

Allegheny-Singer Research Institute

Annual Progress Report: 2011 Formula Grant

Reporting Period

July 1, 2013 – December 31, 2013

Formula Grant Overview

The Allegheny-Singer Research Institute received \$98,254 in formula funds for the grant award period January 1, 2012 through December 31, 2013. Accomplishments for the reporting period are described below.

Research Project 1: Project Title and Purpose

Utility of Cognitive Testing in the Detection of Residual Impairment Following Concussion – This project will evaluate data obtained in the clinical evaluation of individuals who have sustained a concussion. The purpose of this research is to: 1) ensure that clinical evaluations and the tools that we use to evaluate patients following concussions are sufficiently comprehensive to be sensitive to the sequelae of concussion; 2) make the best-informed decisions regarding returning to normal activities and minimizing the risk of re-injury and problems at school and work; and 3) reduce the likelihood that financial resources are used to obtain data that are redundant, not clinically useful, and unnecessarily increase health care costs.

Duration of Project

1/1/2012 – 12/31/2013

Project Overview

We will compare data obtained from the Immediate Post-Concussion Assessment and Cognitive Test (ImPACT), the most popular and widely used cognitive screening measure for concussion, with data obtained from the Standardized Concussion Assessment Tool 2 (SCAT 2) or the National Football League Sideline Concussion Assessment Tool (NFLSCAT) and clinical evaluation, to determine whether or not ImPACT's computer-based cognitive testing provides clinically useful information. During the last two years, more than 1000 patients have been evaluated with the ImPACT and SCAT 2/NFLSCAT in the Allegheny General Hospital (AGH) Sports Medicine Concussion Program. Many of these patients previously underwent baseline and sideline assessments and these data, as well as the IMPACT and SCAT 2/NFLSCAT results obtained in our concussion clinic, are part of the patients' medical records. The Specific Aim of this project is to compare the relationship between ImPACT's cognitive test results with the other means of assessment for ongoing evidence of post-concussion sequelae.

Specific Aims #1-4: Specifically, we will assess the frequency of: 1) initial pre-test data being invalid; based on our clinical experience with this measure, this is not an uncommon problem in patients presenting after a concussion; 2) ImPACT cognitive testing suggesting ongoing impairment and the patient continuing to report or demonstrate ongoing problems based on ImPACT symptom endorsement or SCAT-2/NFLSCAT; 3) ImPACT cognitive testing suggesting ongoing impairment and the patient demonstrating no evidence of ongoing problems based on ImPACT symptom endorsement or SCAT 2/NFLSCAT; and 4) ImPACT cognitive testing suggesting no impairment and the patient continuing to report or demonstrate ongoing problems based on ImPACT symptom endorsement or SCAT 2/NFLSCAT.

Through the systematic review of the medical records of these patients, we will evaluate whether or not ImPACT results prove to be clinically useful in detecting residual impairment following concussion.

Principal Investigator

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Other Participating Researchers

Carol Schramke, PhD; Edward Snell, MD – employed by Allegheny-Singer Research Institute

Expected Research Outcomes and Benefits

The expected outcomes of this project include, in general, an improved understanding of the strengths and limitations of currently used assessment tools and clinical examination in the evaluation of patients with concussion and, specifically, the utility of the computer-based cognitive testing results of ImPACT in the detection of residual impairment following concussion. The main benefit of the project is to incorporate the research outcomes into currently evolving assessment protocols and pathways in concussion clinics to improve the effectiveness of clinical decision-making, care, and ultimate outcome of patients following concussion.

Summary of Research Completed

Specific Aim #1: All previously collected subject data that were entered into a comprehensive Excel spreadsheet underwent verification for all data fields, descriptive statistics were generated for basic demographic data, and additional statistical testing was performed on data collected for Specific Aim #1, which assessed the frequency of potential invalidity of baseline ImPACT testing (please see below for examples). Seventy-two patients fit the described criteria for Specific Aim #1; using the criteria set forth by ImPACT, 36 baseline examinations were found to have potential invalidity, while 36 were considered to be valid, i.e., possible invalid baseline

studies represented 50% of the sample analyzed. It was determined that 22 patients scored average or above in at least one composite category during both baseline and post-injury testing. Of these 22 patients, 11 showed a deficit in at least 1 of the 4 composite categories; the remaining 11 patients scored average or above in all four categories. Patients that scored below average, or worse, in all 4 categories of the baseline study had a worse score in at least 1 category of post-injury testing (Figures 1-6; Table 1). These results indicate a substantial number of invalid or potentially invalid baseline ImPACT tests results, which makes comparison to post-injury tests unreliable or questionable at best. A first draft of the manuscript to report the results of Specific Aim #1 has been completed.

Specific Aims #2-4: No further statistical evaluation was done for Specific Aims #2-4; however, a first draft of the manuscript to report the results of Specific Aims #2-4 was begun.

Figure 1. Segregation by Age

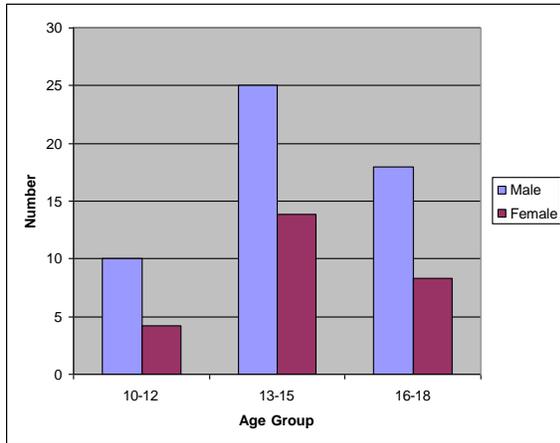


Figure 2. Verbal Memory

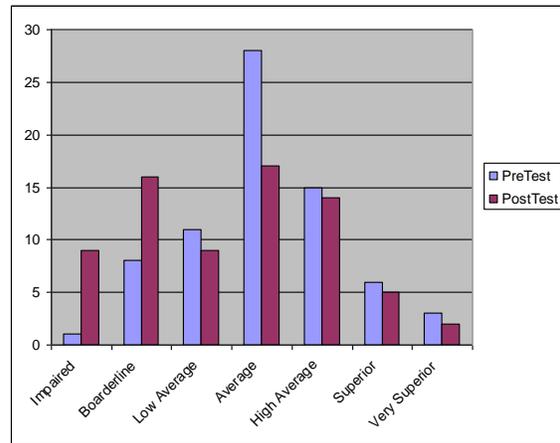


Figure 3. Visual Memory

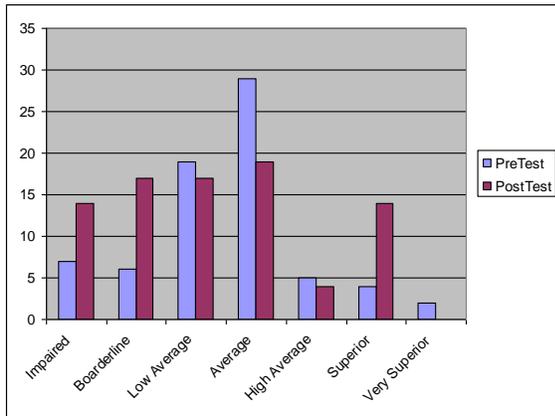


Figure 4. Visual Motor

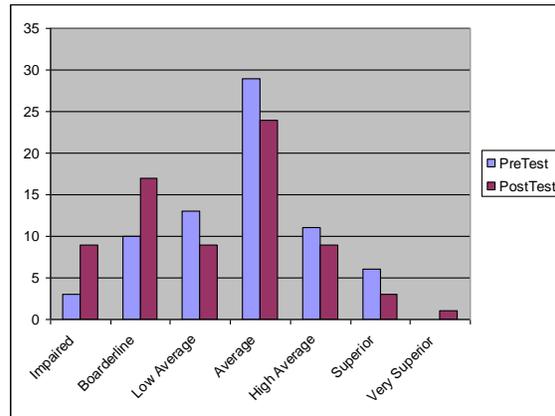


Figure 5. Reaction Time

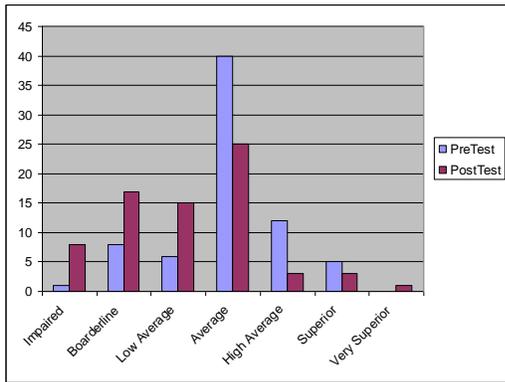


Figure 6. Improvement in Post-Injury Testing

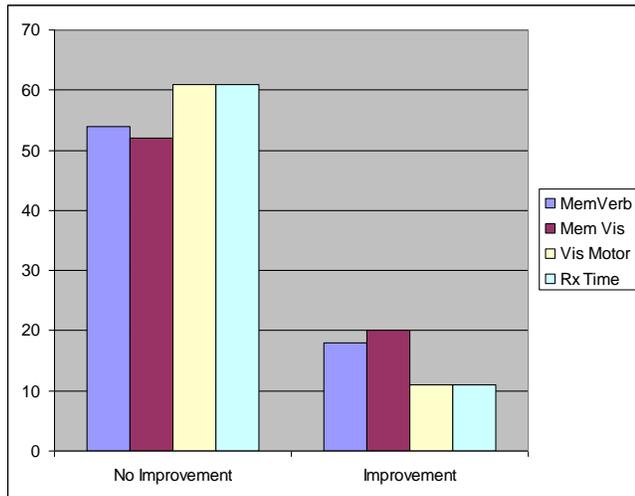


Table 1.

Improvement in classifications between baseline and post-injury testing			
Domain showing improvement	Baseline with no composite scores of questionable validity N=36	Baseline with at least one composite score of questionable validity N=36	Total Sample N=72
Verbal memory	8 (22%)	10 (28%)	18 (25%)
Visual memory	9 (25%)	11 (31%)	19 (23%)
Visual Motor	4 (11%)	7 (19%)	11 (15%)
Reaction Time	2 (6%)	9 (25%)	11 (15%)