Interventions for Concussion: An Evaluation of the Evidence
Authors: Lindsay Braun, SPT; Hilary Frimenko, SPT; Sean Husted, SPT; Michael Jeanfavre, SPT; Jennifer Tier, SPT
Faculty Mentors: Richard Clendaniel, PT, PhD; Michael Reiman, PT, DPT
Doctor of Physical Therapy Division, Duke University, Durham, NC

Background & Purpose
Between 1.6 and 3.8 million individuals suffer a sports related concussion annually with some individuals reporting symptoms 1 year after their injury. Current Zurich guidelines recommend physical and cognitive rest followed by graded exposure to activity. Aerobic exercise, vestibular physical therapy, and manual physical therapy have also been suggested as alternative intervention options for concussion rehabilitation.

The purpose of this project was to review the current evidence supporting concussion management and assess the quality of the current evidence in order to make a recommendation for the treatment of concussions.

Methods
- Exhaustive searches performed in PubMed, CINAHL, and EMBASE for our 4 interventions (aerobic exercise, vestibular therapy, manual therapy, and rest).
  - Inclusion criteria:
    o Concussion or mild traumatic brain injury (mTBI)
    o Included at least one of the selected interventions
    o Only human subjects
    o Written in English
    o Mean age was >/= 12 years of age
    o Peer reviewed source
  - Exclusion criteria:
    o Primary purpose of the selected intervention was not for determination of treatment outcome
    o Editorial, commentary, or position statements
    o Moderate and/or severe traumatic brain injuries
  - The literature was evaluated and given a level based on quality.

Results

<table>
<thead>
<tr>
<th>Interventions</th>
<th>Study Characteristics</th>
<th>Level of Evidence</th>
<th>GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rest</td>
<td>Evidence obtained from high-quality randomized controlled trials, prospective studies, or diagnostic studies</td>
<td>I</td>
<td>GRADE D</td>
</tr>
<tr>
<td>Vestibular Therapy</td>
<td>Evidence obtained from lesser quality randomized controlled trials, prospective studies, or diagnostic studies (e.g. improper randomization, no blind, &gt;90% follow up)</td>
<td>II</td>
<td>GRADE C</td>
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<tr>
<td>Aerobic Exercise</td>
<td>Evidence obtained from high-quality randomized controlled trials, prospective studies, or diagnostic studies (e.g. impre</td>
<td>II</td>
<td>GRADE C</td>
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<tr>
<td>Manual Therapy</td>
<td>Evidence obtained from high-quality randomized controlled trials, prospective studies, or diagnostic studies (e.g. improper randomization, no blind, &gt;90% follow up)</td>
<td>III</td>
<td>GRADE C</td>
</tr>
<tr>
<td>Multimodal Therapy</td>
<td>Evidence obtained from high-quality randomized controlled trials, prospective studies, or diagnostic studies (e.g. improper randomization, no blind, &gt;90% follow up)</td>
<td>IV</td>
<td>GRADE B</td>
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<tr>
<td>V</td>
<td>Expert opinion</td>
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Discussion
- Intervention administration varied greatly (6 hours to 12 months post injury).
- Rest had greatest disparity regarding effectiveness and prescription (i.e. cognitive vs. physical).
- A multimodal treatment approach was superior to other approaches.
- Vestibular therapy showed to be effective when specialized to the patient symptoms.
- Manual therapy had very limited evidence.
- Aerobic exercise was shown to be effective, specifically graded exposure to exercise.
- Limitations include heterogeneity among study populations, time since concussion, outcome measures used, and limited good quality research.

Clinical Relevance & Conclusion
The evidence for concussion interventions is limited and poorly defined. Some general recommendations can be made:
- Too much activity early after injury can be detrimental to recovery.
- Rest is the best option immediately following the concussion.
- More research is needed in order to determine the optimal amount, type, and duration of rest. After a few days, it seems beneficial to then follow a graded exposure back to activity and exercise in order to not exacerbate symptoms.
- A multimodal approach received the highest grade of evidence (GRADE B).
Therefore, an individualized, multimodal approach would potentially be beneficial for individuals with persistent symptoms.

*References available upon request