Defense and Veterans Brain Injury Center "Clinical Updates in Brain Injury Science Today [CUBIST]" Podcast
"A Comparative Meta-Analysis of the Effects of Concussion on a Computerized Neurocognitive Test and Self-Reported Symptoms."
TRT: 6:57min
Host: Anne Bunner, MD

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Episode 110: Sport-related Concussion and NCATs

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Anne Bunner: The views, opinions and findings contained in this podcast are those of the host and subject matter experts. They should not be construed as official Department of Defense positions, policies or decisions unless designated by other official documentation.

Bunner: Hi! Welcome to Clinical Updates in Brain Injury Science Today, or CUBIST, a biweekly podcast for health care providers about current research on traumatic brain injury, also known as TBI. This program is produced by the Defense and Veterans Brain Injury Center, otherwise known as DVBIC. I'm your host today, Anne Bunner. I'm a biologist and program analyst here at DVBIC.

In today's episode, I'll be talking with Dr. Don Marion. Dr. Marion is a neurosurgeon and senior clinical consultant at DVBIC. Don joins us to discuss a study entitled: A Comparative Meta-Analysis of the Effects of Concussion on a Computerized Neurocognitive Test and Self-Reported Symptoms. This article was recently published in the Journal of Athletic Training by Alsalaheen and colleagues.

Bunner: Don, welcome.

Don Marion: Thank you, Anne.

Bunner: What was the key finding of this meta-analysis?

Marion: The study suggests that a neurocognitive computerized assessment tool, called an NCAT, and specifically ImPACT, one of the NCATs, may not add clinically relevant information above what is obtained from a concussion symptom assessment during the first week after the injury.

Bunner: Tell us about the participants in these studies. How many were there? Did they all have recent concussions?

Marion: This meta-analysis included 17 studies and 1,777 patients that routinely completed ImPACT as part of the management of concussion at their site. Yes, they all had concussions. The subjects were 13 to 33 years old and 70% were male. The vast majority were high school or college age. Most had their follow up studies within 1 week, that is a mean of 2.2 days, of their concussion but a little over one quarter did not have follow up studies until one to three weeks, or approximately 9.7 days after their concussion. All had a baseline or pre-concussion ImPACT and post-concussion symptom scale assessment.

Bunner: What kind of studies were included in the meta-analysis?

Marion: Anne, the objective of this study was to compare neurocognitive test scores and objective measure with self-reported symptom scores using the post-concussion symptom scale assessment. All subjects had an impact test and a post-concussion symptom scale assessed before and after their injury. Effect sizes for ImPACT and post-concussion symptom scales were calculated by subtracting the post-injury evaluation from the baseline test.

Bunner: For our listeners, an effect size tells you how much one group differs from another. In this case, how much baseline values differed from post injury values.

Marion: Correct.

Bunner: Give us some background information about computerized neurocognitive tests, or NCATS. What are they for? Is ImPACT unique among them?

Marion: Anne, there currently are more than a dozen different NCATs on the market. They typically assess reaction time, which is not possible with pencil and paper tests, as well as short term memory, simple math abilities, and processing speed. ImPACT is one of the oldest and most widely used and has been approved by the FDA for assessing cognitive deficits associated with concussion, but there is no evidence that ImPACT is any better than any of the other NCATs currently available including ANAM which is the NCAT that the Military uses.

Bunner: What were the findings here? How did the neurocognitive scores and post-concussive symptoms scores change between baseline and post-injury assessment?

Marion: Anne, the mean changes of baseline vs follow-up ImPACT and post-concussion symptoms scale scores were grouped according to those who had their follow-up study less than one week and those who had their follow up studies at one to three weeks. For those with follow up within one week, changes in the post-concussion symptoms scale scores were significantly larger than for the ImPACT scores. Based on this finding, the investigators concluded that the post-injury ImPACT test really did not offer significant additional clinical information to the provider beyond what they obtained from the

post-concussion symptoms scale. At one to three weeks after the injury, changes for both tools were small and not significantly different.

Bunner: What were the limitations of this analysis?

Marion: There were two primary limitations. First, they were comparing a relatively objective test, the ImPACT, with a subjective test that relied on the patient volunteering information, and in some cases at least, patients in these age groups likely had motivations for under-reporting their symptoms, such as a football player who wants to get back into the game. The second concern was the definition of concussion varied among the studies, including the meta-analysis, and sometimes they didn't even include a definition of concussion.

Bunner: What does it mean for clinicians that concussion had a larger effect on self-reported symptoms than on objective cognitive measures?

Marion: This study suggests that in most cases of sport-related concussion, a careful clinical evaluation of the athlete will provide more clinically relevant information than an NCAT, and that ImPACT or other NCATs may not be indicated during that time. However, the meta-analysis also suggested that NCATs obtained one to three weeks after injury in asymptomatic patients may reveal cognitive deficits not otherwise apparent.

Bunner: Thank you so much Don for your insights. That's all we have time for today. We hope you enjoyed this quick literature update.

You can stay up-to-date on future episodes by subscribing to CUBIST on iTunes, Stitcher or wherever you listen to podcasts, where you can also find links to the articles we discuss and other relevant resources. If you are interested in more information on computerized neurocognitive tests, check out the second episode of CUBIST entitled: "Concussion and Neurocognitive Assessment Tools."

If you have any questions about the podcast or about DVBIC products or programs, or if you have feedback for us, please feel free to email us at INFO@DVBIC.ORG. That's I-N-F-O-@-D-V-B-I-C-.-O-R-G.

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CUBIST is produced and edited by Deborah Bailin and was hosted today by me, Anne Bunner. It is a product of the Defense and Veteran's Brain Injury Center, led by acting national director Dr. Thomas Degraba.

Thank you for listening. We'll be back soon to explore TBI research that has received significant media attention.

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