PERFORMANCE OF CERVICAL SPINE
MOBILISATION

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STATEMENT OF ORIGINALITY

This work contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text. I give consent to this copy of my thesis, when deposited in the University Library, being made available for loan and photocopying subject to the provisions of the Copyright Act 1968.

ACKNOWLEDGEMENT OF AUTHORSHIP

I hereby certify that the work embodied in this thesis is the result of original research, the greater part of which was completed subsequent to admission to candidature for the degree.

Signature: ______________________________________ Date: ______
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ABSTRACT

Background and Purpose

Physiotherapists commonly use cervical mobilisation to treat neck pain and headaches. Ensuring similar amounts of mobilisation force are applied by different therapists is a necessary first step in establishing optimal parameters for achieving patient outcomes. A series of studies was designed to quantify cervical mobilisation forces applied by physiotherapists and students, explain any differences identified in applied forces, and determine if real-time objective feedback improves consistency in performance of cervical mobilisation techniques.

Methods

To quantify cervical mobilisation techniques, the forces applied by physiotherapists (n = 116) and undergraduate physiotherapy students (n = 120) were recorded using an instrumented treatment table. Each participant mobilised the C2 and C7 vertebrae of one asymptomatic subject using four grades of mobilisation, with one spinal level repeated after 20 minutes. Factors potentially associated with the applied forces, including spinal stiffness, were investigated.

To investigate the effects of real-time objective feedback on cervical mobilisation forces, visual targets based on force data recorded from an expert physiotherapist mobilising 21 asymptomatic subjects were provided to 50 students. They each mobilised one of these 21 subjects on two occasions. Students’ forces were recorded before and after practising mobilisations with real-time visual feedback of forces (experimental group) or without (control).
Results

Cervical mobilisation forces varied between individuals (ICC [2,1], therapist vertical mean peak force, 0.32, 95% CI 0.20 to 0.53), but intra-therapist repeatability was high (0.93, 95% CI 0.92 to 0.94). The highest resultant mean peak force was applied centrally on C7 by therapists (91.8 N, 95% CI 83.4 to 100.2), with students generally using lower forces. For both therapists and students, higher forces were associated with male gender (therapist, student or mobilised subject), and lower forces with greater C2 spinal stiffness in the mobilised subject.

Students who received real-time feedback applied forces that were more similar to the expert’s peak forces (median difference 4.0 N, IQR 1.9 to 7.7) than did the controls (14.3 N, IQR 6.2 to 26.2, p < 0.001), and this difference was maintained one week later.

Conclusions

The quantification of cervical mobilisation forces and explanations of differences in forces, together with the new technology developed, provide objective data about cervical mobilisation techniques, making effective feedback on performance possible. This will support strategies to improve consistency of mobilisation forces between therapists, as well as students. In turn, this approach provides the basis for future research to determine the mobilisation parameters that are optimal for treating a range of cervical spine disorders.
The following publications were a direct result of the work completed in this thesis:

(basis for Chapter 2, copy in Appendix 1.1)

(basis for Chapter 3, copy in Appendix 1.2)

(basis for Chapter 4, copy in Appendix 1.3)

(basis for Chapter 5, copy in Appendix 1.4)
Snodgrass SJ, Rivett DA, Robertson VJ, Stojanovski, E. Forces applied to the cervical spine during posteroanterior mobilization (currently under review).

(basis for Chapter 6, copy in Appendix 1.5)
CONFERENCE PRESENTATIONS

The following conference presentations were a direct result of the work completed in this thesis:


