Contribution of selected scapulothoracic muscle forces to the control of accessory scapular motions

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PO60
INTER-RATER RELIABILITY OF THE LATERAL SCAPULAR SLIDE TEST Eldon Johnson, SPT, Suza Jena, MA, PT. Department of Physical Therapy, University of North Dakota, Grand Forks, ND
Purpose: Recent research indicates that altered scapular positioning during elevation of the upper extremities can lead to shoulder pathology. However, there are very few quantifiable methods for measuring scapular position at this time. The lateral scapular slide test (LSST) was proposed by Kibler to aid in the identification of individuals with functional scapular instability. The purpose of this study was to determine the inter-rater reliability of the LSST.
Methods: Subjects. Thirty healthy volunteers, age 20-35, served as subjects for this study. Subjects had no prior history of scapulothoracic injury or pathology. Materials. A standard tape measure was used to measure the linear distance from the medial aspect of the inferior angle of the scapula to the most lateral aspect of the nearest adjacent spinous process in each test position. Procedure. Each subject was tested in an isolated environment with the scapula completely visible. From a position of static, upright posture with the feet approximately shoulder width apart, each subject performed the following test movements: (1) arms relaxed at sides with zero degrees of humeral abduction, 2) hands on iliac crest with thumbs pointed posteriorly approximating 45 degrees of humeral abduction, 3) arms abducted to 90 degrees with full internal rotation and elbow extension. Subjects were randomly assigned to be measured by each of the three raters. The instructions were standardized for consistency. Data Analysis. Means, standard deviations and ranges were computed for each position for each tester. The data was then subjected to the intraclass correlation coefficient test.
Results: The intraclass correlation coefficients ranged from 0.89 to 0.94 and showed a progressive decrease from position one to position three. The standard error of measurement (SEM) ranged from 0.23 to 0.27 cm, with the highest SEM observed for test position one. Probability of increased progressive error from position one to position three showing no significant difference occurred among the measurements of the three testers. Conclusions and Clinical Relevance. The results of this study indicate that the lateral scapular slide test has very good intertester reliability and may be used clinically with consistent results when used among several therapists as long as standardization is observed for test position one.

PO62
POPULATION-BASED TREATMENT DESIGN FOR BACK PATIENTS Lilly SE, Lopez S; Department of Rehabilitation Services, Harris County Hospital District, Houston, Texas
PURPOSE: High volumes of patients generated by community health, health maintenance, and managed care systems create challenges for providers with limited resources and reimbursement schedules. This presentation illustrates the use of population characteristics of a diagnostic group to design treatment components for a high volume of patients.
DESCRIPTION: The project designed services for patients with back disorders referred to a large urban county healthcare system outpatient physical therapy department. Intake occurred via diagnosis-based clinics utilizing screening evaluations and other evaluation instruments including the Oswestry Low Back Pain Disability Questionnaire. We analyzed the results to determine the nature of our patient population. Impairments and disabilities were identified by item analysis and trends. Then we designed treatment components and modules that would serve large numbers of patients while effectively addressing specific physical therapy problems and needs.
SUMMARY OF EXPERIENCE: This population is chronic, averaging 7 years duration of symptoms. They are deconditioned with fair overall health and lower than average socioeconomic role status. By the Oswestry, the average patient is severely disabled, foremost in Lifting, Pain, and Social. Instruction/practice sessions and therapeutic exercise groups are designed content-specific to address these issues. The treatment model applies principles of general conditioning & fitness, postural correction, treatment of movement imbalances, muscle strengthening, pain relief, and local interventions. Instruments and surveys are applied to track efficacy, patient satisfaction, and outcomes. Repeat Oswestry scores at follow-up have been significantly improved.
IMPORTANCE: Physical therapy treatment components can address large volumes of patients if they are designed to be sensitive to the population's health needs and deficiencies. Group components conserve resources and can correct many musculoskeletal and health issues. This limits the need for individualized "fine tuning" care which is given as indicated later.

PO61
CONTRIBUTION OF SELECTED SCAPULOTHORACIC MUSCLES TO THE CONTROL OF ACCESSORY SCAPULAR MOTIONS. Ludwig PM, Cook TM; Physical Therapy Graduate Program, The University of Iowa, Iowa City, IA 52242
Purpose: Increased emphasis is being directed to selective control of accessory scapular motions created and utilized in older rehabilitation programs. However, the majority of previous biomechanical descriptions of scapulohumeral motion actions have been limited to two-dimensional models describing scapular upward and downward rotation. The purpose of this project was to model and describe the potential three-dimensional (3-D) moment contributions of selected scapulohumeral muscles to scapular internal/external rotation and anterior/posterior tipping. Subjects: Kinematic data were derived from 25 healthy subjects (19-37 years old; mean height = 1.7 meters +/- 0.1, mean weight = 66.9 kg +/- 11.4). Methods and Materials: An electromagnetic digitizer was used to record the coordinate locations of anatomical landmarks on the scapula and thorax. Three-dimensional scapular orientation relative to the trunk was expressed as ordered Cardan angles representing upward/downward rotation, internal/external rotation, and anterior/posterior tipping. Data were collected at static arm positions of 0°, 90°, and 140° of humeral elevation in the scapular plane. Additional model parameters (scapular axes of rotation, and origins and insertions of the scapular portions of the trapezius, rhomboids, and levator scapula) were based on cadaver dissection and previous data available in the literature. Analyses: The mean 3-D orientation of the scapula was determined at each arm position. Muscle line of action relative to the scapula were then described for the trapezius, rhomboids, and levator scapula, and the potential moment created by each muscle was determined for each of the three arm positions. Summary Results: Of the muscles studied, contributors to scapular tipping moments included the rhomboid major (posterior tipping) at 0° of arm elevation, the lower trapezius (posterior tipping) at 90° of arm elevation, and the rhomboid major (anterior tipping) at 140° of arm elevation. Contributors to internal/external rotation moments included the upper and middle trapezius (internal rotation) at the 0° arm position, the lower trapezius, rhomboids, and levator (external rotation) at the 90° arm position, and the lower trapezius and levator (external rotation) at the 140° arm position. Conclusions: The results of this study highlight the role of selected scapulohumeral muscles in controlling the movement patterns of the scapula. Clinical Relevance: Knowledge of the potential contribution of scapular muscles to accessory scapular motions can assist in the refinement of shoulder therapeutic exercise programs.

PO63
THE ROLE OF EXPERIENCE IN SPINAL MOBILIZATION TECHNIQUES Maureen J. Simmonds, P.T., Ph.D, Rachelle Baum, P.T. M.S, Handy Radwan P.T., M.S School of Physical Therapy, Texas Woman's University, 1130, MD Anderson Blvd, Houston, Texas 77030
The purpose of this experiment was to use an electromechanical spinal model to quantify the forces applied by physical therapists (PT) and student therapists (ST) under different conditions of "spinal" stiffness. Subjects: Twenty seven subjects participated (15 STs and 12 PTs). Materials and Methods: The electromechanical spinal model of Simmonds et al. (1995) was used for this experiment. The model incorporates a vertebra mounted on top of a spring suspended on a plexiglass table, and a load cell mounted on top of the vertebra. The output from the load cell and LVDT is fed through a data acquisition board into an IBM computer. The motion is resisted by a series of springs that can be altered to provide different conditions of "spinal" stiffness. Three stiffness levels were used in this experiment: (1) 11.4N/m, (2) 22.4N/m, and (3) 44.4N/m. All subjects were applied three repetitions of Grades I-IV_Maitland type oscillatory mobilizations and three repetitions of a test grade of mobilization (grade V) to the spinal model. This procedure was repeated for each of the three levels of stiffness. Within each stiffness condition the order of testing was randomized. Data Analysis: Descriptive statistics were computed for mean peak force applied during each grade of mobilization, for each level of stiffness and each repetition for PTs and STs. A 2x3x5x3 ANOVA (group x stiffness x grade x repetition) was used to test for main effects and interactions. Results: The ANOVA revealed significant main effects for experience, stiffness, and mobilization grade (p < .05). Repetition was not significantly different. There were significant two-way interactions, experience by grade; experience by stiffness and grade by stiffness. One three way interaction was significant (experience by grade by stiffness). Mean peak forces were generally lower in the ST group compared to the PTs. The range was 28.11 - 179.27 Newtons across grades and stiffness levels in the ST group compared with 75.64 - 239.86 Newtons in the PT group. Inter-rater variability was high. Within each group, mean peak forces increased with stiffness and for each mobilization grade. Discussion: The results confirm the clinical belief that experience influences the application of spinal mobilization techniques.