

## THESIS REVIEW

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Cleland, JA. *Development of a Clinical Prediction Rule to Identify Patients with Neck Pain Likely to Benefit from Thoracic Spine Manipulation and a Range of Motion Exercise*. PhD thesis  
Fort Lauderdale, FL: Nova Southeastern University, 2006  
E-mail: clelandj@fpc.edu

The prevalence of neck pain in the general population is significant. The United States National Center for Health Statistics reported that in 2004, 14.8% of surveyed adults aged 18 and older experienced neck pain within the past 3 months<sup>1</sup>. Previous studies have reported that 54% of the population has experienced neck pain within the last 6 months, causing disability in 5%<sup>2</sup>.

The first goal of this thesis was to develop a clinical prediction rule (CPR) that would identify neck pain patients that would be likely to benefit from thoracic spine thrust manipulation (TSTM). The second goal of this thesis was to compare the treatment effect of TSTM in all patients who received TSTM, regardless of clinical presentation, against those patients who met the CPR criteria. This dissertation project has already produced a landmark peer-reviewed article that was recently published in *Physical Therapy*<sup>3</sup>.

Chapter 1 provides an introduction to the thesis and outlines the goals of the study. The incidence of neck pain is reviewed with relevance to the practice of physical therapy. The author discusses the problems in classifying patients with neck pain due to the difficulty in identifying the underlying pathology and provides an argument for developing treatment-based classifications.

Chapter 2 presents a very interesting and extensive literature review. Evidence for use of cervical manipulation in the treatment of patients with mechanical neck pain is reviewed as well as the rationale for incorporating TSTM. The theoretical basis for the association of thoracic hypomobility with neck and shoulder pain is presented with references and body charts reflecting the referral patterns of the thoracic zygapophyseal joints. The thesis cites the incidence of serious complications from cervical manipulation to be 5–10 per 10 million and proposes that TSTM may provide benefits without the inherent risks of cervical manipulation. Theoretical mechanisms related to the positive effects of TSTM are explored, including neurophysiological effects and the neuromuscular effects of muscle inhibition, facilitation, and decreased arthrogenic inhibition. The author also provides evidence to challenge the importance of manipulation technique specificity. The rationale for including active range of motion exercises in the study is included.

Chapter 3 outlines the methodology of the study and describes the training of the clinicians that participated in the study. The subject recruitment method and eligibility and exclusion criteria are described. A detailed Manual of Standard Operations and Procedures is included in Appendix B. Self-reported measures utilized include the Neck Medical Screening Questionnaire, Patient Global Rating of Change (GROC), Neck Disability Index (NDI), Numeric Pain Rating Scale and Pain Diagram, The Fear-Avoidance Beliefs Questionnaire (FABQ), and the Tampa Scale of Kinesiophobia. All self-reported questionnaires are included in appendices as well as the standardized examination and treatment forms. The thoracic spine thrust manipulations and general mobility exercise are described and depicted. All subjects received a standardized treatment regimen: two seated thoracic distraction manipulations, two upper thoracic/cervicothoracic junction manipulations, and two supine middle thoracic spine manipulations, as well as a general range of motion exercise with advice to maintain usual activity within the limits of pain. The GROC was used at subsequent sessions to classify treatment effect: the descriptions “a very great deal better”, “a great deal better” and “quite a bit better” indicated successful outcomes. At session 2, patients who experienced a successful outcome were excused from further participation in the study while those who did not have a successful response were treated as in the first session. At the third and final treatment session those who rated their improvement according to the above descriptions were classified as a success while the remaining patients were deemed unsuccessful. At this point the patient’s participation in the study was complete and further treatment was provided per the therapist’s discretion. Differences between groups were analyzed using independent sample t-tests for continuous variables and X<sup>2</sup>-tests for categorical variables. Variables with a significance level of P<0.10 were identified as possible predictor variables and

were entered into a backward stepwise logistic regression model to determine the optimal set of variables for prediction of treatment success. A multivariate CPR for classifying patients likely to benefit from TSTM was created from variables retained in the regression model. The effect size and associated confidence interval were calculated for all patients as well as for the group of patients that met the CPR. In addition, to investigate the reliability of the historical and physical examination 22 subjects were evaluated by two therapists.

Chapter 4 details the results of the study. The six variables that formed the most accurate combination of predictors for identifying patients with neck pain likely to benefit from TSTM were 1.) Symptom duration <30 days, 2.) No symptoms distal to the shoulder, 3.) Patient reporting that looking up did not aggravate symptoms, 4.) FABQ-Physical Activity score <11, 5.) Decreased upper thoracic spine kyphosis at T3–T5, and 6.) Cervical extension <30°. The pre-test likelihood of success with thoracic spine manipulation for the study was 54%. If the patient exhibited 4 of 6 predictor variables, the post-test probability of success increased to 93%. If 3/6 variables were present, the likelihood of success was 86% and with 2/6 variables, the likelihood for success was 71%. Of 78 subjects, 42 experienced successful outcomes. There were no significant differences between the 2 groups in terms of the use of medication or the number of cavitations or pops experienced. There was no significant difference in the rate of successful outcomes among therapists with >3 years of experience compared to those with <3 years of experience.

Chapter 5 provides a summary of the study and its findings. The reliability for the cervical ROM measurements in the study were moderate to substantial and reflected the reliability findings of other studies reported in the literature. The difference in change score on the NDI between the groups was 18% and was significant at  $P < 0.001$ . The author proposes future studies to validate the CPR where patients are randomly assigned to receive TSTM or an alternate intervention. If the CPR is valuable, patients who are positive on the CPR and receive TSTM should exhibit improved outcomes compared to those who are negative on the CPR and receive TSTM, and compared to those who are positive on the CPR but receive an alternate intervention.

With regard to this thesis and as indicated by Dr. Cleland, additional studies should be performed to validate this CPR by applying it to patients in other treatment settings including private practice and HMO settings. It would also be interesting to perform a similar study that excludes the confounding variable of ROM exercise, as the author concedes that the results of the study cannot specifically be attributed to TSTM, because cervical ROM exercise was also incorporated. Finally, additional studies investigating the long-term effects of TSTM are also needed. Although the results of this study have recently been published in a journal article, review of the actual thesis is warranted due to its valuable and expanded discussion of the literature and the informative appendices provided. To date, this thesis has already produced 4 peer-reviewed publications<sup>3-6</sup> and it is part of an ongoing research effort by the author in the area of mechanical neck pain and thoracic dysfunction<sup>7-11</sup>. Dr. Cleland, who is without a doubt one of the currently most prolific authors of high-quality publications in the field of orthopaedic manual physical therapy, is to be commended for yet again a valuable contribution to the research basis of this field.

Anna Lescak, BSc (Kin), MPT, OCS, FAAOMPT

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