Inova Sports Medicine Concussion Program
2022 Research Productivity Report

The Inova Sports Medicine Concussion Program's research activities were successful in 2022. Specifically, we had **four peer-reviewed publications in print for 2022 and three publications that are currently available online (ahead of print)**. Our team **has another two publications currently in review. Five professional lectures were given at conferences and state and local meetings.** One multisite grant application was submitted to the Chuck Noll Foundation but was not funded. Overall, our program met our publication and presentation goals for 2022.

There are three funded studies currently enrolling patients. We are in the third and final year of the U.S. Department of Defense-funded trial examining the efficacy of concussion treatments in patients with chronic concussion. We have already submitted two papers from this project that include the study protocol and a preliminary examination of the adjudication process used to determine concussion clinical profiles and study group assignment. Our site is **leading** participant recruitment and is ahead of schedule for enrollment milestones.

In addition, we are over halfway to our enrollment goal for the Mobile Neurocognitive Health (MNCH) study that is in collaboration with researchers at Penn State University. We have published the MNCH study protocol and submitted a preliminary examination of study compliance data and feasibility for publication. Our compliance rate for patients completing daily symptom reports and cognitive tests on their phones was greater than 75%. Moreover, many of our patients feel that using smartphones to collect data does not impact their concussion symptoms nor prolong their recovery. These findings provide a strong foundation for further integration of this technology into future research and eventually into our clinical care model.

Finally, a collaborative research project with Frederick Place, MD, and Vivian Hwang, MD, from the pediatric emergency department at Inova Fairfax Hospital focused on investigating the effect of a clinical reassurance intervention continues to enroll patients. This project was halted last year due to the COVID-19 pandemic but has slowly increased enrollment in 2022. The patient research registry continues to grow. As of Dec. 30, 2022, there were **1,383 unique patients enrolled and entered in the registry, making it one of the largest clinical concussion databases in the country.**

A list of publications, presentations and grants for 2022 is listed below.

Publications:

1. **Womble MN,** Reynolds E, Kissinger-Knox A, Collins MW, Kontos AP, **West RV,** Eagle S, **Elbin RJ.** The emerging role of telehealth for concussion clinical care during the coronavirus (COVID-19) pandemic. J Head Trauma Rehabil. 2022 Mar-Apr 01;37(2):E49-E54. doi: 10.1097/HTR.0000000000000713. PMID: 34320559.

2. **Elbin RJ, Womble MN,** Eblich DB, Dollar C, **Fedor, S**, Hakun JG. Ambulatory assessment in concussion clinical care and rehabilitation. Front Digit Health. 2022 Jun 23;4:924965. doi: 10.3389/fdgth.2022.924965. PMID: 35814821; PMCID: PMC9260167.

3. **Elbin RJ** Stephenson K, Lipinski D, Maxey K, **Womble MN,** Reynolds E, Covert K, Kontos AP. In-person versus telehealth for concussion clinical care in adolescents: a pilot study of therapeutic alliance and patient satisfaction. J Head Trauma Rehabil. 2022 Jul-Aug 01;37(4):213-219. doi: 10.1097/HTR.0000000000000707. Epub 2021 Jul 26. PMID: 34320555.

Inova Sports Medicine and Orthopedics
8100 Innovation Park Dr., Suite 110, Fairfax, VA 22031
P 703.970.6427
inova.org

4. **Elbin RJ,** Eagle S, Marchetti GF, Anderson M, Schatz P, **Womble MN,** Stephenson K, Covassin T, Collins MW, Mucha A, Kontos AP. Using change scores on the vestibular ocular motor screening (VOMS) to identify concussion. Appl Neuropsychol Child. 2022 Oct-Dec;11(4):591-597. doi: 10.1080/21622965.2021.1911806. Epub 2021 Apr 24. PMID: 33896282.

Presentations:

1. Kontos AP, Okonkwo DO, **Elbin RJ, Womble MN,** Sparto PJ, Huppert T, Soose R, Trbovich A, Holland CL, Bitzer HB, Dollar C, Stephenson K, Mucha A, Kochick V, **Fedor S,** Collins MW. Multisite randomized controlled trial of targeted multidomain (T-MD) interventions in military personnel with complex mTBI. Podium. Military Health System Research Symposium, Fort Lauderdale, FL. September 2022.

2. **Elbin RJ**, Collins MW, Okonkwo DO, Trbovich A, Mucha A, Kochick V, Soose R, Sparto PJ., Huppert T, Holland CL, itzer H, Shaffer M, Colorito A, **Womble MN, Jennings S, Fedor S, Dollar C,** Stephenson K, Kontos AP. Preliminary findings from the adjudication process for identifying mTBI clinical profiles in the targeted multidomain (T-MD) randomized controlled trial for mTBI. Poster. Military Health System Research Symposium, Fort Lauderdale, FL. September 2022.

3. Stephenson K, O'Hara M, Holland CL, **Womble MN, Jennings S,** Weber Rawlins M, **Elbin RJ.** Clinical considerations of neuropsychologists for treating concussions. Poster. Sport Neuropsychology Society Symposium, Dallas, TX. May 2022.

4. **Fedor S, Womble MN, Elbin RJ.** A description of patient characteristics and predictors for vestibular therapy referral following concussion. Poster. Sport Neuropsychology Society Symposium, Dallas, TX. May 2022.

5. Schatz P, Legido G, **Womble MN, Elbin RJ.** Establishing empirically based normative cut-offs for identifying anxiety following sports-related concussion. Poster. Sport Neuropsychology Society Symposium, Dallas, TX. May 2022

6. Stephenson K, **Elbin RJ, Womble MN.** Computerized neurocognitive testing and symptom provocation in concussed athletes. Invited lecture. Razorback Sports Medicine Symposium, Fayetteville, AR. September 2022.

2022 Grants and Contracts:

Elbin RJ, Hakun J, **Womble M.** (2022). Smart-phone based assessments of risk factors for protracted recovery following sport-related concussion. Chuck Noll Foundation two-year award (not funded): $147,062.21.

Other Research Activities:

Weekly journal clubs: We continue to hold remote weekly journal club meetings every Friday with the University of Arkansas and Saint Joseph's University to assist Inova clinicians and research students in staying up to date with recent research regarding management of concussion as well as to develop future research questions and ideas. This requires reviewing articles on a preidentified topic (e.g., hydration, physical activity, vestibular therapy) each week.

Engaging fellows and students in research activity: We have successfully kicked off our clinical neuropsychology fellowship and have started to integrate our new fellow, Stephanie Amalfe, MD, into our research program. Dr. Amalfe has learned and successfully executed all phases of our research infrastructure and is leading a case series paper on the management and treatment of postconcussive stuttering. In addition, we have onboarded two new students from George Mason University and three new students from the University of Arkansas who will be assisting our research remotely.