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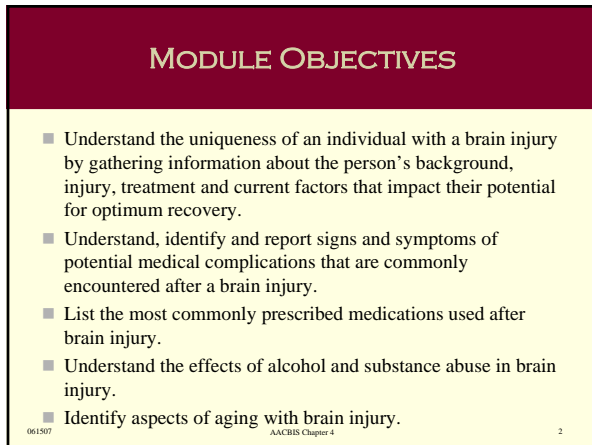
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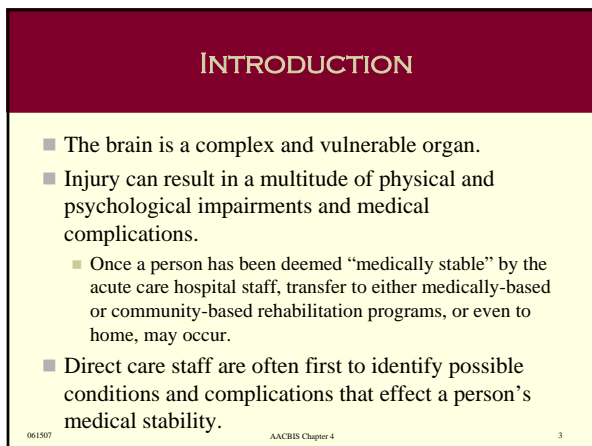
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**THE GOAL OF REHABILITATION**

- The goal of rehabilitation is to help people regain the most                      possible.
- Treatment must be individualized in accordance with each person's unique needs.
- The first step in assisting the person is a thorough review and assessment of factors which have impacted upon the whole person.
- Well documented information on the health status of the individual when admitted is important.
  - It is a baseline for comparison when health status changes.

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**INITIAL ASSESSMENT**

Review the following:

- Past medical history
- Historical information
- Information about the accident/injury
- Therapeutic evaluation
- Current medications, dosages and side effects

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**MEDICAL MANAGEMENT OF BRAIN INJURY**

The medical management of brain injury is complex and can be a                      ?



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### CARDIOVASCULAR 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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### 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)

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### MUSCULOSKELETAL SYSTEM

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

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**SKIN SYSTEM**

- Skin: lacerations and abrasions
  - Acne and profuse sweating may appear or be worsened by a brain injury
- [redacted] ? 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
  - Swallowing disorders are common:
    - [redacted] ? delayed or absent swallowing reflex
    - [redacted] ? reduced tongue control
    - Increased risk of aspiration can cause lung infection or pneumonia
- Gastrostomy tube – a tube placed through a surgical opening into the stomach through which to administer liquid feedings

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**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**

- [redacted] ? – decreased capacity, urgency, frequency and incontinence
- Avoid indwelling catheters
- Begin bladder training once person is oriented and has sufficient [redacted] ? to participate in program

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**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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**SEIZURES**

**Seizures** are caused by an abnormal, disorderly discharge of electrical activity in the nerve cells of the brain. There are 2 main types:

- [redacted] ?
- [redacted] ?

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**PARTIAL SEIZURES**

**Simple Partial Seizures**

- Disturbances in specific, localized areas of [redacted] ? of the brain.
- [redacted] ? loss of consciousness
- Motor symptoms, such as stiffening or jerking of muscles, moving eyes side to side, tongues movements, blinking
- Psychic symptoms may include hallucinations, sudden feelings of fear or anger, and sensations of déjà vu
- Sensory symptoms, such as numbness, tingling, abnormal sensations, buzzing, ringing sounds, unpleasant taste

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**PARTIAL SEIZURES** *CONTINUED*

Complex partial seizures

- Formerly known as [redacted] ? or [redacted] ? seizures
- May experience a warning or aura
- Impaired consciousness
- Semi-purposeful and inappropriate actions (i.e. compulsive patting, rubbing body parts, lip smacking, walking aimlessly, picking at clothing)
- Usually lasts 1-3 minutes and may be followed by some [redacted] ?

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**GENERALIZED SEIZURES**

Generalized seizures

- Sudden burst of abnormal, generalized discharges that usually affect [redacted] ? of the brain

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**GENERALIZED SEIZURES** *CONTINUED*

Tonic-clonic seizures

- Formerly known as [redacted] ?
- Abrupt [redacted] ?
- 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
- [redacted] ? – state of confusion, extreme fatigue, no memory of the seizure

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**GENERALIZED SEIZURES** *CONTINUED*

Absence seizures

- Formerly known as [redacted] ?
- [redacted] ? 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** *CONTINUED*

Myoclonic seizures

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

Status epilepticus

- [redacted] ? that lasts longer than 5 minutes or two or more seizures without time between for the person to recover consciousness.

**Status epilepticus is a [redacted] ? !**  
**If not treated effectively, brain damage or death can result.**

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**SEIZURE TRIGGERS**

- Fatigue and illness
- Consumption of [redacted] ?
- Increased/elevated body temperature
- Flashing lights (strobe, computer terminals, TV, movies)
- [redacted] ? including hyperventilation
- Decreased oxygen
- Dehydration due to sweating (chemical/electrolyte imbalance)
- Withdrawal from alcohol, drugs, or sedative agents
- Hypoglycemia (low blood sugar)
- Medications (i.e. antidepressants, anti-psychotics) that can lower the [redacted] ?

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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 prevent injury from falling
- Turn the person to the side to **?** and allow saliva to drain from mouth
- Put something soft **?** and along bedrails, if in bed
- Loosen tight clothing around the neck
- Do not attempt to restrain the person
- Do not give **?** 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 **?**

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### SIGNS AND SYMPTOMS TO REPORT

- The following body systems each have specific signs and symptoms that must be monitored, identified and reported to medical personnel:
 

■ Respiratory	■ Gastrointestinal
■ Cardiovascular	■ Urinary
■ Integumentary (skin)	■ Neurological
■ Musculoskeletal	■ Infection
- All staff should practice standard precautions
  - Handwashing, personal protective equipment

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**PHARMACOLOGY AND THE TREATMENT OF BRAIN INJURY**

- After brain injury, chemicals in the brain are affected.
- Medications work by either **?** 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 **?**
  - Consideration should also be given to the use of behavioral and social interventions.

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**PHARMACOLOGY AND THE TREATMENT OF BRAIN INJURY *CONTINUED***

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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**DEFICITS IN AROUSAL**

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

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**ALTERNATIVE MEDICATIONS OR VITAMINS**

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

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**PSYCHIATRIC MANIFESTATIONS**

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

- Major [redacted ?]
- Bipolar disorder
- Psychoses
- [redacted ?] disorders (panic attacks, phobias, obsessive compulsive disorder)

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**INTERVENTIONS FOR NEUROBEHAVIORAL SEQUELA**

- Specific [redacted ?] 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:
    - = [redacted ?] Scale
    - = [redacted ?] Scales

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**INTERVENTIONS FOR NEUROBEHAVIORAL SEQUELA** CONTINUED

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

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**ANTIDEPRESSANTS USE**

- **[REDACTED] ? [REDACTED]** More commonly used to treat behavioral dyscontrol than tricyclic antidepressants or MAO inhibitors.
- **[REDACTED] ? [REDACTED]** are associated with side effects such as sedation, lowered seizure threshold and cardiac effects.

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**ANTIDEPRESSANTS USE** CONTINUED

- **[REDACTED] ? [REDACTED]** 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

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### OTHER MEDICATIONS USE

**Bipolar Disorder medications**

- **Lithium:** for post-traumatic agitation (rarely used)
- [redacted] ?
- Limited role in the treatment of post-traumatic agitation
- Can precipitate worsening agitation and belligerence due to their effect of increasing disinhibition

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### 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, [redacted] ? have more favorable side effect profiles than conventional antipsychotics

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### 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, [redacted] ? (rigidity with little jerks when the muscle in the arms and legs are stretched by the examiner), shuffling gait, drooling, [redacted] ? (inability to sit or stand still), [redacted] ? (spasms of neck, tongue, or facial muscles), grimacing, abnormal eye movement, [redacted] ? (twisted position of the neck)

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**ANTIPSYCHOTICS SIDE EFFECTS** *CONTINUED*

- **?**
  - 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

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**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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**SUBSTANCE ABUSE**

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

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**SUBSTANCE ABUSE** CONTINUED

- 1988 National Head Injury Task Force on Substance Abuse:
  - Approximately **?** of persons in post-acute rehabilitation facilities have moderate to severe problems with substance abuse
  - **?** 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** CONTINUED

- 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 **?** (collection of blood) is increased in persons with cerebral **?** (wasting away) associated with alcohol abuse.

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**SUBSTANCE ABUSE** CONTINUED

- Alcohol may cause respiratory depression, which also increases the risk of **?**
- 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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### 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 [redacted] brain aging.
  - In one study, the most commonly reported symptom, [redacted], increased from 60% to 74% at year five
  - Family subjective burden also increased over time
- Other problems include
  - Musculoskeletal complications (i.e. arthritis, bursitis, tendonitis)
  - Alterations in endocrine and immune systems may affect the person's susceptibility to infection.

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