
 **BRAIN INJURY ASSOCIATION OF MICHIGAN**

CERTIFICATION EXAM PREPARATION COURSE
CHAPTER 4: HEALTH, MEDICATIONS AND MEDICAL MANAGEMENT

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INTRODUCTION


- The brain is a complex and vulnerable organ.
- Injury can result in a multitude of physical and psychological impairments and medical complications.
 - Once a person has been deemed "medically stable" by the acute care hospital staff, transfer to either medically-based or community-based rehabilitation programs, or even to home, may occur.
- Direct care staff are often first to identify possible conditions and complications that effect a person's medical stability.

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CARDIOPULMONARY SYSTEM

- May be caused by direct trauma to the heart itself, complications from trauma, or damage to parts of the brain that control the functioning of the heart
- Monitor heart rate (normal adult 60-90 beats/minute)
- Monitor blood pressure (optimal 120/80 mm Hg)
- Observe for side effects of antihypertensive meds (dizziness, lightheadedness especially after standing)



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CARDIOVASCULAR SYSTEM

- Chest pain or palpitations
- Abnormal pulse rate or rhythm (normal 60-90/minute)
- Abnormal blood pressure (120/80)
- Edema (swelling) of leg and ankles
- Cyanosis and painful noisy respirations
- Painful, swollen, red and warm to touch extremity
- Profuse sweating, clammy skin, pallor
- Extreme fatigue, dizziness
- Nausea, vomiting



RESPIRATORY SYSTEM

- Complications include infection, airway obstruction, trauma to the larynx, trachea, chest and lungs, risk of aspiration pneumonia
- Monitor breathing rate (normal adult 12-20 breaths per minute)



RESPIRATORY SYSTEM

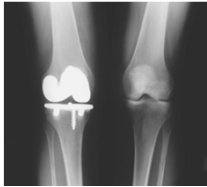
- Difficulty Breathing
- Shortness of Breath
- Cough
- Increased Production of Sputum
- Cyanosis (bluish discoloration of skin and mucous membranes)
- Abnormal Respiratory Rate (normal is 12-20 breaths per minute).

MUSCULOSKELETAL SYSTEM



- Observe for muscle and skeletal complications and peripheral nerve injuries
- **Spasticity** (an involuntary increase in muscle tone-tension)
- **Contractures** (flexion and fixation of a joint due to a wasting away and abnormal shortening of muscle fibers and loss of skin elasticity)
- **Heterotopic Ossification (HO)** (abnormal growth of bone in soft tissues or around joints)

MUSCULOSKELETAL SYSTEM




- Swelling, discoloration, limited range of motion
- Stiff, tender or painful joints
- Pain and/or altered sensation
- Inability to bear weight
- Abnormal shape of arm or leg
- Falls
- Increased muscle tone
- Severe pain upon forcible movement of joints


SKIN SYSTEM

- Increased sensitivity or pain
- Any reddened area of the body that does not return to original coloring after repositioning
- Severe skin tears
- Rash, raised and reddened bumps
- Severe itchiness
- Pressure ulcers


SKIN SYSTEM

- Skin: lacerations and abrasions
 - Acne and profuse sweating may appear or be worsened by a brain injury
- **Pressure ulcers** are most frequent complication
 - On bony prominences (hips, coccyx, heels, elbows, shoulder blades and back of the head)
 - Ischium (back lower portions of hip bones) if using wheelchair
- Staff members must frequently examine skin, report abnormalities, use proper transfer techniques, frequently reposition, and provide adequate nutrition and hydration.




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GASTROINTESTINAL SYSTEM

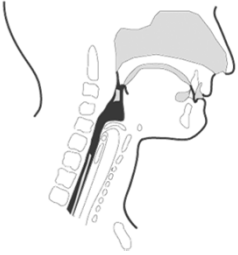



- Change in nutritional needs
 - Possible increase in metabolism (more calories needed)
 - Nutritional intake may be compromised by poor hand to eye coordination, difficulty swallowing, diminished attention and impaired cognition
- **Gastrostomy tube** – a tube placed through a surgical opening into the stomach through which to administer liquid feedings

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GASTROINTESTINAL SYSTEM

- Swallowing disorders are common:
 - Incidences range from 25-42% in Inpatient Rehabilitation
 - Increased risk of aspiration can cause lung infection or pneumonia



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GASTROINTESTINAL SYSTEM

- Severe constipation
- Abdominal pain/tenderness
- Abdominal distension, gas, complaints of feeling bloated
- Severe loss of appetite
- Cramping
- Frequent watery stool
- Nausea or vomiting
- Fecal impaction
- Pain when attempting bowel movement
- Rectal bleeding, tar-like stools
- Fever



ELIMINATION SYSTEM

Bowel Function

- Monitor dietary and fluid intake to assure adequate intake
- Establish a regular toileting schedule
- Stool softeners, bulk laxatives and a regularly scheduled suppository may be needed


Bladder Function

- **Disinhibited neurogenic bladder** – decreased capacity, urgency, frequency and incontinence
- Avoid indwelling catheters
- Begin bladder training once person is oriented and has sufficient **short term memory** to participate in program


URINARY SYSTEM

- Pain or burning upon urination
- Foul smelling urine
- Urinary frequency
- Urinary retention
- Blood in the urine
- Lower abdominal pain/discomfort
- Incontinence
- Fever, chills
- Flank, back or abdominal pain
- Nausea or vomiting

NEUROLOGICAL SYSTEM



- Headaches
 - Most common neurological condition reported after brain injury
 - May be accompanied by memory impairment, dizziness, fatigue, difficulty concentrating and cognitive impairment




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NEUROLOGICAL SYSTEM

- Vision impairment/neglect of visual space
- Blurred or double vision
- Hemiparesis (weakness of one side of the body)
- Hemiplegia (paralysis of one side of the body)
- Aphasia (difficulty understanding speech and or difficulty expressing thoughts)
- Dysphagia (difficulty swallowing)
- Vertigo or dizziness
- Sensory impairment, numbness, tingling
- Loss of perception of body awareness
- Ataxia (muscular discoordination when voluntary movements are attempted)
- Change in mental status
- Decreased level/loss of consciousness
- Motor weakness
- Headache
- Seizure
- Tremors

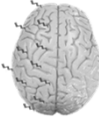


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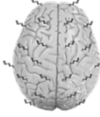
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SEIZURES


Seizures
Seizures are caused by abnormal disorderly discharge of electrical activity in the nerve cells of the brain.



Partial seizures arise from disturbances in specific, localized areas of one hemisphere of the brain.



Generalized seizures are a sudden burst of abnormal discharges that usually affect both hemispheres of the brain.




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GENERALIZED SEIZURES

Generalized seizures


- Sudden burst of abnormal, generalized discharges that usually affect **both hemispheres** of the brain

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GENERALIZED SEIZURES

Tonic-clonic seizures


- Formerly known as **grand mal**
- Abrupt **loss of consciousness**
- Tonic phase (excessive muscle tone/contraction)
- Clonic phase (alternating contraction and relaxation of muscles) consists of violent jerking of the head, face and extremities with gradual slowing in frequency and intensity
- Typically lasts 2-3 minutes with consciousness slowly returning over a 10-30 minute period
- **Postictal state** – state of confusion, extreme fatigue, no memory of the seizure

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GENERALIZED SEIZURES

Absence seizures

- Formerly known as **petit mal**
- **Transient** loss of consciousness for several seconds
- The person may cease physical movement, have a loss of attention or stare vacantly, eye blinking, staring, chewing movements
- May be of such short duration that the seizure is not recognized by an observer or even the individual having the seizure

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GENERALIZED SEIZURES

Myoclonic seizures

- Sudden, brief contraction of muscle groups, which produce rapid, jerky movements in one or more extremities

Status epilepticus

- **Continuous type of seizure** that lasts longer than 5 minutes or two or more seizures without time between for the person to recover consciousness.

Status epilepticus is a medical emergency!

If not treated effectively, brain damage or death can result.

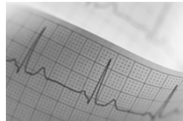


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SEIZURE TRIGGERS

- Fatigue and illness
- Consumption of **drugs, alcohol, or other illicit substances**
- Increased/elevated body temperature
- Flashing lights (strobe, computer terminals, TV, movies)
- **Agitation or emotional distress** including hyperventilation
- Decreased oxygen
- Dehydration due to sweating (chemical/electrolyte imbalance)
- Medications (i.e. antidepressants, anti-psychotics) that can lower the **seizure threshold**
- Hypoglycemia (low blood sugar)

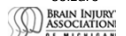


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FIRST AID PROCEDURES FOR SEIZURES


- Do not force any object into the person's mouth or try to hold the tongue
- Clear the environment of harmful objects
- Ease the individual **to the floor** to prevent injury from falling
- Turn the person to the side to **keep the airway clear** and allow saliva to drain from mouth
- Put something soft **under the head** and along bedrails, if in bed
- Loosen tight clothing around the neck
- Do not attempt to restrain the person
- Do not give **liquids** during or just after the seizure
- Continue to observe the person until fully alert, checking vital signs such as pulse and respirations periodically
- Give artificial respiration if person does not resume breathing after seizure




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DRUG TREATMENT FOR SEIZURES





- After the first seizure, the following events typically occur:
 - Detailed neurological examination
 - Blood studies
 - Electroencephalogram (EEG,) or other brain imaging study (CT scan or MRI)
 - Medication review
- Staff should closely observe the person for signs and symptoms of additional seizures, as well as potential medication side effects and signs of **toxicity**.

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PHARMACOLOGY AND THE TREATMENT OF BRAIN INJURY

- After brain injury, chemicals in the brain are affected.
- Medications work by either **facilitating or inhibiting** neuro-chemical transmitter activity.
- Medications should never be used as a substitute for appropriate treatment, planning, and levels of staffing.
 - Before any medication is begun, it is important to assure that the person is **as medically stable as possible**.
 - Consideration should also be given to the use of behavioral and social interventions.





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PHARMACOLOGY AND THE TREATMENT OF BRAIN INJURY

Continuously monitor the individual if the drug is:

- Producing the intended effect
- Still needed
- Causing adverse effects (i.e. sedation, memory dysfunction, decreased arousal)
- Impeding recovery



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ALTERNATIVE MEDICATIONS OR VITAMINS



- The use of alternative medications, vitamins and over-the-counter medications or herbal remedies should be **avoided** unless specifically recommended by a physician.
- Common **cold and cough medications** contain ingredients that may not be well tolerated by persons who have sustained a brain injury.

ANTIDEPRESSANTS USE

- **MAOIs:** Oldest class of antidepressants which were used to treat posttraumatic agitation
 - Discouraged due to dietary restrictions of foods with high levels of tyramine (i.e. cheese, red wine, beer, sardines, sauerkraut, liver, aged meats)
 - Possible serious interactions with cold medications, antiparkinsonian drugs and meperidine (Demerol®)
 - A hypertensive crisis (increased blood pressure, severe headache, heart palpitations, cardiac effects and stroke) can occur if these foods or medications are taken with MAOIs

OTHER MEDICATIONS USE

Bipolar Disorder medications

- **Lithium:** for post-traumatic agitation (rarely used)

Anti-anxiety medications (anxiolytics)

- Limited role in the treatment of post-traumatic agitation
- Can precipitate worsening agitation and belligerence due to their effect of increasing disinhibition



ANTIPSYCHOTICS USE

- Use is controversial; not considered agents of first choice
- May be prescribed for persons with a pre-injury diagnosis of schizophrenia or who present with hallucinations, delusions, paranoia, physical aggression and are a danger to themselves or others
- If it is deemed necessary to use antipsychotics, **atypical antipsychotic agents** have more favorable side effect profiles than conventional antipsychotics

ANTIPSYCHOTICS SIDE EFFECTS

- Can delay or impair recovery, impair learning and memory, and lower seizure threshold
- Anticholinergic effects include:
 - Drowsiness, delirium, agitation, insomnia, urinary retention, palpitations, tachycardia, blurred vision, confusion, stomach upset, dizziness, constipation, dry mouth
- Extra-pyramidal effects:
 - muscle tremors, masked facial appearance, **cogwheel rigidity** (rigidity with little jerks when the muscle in the arms and legs are stretched by the examiner), shuffling gait, drooling, **akathisia** (inability to sit or stand still), **dystonic reaction** (spasms of neck, tongue, or facial muscles), grimacing, abnormal eye movement, **torticollis** (twisted position of the neck)


ANTIPSYCHOTICS SIDE EFFECTS

- **Tardive dyskinesia**
 - Very serious side effect
 - May be irreversible
 - Characterized by lip smacking, rhythmic darting of the tongue, chewing movements, aimless movements of the arms and legs and in severe cases, difficulty breathing and swallowing




SUBSTANCE ABUSE


- **Alcohol** is the predominant risk factor for injury and an obstacle to rehabilitation for both brain and spinal cord injury.
 - Nearly **58%** of individuals with acquired brain injury had a history of alcohol abuse or dependence prior to injury
 - **One-third** of ABI outpatients had used illicit drugs prior to their brain injury. Marijuana was used most commonly followed by cocaine
 - As many as **50 percent** of individuals with an acquired brain injury will return to using drugs and alcohol post-injury

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SUBSTANCE ABUSE




- 1988 National Head Injury Task Force on Substance Abuse:
 - Approximately **40%** of persons in post-acute rehabilitation facilities have moderate to severe problems with substance abuse
 - **Alcohol** is the substance most abused in over 90% of the cases
- Substance abuse causes significant negative effects on the brain and central nervous system.

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SUBSTANCE ABUSE

- It is difficult to determine an accurate diagnosis when a person has also used drugs prior to the injury.
 - Behaviors following acute intoxication and overdose are very similar to those from brain injury (lethargy, or agitation, confusion, disorientation, respiratory depression etc.)
 - Substance abuse causes metabolic changes in the body.
- The likelihood of developing **hematomas** (collection of blood) is increased in persons with cerebral **atrophy** (wasting away) associated with alcohol abuse.

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SUBSTANCE ABUSE


- Alcohol may cause respiratory depression, which also increases the risk of *hypoxia*.
- Individuals who have no history of drug use may experiment with alternative medications, nonprescription drugs, and illegal substances in an attempt to relieve troublesome symptoms.


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PSYCHIATRIC MANIFESTATIONS

Psychiatric manifestations often occur sometime after a brain injury and include:


- Major *depression*
- Bipolar disorder
- Psychoses
- *Anxiety* disorders (panic attacks, phobias, obsessive compulsive disorder)



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INTERVENTIONS FOR NEUROBEHAVIORAL SEQUELA

- Specific *behavioral symptoms* should be targeted for treatment
- Assessment tools are used to objectively define behavioral symptoms and to reach consensus about behaviors to target.
 - Common rating scales:
 - *Agitated Behavior* Scale
 - *Overt Aggression* Scales

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INTERVENTIONS FOR NEUROBEHAVIORAL SEQUELAE



- **Environmental factors** must be considered when determining treatment.
 - Examples: noise levels and distractions
- **Treatment approaches:**
 - De-escalation techniques, relaxation training, cognitive restructuring, and behavior therapy
 - Pharmacology

ANTIDEPRESSANTS USE

- **SSRIs (Selective Serotonin Reuptake Inhibitors):** More commonly used to treat behavioral dyscontrol than tricyclic antidepressants or MAO inhibitors.
- **Tricyclic antidepressants** are associated with side effects such as sedation, lowered seizure threshold and cardiac effects.



DEFICITS IN AROUSAL

- Arousal is defined as the general state of readiness of an individual to process sensory information and/or organize a response.

MEDICATIONS TO TREAT SLEEPING DISORDERS





- Problems with falling asleep and/or staying asleep are common complaints after a person has sustained a brain injury.

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MEDICAL MANAGEMENT OF BRAIN INJURY

The medical management of brain injury is complex and can be a ***lifelong challenge***




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AGING WITH BRAIN INJURY



- Many individuals with brain injury experience significant residual disabilities, which persist throughout the aging process.
- Recent studies strongly suggest that TBI can provoke some of the changes seen in the brain of persons suffering from Alzheimer's disease and can ***accelerate*** brain aging.
 - In one study, the most commonly reported symptom, ***personality change***, increased from 60% to 74% at year five
 - Family subjective burden also increased over time

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