

# Core stability:

## Evaluation of a therapeutic intervention followed by two progression exercises.

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### Introduction

Poor core stability can be a very disabling factor in terms of the ability to utilise the upper and lower limbs in functional activities (Davies, 1990) and is reflected in poor predictive measures of activities of daily living (Hsieh et al, 2002).

Prior to functional rehabilitation of the core stabilisers patients need to be able to isolate these muscles independently. This may be achieved by facilitation of a neutral lumbar spine (Akuthota and Nadler, 2004). This facilitation technique is based on a sound theoretical rationale however, until now this technique has not been objectively evaluated in any population.

### Aim

To investigate core muscle activity post facilitation and then following two progression exercises.

### Method

A same subject experimental design was implemented using twenty two healthy volunteer subjects (mean age 46 years SD  $\pm 5.25$ ). Averaged normalised surface electromyography (SEMG) was recorded from bilateral Superficial Multifidus (MT), Transverse Abdominus/Internal Oblique (TA/IO), External Oblique (EO) and Erector Spinae Longissimus Thoracis (ESLT).

Measurements were obtained for i) baseline upright sitting ii) post facilitation and during iii) a bilateral arm lift and iv) a unilateral leg lift in sitting.

In brief, the facilitation technique is performed from slump sitting. Initially a downward stretch is applied to lumbar MT to stimulate a stretch reflex. To enhance proprioception the thumbs are then simultaneously moved upward with vibration and the subject is instructed to extend/grow from the base of the lumbar spine.

The attainment of a neutral lumbar spine was evaluated visually (figure 1). SEMG was then recorded over 3.5 seconds.

Figure 1: Post facilitation



From the facilitated posture subjects performed the standardised progressions (bilateral arm lift and right leg lift) individually and further data was recorded.

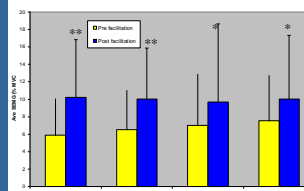
Data was analysed using a repeated measures ANOVA ( $\alpha \leq 0.05$ ). Local ethical approval was obtained.

### Results

#### 1) Pre and post intervention

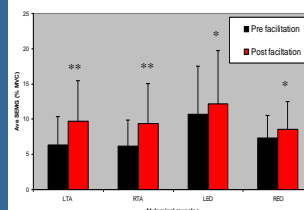
Descriptive and statistical analyses shown in Graph 1 and 2 indicate that the increase in average SEMG activity for all muscles was statistically significant, with that of the local stabilisers (TA/IO and MT) being highly significant.

Graph 1: Means and Standard Deviations (SD) for back extensors.



(\*\* denotes significance  $p < 0.001$ ; \* denotes  $p < 0.005$ )

Graph 2: Means and SD for abdominals.



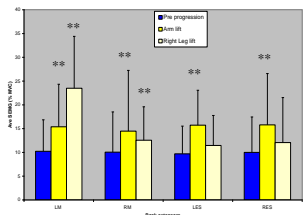
#### 2) Progressions

Descriptive and statistical analyses shown in Graph 3 and 4 indicate that:-

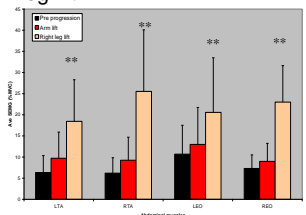
i) for the arm lift there was a highly statistically significant increase in activity in the back extensor muscles.

ii) for the right leg lift there was a highly significant increase in all back extensor muscles and bilaterally in TA/IO. Of note is the visually greater increase in left MT compared to right MT.

Graph 3: Means and SD for back extensor muscles at baseline, arm lift and right leg lift.



Graph 4: Means and SD for abdominal muscles at baseline, arm lift and right leg lift.



### Conclusion

Clinically, this study provides evidence for the potential use of this facilitation technique as a therapeutic intervention in the rehabilitation of general core stability and specifically to enhance recruitment of the local stabilisers. The results also signify that a bilateral arm lift is a useful progression primarily for the back extensor muscles and a right leg lift primarily for the abdominal muscles. Limitations – the results cannot be directly applied to patient populations as the sample consisted of healthy individual.

### Acknowledgements

Research Centre for Clinical Kinesiology, Cardiff University.

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## Introduction

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## Method

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## Aim

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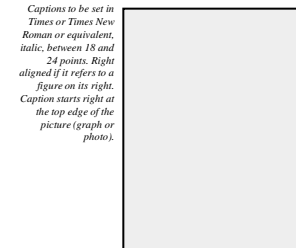
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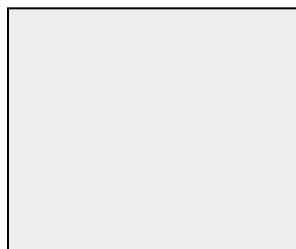
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## Results

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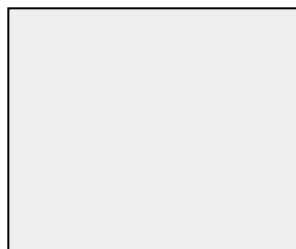
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## Acknowledgements

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