



# AFO AND FES IN MULTIPLE SCLEROSIS – WHAT'S THE EVIDENCE?

Roy Bowers, Senior Teaching Fellow

Emma Davidson, Masters Student

National Centre for Prosthetics and Orthotics, University of Strathclyde, Glasgow, Scotland

## INTRODUCTION

Multiple Sclerosis (MS) affects more than 400,000 people in the United States and over 2.5 million people worldwide (*National Multiple Sclerosis Society*). In the United Kingdom it has been estimated that approximately 100,000 people have MS, with Scotland recording the fastest growing incidence rate of MS in the world (*Multiple Sclerosis Trust*). This research aimed to review all available literature on the use of Ankle-Foot Orthoses (AFO) and Functional Electrical Stimulation (FES) for the treatment of gait difficulties in patients with MS, and to compare each intervention for specific outcome measures. The quality of baseline information on the patients and interventions was also assessed as this is essential to enable trials to be comparable and clinically applicable.

## METHOD

An extensive search carried out using the electronic databases Embase, Medline, CSA Illumina, Amed, The Cochrane Library, Science Direct, ISI Web of Knowledge and The Knowledge Network produced 2,459 potentially relevant results. From these, 442 papers were considered relevant by title, with 166 papers still considered relevant after further reading of their abstracts. Of the full texts sourced only 14 experimental papers were considered appropriate for critical appraisal in this literature review.

**Keywords:** Multiple Sclerosis, MS, Ankle-Foot Orthosis, AFO, Ortho\*, Splint, Brace, FES, Functional Electrical Stimulation, Rehabilitation, Function, Gait

## RESULTS

Only one of the 14 papers reviewed was a direct comparison trial (*Sheffler, 2009*). Walking speed was the most reported outcome measure (11 of the 14 trials). Of these 11 trials, five of the six that exclusively assessed FES reported increase in walking speed. Two of the four exclusively AFO trials reported a significant increase in walking speed with AFO. The only direct comparison trial found that half of the small sample walked significantly faster with FES compared to AFO or to footwear only, with the other half demonstrating no effect from either intervention.

Energy expenditure was the second most frequently reported outcome measure with three FES trials and two AFO trials reporting a significant decrease in this outcome.

Other spatiotemporal outcome measures such as cadence, step length and walking distance were infrequently

reported. This was also the case for kinematics and kinetics, resulting in an incomplete understanding of the potential effects of either intervention on the quality of gait.

## DISCUSSION

This literature review has highlighted several limitations in the current evidence base, particularly a lack of baseline information regarding both the participants and interventions being investigated. Without this information the appropriateness of prescription cannot be accurately assessed. Few of the reviewed studies adequately reported on the biomechanical effects of FES and AFO. The majority of the reviewed studies were found to be of a low level of evidence.

## CONCLUSION

More research is required of an elevated standard to provide stronger evidence to inform future clinical practice. A study addressing the biomechanical effects of both FES and AFO on the stance phase of gait will add to the evidence base for both interventions.

## REFERENCES

- National Multiple Sclerosis Society. [09/01/12]; Available from: <http://www.nationalmssociety.org/about-multiple-sclerosis/what-we-know-about-ms/who-gets-ms/index.aspx>.
- Multiple Sclerosis Trust. [25/11/11]; Available from: [http://www.mstrust.org.uk/atoz/prevalence\\_incidence.jsp](http://www.mstrust.org.uk/atoz/prevalence_incidence.jsp).
- Sheffler LR. Spatiotemporal and Kinematic Effect of Peroneal Nerve Stimulation Versus an Ankle-Foot Orthosis in Patients With Multiple Sclerosis: A Case Series. *PM & R*. 2009;1(7):604-11.