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Groningen Manipulation Study: The effect of manipulation of the structures of the shoulder girdle as additional treatment for symptom relief and for prevention on chronicity or recurrence of shoulder complaints. Design of a randomized controlled trial within a comprehensive prognostic cohort study.

Gert Bergman, Jan Winters, MD, PhD; Geert van der Heijden, PhD; Klaas Postema, MD, PhD; Betty Meyboom-de Jong, MD, PhD

Background: We present the design of "The Groningen Manipulation Study (GMS)." This randomized controlled trial is part of the "Dutch Shoulder Disability Study," a comprehensive prognostic cohort study on shoulder disorders, with randomized controlled interventions in sub-cohorts.

Objective: To evaluate the effectiveness of manipulative treatment of the structures of the shoulder girdle, additional to standard treatment by the general practitioner (GP), for relief of shoulder complaints and prevention of persistent or recurrent shoulder complaints.

Methods: A total of 250 patients with shoulder complaints and a functional limitation of the shoulder girdle will be included from 30 general practices in Groningen, the Netherlands. All participating patients receive standard treatment by the GP and will be randomly allocated to additional manipulative treatment. Evaluation measurements take place six, 12, 26, and 52 weeks after randomization.

Conclusion: The short-term primary outcome measure is the proportion of patients with relief of shoulder complaints, and the long-term primary outcome is the proportion of patients without persistent or recurrent shoulder complaints. Questionnaires are used to study dependent and independent variables. Together with a structured medical history and a physical examination, the mobility of the cervicothoracic spine and the adjacent ribs is determined with a six-degrees-of-freedom electromagnetic tracking device.

Key Indexing Terms: Study design; shoulder complaints; randomized controlled trial; blinding.

Stroke after chiropractic manipulation due to extracranial postero-inferior cerebellar artery dissection.

J. Sedat, M. Dib; M.H. Mahagne; M. Lonjon, P. Paquis

Objective: To describe a case of dissection of the postero-inferior cerebellar artery (PICA) following

cervical manipulation.

Clinical Features: Following cervical manipulation, a 42-year-old woman suffered a cerebellar syndrome related to an infarct in the area supplied by the PICA, confirmed by computed tomography of the brain. Cerebral angiography showed a normal appearance of the vertebral artery, a cervical extradural origin of PICA and a dissection of the latter at the C1-C2 level.

Intervention and Outcome: Anticoagulant treatment with heparin was implemented. A positive outcome was achieved after three weeks.

Conclusion: Anatomical variations of the vertebral arteries and their branches are not infrequent, and may constitute a predisposing factor to complications following neck manipulation.

Key Indexing Terms: Dissection; postero-inferior cerebellar artery; chiropractic manipulation.

A compilation of chiropractic & complementary/alternative (CAM) data from-public-use national surveys: Report on a health services research resource for the chiropractic and CAM scientific community.

Monica Smith, DC, PhD; Lynne Carber, BS

Background: Federally funded national surveys are routinely conducted in order to provide reliable, valid and relevant data on health and health care, and these "public-use" survey data are typically made available for further study by the wider scientific community. The full potential for using such data to examine the delivery, utilization, organization, and costs of chiropractic or complementary/alternative (CAM) healthcare remains largely untapped.

Objective: This paper reports on a project that identifies and indexes public-use survey databases that contain explicit reference to chiropractic and CAM healthcare, and compiles that information into a Web-based resource for the scientific community.

Methods: Review of database source collections.

Results: The utility and efficiency of secondary analyses as a cost-effective research strategy is well-appreciated within the larger health services research community, creating many possible opportunities for productive cooperative research endeavors across scientific disciplines.

Conclusion: The "Compilation Manual" is available for free download at w3.palmer.edu/carber/manualhome.asp, or by following the links at the Palmer Center for Chiropractic Research homepage (www.palmer.edu/pccr/PCCRhome.htm).

Key Indexing Terms: Chiropractic; complementary and alternative medicine; health services research; survey; Internet-based information resource.

Is the sagittal configuration of the cervical spine changed in women with chronic whiplash syndrome? A comparative computer-assisted radiographic assessment.

Objective: To reveal whether women with chronic whiplash-associated disorder symptoms, grade I-II, demonstrate regional and/or segmental radiographic signs of altered cervical lordosis.

Design: Case-control study.

Setting: Radiographic department at a university hospital.

Participants: Three age-balanced groups comprising 120 women. The cases were a group with chronic whiplash syndrome (41); the controls a chronic insidious onset neck pain group (39); and an asymptomatic group (40) given baseline data. The sample was referred from informed doctors and physiotherapists.

Intervention: The women sat in a standardized sitting position. Radiographs were taken in a lateral position using fluoroscopic control for alignment.

Outcome Measures: Two distinct measurements were taken: one of the angles of the upper and lower cervical curvatures, respectively; the other of the angles between the inferior borders of each pair of vertebrae in the lower cervical spine. The three groups were compared on the ratio of the lower to upper cervical spine angles and on the mean angular values for each segment in the lower cervical spine.

Results: The whiplash group showed a decreased ratio between the lower-versus-upper cervical spine, but comparisons between groups were not statistically significant. The whiplash group was in a significantly more flexed position at the C4-C5 level compared to the asymptomatic group ($p = 0.007$). The reliability measures have to be strengthened to render these results definitely conclusive.

Conclusion: The whiplash group exhibited a different configuration of cervical lordosis. This is clinically important and needs to be ascertained more closely.

Key Indexing Terms: Cervical vertebrae; lordosis; whiplash injury; neck pain; radiographs.

Empowerment of chiropractic faculty: A profile in context.

Dennis Marchiori, DC; Alan Henkin, PhD

Background: The primary resource base and core human capital in chiropractic education is found among its faculty. The chiropractic profession depends on a motivated faculty for continuous quality improvement and innovation in areas of curriculum, scholarship, and practice.

Empowerment has been associated with increased intrinsic motivation. Assessments of attitudes of faculty in terms of empowerment, a set of cognitions created by the work environment, may inform executive decision-making related to development of a productive professional work environment.

Objective: The goal of this exploratory study is to provide an initial understanding of empowerment among faculty in the organizational context of chiropractic education, to construct a profile of perceived faculty empowerment, and to inquire into potential associations between perceived

empowerment and faculty demographic and workplace characteristics.

Study Design: Full faculty survey utilizing descriptive statistics and multivariable analysis.

Methods: Surveys were distributed to full-time and part-time faculty working in the United States and Canada. The survey was composed of Spreitzer's multidimensional measure of psychological empowerment, and additional items designed to measure faculty demographics and workplace variables including: academic rank; years at the institution; years in higher education; sex; age; area of assignment; employment status; and academic rank.

Results: More than 54 % of the study population (N=609) completed and returned the instrument. The respondents were typically male (68.4%) and employed full-time (81.6%). Almost half (47.5%) of the respondents were assigned to the area of patient care at their institution. Area of assignment and employment status emerged as important variables for explaining the variance in dependent variable scores.

Conclusion: The findings of this research provide a basic profile and some initial perspectives of empowerment in the context of the work environment of the chiropractic profession's learning institutions.

Key Indexing Terms: Faculty; faculty development; chiropractic.

Comparative analysis of low-back loading on chiropractors utilizing various workstation table heights and various tasks.

Kenneth Lorme, DC; Syed Naqvi, PhD

Background: There is epidemiological evidence which identifies chiropractors as a high-risk group for low-back disorders. However, to date, there are no known biomechanical studies to determine if their workstations may be a contributing factor.

Objective: To investigate whether chiropractors' workstation table height or the tasks they perform make them susceptible to low-back strain. As well as investigating low-back strain, a screening was performed to determine whether chiropractors' upper extremities were at risk to undue strain as workstation table height was varied.

Study Design: Experimental pilot study.

Setting: A university ergonomic laboratory.

Methods: An adjustable manipulation table was set at three different heights: 465mm, 665mm and 845mm. Seven volunteer chiropractors were fitted with a lumbar motion monitor (LMM) and were videotaped and photographed for analysis while performing spinal manipulation to the cervical, thoracic and lumbar spine of a volunteer patient at each workstation table height. Two biomechanical models, the static 3D Static Strength Prediction Program (3DSSPP) and the dynamic Lumbar Motion Monitor (LMM) program, were used to record the dependent variables. A screening of various upper extremity variables was also performed with the static model.

Conclusion: Workstation table height was found to have a significant effect on low-back load on the

subjects under study. The results of this study demonstrate an overall unacceptably high amount of sagittal flexion, ligament strain and disc compression force on the chiropractor subjects in the tasks performed.

Key Indexing Terms: Workstation height; occupational health; ergonomics; chiropractic; low-back pain.

Carotid artery blood flow during premanipulative testing.

Peter Licht, MD, PhD; Henrik Christensen, DC, MD; Poul Høilund-Carlsen, MD, DMSc

Background: Cervical manipulation is used millions of times every year. Concern about cerebrovascular accidents (CVA) is common, but actual cases are rarely reported. Premanipulative tests are presumed to identify patients at risk of CVA. In an earlier study we found no significant changes in the vertebral artery blood flow of patients with a positive premanipulative test with different head positions. Consequently, we questioned if there is a role for premanipulative testing to identify patients at risk of CVA.

Objective: The aim of this study was to examine if, instead, blood flow velocity in the internal carotid arteries changes with head position in patients with a positive premanipulative test, potentially giving contraindication to cervical manipulation.

Methods: In a prospective study, private practicing chiropractors from three Danish counties referred patients with a positive premanipulative test for an examination of cervical artery blood flow. Premanipulative testing was performed by an experienced chiropractor, and flow velocities were measured in both vertebral and internal carotid arteries by color duplex sonography at a university hospital vascular laboratory.

Results: A total of 11 consecutive patients with a positive premanipulative test were referred. Two of these were excluded because we could not reproduce any symptoms at repeat premanipulative testing before the vascular examination. In the remaining nine patients we found no significant difference with different head positions, in peak flow velocity or time-averaged mean flow velocity, in the internal carotid arteries. Blood flow did not cease in any patient, despite a positive premanipulative test in all.

Conclusion: It appears that a positive premanipulative test is not associated with a change in peak flow velocity or time-averaged mean flow velocity in either the carotid or the vertebral arteries. If premanipulative testing is used solely for the detection of vascular insufficiency as a potential substrate for CVAs following cervical manipulation, we believe premanipulative testing is of little clinical value.

Key Indexing Terms: Internal carotid artery; Doppler; chiropractic; manipulation.

Contents for chiropractors' athletic event emergency bags.

Hal Rosenberg, DC; Bart Green, DC, MSED

Background: Chiropractors are providing health care at a growing number of athletic events. With this increased participation it is critical that chiropractors be adequately prepared for these events with the proper knowledge, skill, and equipment to provide emergency care.

Objective: To recommend an inventory of items that should be included in a chiropractor's event site emergency bag, based upon the best available evidence.

Data Sources: A pilot search was conducted by searching MEDLINE to retrieve articles regarding emergency supplies used at athletic events. Key terms were then taken from the pilot search and used to conduct a systematic search and review of the literature.

Study Selection: Articles were included if they were published in English and discussed athletic event-site emergency first aid and supplies. Papers published in non-peer-reviewed publications were excluded.

Data Extraction: Items recommended for event site emergency care bags were extracted from 19 studies and reviewed by an expert panel of sports chiropractors. Expert rankings from a Likert scale were then averaged for each item.

Data Synthesis: Items are categorized as "recommended," "possibly recommended," or "not recommended," based upon expert rankings and frequency counts of citations.

Results: The most recommended items are latex gloves, penlights, and oral airways. An inventory of 169 items with citations and ratings is included in this review.

Conclusion: This is the first evidence-based paper to delineate appropriate first aid and emergency equipment for sports chiropractors. This paper has utility for educators who teach emergency care for athletic events and for practitioners who would like to have a clear inventory for their emergency bags.

Key Indexing Terms: Athletic injuries; chiropractic; equipment and supplies; first aid; sideline; sports medicine.

Accuracy and reliability of a new protractor-based neck goniometer.
Michael Haynes, BAppSc(Chiro); Stephen Edmondston, PhD

Objective: To assess the reliability of the SpinT, a new protractor-based device, for measuring active cervical spine ranges of motion. Also, to compare the accuracy of CROM and SpinT measurements of rotation about the y-axis with and without tilt, the former motion occurring during natural rotation of the head.

Study Design: Inter-examiner reliability, intra-examiner reliability and accuracy trials were conducted.

Methods: Two examiners individually made two measurements of each of the individual cervical ranges of motion of 23 individuals who had no cervical complaints: 15 men and eight women, aged 21-42 years. The participants were asked to move their necks to end range while they sat upright.

The accuracy of the CROM and SpinT goniometers was assessed using a testing instrument capable of rotating and/or tilting to preset angles, and upon which either device could be positioned.

Results: There was excellent agreement between the SpinT measurements of rotation about the y-axis compared to the readings from the testing platform, regardless of the angle of tilt, while the CROM displayed poor concordance when the tilt exceeded an angle of 50 degrees. The reliability trials generally yielded close agreement between the examiners, especially regarding measurements of rotation left, right and extension, and revealed higher concordance regarding intra-examiner results.

Conclusion: This study indicates that SpinT measurements of active cervical ranges of motion are reliable, and that the SpinT is accurate in measuring rotation with associated tilt.

Key Indexing Terms: Cervical vertebrae; spine; tests and measurements; range of motion.

Is cervical spinal manipulation dangerous?

Peter Licht, MD, PhD; Henrik Christensen, DC, MD; Poul Høilund-Carlsen, MD, DMSc

Objective: Concern of cerebrovascular accidents after cervical manipulation is very common. We report a case of cerebrovascular infarction without sequelae.

Clinical Features: A 39-year-old man with nonspecific neck pain was treated by his general practitioner with cervical manipulation.

Intervention and Outcome: This immediately elicited severe headache and neurological symptoms that disappeared completely within three months, despite permanent signs of a complete left-sided cerebellar infarction on CT and MR imaging. At seven-year follow-up, repeat MR imaging of the patient (fully employed) still showed infarction of the left cerebellar hemisphere. However, the patient remained completely free of neurological symptoms, and color duplex ultrasonography showed normal cervical vessels, including patent vertebral arteries.

Conclusion: It appears that the risk of cerebrovascular accidents following cervical manipulation is low considering the enormous number of treatments given each year, and very much lower than the risk of serious complications associated with generally accepted surgery. Provided there is a solid indication for cervical manipulation, we believe the risk involved is acceptably low, and the fear of serious complications is greatly exaggerated.

Key Indexing Terms: Chiropractic manipulation; cervical spine; stroke.

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