Move it or Lose it:
The Benefits of Movement and Exercise in Traumatic Brain Injuries

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Objectives:

• Participants will understand common symptoms and impairments that physical therapists treat in patients who have had a traumatic brain injury.

• Participants will be able to list three benefits of early intervention and exercise to those who have sustained a traumatic brain injury.

• Participants will be able to demonstrate 2 common exercises completed in physical therapy during treatment of a patient who has had a traumatic brain injury.
What is a traumatic brain injury (TBI)?

- Multiple causes (bump, blow, jolt or penetrating head injury)
- Disrupts normal function of the brain
- Not all hits to the head result in a TBI
- Range of severity
  - Mild (i.e., a brief change in mental status or consciousness)
  - Severe (i.e. an extended period of unconsciousness or memory loss after the injury)
Mild traumatic brain injuries \(^{(1,2,4)}\)

- **Common causes:**
  - Falls
  - Vehicle-related collisions
  - Violence
  - Sports injuries
  - Explosive blasts and other combat injuries

- **Common symptoms**
  - Physical
  - Behavioral/emotional
  - Cognitive
Outpatient treatment of mild TBIs

Collaboration of an interdisciplinary team

- Physical Medicine and Rehabilitation physicians
- Developmental optometrist
- Nurse practitioners, Physician Assistants
- Occupational Therapists
- Speech Language Pathologists
- Physical Therapists
- Neuropsychologist
- Clinical Psychologist
- Audiology / Vestibular specialists
- Therapeutic recreation
- Nurse coordinators
- Social Workers
<table>
<thead>
<tr>
<th>Physical</th>
<th>Behavioral/Emotional</th>
<th>Cognitive</th>
<th>Sleep</th>
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</thead>
<tbody>
<tr>
<td>Headache</td>
<td>Drowsiness</td>
<td>Feeling “slowed down”</td>
<td>Sleeping more than usual</td>
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<tr>
<td>Nausea</td>
<td>Fatigue/lethargy</td>
<td>Feeling “in a fog” or “dazed”</td>
<td>Sleeping less than usual</td>
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<tr>
<td>Vomiting</td>
<td>Irritability</td>
<td>Difficulty concentrating</td>
<td>Trouble falling asleep</td>
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<tr>
<td>Blurred or double vision</td>
<td>Depression</td>
<td>Difficulty remembering</td>
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<td>Seeing stars / lights</td>
<td>Anxiety</td>
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<tr>
<td>Balance problems</td>
<td>Sleeping more than usual</td>
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<tr>
<td>Dizziness</td>
<td>Difficulty falling asleep</td>
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<tr>
<td>Sensitivity to light or noise</td>
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<td>Tinnitus (ringing in the ear)</td>
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Common symptoms that physical therapists treat in patients with mild TBI

- Headaches
- Neck pain
- Balance problems
- Motion sensitivity
- Visual deficits
- Dizziness
- Fatigue
- Deconditioning
- Poor tolerance to activity
What are functional limitations associated with persistent symptoms of a mild TBI?

- Anything that limits a person’s abilities to complete normal activities, return to work or return to sport such as:
  - pain
  - difficulty turning their head
  - difficulty moving in bed, standing, sitting, or walking
  - falls or near falls
  - poor tolerance to a household activity (making meals, cleaning, shopping, walking)
  - poor tolerance to aerobic activity (running, jumping, turning quickly)
  - inability to tolerate busy places
Why is early mobilization after a mild TBI with a physical therapist important?

• People need to get moving!

  – prolonged rest can lead to fatigue, reactive depression, and physiological deconditioning

  – most mild TBIs resolve themselves within 7 to 10 days, up to 3 months for non-athletes

  – people are able to and should exercise despite having persistent symptoms with the assessment and guidance of a physical therapist

    • quantitative, individualized, and progressive subsymptom threshold aerobic exercise rehabilitation
    • improved symptom resolution compared to strict rest
Benefits of early intervention and exercise

• Cardiovascular system
• Sleep
• Pain
• Fatigue
• Cognition
• Psychiatric conditions
Exercise benefits and the cardiovascular system

- Increases the body’s relaxation response (parasympathetic) that helps to regulate elevated heart rate and blood pressure \(^{(8, 12, 13)}\)

- Increases blood flow to the brain \(^{(13)}\)

- Improved endurance and fitness after completing light and high resistance weight training as well as long duration aerobic exercise \(^{(8, 14, 15)}\)
Exercise benefits and sleep

• Moderate intensity exercise improved self-reported sleep quality scores in a study of older adults \(^{(8,16)}\)

• In healthy army recruits, aerobic exercise improved \(^{(8,17)}\)
  – Sleep onset latency
  – Sleep efficiency
  – Decreased wake time during sleep
Exercise benefits on cognition and fatigue

• Reduction in fatigue after endurance conditioning noted in studies of patients with cancer and multiple sclerosis (8,18,19,20,21)

• Increased blood flow to the brain which aids in improved cognitive performance (13,22,23)

• Associations of exercise and cognition in older adults and the elderly (8)
  – decreased brain tissue loss (24)
  – lowering risk of dementia, Alzheimer’s disease (25)
  – delayed onset of age-related decline in brain function (26)
Exercise benefits on psychiatric conditions

- Regular aerobic exercise associated with decreased incidence of depression and anxiety disorders (8,27)

- Improved mood and emotion in patients with a TBI (8,28)
Long-term benefits of exercise after sustaining a mild TBI

- Improved quality of life\(^{(29)}\)
- Prevention of chronic disease that is associated with a sedentary lifestyle\(^{(8)}\)
- Maintain and progress physical work capacity\(^{(8,30)}\)
- Maintain and progress level of endurance and balance\(^{(8,30, 31)}\)
- Manage and/or reduce levels of fatigue and stress\(^{(8,30)}\)
- Reports of improved self-esteem and less depression\(^{(29,31)}\)
- Reports of improved social participation\(^{(29,31)}\)
Suggestions for a life long exercise program

• Walking program
  – 15-20 minutes, 4-5 days a week

• Bicycle

• Body weight exercises
  – Squats
  – Lunges
  – Arm and leg lifts
    • Completed in standing, sitting, laying down, or on hands and knees

• Weight lifting

• Free / low-cost exercise groups

• Personal training / accountability group

• Community centers
Common exercises completed with PT

- **Aerobic**
  - walking program

- **Head and neck**
  - looking side to side, up and down

- **Strength and endurance**
  - squats
  - bicep curls and shoulder press

- **Balance**
  - feet together (eyes open, eyes closed)
Questions?
References