INTRODUCTION
Every year in the U.S. approximately 795,000 people experience a stroke. 85% of that group exhibit hemiparesis, and between 55-75% of survivors continue to experience upper extremity (UE) functional limitations even after 6 months (Wolf et al., 2006). For many people, traditional interventions may not result in restored bilateral function, and leave them seeking alternative solutions. This case report highlights one such alternative – the MyoPro® custom-fabricated, myoelectric elbow-wrist-hand orthosis (MEWHO). The Myopro® uses surface sensors - built into the orthosis and located over the bicep and triceps muscles - to detect the user’s electromyographic (EMG) signal once he/she initiates a muscle contraction. The EMG signal activates a motor to move the elbow in the desired direction, proportional to muscle output. An additional set of sensors are positioned over the wrist flexors and extensors. EMG output from these sensors power a motor to open and close the fingers in a 3 jaw-chuck grip pattern, upon user initiation.

METHOD
The participant is a 41 year old, right hand dominant woman diagnosed with left cavernous hemangioma in July 2009, with residual right hemiparesis. She received her MEWHO in 2014 and completed 21, 1 hour outpatient therapy sessions over 10 months, dedicated to training with her device. Outcomes included the UE component of the Fugl-Meyer (FM), the Wolf Motor Function Test Functional Ability Score (WMFT-FAS), the Box and Blocks (B&B) test and therapist observation of functional tasks. UE measurements of strength, range of motion (ROM) and spasticity (MAS) were also taken. Baseline assessments were taken without the orthosis. Subsequent testing was done with the participant wearing the orthosis (with the exception of the MAS). The participant also completed a log for 2 months every time she used her device at home.

RESULTS
The participant demonstrated statistically significant improvements across all measures. There was a 15 point increase in the FM scale, a 16 point increase in the WMFT-FAS and a 4 block increase in the B&B test between baseline (without orthosis) and discharge (with orthosis). The participant also demonstrated an improved ability to perform bilateral, gross motor tasks while wearing the MEWHO, such as carrying a laundry basket, taking out the trash and cutting food bilaterally. She was also able to return to work (with her orthosis) at a cosmetics retail store. Additionally, after 10 months of training, the participant began to exhibit a return of voluntary muscle activity in the wrist and finger extensors. Testing also showed a 1 point decrease in spasticity in the elbow, wrist and finger flexors, and increased ROM and strength both with and without the MEWHO.

DISCUSSION
Over 10 months and under clinical supervision and training, the participant demonstrated improvements in the utilization of her affected extremity and subsequently, her level of function and independence. Consistent use of this orthosis also resulted in improvements in the ROM, strength and spasticity in her paretic arm including hand function both with and without the orthosis on. The improvements in scores relating to grasp/release and 3 jaw chuck pinch are particularly significant and translate into a better ability to complete tasks that previously required assistance from caregivers. Additional case studies and larger clinical trials are recommended to further investigate the benefits of the MyoPro® MEWHO.

CONCLUSION
The MyoPro® is a portable, custom fabricated MEWHO that was shown to provide the participant with paretic UE support and enhanced ROM that facilitated increased function and independence with ADLs, household management, family care and work tasks. This case report builds on the existing literature supporting MEWHOs as treatment options for paretic upper limbs (Page, 2013).

CLINICAL APPLICATIONS
The availability of custom fabricated myoelectric orthoses presents practitioners with a unique tool to offer patients with UE impairments, who have previously not had any options for improving their independence and upper limb function.

REFERENCES