Defense and Veterans Brain Injury Center
Progressive Return to Activity Following Acute Concussion/ Mild Traumatic Brain Injury

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“Medically Ready Force...Ready Medical Force”
Learning Objectives

1. Describe the role of this clinical recommendation and overall goal for recovery following acute mild TBI
2. Identify the three domains for graded activity progression through five stages
3. Understand the goal of each stage and identify minimum rest requirements
4. Recognize the objective and subjective measures for progression
5. Demonstrate understanding of progressive return to activity using clinical case studies
Traumatic Brain Injury

• With more than 339,462 traumatic brain injuries (TBIs) in DoD from 2000 through the third quarter of 2015, TBI is a major concern that can negatively impact service members’ health, unit readiness and mission accomplishment.

• TBI is a disruption of brain function resulting from a blow or jolt to the head.

• TBIs are classified as mild, moderate, severe or penetrating.
## Closed TBI Classification

<table>
<thead>
<tr>
<th>Severity</th>
<th>Mild (Concussion)</th>
<th>Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structural imaging</td>
<td>Normal</td>
<td>Normal or abnormal</td>
<td>Normal or abnormal</td>
</tr>
<tr>
<td>(Computed tomography)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loss of consciousness</td>
<td>0 to 30 minutes</td>
<td>30 minutes and &lt; 24 hours</td>
<td>&gt; 24 hours</td>
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<tr>
<td>(LOC)</td>
<td></td>
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<tr>
<td>Alteration of consciousness</td>
<td>A moment up to 24 hours</td>
<td></td>
<td>&gt; 24 hours</td>
</tr>
<tr>
<td>(AOC)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-traumatic amnesia (PTA)</td>
<td>0 to 1 day</td>
<td>&gt; 1 day &lt; 7 days</td>
<td>&gt; 7 days</td>
</tr>
</tbody>
</table>

Source: Assistant Secretary of Defense for Health Affairs. Health Affairs Memorandum (October 1, 2007).

Traumatic Brain Injury: Definition and Reporting

This classification refers to severity at the time of injury, not symptoms experienced.
Mild TBI

- Majority of documented brain injuries (82.5 percent) in the DoD are mild TBIs (mTBI), also known as concussion
- All concussions should be evaluated in accordance with:
  - Department of Defense Instructions (DoDI) 6490.11
Progressive Return to Activity

Two Clinical Recommendations available:

- Progressive Return to Activity Following Acute Concussion/Mild TBI: Guidance for the Primary Care Manager in Deployed and Non-Deployed Settings
  

- Progressive Return to Activity Following Acute Concussion/Mild TBI: Guidance for the Rehabilitation Provider in Deployed and Non-Deployed Settings
  
Purpose

This clinical recommendation offers guidance to providers in both the deployed and non-deployed settings on a progressive approach from rest to return to pre-injury activity for service members who have sustained a concussion/mTBI, and continue to experience symptoms after the initial treatment.

Source: DoD Photo
Author: TSgt Prentice Colter

Source: Brainline.org
Guidance

- The rehabilitation provider guidance is a continuation of the ‘Progressive Return to Activity Following Acute mTBI: Guidance for the Primary Care Manager (PCM)’

- Distinction for patients between both recommendations include:
  - ‘Guidance for the Primary Care Manager’ is a self-guided staged recovery
  - ‘Guidance for the Rehabilitation Provider’ is a clinician-directed staged recovery
Diagnosed and confirmed concussion:

- Provide mandatory 24 hour recovery period
- Review Acute Concussion Educational Brochure
- Symptom Management
- Initiate progressive return to activity OR refer to rehabilitation provider for a comprehensive progressive return to activity process
Progressive Return to Activity Approach

Service members may enter the comprehensive, progressive return to activity process if:

First Concussion

■ SM experience symptoms greater than 1 (mild) after 24 hours in Stage 1 (Rest) or after exertional testing

Second concussion in the past 12 months

• All SM’s who have sustained a second concussion in 12 months must enter the progressive return to activity process
  
  • SM must have 7 consecutive days of symptom resolution (defined as symptoms of 0-1, mild, on the NSI) at Stage 1 and 2 before completing Stages 3-5
Progressive Return to Activity

• The progressive return to activity protocol measures three domains as parameters for ongoing evaluation:
  – Physical Progression
    • Stars with light activity progressing to heavy resistance
  – Cognitive Progression
    • Starts with low demand activity progressing to complex dynamic cognitive tasks
  – Vestibular and Balance Progression
    • Starts with slow head and body movement progressing to complex, dynamic tasks such as plyometric training or swimming with flip turns
Rehabilitation Stages

Progression across each domain is measured in the following stages:

<table>
<thead>
<tr>
<th>Rehabilitation Stages</th>
<th>Description</th>
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<tbody>
<tr>
<td>Stage 1</td>
<td>Rest</td>
</tr>
<tr>
<td>Stage 2</td>
<td>Light Routine Activity</td>
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<tr>
<td>Stage 3</td>
<td>Light Occupation-oriented Activity</td>
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<tr>
<td>Stage 4</td>
<td>Moderate Activity</td>
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<tr>
<td>Stage 5</td>
<td>Intensive Activity</td>
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<tr>
<td>Stage 6</td>
<td>Unrestricted Activity</td>
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</table>
Progression Across Stages

Use the following tools to assess both self-reported (subjective) and objective measures of progression across each stage:

• Self-reported Measures:
  — Neurobehavioral Symptom Inventory (NSI)
  — Borg’s Rate of Perceived Exertion (RPE)

• Objective Measures:
  — Theoretical Maximum Heart Rate (TMHR) during activity
  — Resting Heart Rate (HR)
  — Resting Blood Pressure (BP)
Neurobehavioral Symptom Inventory

- Twenty-two item inventory of non-specific but common mTBI symptoms
  - Symptoms are reported on a scale of 0 to 4:
    - 0 = none
    - 1 = mild
    - 2 = moderate
    - 3 = severe
    - 4 = very severe
  - NSI symptom report becomes part of the medical record
Objective Measures of Progression

- Borg’s Rate of Perceived Exertion
  - Measures the intensity of physical activity based upon the physical responses that a person experiences during exercise
  - Reported on scale of 6 ‘no exertion at all’ to 20 ‘maximum exertion’

- Theoretical Maximum Heart Rate
  - Calculated using: $220 - \text{age} = \text{TMHR}$

- Resting BP (max 140/90 mmHg)

- Resting HR (max 100 beats per min)
Progression through Activity

The following criteria apply at all stages and should be met for the service member to progress:

- No new symptoms
- No symptoms above rating of 1 (mild) on NSI
- Resting BP not to exceed 140/90 mm Hg
- Resting HR not to exceed 100 bpm

Activity to rest intervals must be followed as defined

- Example: Stage 3 (Light Occupational-oriented Activity) - maximum of 60 minute physical activity periods followed by four hours of rest (1:4 ratio)

- If criteria for progression are met, advance to next stage
- If criteria for progression are not met, return to prior stage for 24 hours
- If service member reports symptoms during activity, stop activity and rest
Stage 1: Rest

Objective

• Rest, limit activity to promote recovery
• No same day return to duty/ play
• Establish and document resting HR/BP

Activity and rest guidelines

• Target RPE is 6-8, HR should not exceed 40 percent of TMHR
• Basic activities of daily living and extremely light leisure reading
• Television with rest breaks each hour
• Limit positions where the head is below the heart

Increase demands systematically and progressively, observing for any changes that provoke symptoms; modify intensity/duration of demands on symptom exacerbation

DO NOT!!!

• work or study
• drink alcohol
• exercise
• drive
• exert yourself to the point of making your heart race
• play video games
Stage 2: Light Routine Activity

Objective

- Light routine activity limited to 30 minutes, followed by four hours of rest

Activity and rest guidelines

- Target RPE is 7-11
- HR should not exceed 55 percent of TMHR
- Light aerobic activity, avoid repetitive lifting
  - 30 minute periods followed by 4 hours of rest
- Cognitive activities such as computer use, leisure reading, and simple board games
  - 30 minutes maximum followed by 60 minute rest between activities
- Vestibular and balance activities such as climbing stairs, putting on boots

Increase demands systematically and progressively, observing for any changes that provoke symptoms; modify intensity/ duration of demands on symptom exacerbation

DO NOT!!!

- drink alcohol
- drive
- play video games
- do resistance training or repetitive lifting
- do sit-ups, push-ups or pull-ups
Stage 3: Light Occupation- oriented Activity

Objective
- Full body, complicated coordinated movements

Activity and rest guidelines
- Target RPE is **10-12**
- HR should not exceed **65 percent** of TMHR
- Aerobic activity
  - 60 minute periods followed by 4 hours of rest (1:4 ratio)
- Light cognitive activities
  - 30 minutes maximum followed by 60 minutes of rest between activities
- Vestibular and balance activities: walking on uneven surface, steps/stairs, swimming (no flip turns)

*Increase demands systematically and progressively, observing for any changes that provoke symptoms; modify intensity/duration of demands on symptom exacerbation*
Stage 4: Moderate Activity

Objective
- Increase in intensity and complexity of exercise and cognitive activity

Activity and rest guidelines
- Target RPE is **12-16**
- **HR is 70-85 percent** of TMHR
- Non-contact sports, brisk hike (no additional load), light resistance training
  - 90 minutes maximum followed by four times the amount of rest (1:4); *i.e. 30 minutes of activity requires minimum 2 hours of rest*
- Video games, driving simulation
  - 20 minutes to maximum of 40 minutes, followed by 80 minutes cognitive rest (1:2)
- Activities with greater vestibular/balance demand including swimming with flip turns, navigating uneven terrain

*Increase demands systematically and progressively, observing for any changes that provoke symptoms; modify intensity/duration of demands on symptom exacerbation*
Stage 5: Intensive Activity

Objective

• Duration/ intensity of activity parallels service member’s typical role, function and tempo

Activity and rest guidelines

• Target RPE is 16+, HR is 85-100 percent of TMHR
• Resume usual physical exercise routine
• Driving (as appropriate), weapons simulator or target practice
• Cognitive activities should include multitasking and problem solving
  — 50 minutes maximum
• Greater exercise intensity and dynamic balance activities: running, patrol duty, jump landing, use of night vision goggles

Increase demands systematically and progressively, observing for any changes that provoke symptoms; modify intensity/duration of demands on symptom exacerbation
Accompanying Tools

Use the following tools to assess and monitor progression through each stage:

- Patient Activity Guidance After Concussion handouts
- Progressive Return to Activity Clinical Support Tool
Conclusion

The role of this clinical recommendation is to provide a clinician-directed progressive approach for return to activity following acute concussion/mild TBI

Progression should be measured in three domains: physical, cognitive, and vestibular/balance

Progressive return to activity does not begin until completion of mandatory rest periods

Required measures of progression include: NSI no symptoms above 1 (mild), no new symptoms, resting HR < 100 bpm and resting BP < 140/90 mm Hg

Increase demands systematically and progressively, observe changes, modify intensity/duration of activity based on symptom exacerbation
Additional Clinical Recommendations
available at: [https://dvbic.dcoe.mil/resources/clinical-tools](https://dvbic.dcoe.mil/resources/clinical-tools)

<table>
<thead>
<tr>
<th>Topic</th>
<th>Date</th>
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<tbody>
<tr>
<td>1) Military Acute Concussion Evaluation (MACE) and Clinical Management Algorithms</td>
<td>SEPT 2012</td>
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<tr>
<td>2) Cognitive Rehabilitation</td>
<td>APR 2009</td>
</tr>
<tr>
<td>3) Driving Following TBI</td>
<td>JUL 2009</td>
</tr>
<tr>
<td>4) Indications and Conditions for In-Theater Post-Injury Neurocognitive Assessment Tool (NCAT) Testing</td>
<td>MAY 2011</td>
</tr>
<tr>
<td>5) Indications and Conditions for Neuroendocrine Dysfunction Screening Post Mild TBI</td>
<td>MAR 2012</td>
</tr>
<tr>
<td>6) Assessment and Management of Dizziness Associated with Mild TBI</td>
<td>SEP 2012</td>
</tr>
<tr>
<td>7) Assessment and Management of Visual Dysfunction Associated with Mild TBI (in collaboration with the Vision Center of Excellence)</td>
<td>JAN 2013</td>
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<tr>
<td>8) Neuroimaging Following Mild TBI in the Non-Deployed Setting</td>
<td>JUL 2013</td>
</tr>
<tr>
<td>9) Progressive Return to Activity Following Acute Concussion/Mild TBI: Guidance for the Primary Care Manager in Deployed and Non-deployed Settings</td>
<td>JAN 2014</td>
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<tr>
<td>10) Progressive Return to Activity Following Acute Concussion/Mild TBI: Guidance for the Rehabilitation Provider in Deployed and Non-deployed Settings</td>
<td>JAN 2014</td>
</tr>
<tr>
<td>11) Management of Sleep Disturbances Following Concussion/Mild TBI</td>
<td>JUN 2014</td>
</tr>
<tr>
<td>12) Management of Headache Following Concussion/Mild TBI: Guidance for Primary Care Management in Deployed and Non-Deployed Settings Clinical Support Tool</td>
<td>FEB 2016</td>
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Questions

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