- Behavioural responses

Residual Deficits

- Language barriers
- Swallowing impairments
- Visuospatial perception impairments
- Fatigue
- Seizures
- Edema
Left Hemispheric Stroke

• Right hemiparesis or hemiplegia
• Analytical thinking impaired
• Mathematical computations or interpretation of symbols impaired
• Right homonymous hemianopsia
• Behavioral changes
• Language deficits
Hemiparesis or Hemiplegia

• Weakness or paralysis of the opposite side of the body from the affected brain attack
Analytical thinking and mathematical calculations

Right Hemianopsia

- Half the visual field is defective or blind
- It is a disorder of the cerebrum, not the eyes themselves
Homonymous refers to the loss of vision in the temporal field of one eye and the nasal field of the other eye.
Behavioural Changes

• Cautiousness
• Hesitancy

Language deficits

• Broca’s (motor, expressive) aphasia
• Wernicke’s (sensory, receptive) aphasia
• Conduction
• Global aphasia
• Apraxia (Aphemia) of Speech
• Transcortical (motor, sensory, or mixed)
Broca’s Aphasia

- Auditory comprehension is preserved
- Verbal response impaired
- Short sentences and loss of grammar
- Nonfluent spontaneous speech
- Reading and writing is impaired

Wernicke’s Aphasia

- Speech response preserved
- Auditory Comprehension Impaired
- Reception of verbal language impaired
- Reading comprehension and writing is impaired
- Paraphasia-substitution of one word in a sentence
- Neologisms-make up new words
Conductive Aphasia

- Speech is preserved
- Reading is preserved but reading aloud isn’t
- Auditory Comprehension is preserved
- Reception is impaired
- Writing affected

Global Aphasia

- All aspects of speech and reception are impaired
Apraxia (Aphemia) of Speech

- Auditory Comprehension is preserved
- Reading and writing is preserved
- Reception and naming is impaired
- Nonfluent spontaneous speech occurs

Transcortical (sensory, motor, or mixed)

- When repetition is preserved transcortical is present
- Naming and writing is impaired
Right Hemispheric Stroke

• Left hemiplegia or hemiparesis
• Left homonymous hemianopsia
• Visuospatial disorder
• Visual disturbances
• Directional concepts undistinguishable
• Impaired ability to distinguish forms and shapes, difference between foreground/ background
• Unable to “read” nonverbal communication

Right Hemisphere Stroke

• Somatognosia-unable to recognize own body parts and how they relate to others
• Anosognosia-denial of the extent of the paralysis or disability
• Unilateral neglect
• Behavioural changes-impulsive, self absorbed
• Emotional dysfunction-depression/euphoria
• Self care disorders
• Unrealistic judgment
Brainstem Stroke

- A stroke located in the midbrain, pons, or medulla is a brainstem stroke. This stroke can be the result of an ischemic or hemorrhagic process.

Brainstem Stroke

- Dysarthria or Anarthria
- Dysphasia (Swallowing or chewing impaired)
- Ataxia
- Balance/Coordination/Vertigo (with nausea)
- Nausea and Vomiting
- Visual Disturbances
- Vertigo
Brainstem Stroke

• Tinnitus
• Sensory / perceptual disturbances
• Respiratory disturbances
• Hypothermia
• Decreased LOC
• Coma
• Locked in syndrome (Pons)

Nursing Assessment

• Neurological Assessment
• Musculoskeletal Assessment
• FIM
• Subjective Data
• Objective Data
• Physical Assessment
Cranial Nerves

**I** - Olfactory Nerve

**II** - Optic Nerve

**III** - Oculomotor Nerve

**IV** - Trochlear Nerve

**V** - Trigeminal Nerve

**VI** - Abducens

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Cranial Nerves (cont’)

- **VII** - Facial Nerve
- **VIII** - Acoustic Nerve
- **IX** - Glossopharyngeal Nerve
- **X** - Vagus Nerve
- **XI** - Spinal Accessory Nerve
- **XII** - Hypoglossal Nerve
Cranial Nerves

CN1-Smell soap or Tobacco
CN2-visual acuity (near & or far), gross visual field; ophthalmoscopic exam
CN3,4,6-pupillary light response; lateral and vertical gaze
CN5-double simultaneous stimulation.
   Supplementary: Corneal blink reflex
CN7-Smile; Supplementary: brow wrinkling

CN8-hear fingertips moving. Supplementary:
   lateralize deficit on humming
CN9,10-gag reflex
CN11-shoulder elevation
CN12-stick out tongue

(Goldberg 1992)
Nursing Assessment

- Health Perception/Management Pattern
- Swallowing
- Bowel and Bladder function
- Mobility/spasticity /shoulder
- Sleep patterns
- Cognition / Language / Speech
- Perception /Sensory
- Self-Perceptual Alterations
- Role-Relationship Perception
- Sexuality Reproductive Patterns
- Emotional / Coping
- Value and Beliefs

Health Perception / Management Diagnosis

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impaired Perception</td>
<td>Encourage adherence in recommended treatments</td>
</tr>
<tr>
<td></td>
<td>Educate</td>
</tr>
<tr>
<td></td>
<td>Monitor adoption of treatments in daily routines</td>
</tr>
<tr>
<td></td>
<td>Modify treatment if adoption fails</td>
</tr>
</tbody>
</table>
### Nutrition

#### Diagnosis

- Impaired Swallowing
- Imbalanced nutrition: less than body requirements

#### Interventions

- Supervised Meals
- Modified diet
- Incorporate behavioral strategies and positioning
- Monitor for aspiration
- Education
- Supplemental feeds via G-tube
- Weights
- Nutritional monitoring
- Ability to self/assistance
- Fluid monitoring
- Electrolyte monitoring
- Weight gain strategies (bring in food from home)
- Medication management with supplements
**Elimination - Bowel**

<table>
<thead>
<tr>
<th>Diagnoses</th>
<th>Interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Bowel incontinence</td>
<td>• Establish bowel management routines</td>
</tr>
<tr>
<td>• Bowel constipation</td>
<td>• Monitor for accidents</td>
</tr>
<tr>
<td></td>
<td>• Diet changes</td>
</tr>
<tr>
<td></td>
<td>• Adequate fluid intake</td>
</tr>
<tr>
<td></td>
<td>• High fibre foods</td>
</tr>
<tr>
<td></td>
<td>• Encourage mobility</td>
</tr>
<tr>
<td></td>
<td>• Medications</td>
</tr>
<tr>
<td></td>
<td>• Education</td>
</tr>
</tbody>
</table>

**Elimination – Bladder**

<table>
<thead>
<tr>
<th>Diagnoses</th>
<th>Interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Bladder incontinence</td>
<td>• Complete bladder investigations</td>
</tr>
<tr>
<td>• Retention</td>
<td>• Adequate fluid intake</td>
</tr>
<tr>
<td>• Urgency</td>
<td>• Establish routines based on investigations</td>
</tr>
<tr>
<td>• Hesitancy</td>
<td>• Medications</td>
</tr>
<tr>
<td></td>
<td>• Awareness/Cognition</td>
</tr>
<tr>
<td></td>
<td>• Safety concerns</td>
</tr>
<tr>
<td></td>
<td>• Incorporate urinary devices</td>
</tr>
<tr>
<td></td>
<td>• Educate on S&amp;S of UTI</td>
</tr>
</tbody>
</table>
Mobility/ spasticity/ shoulder
Diagnosis

- Impaired mobility (bed, transfers, wheelchair mobility, and ambulation)

Interventions

- Establish routines in partnership with OT/PT/Nursing
- Monitor for fatigue, strength and impulsiveness
- Establish functional positioning patterns for bed/WC/walking
- Encourage independent bed mobility

Bobath-Neurodevelopmental Therapeutic Approach

- Adopted specifically for the care of stroke clients
- Client is taught the sensation of movement, not the movement itself
- Due to the brain injury the client will develop abnormal patterns of positioning. Positioning patterns are implemented for laying, sitting and ambulating

(Hoeman, 2002; p213)
<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impaired risk for skin integrity</td>
<td>Observation of skin integrity</td>
</tr>
<tr>
<td></td>
<td>Encourage strategies to assess &amp; reduce breakdown</td>
</tr>
<tr>
<td></td>
<td>Assess for information transfer into daily routines</td>
</tr>
<tr>
<td></td>
<td>Turning/mobility/positioning routines/schedules</td>
</tr>
<tr>
<td></td>
<td>Incorporate aids provided by OT</td>
</tr>
<tr>
<td></td>
<td>Education of prevention &amp; treatment of skin breakdown</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impaired mobility due to Spasticity</td>
<td>Evaluate impact of spasticity on self care, transfers, mobility, sleep and pain regularly</td>
</tr>
<tr>
<td></td>
<td>Evaluate response to treatments modalities</td>
</tr>
<tr>
<td>Mobility/spasticity /shoulder</td>
<td>Interventions</td>
</tr>
<tr>
<td>------------------------------</td>
<td>---------------</td>
</tr>
<tr>
<td><strong>Diagnosis</strong></td>
<td><strong>Interventions</strong></td>
</tr>
<tr>
<td>• Impaired shoulder mobility and prevention of subluxation</td>
<td>• Positioning patterns established and reinforced</td>
</tr>
<tr>
<td></td>
<td>• ROM exercises</td>
</tr>
<tr>
<td></td>
<td>• Reinforce protection of affected limb during transfers, etc</td>
</tr>
<tr>
<td></td>
<td>• Slings/Shoulder strapping?</td>
</tr>
<tr>
<td></td>
<td>• Evaluate comfort from treatment modalities</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sleep</th>
<th>Interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Diagnosis</strong></td>
<td><strong>Interventions</strong></td>
</tr>
<tr>
<td>• Disturbed sleep pattern</td>
<td>• Safety consideration</td>
</tr>
<tr>
<td></td>
<td>• Incorporate sleep hygiene techniques</td>
</tr>
<tr>
<td></td>
<td>• Evaluate impact of rest on daily activities</td>
</tr>
<tr>
<td>Cognition Diagnosis</td>
<td>Interventions</td>
</tr>
<tr>
<td>---------------------</td>
<td>--------------</td>
</tr>
<tr>
<td><strong>• Impaired Memory</strong></td>
<td>• Evaluate orientation, short and long term memory regularly</td>
</tr>
<tr>
<td></td>
<td>• Introduce and encourage familiar visual prompts, memory book, and cueing</td>
</tr>
<tr>
<td></td>
<td>• Reduce chances of confusion with familiar surroundings and rituals</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cognition Diagnosis</th>
<th>Interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>• Impaired problem solving skills</strong></td>
<td>• Assist with problem solving</td>
</tr>
<tr>
<td></td>
<td>• Provide organized list to assist with common tasks that may require solutions</td>
</tr>
<tr>
<td></td>
<td>• Incorporate problem solving aids into daily routine</td>
</tr>
<tr>
<td></td>
<td>• Cue as needed</td>
</tr>
<tr>
<td></td>
<td>• Monitor for impulsiveness/safety</td>
</tr>
<tr>
<td>Cognition Diagnosis</td>
<td>Interventions</td>
</tr>
<tr>
<td>---------------------</td>
<td>---------------</td>
</tr>
<tr>
<td>• Impaired Communication</td>
<td>• Encourage established means of communication</td>
</tr>
<tr>
<td></td>
<td>• Provide time to communicate</td>
</tr>
<tr>
<td></td>
<td>• Evaluate comprehension of interaction</td>
</tr>
<tr>
<td></td>
<td>• Promote opportunities to communicate and interact socially</td>
</tr>
<tr>
<td></td>
<td>• Educate client and family</td>
</tr>
<tr>
<td></td>
<td>• Support exercises and strategies by Speech</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Perceptual Alterations Diagnosis</th>
<th>Interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Sensory/perceptual alteration: olfactory (smell)</td>
<td>• Environmental management</td>
</tr>
<tr>
<td>• Sensory/perceptual alteration: gustatory (taste)</td>
<td>• Safety measures</td>
</tr>
<tr>
<td></td>
<td>• Education</td>
</tr>
<tr>
<td>Perceptual Alterations</td>
<td></td>
</tr>
<tr>
<td>------------------------</td>
<td></td>
</tr>
<tr>
<td><strong>Diagnosis</strong></td>
<td></td>
</tr>
<tr>
<td>Sensory/perceptual</td>
<td></td>
</tr>
<tr>
<td>alteration: touch &amp;</td>
<td></td>
</tr>
<tr>
<td>sensation</td>
<td></td>
</tr>
<tr>
<td>Unilateral Neglect</td>
<td></td>
</tr>
<tr>
<td><strong>Interventions</strong></td>
<td></td>
</tr>
<tr>
<td>Safety</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td></td>
</tr>
<tr>
<td>Avoid using (L) and</td>
<td></td>
</tr>
<tr>
<td>(R) in terminology</td>
<td></td>
</tr>
<tr>
<td>Safety issues/hazards</td>
<td></td>
</tr>
<tr>
<td>Cue &amp; train to observe</td>
<td></td>
</tr>
<tr>
<td>and use affected side</td>
<td></td>
</tr>
</tbody>
</table>
### Pain

**Diagnosis**
- Pain

**Interventions**
- Assess pain using appropriate scales (VAS)
- Active listening
- Medications
- Coping strategies
- Positioning
- Cold/heat modalities
- Biofeedback/acupuncture/TENS
- Relaxation

### Self-Perception

**Diagnosis**
- Impaired Self-perception

**Interventions**
- Observe actions and provide safety
- Provide feedback regarding perception
### Sexuality

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Altered Sexuality patterns</td>
<td>• Obtain permission to discuss issues</td>
</tr>
<tr>
<td></td>
<td>• Identify perceived limitations and changes that have occurred</td>
</tr>
<tr>
<td></td>
<td>• Appropriate diagnostic test performed to identify current function</td>
</tr>
<tr>
<td></td>
<td>• Education on disease process related to sexuality</td>
</tr>
<tr>
<td></td>
<td>• Sexual education and counseling</td>
</tr>
</tbody>
</table>

### Coping /Stress

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insufficient Coping</td>
<td>• Assist the client to adapt to perceived stressors</td>
</tr>
<tr>
<td></td>
<td>• Mutual goal setting</td>
</tr>
<tr>
<td></td>
<td>• Introduce coping strategies, open dialog and professional assistance if perceived necessary</td>
</tr>
<tr>
<td></td>
<td>• Emotional support</td>
</tr>
<tr>
<td></td>
<td>• Anger management</td>
</tr>
</tbody>
</table>
### Value / Belief

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Values, Goals, Beliefs</td>
<td>• Support and respect conflicting beliefs</td>
</tr>
<tr>
<td></td>
<td>• Ensure values, goals and belief are incorporated into the overall rehab plan</td>
</tr>
</tbody>
</table>

### Prevention

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Impaired Respiratory function</td>
<td>• Evaluate for potential aspirations</td>
</tr>
<tr>
<td></td>
<td>• Evaluate for signs of decreased respiratory status</td>
</tr>
<tr>
<td></td>
<td>• Maintain and encourage mobility</td>
</tr>
<tr>
<td></td>
<td>• Educate strategies to remain healthy</td>
</tr>
</tbody>
</table>
Definitions

**Agnosia**—inability to recognize sensory stimuli (somatic, visual, auditory, or tactile)

**Anomia**—Loss of the ability to name objects or remember names of people

**Anarthria**—Total loss of articulation; location of damage is brainstem

**Aphasia**—The loss of ability to speak or understand spoken or written language

**Apraxia**—The inability to plan or execute a movement to function or participate in activity. Types include: constructional, dressing, motor, idiomotor, and ideational.

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**Dysarthria**—Weakness or altered neuronal control of the muscles responsible for speech production or defective sensory feedback regarding their movement.

**Dysphagia**—Impairment of the ability to swallow.

**Neologisms**—nonsense or nonexistent words.

**Paraphasia**—substitution of one word for another.
Bibliography


