Online Journal Club-Article Review

| Background/Overview | |
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| Article Citation | Vasudevan EV, Glass RN, Packel AT. Effects of traumatic brain injury on locomotor adaptation. JNPT. 2014;38:172-181. |
| Study Objective/Purpose (hypothesis) | The authors are looking at how suffering a traumatic brain injury can affect locomotor adaptation through use of a split belt treadmill. |
| **Methods** | |
| Study Design | Cross-sectional |
| Target Population | People post traumatic brain injury who can walk without assistance for 5 minutes |
| Interventions (if applicable): | None (not RCT) but participants walked on split belt treadmills and walked 5 minutes for a "baseline" period with belts tied at .7m/s; 15 minutes of "adaptation" (belts split at .7m/s and 1.4 m/s) and 15 min of "post-adaptation" with belts tied at .7 m/s. |
| Outcome Measures | Step symmetry, temporal coordination, adaptation and de-adaptation rates |
| **Results** | |
| Summary of Primary and Secondary Outcomes: note results that were statistically significant | The TBI participants were able to make immediate feedback-driven changes in their gait on the split-belt treadmill, but showed greater step asymmetry versus the control participants and continued during the adaptation period and TBI participants did not adapt back to baseline symmetry during the 15 minute post-adaptation period whereas the control participants did. |
| **Authors' Conclusions** | |
| Authors' Conclusion | The gait of the participants with TBI was made to be more asymmetric during the period of split belt treadmill walking than the comparison participants. Authors conclude "this suggests a diminished ability to rapidly modify locomotor coordination in response to environmental changes following TBI". The authors postulate that these differences can be potentially attributable to many interacting factors including cerebellar damage, impaired higher level cognition and others. |
| **Reviewer's Discussion and Conclusion** | |
| Study Strengths | First attempt to look at adaptation in people following TBI, conditions were well controlled and easy to reproduce, design was established in other studies |
| Study Limitations and Potential for Bias | Observational study, population was limited to people with TBI who could walk unassisted, time since injury ranged from 6 months to nearly 6 years, data collectors could not be blinded to group. |

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| | Did not measure falls in TBI group—would be interesting to know if this is a group of "fallers" or not. |
| Applicability:<br>• Types of patients (dx) that results apply to<br>• Types of settings or patient acuity that the results apply to<br>• Can interventions be reproduced? Can results be applied to other pt populations? | Applies to independently ambulatory individuals post TBI over 6 months post-injury.<br>Interventions—n/a, but makes clinician aware that adaptation ability could be impaired even if patients doesn't demonstrate any overt gait deviations. Would suggest that clinicians should practice gait in varying environments and be aware of this potential issue in their patients. |
| How will study results impact PT management of this patient population?; List suggestions for how to implement changes in your clinic/department to integrate study findings into patient care | See above<br>Make clinicians aware of this finding and challenge patients more in varying environments to ensure safety with walking in all types of conditions. |

Journal Club Discussion Questions for Vasudevan 2014

1. What was your overall impression of the study? Did the conclusions the authors made match your clinical experience?
2. Do you use the HiMat or ICARS in practice? Do you find these tools to be useful?
3. Were there characteristics of the subjects that matched your patient population? Any that did not match?
4. What do you feel is the take-home message? What could you apply to your patients tomorrow?