

GENERAL CONSIDERATIONS FOR NEUROSCIENCE NURSING

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COMPETENCIES

1. Demonstrate knowledge of intracranial pressure principles
2. Identify the pathophysiology and manifestations of the stages of increased intracranial pressure
3. Recognize factors that may impact on intracranial pressure/cerebral perfusion pressure (CPP) and implement nursing strategies accordingly
4. Implement nursing strategies, including pharmacology, to prevent and manage concerns in neuroscience clients
5. Identify the pathophysiology, manifestations and treatment options for managing clients with fluid/electrolyte imbalances
6. Review client education with relation to nervous system dysfunction
7. Review nursing rehabilitation principles for the client with any type of nervous system dysfunction

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INTRACRANIAL PRESSURE PRINCIPLES

- Intracranial pressure (ICP);
 - Pressure within the rigid skull and includes the dynamic balance of CSF, brain and blood volumes
 - Average intracranial volume in the adult is approximately 1700 mL
 - Brain - 1400 mL (80%)
 - CSF - 150 mL (10%)
 - Blood - 150 mL (10%)
 - Constantly fluctuating in response to activity (ex. coughing, straining)
 - Normal range - 1-10mmHg, although 15mmHg is considered the upper limit of normal
 - Pressure above 20mmHg is considered elevated and significant if persistent

INTRACRANIAL PRESSURE PRINCIPLES MONRO-KELLIE DOCTRINE

- The consistency of cerebral hemodynamics, including blood flow, brain volume, CPP and CSF are required to maintain ICP at 5-15mmHg
- Factors effecting Monro-Kellie
 - Compensation-an increase in one component requires a decrease in another
 - ~20%of brain volume is fluid that sits around the cells
 - CSF is most readily displaced and can be pushed into the spinal cord
 - ICP can become elevated due to non-pathological causes (sneezing, coughing) or pathological causes (tumour, stroke, abscess)
 - ICP manageable until it reaches 25mmHg then compensation- >40-50 mmHg loss of consciousness, >50 infarction and death

INTRACRANIAL PRESSURE PRINCIPLES CEREBRAL PERFUSION PRESSURE (CPP)

- CPP is defined as the blood pressure gradient across the brain that provides blood flow to the brain
- CPP is calculated as the difference between the incoming Mean Arterial Pressure (MAP) and the opposing Intracranial Pressure (ICP) $CPP = MAP - ICP$
- CPP is maintained best when SBP ranges between 50-150mmHg
- Normal adult CPP - 70-100mmHg
- Episodes of CPP <70mmHg are associated with a significant decrease in brain tissue oxygenation
- If CPP is inadequate, ischemia develops; if ischemia is not reversed, infarction results.

INTRACRANIAL PRESSURE PRINCIPLES AUTOREGULATION

- The ability of the cerebral arteries to maintain cerebral blood flow despite fluctuations in CPP
- Maintained by vasoconstriction or vasodilation of the cerebral arteries
- Participatory areas include basal ganglia, cortex and white matter
- Affected or lost by
 - chronic hypertension
 - Stroke
 - Severe SAH
 - O₂ and CO₂ levels
 - Body temperature
 - ICP

INTRACRANIAL COMPLIANCE

- The ability of the brain to tolerate an increase in intracranial volume without an increase in pressure
- Compensatory mechanisms
 - Activated when an ↑ in ICP occurs to balance cranial contents to protect the brain
 - Dependent upon rate of expansion

COMPENSATORY MECHANISMS

- **Blood** –
 - shifting from intracerebral veins to dural venous sinuses and vasoconstriction
- **CSF** –
 - movement into spinal and periorbital subarachnoid spaces, decrease in production, increase in absorption
- **Brain** –
 - is pushed from an area of high pressure to one of lower pressure
 - Usually through a fold of dura

DECOMPENSATION CATEGORIES

Stage	ICP	Venous response	CSF flow	Tissue response	Arterial response	Exam findings
1	• compensated	• decreased flow • compression of veins	• increased reabsorption	• no impact	• no change	• confusion, drowsiness, slight pupil and resp. changes
2	• Intracranial hypertension • partial compensation	• cont. compression	• maximum reabsorption reached	• hypoxia • hypercapnia	• general vasoconstriction to increase BP to push through ICP • cerebral vasodilation	• decreasing LOC, Cheyne-stokes respiration, sluggish pupils, bradycardia, wide pulse pressure
3	• dramatic rise in ICP, decompensation	• loss of auto-regulation, maximum constriction	• beginning of hydrocephalus	• severe hypoxia • acidosis	• maximum vasodilation	• coma, pupillary changes, minimal response to pain
4	• decompensation		• obstructive hydrocephalus	• herniation • ischemia	• disruption of arterial blood flow	• coma, dilated fixed pupils, ataxic breathing, posturing

INCREASED INTRACRANIAL PRESSURE ETIOLOGY

- 1. INCREASE IN BRAIN VOLUME**
 - Space occupying lesion
 - Cerebral edema
- 2. INCREASE IN BLOOD VOLUME**
 - Obstruction of venous outflow
 - Hypercapnia (increased CO2)
- 3. INCREASE IN CSF**
 - Increased production
 - Decreased absorption
 - Obstruction of flow

NURSING MANAGEMENT OF INCREASED INTRACRANIAL PRESSURE

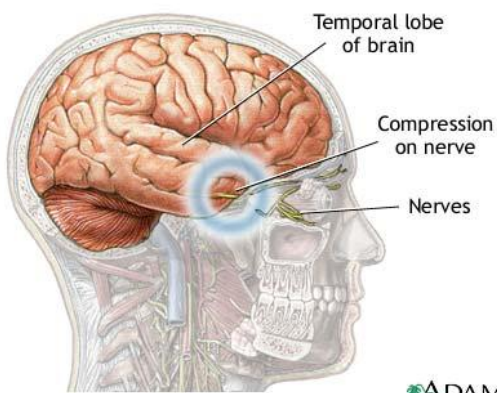
- 1. Monitor patient**
 - More frequent NSR, VS
 - Neuro observation unit
- 2. Report changes**
 - LOC, behaviour, headache, motor deficits, vital signs, ocular/motor changes
 - May be subtle
- 3. Elevate HOB**
 - 30 degrees
 - Ensure proper alignment of head and neck
- 4. Avoid clustering of activities**
- 5. Treat**
 - Hyperthermia, hyperglycemia

SIGNS AND SYMPTOMS OF INCREASED INTRACRANIAL PRESSURE

- Nursing assessment is directed at detecting early signs of ↑ ICP when interventions are still effective
- Will vary depending on:
 - The compartmental location of lesion
 - Supratentorial **vs.** infratentorial
 - Specific location of mass
 - Diencephalon, brainstem, cerebrum, cerebellum
 - Presence of edema/mass effect
 - Degree of intracranial compliance

SIGNS AND SYMPTOMS OF INCREASED INTRACRANIAL PRESSURE

- **EARLY**
 - Pupil dysfunction-unequal &/or sluggish papillary responses (potentially grave yet early sign)
 - Worsening motor deficit
 - Headache*
 - Nausea and Vomiting
 - Decreased LOC*
 - Changes in mental status-confusion, lethargy*
 - Seizure activity
 - *earliest signs

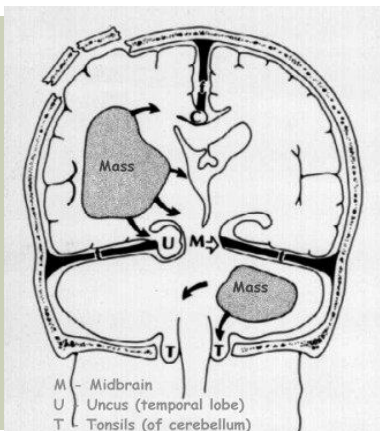


INCREASED INTRACRANIAL PRESSURE SIGNS AND SYMPTOMS

- May be too late for interventions to be effective
- Late signs
 - Cushing's triad-due to brainstem pressure
 - HTN, bradycardia, abnormal/irregular respiration
 - Worsening motor deficit
 - Hemiplegia, posturing
 - Worsening LOC
 - Loss of brainstem reflexes
 - Pinpoint pupils

HERNIATION SYNDROMES

- **Herniation**
 - Displacement of a portion of brain through or around linings or openings within the cranial cavity due to ↑ volume
 - Results in trauma to brain tissue, vascular compromise &/or obstruction of CSF flow



HERNIATION SYNDROMES

■ Uncal/Tentorial

- Mass lesion in the cerebrum forces the brain downward through the tentorial incisura
- Tip of temporal lobe (uncus) is pushed into tentorial notch
- Causes compression of midbrain
- Causes compression of oculomotor nerve
- Patient's at risk
 - Mass in anterior/middle fossa
 - Subdural/epidural hematomas
 - MCA strokes
 - Postoperative frontal/temporal/pterional craniotomy
 - Anterior circulation aneurysms

UNCAL HERNIATION S&S

■ Early:

- CN III – unilateral dilated, sluggish pupil progressing to fixed & dilated pupil
- Slight decrease LOC, restless
- Contralateral hemiparesis

■ Late:

- CN III – bilateral dilated fixed pupils
- Deteriorating LOC - coma
- Flaccid or decerebrate posturing
- Changes in rate and depth of respirations

HERNIATION SYNDROMES

■ Tonsillar

- Cerebellar tonsils and brainstem are pushed thru foramen magnum
 - Medullary compression and is often fatal
- Patients at risk
 - Mass in posterior fossa or cerebellum
 - Posterior circulation aneurysms
 - Brainstem/cerebellar strokes
 - Postoperative suboccipital craniotomy

TONSILLAR HERNIATION S&S

- Worsening LOC
- Altered respirations
- Altered vital signs
- Hiccups
- Posturing
- Cardiac arrest

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FACTORS THAT IMPACT ICP OR CPP

- **Hemodynamic Status**
 - Blood Pressure- the main force that maintains cerebral circulation is the pressure difference between the arteries and the veins. In the brain, cerebral venous pressure is low (5mmHg) so that arterial blood pressure is the most important factor in maintaining CBF
 - Cardiac Function- systemic arterial blood pressure is dependent on cardiac output and resistance which are primarily under autonomic control.
 - Fluid Volume- volume must be sufficient to allow perfusion yet not so great that it compounds the problem
- Nursing Strategies-* monitor fluids, IV status, cardiac rhythm, BW-esp. lytes, vital signs--report changes as appropriate

FACTORS THAT IMPACT ICP OR CPP

■ **Suctioning**

- Decreases O2 and therefore increases CO2
- Partially obstructs the airway with the catheter
- Prevent Hypercapnia-pCO2 greater than 42mmHg and prevent hypoxia-pO2 less than 50mmHg

Nursing Strategies- breath stacking with suctioning, preoxygenating, blood gas results, limited deep suctioning, prevention of aspiration pneumonia-SLP assessment, modified diets

FACTORS THAT IMPACT ICP OR CPP

■ **Elevated CO2 results in increased CBF leading to increases CBV and ICP**

- Hypercapnia (PCO2 >45mmHg) results from under ventilation from:
 - Sleep
 - Pulmonary diseases/conditions
 - Sedation from medications
 - Shallow respirations
 - Pressure on brain-stem respiratory centers
 - Improperly calibrated respirator

Decreased O2 in the blood (<50mmHg) caused by:

- Insufficient concentration of O2
- Insufficient ventilation during and after suctioning
- Partial or complete obstruction
- Inadequate ventilation during intubation

FACTORS THAT IMPACT ICP OR CPP

■ **Positioning and alignment**

- Prevent flexion of neck
- Prevent extreme flexion of hips
- Elevation of HOB to 30 degrees or more
- No Trendelenburg positioning
- No prone positioning

Nursing Strategies- proper alignment in bed, sitting

FACTORS THAT IMPACT ICP OR CPP

- External Ventricular Drains
- Can both monitor ICP & drain CSF

Indications for ICP monitoring

- #1 is Traumatic Brain Injury

Indications for both ICP monitoring and drain placement

- Obstructive hydrocephalus
 - SAH (causing obstructive hydrocephalus, Hunt & Hess >= 3)
 - Cerebral edema
 - Mass lesion
 - Infections
 - Shunt failure
 - Brain relaxation in the OR
- Nursing Strategies*-follow orders, report changes, maintain patency/sterility of system

FACTORS THAT IMPACT ICP OR CPP

- Lumbar Drains
- Remove circulating CSF allowing a decrease in ICP to occur. Used in the treatment of CSF leaks and hydrocephalus

- Jackson-Pratt Drains/Hemovac Drains
- Most commonly used in the treatment of subdural hematoma

Nursing Strategies-close monitoring, patency, hourly/shift monitoring of fluid, reporting changes to team

FACTORS THAT IMPACT ICP OR CPP

- Pharmacological agents-
- Vasodilating Drugs increase CBF resulting in increased ICP (eg. Anesthetic agents, some antihypertensives, some histamines)
- Osmotic Agents-work to pull fluid out of the cranial cavity and excrete it via the kidneys
- Corticosteroids- reduce inflammation and thus reduce edema
- Anticonvulsants- given prophylactically to avoid seizures could cause an increase in ICP- no evidence to support- controversial
- Sedation- High dose barbiturates may be used to dampen environmental stimuli therefore cerebral metabolism

Nursing Strategies- ensure medications given as ordered, reporting changes, solid understanding of pharmacology of medications ordered

FACTORS THAT IMPACT ICP OR CPP

Hyperthermia/Hypothermia

- ↑ temperature causes ↑ cell metabolism, leading to ↑ carbon dioxide and lactic acid by-products. Carbon dioxide is a cerebral vasodilator → increased ICP
- ↓ temperature causes ↓ cerebral metabolic consumption rate for O₂ by 6-7% for each 1° C decline, resulting in substantial reductions in the tissue effect of cerebral ischemia. Recommendation of brain temperature of 32-35°C or a core temperature of 32°C

Nursing Strategies- monitoring of temperature at least q6h, quickly reducing any elevation of temperature to reduce metabolic demands

FACTORS THAT IMPACT ICP OR CPP

Noxious Stimuli

- Includes, but not limited to, upsetting conversations, invasive procedures, painful nursing activities
- Cause activation of the sympathetic nervous system. This is thought to be the major cause of increased blood pressure, increased CBF and increased ICP, particularly in the patient who already has increased ICP

Nursing Strategies- pacing of activities (ie. ADL's) reducing stimulation from visitors, adequate use of pain medications

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NEUROLOGICAL DYSFUNCTION - SEIZURES

- Seizure: an abnormal discharge in the brain that results in an abrupt and temporary altered state of cerebral function.
- Types: as covered on January 30
- Precipitating Factors - Triggers;
 - Common; particular odors, flashing lights, certain types of music
 - Other: fatigue, sleep deprivation, hypoglycemia, emotional stress, electrical shock, febrile illness, alcohol consumption, certain drugs, menstruation, hyperventilation and more
- Medical Management – Drug Therapy;
 - Concerns; side effects, toxicity, ease of administration, efficacy, and effects on different age groups.
 - Goal; to control or reduce the frequency of seizures, and minimize side effects
 - Individualized

NEUROLOGICAL DYSFUNCTION - SEIZURES

- Prevention;

<ul style="list-style-type: none"> ▪ Major Risk Factors (<35 years); ▪ Trauma ▪ Alcohol withdrawal ▪ Illicit drug use ▪ Brain tumor ▪ Central Nervous System (CNS) disorders 	<ul style="list-style-type: none"> ▪ Major Risk Factors (>35 years); ▪ Cerebrovascular disease ▪ Brain tumor ▪ Alcohol withdrawal ▪ Metabolic disorders ▪ Alzheimer’s disease ▪ Neurodegenerative diseases ▪ Idiopathic (70%)
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NEUROLOGICAL DYSFUNCTION - SEIZURES

- Nursing Management;
 - Protect the patient from injury
 - Care for the patient after the seizure
 - Document the details of the event
 - Person’s who are at risk for having a seizure should be placed on seizure precautions;
 - Side rails of the bed are up (and padded), if patient is at risk for falls
 - A suction set up is available at the bedside
 - The bed is kept in low position

NEUROLOGICAL DYSFUNCTION – CEREBRAL FLUID LEAK

- Cerebrospinal Fluid (CSF) Leak: may occur spontaneously, as a result of a surgery or traumatic event
 - Signs & Symptoms;
 - severe headache (sitting or standing)
 - Clear/yellow drainage on the dressing "halo effect" that is positive for glucose
 - Nursing Management:
 - Doctor should be notified immediately
 - Surgical wound may require additional sutures
 - Patient may require insertion of a lumbar drain for a few days
 - Complete bed rest for 5+ days, allowing the tear to heal (otherwise, surgery may be required).
 - Prophylactic antibiotic therapy may be prescribed.
 - At risk of developing meningitis

NEUROLOGICAL DYSFUNCTION – HYDROCEPHALUS

- Hydrocephalus: A progressive dilatation of the ventricular system due to increased pressure of cerebrospinal fluid which results in an imbalance between CSF production and reabsorption.
- Treatment;
 - External Ventricular Drain (EVD) (temporary)
 - Ventricular Peritoneal Shunt (permanent)
 - With shunt in place the patient will clinically improve;
 - Mental status - becomes more alert, oriented and manageable.
 - Incontinence quickly reversed
 - Reversal of gait disturbance takes longer – may be a permanent deficit.

NEUROLOGICAL DYSFUNCTION – HYDROCEPHALUS

- Nursing Management
 - Dependent on the cause of the hydrocephalus
 - Post op shunt insertion- monitor patient for patency of shunt, signs of infection, medicate for pain, mobilize early, ensure shunt is not over-draining CSF
 - Patient/ Family teaching is key to ensure that any symptoms of shunt malfunction are reported promptly to the medical team for further evaluation
 - Treat complications as they arise-seizures, constipation(avoid as it increases intra-abdominal pressure and affects distal catheter drainage)

NEUROLOGICAL DYSFUNCTION – COGNITIVE CHANGES

- Many neurological diagnoses will accompany cognitive deficits
- Can include-
 - Lapses in memory and attention
 - Difficulties in organization
 - Planning and problem solving
 - Apathy
 - Dis-inhibition
 - Lack of insight
- Management & Nursing Strategies:
 - Directly related to the changes-reorient as appropriate

NEUROLOGICAL DYSFUNCTION – COGNITIVE CHANGES

- Pharmacology:
 - Drugs to be considered:
 - Those producing anticholinergic activity; amitriptyline, neuroleptics, tricyclic antidepressants
 - Histamine blocking agents: cimetidine, ranitidine
 - Analgesics: non-steroidal anti-inflammatory drugs
 - Sedative-hypnotics: benzodiazepines
 - Cardiovascular drugs: nifedipine, beta blockers

NEUROLOGICAL DYSFUNCTION – BEHAVIOURAL CHANGES

- Brain injury, traumatic or acquired can result in cognitive deficits, mood disturbances, personality changes, and behavioral problems
- The nature and severity of neuro-behavioural problems depends on a number of factors:
 - Nature
 - Location and severity of injury
 - Diffuse effects
 - Secondary mechanism of injury
 - Presence of seizures
 - Age
 - Medical health
 - History of previous brain injury
 - Pre-morbid level of function
 - History of any substance abuse (drugs/alcohol)
 - Psychiatric history
 - Psychosocial factors
 - Culture
 - Presence of violence

NEUROLOGICAL DYSFUNCTION – BEHAVIOURAL CHANGES

- **Nursing Strategies**
 - Awareness of changes; use a structured, consistent approach to daily routine; ensure rest is adequate; feedback about behaviours
- **Pharmacology**
 - Sedation may be appropriate; pharmacist review/recommendations of meds; individualized medication timing-therapy based
- **Prevention**
 - Recognition of patient behaviour- intercede before behaviour escalates; consistency of care- primary nurse
- **Management**
 - Team approach; consistency amongst all involved family included

NEUROLOGICAL DYSFUNCTION – AGITATION

- **Nursing Strategies**
 - Be alert to signs, triggers; reduce overstimulation by team and family
- **Pharmacology**
 - Mixed info available-generally acceptable to give settling meds initially but not long term
- **Prevention**
 - Structured routines work well
- **Management**
 - Prevention is the best approach

RANCHO LOS AMIGOS SCALE

- Developed to provide a detailed description of the cognitive function a brain injured individual progresses through:
 - Level 1- no response; total assistance
 - Level 2- generalized response; total assistance
 - Level 3- localized response; total assistance
 - Level 4- confused/agitated; maximal assistance
 - Level 5- confused, inappropriate; maximal assistance
 - Level 6- confused, appropriate; moderate assistance
 - Level 7- automatic, appropriate; minimal assistance for ADL's
 - Level 8- purposeful, appropriate; stand by assistance
 - Level 9- purposeful, appropriate; stand by assistance on request
 - Level 10- purposeful, appropriate; modified independent

NEUROLOGICAL DYSFUNCTION – CEREBRAL EDEMA

- **Clinical findings:**
 - Little clinical evidence if *mild edema*
 - Moderate edema:
 - Generalized symptoms
 - Headache
 - Nausea, vomiting
 - Altered LOC
 - Focal findings
 - New or increasing drift, weakness
 - New or increasing speech difficulty
 - Severe edema:
 - Herniation

NEUROLOGICAL DYSFUNCTION – CEREBRAL EDEMA

- **Nursing Strategies**
 - Complete and regular assessments; awareness that peak swelling occurs 2-4 days after injury; reporting findings to the MRP
- **Prevention**
 - Includes positioning, timely medication, accurate assessments and awareness of medical plan
- **Management**
 - Surgical intervention may be necessary – craniectomy to reduce pressure in the skull
- **Pharmacology**
 - Use of mannitol is initially useful, repeat doses become less effective; barbiturates and anticonvulsants also can be used to lessen cerebral metabolic rate

NEUROLOGICAL DYSFUNCTION – ALTERED LEVEL OF CONSCIOUSNESS

- **Nursing Strategies**
 - Assessment and reporting of changes in LOC; patient safety; swallowing concerns, awareness of the 'expected' plan
- **Management**
 - Patient safety, determining why there is a change and treating cause
 - CT Scan will be completed to guide decisions
- **Pharmacology**
 - Medication review to ensure that medications are not causing/compounding the change in LOC

SYSTEMIC DYSFUNCTION – AIRWAY/RESPIRATORY

- Nursing strategies
 - monitor RR, saturations, gases, suctioning, RT involvement, blood work, appropriate diet, monitor for aspiration, pneumonia, turn/reposition q2h, through chest assessments q shift, awareness of previous History-eg. COPD, asthma, position changes, early mobilization
- Management
 - report changes, appropriate suctioning, mobilize
- Pharmacology
 - Lasix, scopolamine

SYSTEMIC DYSFUNCTION – CARDIOVASCULAR/ PERIPHERAL VASCULAR

- Nursing strategies
 - awareness of issues/PMH, telemetry (remote/bedside), reduction of increased ICP (eg. vasovagal, sneezing)
- Management
 - report changes, follow orders
- Pharmacology
 - appropriate use of meds, pharmacy consult

SYSTEMIC DYSFUNCTION – ENDOCRINE

- Nursing strategies
 - monitor serum/urine lytes and omsolality, accurate I&O's- initially hourly- report changes, glucose monitoring
- Management
 - consult endocrine team, medications, blood work/urine as ordered
- Pharmacology
 - meds to assist hormone balance

SYSTEMIC DYSFUNCTION- FLUID VOLUME STATUS

- Nursing strategies
 - monitoring ins/outs accurately as appropriate, awareness of lab results
- Management
 - correct fluid support eg. Hyper/hypotonic solutions
- Pharmacology
 - meds as ordered

SYSTEMIC DYSFUNCTION- GENITOURINARY

- Nursing strategies
 - Post void residual, bladder scan, remove indwelling catheters, ensure adequate oral/IV intake
- Management
 - bladder retraining, monitor kidney function via blood work
- Pharmacology
 - appropriate antibiotics for UTI's

SYSTEMIC DYSFUNCTION- GASTROINTESTINAL

- Nursing strategies
 - monitor BS to hear in all 4 quadrants, awareness of S&S of bowel obstruction/ileus, bowel routine, early mobilization
- Management
 - Report concerns in a timely manner
- Pharmacology
 - bowel meds (Colace, MOM, sennakot, suppository/ enema)

SYSTEMIC DYSFUNCTION- INTEGUMENTARY

- Nursing strategies
 - mobilize, turn q2h, peri-care, wound care team (SWOT) assessment of areas of skin breakdown, IV assessments for peripheral/ central access sites
- Management-
 - Monitor closely for breakdown
- Pharmacology
 - medicated dressings, appropriate antibiotic use for infections

SYSTEMIC DYSFUNCTION- MUSCULOSKELETAL

- Nursing strategies
 - avoidance of the complications of bed rest/ immobility, splints, awareness of weakness due to disease
- Management
 - PT and OT consults, concern for safety of patient to reduce further injury
- Pharmacology
 - muscle relaxants, analgesia/anti-inflammatory as appropriate

SYSTEMIC DYSFUNCTION- SEXUAL FUNCTION AND INTIMACY

- Nursing strategies
 - open, frank discussions with patient,
 - awareness of patient's concerns
 - awareness of fertility-may resume months after a SCI,
 - concerns about autonomic dysreflexia with intercourse
 - men may still have erection but have difficulty/no ejaculation
 - counseling for both partners may be considered
- Management – Social Work involvement
- Pharmacology
 - meds like Viagra may help,
 - Is patient on anti-hypertensives? (ex. betablocker)

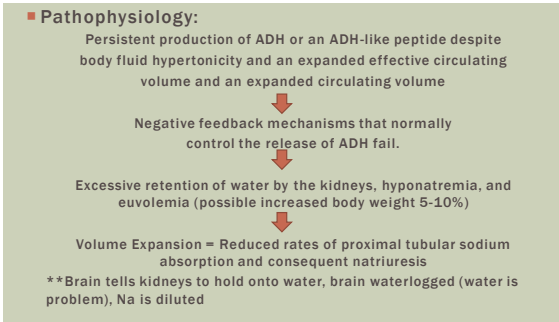
SYSTEMIC DYSFUNCTION- PSYCHOSOCIAL

- Nursing strategies
 - learning new coping strategies
 - support group
 - acceptance of a new way of life by patient and family/friends
 - grieving loss(es), impact of cognitive impairments on psychosocial function
- Management
 - Social work involvement
- Pharmacology
 - short term antidepressants, possibly antipsychotic medication

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FLUID ELECTROLYTE IMBALANCES: SYNDROME OF INAPPROPRIATE ANTIDIURETIC HORMONE (SIADH)



**FLUID ELECTROLYTE IMBALANCES:
SIADH**

- Manifestations:
 - Confusion
 - Lethargy
 - Nausea/vomiting
 - Coma
 - Seizures
 - Fluid overload
- Treatment:
 - Restriction of free water (< 1000mL/24 hours)
 - Slow replacement of sodium, most commonly with saline.
 - *Correction usually occurs over 3-6 days.
 - Furosemide (Lasix) 40mg daily for diuresis

**FLUID ELECTROLYTE IMBALANCES:
CEREBRAL SALT WASTING (CSW)**

- Pathophysiology;
 - Renal loss of Na leading to hyponatremia, increased urine Na
- Treatment;
 - Simultaneous urine/serum osmo & lytes
 - Volume and gradual salt replacement (0.9% normal saline or hypertonic NaCl solution)
- Causes;
 - Why the kidneys fail to reabsorb sodium is unclear
 - Brain tells kidneys to secrete Na, fluid follows
- Symptoms;
 - Hypovolemia
 - Global decline

**FLUID ELECTROLYTE IMBALANCES:
DIABETES INSIPIDUS (DI)**

- Manifestations;
 - DI is a condition of decreased secretion of ADH
 - Classified into neurogenic DI and nephrogenic DI
- Pathophysiology;
 - Increased urinary output related to a decrease in antidiuretic hormone secretion
- Treatment;
 - Most times DI is transient and resolves spontaneously within a few days or a few weeks
 - Dependent on severity
 - Replacement of fluid if the patient is unable to take an adequate amount of fluid orally
 - Administration of ADH (intranasal) or demopressin (oral)

SIADH V. CSW V. DI???

	SIADH	CSW	DI
Serum Na	decreased	decreased	increased
Serum osmo	decreased	increased	increased
Urine Na	increased	increased	decreased

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CLIENT EDUCATION & SUPPORT: NERVOUS SYSTEM DYSFUNCTION

- **Prevention Strategies**
 - includes things such as wearing a bike helmet; healthy lifestyle; regular medical follow-ups; regular exercise; nutritious, balanced diet; reducing risky behaviours; open discussions about risky behaviours (specific to condition and in general)
- **Pathophysiology**
 - as discussed with each of the disease processes
- **Manifestations**
 - dependent on the individual disease

CLIENT EDUCATION & SUPPORT: NERVOUS SYSTEM DYSFUNCTION

- **Treatment options**
 - done in collaboration with the medical team, allowing patient to explore alternative therapies in a non-judgmental manner
- **Resources**
 - community resources are under utilized in most acute care settings- eg. Brain Tumour Foundation, Epilepsy Ontario, Heart and Stroke,
- **Ongoing recovery**
 - Institutional rehab/community rehab; need lots of support with transitions from one care setting to another/home; long term prognosis; unconventional treatment options; support to all affected;

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4. Implement nursing strategies, including pharmacology, to prevent and manage concerns in neuroscience clients
5. Identify the pathophysiology, manifestations and treatment options for managing clients with fluid/electrolyte imbalances
6. Review client education with relation to nervous system dysfunction
- 7. Review nursing rehabilitation principles for the client with any type of nervous system dysfunction**

NURSING REHABILITATION PRINCIPLES

- The nurse assesses the patient's functional level and collects the following data, which will be used for planning nursing care and for discharge planning;
 - Level of consciousness and cognitive function (important for patient teaching)
 - Presence of neurological deficits
 - Verbal communication skills (ability to participate, word finding difficulty)
 - Independence in performing ADLs
 - Emotional response to surgery and underlying problems (ex. depression)
 - Safety concerns (ex. risk for falls?)
 - Previous family role and responsibilities
 - Support systems and living situation.

NURSING REHABILITATION PRINCIPLES

- It is important that the nurse is part of the team approach to rehabilitation including-
 - Assisting in restoring function where able
 - Reinforcement of therapist goals
 - Promote independence as early as possible for even the smallest of tasks
 - Prevention of complications
 - Increasing outcomes through consistency

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