A Pilot Study to Investigate the Effects of Electrical Stimulation on Recovery of Hand Function and Sensation in Subacute Stroke Patients

Geraldine E. Mann, MSc, Jane H. Burridge, PhD, L. J. Malone, MSc, P. W. Strike, MPhil

Salisbury Healthcare NHS Trust, Salisbury Wiltshire, UK

ABSTRACT

Objectives.
1) To compare the effect of cyclic neuromuscular electrical stimulation (NMES) of the forearm and elbow extensor muscles with passive stretching exercises on hand function and sensation following stroke. 2) To inform sample size for a larger randomized controlled trial (RCT).

Materials and Methods.
Twenty-two subjects with hemiplegia resulting from a stroke during the previous 12 months were randomly allocated into stimulation (treatment) and exercise (control) groups. Stimulation was applied to the elbow, and forearm extensor muscle groups of the hemiplegic arm for 12 weeks. Subjects in the control group were taught passive stretching exercises for the same period. The primary outcome measure was the Action Research Arm test (ARAT). Sensation was tested using two-point discrimination. Statistical analysis applied nonparametric analysis of covariance (ANCOVA).

Results.
Statistically significant between-group differences in change in ARAT scores were shown between the two groups after 12 weeks of treatment ($p=0.003$) and following 12 further weeks without intervention ($p=0.012$). There were no significant differences in sensation.

Conclusions.
1) A significant treatment effect of electrical stimulation over passive exercise has been demonstrated in a group of 22 sub acute stroke patients, randomized into two equal groups and further work identified which may help to improve recovery of hand function and sensation following stroke. 2) A sample size of 24 subjects in each group has been estimated assuming a two-sided test significance level of 5% with 80% power, primary outcome variability SD = 6.75, a minimum difference of ten ARAT score units, and a 10% dropout rate.

KEY WORDS: electrical stimulation, hand, sensation, stroke