AAMTI Project Spotlight: Using Real-Time Feedback to Alter Running Biomechanics: A Randomized Controlled Trial

An anterior foot strike pattern during running has been suggested to reduce injuries. A mobile feedback system may assist in transitioning to this style of running. The purposes of this AMEDD Advanced Medical Technology Initiative (AAMTI) funded project were to assess the short and long term effectiveness of a mobile feedback system on transitioning runners from a rearfoot strike pattern to a non rearfoot strike pattern, and to prospectively compare injury incidence rates at one year, between rearfoot strike and non rearfoot strike runners.

LTC Don Goss, MAJ Jamie Morris, and Ms. Erin Florkiewicz at the Baylor University – Keller Army Community Hospital Division 1 Sports Physical Therapy Fellowship, partnered with Irene Davis, PT, PhD, FAPTA, FACSM, FASB, from the Spaulding National Running Center at Harvard Medical School. Industry partners who participated were Nike, I Measure U, and Runkeeper.

There were 114 rearfoot striking runners who participated in this study. They all completed a two-hour training session to learn a non rearfoot strike pattern. Participants were then randomized into a control group with no additional training, and a biofeedback group where they received an ankle sensor and iPod to provide real-time biofeedback to augment the transition to a non rearfoot strike pattern. Foot strike pattern and cadence were assessed at baseline, post-training, six months, and one year. Injury and mileage data were collected through weekly email surveys over a one-year period.

Eighty percent of runners demonstrated a non rearfoot strike pattern following the two-hour training session (91/114, p < 0.001). Injury rates were similar between rearfoot strike runners (37% injured) and non rearfoot strike runners (30% injured) after one year (p = 0.47). Rearfoot strike runners were at six times greater risk for knee injury than the non rearfoot strike runners.

Both groups had a significant number of participants transition from a rearfoot strike pattern to a non rearfoot strike pattern immediately after training and maintained a non rearfoot strike pattern at the one-year follow-up. However, compliance with the sensor in the biofeedback group was very poor. Regardless of foot strike pattern, runners sustained one-year injury incidence rates between 30-37%. However, rearfoot strike runners had nearly a six times greater risk for developing a knee injury than non rearfoot strike runners.

This project would not have been possible without the support of TATRC through the FY 2014 AAMTI funds. The study is completed now and has been submitted for publication in peer reviewed literature.

AAMTI-funded researchers MAJ Jamie Morris and Ms. Erin Florkiewicz share project results.