Myoelectric Videogame Training Functional Outcomes

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BACKGROUND

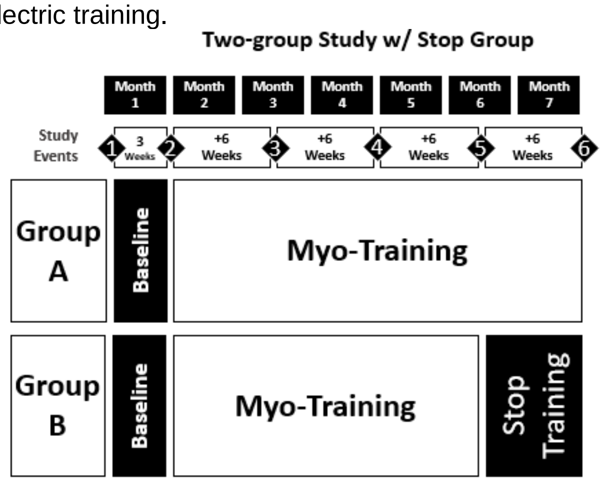
Myoelectric training is important for new patients learning prosthetic limb control [Dawson]. Upper-limb prosthetic fittings are often not successful because the prosthesis does not provide functionality that the user expects. Myoelectric prosthetic users must develop control skills by exercising muscles. Without proper training, users cannot reliably provide suitable myoelectric signals and often fatigue quickly. A Myoelectric Gaming Interface (MEGI) system was developed to provide training by mapping myosignals to video game controls in order to improve muscle tone and coordination.

AIM

This study measured the functional effects of video game training on myoelectric control signal properties over time.

METHOD

A training system was designed to leverage video-games to elicit muscle contractions typical for prosthesis control. Video-games were curated to focus on clinically-relevant contractions to train two-site skills: independent signals, amplitude range, proportional control, precision, sustainment, limb movement, contralateral coordination, switch events. Participants undergo baseline period of prosthesis recordings for comparison before training is introduced. Myo-training is introduced, and participants periodically train for periods of 15-60 minutes, multiple times a week. At interval study events, functional outcome tests evaluate prosthesis skill and functional perception. Subjects are separated into two groups; one group is tracked during a period of stopped training. The study spans up to six months of myoelectric training.



RESULTS

The study is in progress. A logging system records everyday prosthesis usage as baseline and during training. Initial baseline data from subjects was analyzed to summarize prosthesis wear time, prosthesis use time, number of actuation cycles for each device, and distribution of myoelectric signal amplitude. Prosthesis usage for a highly active myoelectric user was recorded for a week. The prosthesis use was logged in a 148-hour (6 day) window and measured powered-on 48% of the time (71 hours). During this time, electromyography was active for 1.43% of on-time. The myo signals were evaluated as percentage of full-scale span (%FFS) and demonstrated the user utilizing 67% FFS of the range of for both close and open signals.

DISCUSSION AND CONCLUSION

The metrics analyzed in baseline and during training determine functional changes in prosthesis use over time. The stop period will evaluate any loss or carry-over functional effects of discontinued myoelectric training.

REFERENCES

Dawson M, Functional Restoration of Adults and Children w. Upper Extremity Amputation, 2004 p207

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