# ABSTRACTS OF ACC CONFERENCE PROCEEDINGS

## Platform Presentations

### Use of Spinal Manipulative Therapy for Pediatric Health Conditions: A Systematic Review of the Literature

**Jenna Arts**, **Amanda Mei**, **Emily McManus**, and **Brian Gleberzon,** Canadian Memorial Chiropractic College

**Introduction:** The purpose of the study was to (1) conduct a search of the literature between 2007 and 2011 investigating the use of spinal manipulation for pediatric health conditions and (2) perform a systematic review of eligible retrieved clinical trials. **Methods:** The Index of Chiropractic Literature (ICL) was electronically searched using appropriate search words, as well as reference tracking of previous reviews. Studies that met the inclusion criteria were evaluated using an instrument that assessed their methodological quality. **Results:** Sixteen clinical trials were found. **Discussion:** Six clinical trials investigated the effectiveness of spinal manipulative therapy (SMT) on colic, two each on asthma and enuresis, and one each on hip extension, otitis media, suboptimal breastfeeding, autism, idiopathic sciolosis, and jet lag. None investigated the effectiveness of SMT on spinal pain. **Conclusion:** Studies that monitored both subjective and objective outcome measures of relevance to both patients and parents tended to report the most favorable response to SMT, especially among children with asthma. Many studies reviewed suffered from several methodological limitations. Further research is clearly required in this area of chiropractic health care. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

### Cervicogenic Headache Etiology: Cadaveric Study of the Connection Between Suboccipital Structures and the Cervical Dura Mater

**Erton Averion** and **Mohsen Radpasand**, D'Youville College

**Objective:** This cadaveric observational case series examined the connection between cervical dura and suboccipital structures, rectus capitis posterior minor/major (RCPmi/ma), and ligamentum nuchae (LN) to provide essential evidence relating cervicogenic headache to cervical spine joint complex dysfunction. **Methods:** Four total cadavers were used. Deep dissections of the suboccipital region were performed investigating the dura-muscular-ligamentous connections between RCPmi/ma, LN, and posterior cervical dura. Full Institutional Review Board approval was granted for this study. **Results:** All four cadavers exhibited firm attachments between RCPmi/RCPma and LN to posterior dura. Manual traction of individual structures resulted in direct movement of cervical dura at the atlanto-axial interspace and adjacent C0/C1 and C2/C3 interspaces. **Conclusion:** Cervicogenic headache is referred to the head from either soft tissues or bony structures of the cervical region. Sensory fibers from upper cervical nerve roots interact with sensory fibers in the descending tract of the trigeminal nerve permitting referral of pain sensation between the neck region and sensory receptive fields in the face and head. An anatomical appreciation of suboccipital structures and their connection to posterior cervical dura will provide support for clinicians implementing a conservative and effective treatment protocol, such as chiropractic manipulations, appropriate for cervicogenic headaches. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

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## Student Interns' Feedback on Use of the SNAPPS Model to Promote Active Learning

**Victor Benavides** and **Amy Wright**, Texas Chiropractic College

**Introduction:** SNAPPS is a learner-centered model based on cognitive learning and reflective practice that focuses on a collaborative model for case presentations. Students were asked to reflect on the patient presentation in a concise manner while verbalizing the case to the clinician. The goal of this model was to enhance clinical reasoning skills of the students. **Methods:** Students were given a formal agenda on the use and explanation of the mnemonic SNAPPS. Students had numerous opportunities throughout the trimester to practice verbalizing the SNAPPS encounter with the clinicians. **Results:** Informal feedback from three consecutive entering student clinic classes was given in 2010. Positive anonymous feedback was given on their experience and attitude toward the model. The SNAPPS model from the students' perspective enhanced their clinical reasoning skills. **Discussion:** Further evaluation of the SNAPPS model is needed to determine if course outcomes in clinical reasoning are being met. **Conclusion:** Implementation of any new learning tool in the clinical setting can be challenging. Receiving positive feedback from students is a first step in student buy-in to the process. Further outcomes of the SNAPPS model need to address the retention of the clinical reasoning process. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Use of YouTube Tutorials as an Educational Tool: Student Perceptions, Effectiveness, and Greater Implications

**Lisa Bloom**, New York Chiropractic College

**Introduction:** Current literature states that the expectations, motivations, and needs of students have changed and it is imperative that educational techniques evolve to accommodate the new learner. The purpose of this investigation was to determine the effect of online tutorials on learning. **Methods:** The investigator created a YouTube channel and uploaded original tutorials targeted at difficult concepts in course material. Following the approval of an Institutional Review Board exemption, a survey regarding use and effectiveness of the tutorials was administered to the students in the class. Data were collected and tabulated. Further data were obtained through the Insight link on YouTube channels, which provides information on demographics, views, usage, and discovery. **Results:** Responses through the survey through the student users were overwhelmingly positive. Students cited the ease of access, the ability to replay the tutorials, and the focused topic as some of the positive aspects. Data obtained via YouTube's Insight demonstrated international viewing with communication from doctors, students, and patients. **Discussion and Conclusion:** Video tutorials appear to have had a strong positive impact. The student's perception of learning and his/her perception of the instructor's commitment and engagement in the learning process were both positively affected. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Sonography of the Normal Anterior Talofibular Ligament

**Eve Bonic**, **Daniel Haun**, **John Cho**, **Thomas Clark**, and **Norman Kettner**, Logan College of Chiropractic

**Purpose:** While the normal thickness of the anterior talofibular ligament (ATFL) has been reported to be 2 mm, there are few data regarding the ATFL thickness in normal subjects. This study reports the normal thickness of the ATFL and the interexaminer reliability of the ATFL measurements using an 18-MHz transducer. **Methods:** Twenty-seven (18 male) subjects between 22 and 44 (mean 27.5) years with no history of ankle pain or ankle sprain within the past year were included. ATFL thickness measurements were obtained at the fibular insertion and midportion. A second examiner performed measurements on previously obtained images to assess interexaminer reliablility. **Results:** The mean thickness and standard deviation of the proximal and mid right and left ATFL were 2.1 ± 0.4 mm and 2.2 ± 0.4 mm, respectively The ICC (95% CI) for the proximal ATFL was 0.752 (0.561–0.866) and for the mid-ATFL was 0.765 (0.582–0.874). **Conclusion:** This is the first study to use sonography to obtain the thickness of the proximal and mid-ATFL in asymptomatic subjects, to evaluate the ATFL using an 18-MHz transducer, and to assess interexaminer reliability. Our normative data will provide the opportunity to investigate patients with ATFL injuries. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Is Trunk Motor Control Impaired by Acute Back Muscle Fatigue and Recovery?

**Jean-Alexandre Boucher**, **Jacques Abboud**, **Emmanuelle Dion**, and **Martin Descarreaux**, Université du Québec à Trois-Rivières

**Introduction:** Decrease in proprioception sense can be expected in healthy subjects in the presence of muscular fatigue. Persistence of these changes, however, still needs to be further studied. The aim of this study was to evaluate trunk repositioning sense following acute muscle fatigue and during recovery. **Methods:** Twenty healthy participants had to reproduce a 20° and 30° angle in trunk extension on an isokinetic device. They were tested before and after Biering-Sorensen fatigue protocol was performed. **Results:** Back muscle fatigue significantly increased the variability when participants attempted to reproduce a trunk extension of 30°. Such increase was observed immediately after the fatigue protocol but back to initial baseline values at the 15- and 30-minute measurements. **Discussion:** The significant postfatigue variable error increase was relatively small when compared to required movement range, but was similar to previous reported data. Pointing task performances may depend on several factors such as proprioceptive inputs from lower limb muscles as well as contributions from the vestibular apparatus. **Conclusion:** Trunk muscle fatigue induced changes in pointing task performance indicators immediately after the fatigue protocol. However, this effect did not last for more than a few minutes. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Alterations of the Dyspeptic Signs and Symptoms of Patients With Gastritis Following Chiropractic Treatment: A Small Randomized Controlled Study

**Janaina Butafava**, Private Practice, **Fabio Dal Bello**, Universidad Central de Chile, and **Charles Blum**, Sacro Occipital Technique Organization – USA

**Introduction:** The purpose of this study was to investigate whether chiropractic care, specifically sacro occipital technique (SOT) and chiropractic manipulative reflex technique (CMRT), for the upper gastrointestinal system could be an effective method of care for patients presenting with dyspetic signs or gastritis. **Methods:** The sample was composed of 15 subjects, medically diagnosed with gastritis and randomly divided into three groups of five: one group was the control which received no treatment, one group was treated with traditional pharmaceutical interventions, and one group was treated with chiropractic. Endoscopy evaluation was performed before and after the chiropractic treatment and a clinical outcome assessment questionnaire was used to determine any changes in a subject's clinical symptoms. **Results:** While the control group had some decrease of endoscopic gastritis signs, compared with traditional pharmacological treatment and control group, the chiropractic group had the greatest positive clinical response with improved endoscopic and quality of life findings. **Conclusion:** Further research with large study samples are needed to determine if there is a subset of patients with gastritis or dyspepsia who may respond to CMRT care and mitigate the need for medications or more invasive procedures that offer risk. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Identifying and Overcoming Barriers to General Medical Practitioner Referral to Chiropractors

**Katherine Butler**, **Christina Cunliffe**, and **Adrian Hunnisett**, McTimoney College of Chiropractic

**Introduction:** Complementary and alternative medicine (CAM), including chiropractic, has increased with general practitioners (GPs) acting as gatekeepers of referral in primary care. Many studies investigate GP attitudes toward CAM and chiropractic, but there are no studies investigating potential barriers to GP referral for chiropractic. **Method:** Following ethical approval, a self-administered questionnaire assessing GP training and referral attitudes to CAM was mailed to 102 GPs working in the author's locality. **Results:** A response rate of 58% was achieved. The majority (93%) reported that they had no exposure to chiropractic throughout medical school, although almost half (47%) offered some form of alternative health care in their practices. Identified barriers included education about chiropractic, referral guidelines, lack of communications, and payment for service. A substantial number (81%) would refer to a chiropractor if this information was available on the National Health Service. **Discussion:** Barriers to referring patients for chiropractic are perceived lack of evidence base, concerns over training of chiropractors, and a lack of knowledge about conditions best treated by chiropractic. **Conclusion:** Education about chiropractic and CAM was lacking in the respondents and chiropractors need to be proactive in their relationships to take advantage of local commissioning initiatives. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Chiropractic Dosage for Lumbar Spinal Stenosis

**Jerrilyn Cambron**, **Grant Iannelli**, **Jennifer Dexheimer**, **Mabel Chang**, National University of Health Sciences, **Michael Schneider**, University of Pittsburgh, **James Jedlicka**, and **Gregory Cramer**, National University of Health Sciences

**Introduction:** Symptomatic lumbar spinal stenosis (LSS) has a current reported point incidence of up to 10% of the US adult population. **Methods:** This randomized clinical trial pilot study investigated the efficacy of different amounts of total treatment dosage over 6 weeks in 60 volunteer subjects with lumbar spinal stenosis. Subjects were evenly randomized into four groups of either flexion distraction manipulation (FD) care or placebo care: group 1 with 8 FD treatment visits, group 2 with 12 FD treatment visits, group 3 with 18 FD treatment visits, or group 4 with 8 placebo visits. **Results:** No significant differences between the groups were found. However, trends were noted for changes in low back pain on visual analog scale measures ($p = .0557$) on the Swiss spinal stenosis symptom severity measure ($p = .0559$) with the 18-treatment group demonstrating a greater reduction in pain and symptom severity over 3 months. **Discussion:** This was the first study to assess dosage of chiropractic care for lumbar spinal stenosis. Larger studies are needed. **Conclusion:** Although no significant differences between study groups in any of the study measures were found, trends indicated that an increased number of treatments resulted in less pain and disability. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Health Assistance to Elderly Patients From Different Ethnic Groups That Seek Chiropractic Care

**Marta Casagrande Saraiva** and **Thiana Paula Schmidt dos Santos**, Feevale University

**Introduction:** The objective of the present study was to show the applicability of Madeleine Leininger's theory of transcultural care in chiropractic care for the elderly. Four elderly patients from different ethnic groups were assessed at a chiropractic clinic in the city of Novo Hamburgo, Southern Brazil. **Methods:** The patients were seen in five visits: two group meetings and three individual visits. Chiropractic assistance was developed in three stages: preservation and maintenance of cultural aspects, adjustment of cultural aspects, and repattern of cultural aspects. The data were collected during individual and group interviews during treatment. **Results:** The results demonstrated the importance of preservation and maintenance of aspects such as values and beliefs for the satisfaction of individuals that accept this type of health care treatment. **Conclusion:** The study showed the need for the professional to go beyond technique in assistance of elderly patients in the sense of taking a different approach that can look at the elderly citizen as an integral being for the establishment of effective links for health promotion. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Concurrent Validity in Range of Motion Measurement of Seated Versus Supine Active Cervical Rotation

**Tammi Clark**, **Theresa Whitney**, and **Robert Cooperstein**, Palmer College of Chiropractic, West Campus

**Introduction:** Accurate, efficient, and reproducible measurement of range of motion is a valuable clinical tool to determine extent of injury and disability and to assess effects of therapeutic interventions. The goal of this study was to compare measurement of active cervical rotation (ACR) in the seated position with ACR in the supine position using methods and devices commonly used in clinical practice in order to determine if resultant measurements provide interchangeable data. **Methods:** In this Institutional Review Board-approved study, ACR of 32 asymptomatic volunteers was measured in seated and supine positions. Seated measurements were obtained using a single magnetic compass-oriented goniometer. Supine measurements were obtained using a single gravity-dependent goniometer. **Results:** Supine measures consistently exceeded seated measures. Test-retest reliability was rated good for both. For the means of three supine measures and three seated measures ICC (2, 2) = 0.021 (–0.226, 0.307) suggesting insignificant between-methods agreement. **Discussion and Conclusion:** Measurement of seated ACR does not provide interchangeable information compared with measurement of supine ACR when using measurement devices and methods commonly used in clinical practice. To ensure consistency of interpretation of ACR in research and clinical applications, it is essential to consider the position in which ACR is measured. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Use of a Web-Based Curriculum Software Package in Evaluation of a Chiropractic College Curriculum

**Jesse Coats**, **Kenneth Sorrels**, **John Mrozek**, and **Shari Wynd**, Texas Chiropractic College

**Introduction:** A competency-based curriculum plan provides the framework for our transition to an outcome-based curriculum model. The competencies involved are those set out currently by the Council on Chiropractic Education (CCE) and those that were faculty developed (FD). This paper focuses on a mechanism for mapping the competencies on our current and proposed curriculum models providing important information for analysis and planning. **Methods:** The competencies were entered into a modified web-based software package. A total of 411 criteria of knowledge, skills, and attitudes (234 CCE and 177 FD) were derived from the competencies and linked to course syllabi. Reports were then generated to provide feedback regarding competency coverage. **Results:** CCE and FD (CCE:FD) competencies are covered as follows:(CCE 0.4%:FD 6%) not covered, (CCE 14.6%:FD 38%) covered 1–5 times, (CCE 17.9%:FD 12%) covered 6–10 times, and (CCE 67.1%:FD 44%) were covered greater than 10 times. **Discussion and Conclusion:** The evaluation of competency inclusion using a web-based software program addresses an important part of our curriculum plan. Further study is needed regarding the distributed competency concentration. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Novel Electromyogram Protocols for Assessment of Neck Pain: A Pilot Study

**James DeVocht**, **Kalyani Gudavalli**, **Ting Xia**, and **Ram Gudavalli**, Palmer Center for Chiropractic Research

**Introduction:** The flexion–relaxation (FR) ratio in the lumbar region has long been established as an objective method of using an electromyogram (EMG) to distinguish between those with low back pain and those without. Few papers describe that approach in the cervical region. This study investigates four EMG ratios [two cervical FR ratios and two similar ratios from axial rotation (AR) of the head] in participants with neck pain and those without. **Methods:** Five controls and five participants with neck pain were enrolled. Two FR ratios were obtained during modified FR protocols from the cervical paraspinals: when the participants were seated and when they were prone. Two AR ratios were obtained during axial rotation of the head: from the cervical paraspinals and from the sternocleidomastoids. **Results:** All EMG ratios were considerably higher for the control group than for the neck pain group. For those with neck pain, all four methods showed good correlation between EMG ratio and pain level. **Conclusion:** All four methods investigated show promise for being able to distinguish between normal and those with neck pain as well as providing an objective indication of the level of neck pain. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Nonuniform Compression of Sacral Cartilage During Angular Rotation

**Dennis Enix**, Logan College of Chiropractic, and **Douglas Smith**, University of Missouri

**Introduction:** Axial loads transmitted through the geometrically complex sacral articular surface are not evenly distributed throughout, having unequal loads and moments between the left and right, and are dependent on joint angulations. **Methods:** Polymer replicas of 10 auricular surfaces of human cadaveric sacrum's were made. Laser isarithmic scans created three-dimensional digital mesh models of the joint cartilage using Matlab processing. Nonlinear hyperelastic and linear elastic material properties replicating soft tissue and bone were added then analyzed as a finite element structure. Von-Mises stresses on the cartilage were analyzed during sacral rotation from 11.4º to 21.0º. **Results:** The sacral cartilage deformed in a nonuniform manner as pelvic anteriority increased, with the greatest compression on the superior articular cartilage and the peak stresses occurring around the edge and deeper recesses of the surfaces. **Discussion:** Compressive forces during angular rotation of the sacral surface create uneven changes in cartridge thickness. The stress contours for the cartilage appear to follow the geometric articular surface contours. **Conclusions:** This geometrically irregular shaped joint has a complex pattern of load distribution characteristics resulting in nonuniform deformation of cartilage with the greatest compression on the superior articular surfaces. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Intervertebral Disc-Derived Stem Cells: Implications for Regenerative Medicine and Neural Repair

**William Mark Erwin**, Toronto Western Hospital, University of Toronto, Canadian Memorial Chiropractic College, **Diana Islam**, Toronto Western Hospital, **Eftekhar Eftekarpour**, University of Manitoba, **Robert Inman**, Toronto Western Hospital, University of Toronto, and **Michael Fehlings**, Toronto Western Hospital, University of Toronto

**Introduction:** Cervical spondylotic myelopathy is most commonly caused by advanced degenerative disc disease and may lead to tetraparesis or even death. We elected to test the hypothesis that progenitor cells within the nucleus pulposus (NPPCs) would differentiate within the neural niche into neural precursor cells for use in neural repair. **Methods:** We developed self-renewing cell colonies from canine intervertebral discs and evaluated them for the expression of stemness genes; capacity to differentiate along chondrogenic, adipogenic, osteogenic, and neurogenic lineages in vitro; as well as in vivo differentiation capacity within the compact myelin-deficient shiverer mouse brain. **Results:** NPPCs express stemness genes such as Sox2, Oct4, Nanog, CD133, Nestin, and NCAM and can differentiate into chondrogenic, adipogenic, and neural lineages in vitro. Within the shiverer mouse brain, NPPCs differentiate into neuron, astro-glial cells and demonstrate immunoreactivity to CNPase and myelin basic protein (markers of oligodendrocyte precursor cells). **Discussion:** Progenitor cells obtained from the intervertebral disc (IVD) have the capacity to be used not only for cartilage and IVD repair, but also for neural repair strategies and, most important and of profound potential significance, they offer the possibility of use in the case of the injured spinal cord. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Developing the Next Generation of Clinical Research Scientists: Northwestern Health Sciences University's Fellowship Program

**Roni Evans**, **Linda Hanson**, **Brent Leininger**, **Corrie Vihstadt**, and **Gert Bronfort**, Northwestern Health Sciences University

**Purpose:** To describe a clinical research fellowship program (CRFP) at a complementary and alternative medicine institution and highlight the outcomes of the program to date. **Methods:** As part of a National Center for Complementary and Alternative Medicine funded Research Education Partnership Project, a 4-year, full-time CRFP was designed including (1) academic coursework culminating in a Master of Science in Clinical Research, (2) practical clinical research training, (3) teaching experience in foundational research principles, and (4) mentorship. Funding is provided through various sources. **Results:** Three fellows are enrolled and have been accepted in Masters degree programs. All are gaining practical experience in federally funded clinical trials. Fellows are gaining experience in systematic literature reviews, study design, proposal writing, human subjects protection, data safety and monitoring, data analysis, and multi-institutional collaborations. They have also rotated through various research-related teaching responsibilities associated with the R25 project. Mentorship is based on individual skill level and interest and occurs at multiple levels with several experienced research faculty. **Conclusion:** This is a unique program grown from coordination of multiple research and education initiatives. Several benefits have been realized, including expansion of important research department outcomes such as publications, presentations, and critical research funding. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## A Comprehensive Faculty Development Program for Advancing Evidence-Informed Practice

**Roni Evans**, **Mary Tuchscherer**, Northwestern Health Sciences University, **Louise Delagran**, University of Minnesota, **Della Shupe**, **Barbara Gosse**, **Pat Cassello-Maddox**, and **Linda Hanson**, Northwestern Health Sciences University

**Introduction:** Our institution is conducting an education project funded by the National Center of Complementary and Medicine with the broad objective of facilitating evidence-informed practice (EIP). A key strategy is to actively engage faculty through a comprehensive and multimethod EIP-focused faculty development program. **Methods:** A team of faculty has designed a multifaceted program including workshops, online learning modules, a Research Scholars seminars series, and individual mentorship. Evaluation of the program includes quantitative and qualitative data collection and EIP "deliverables," including faculty capstone projects, presentations, publications, and efforts to integrate EIP learning objectives into courses. **Results:** Participation in the faculty development initiatives has been high. To date 80% of faculty members have completed some online foundational EIP training. Interest in the intensive Research Scholars

series has exceeded expectations with over 20% of ranked faculty participating. **Conclusion:** Our faculty members are increasingly embracing EIP. Many are facilitating a transformative change in culture by adopting and integrating EIP in ways most relevant to their institutional role. We feel our success is attributable to several factors, including the use of a multifaceted approach that is responsive and flexible to faculty needs. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Using Computer-Assisted Learning to Engage in a Variety of Learning Styles in Understanding Business Management Principles

**Mary Frost**, **Dustin Derby**, and **Andrea Haan**, Palmer College of Chiropractic

**Introduction:** Changes in small business and insurance present challenges for newly graduated chiropractors. Technology that reaches identified, diverse learning styles may assist the chiropractic student in business classes to better meet course outcomes. Thus, the purpose of this Institutional Review Board-exempted study is to determine if the use of technology-based instructional aides enhance students' appraisal of course learning outcomes. **Methods:** Using convenience sampling, 86 students completed a survey assessing course learning outcomes, learning style, and the helpfulness of lecture and computer-assisted learning (CAL) related to content mastery. Quantitative analyses occurred. **Results:** Although respondents reported not finding the CAL as helpful as the lecture, significant relationships and significant differences were discovered between pre- and postmeasures of learning outcomes by primary learning style. **Discussion:** Significant relationships were found between pre- and postmeasures of the learning outcomes for the visual and kinesthetic groups. It was surprising, however, that all learning style groups exhibited significant pre- and postappraisal relationships with learning outcomes 3 and 4. **Conclusion:** Evidence suggests that the instructional aides appear to augment student learning across multiple learning styles. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Developing a Model Curriculum for Ethical Practice Building at Chiropractic Colleges: Opinions From an International Workshop

**Brian Gleberzon**, Canadian Memorial Chiropractic College, **Stephen Perle**, University of Bridgeport College of Chiropractic, and **Gilles Lamarche**, Parker College of Chiropractic

**Introduction:** There has been an observable increase in the number of veteran doctors and new graduates who are engaging in unethical practice activities, especially insurance fraud. A workshop was designed that sought to investigate and identify the factors contributing to this observation. **Methods:** A workshop was conducted during the ACC-RAC 2011. **Results:** Thirty conference attendees participated in the workshop. They reported that the financial burden of chiropractic education may be the primary factor in unethical practice activities, along with a sense of entitlement, inability to delay gratification, and lack of appropriate role models. Strategies to overcome these barriers to ethical conduct were discussed. **Summary:** An exit survey indicated that participants found the workshop worthwhile and expressed interest in attending a follow-up workshop that would focus on the process of implementing identified strategies into college curricula. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## An Interprofessional Education Model for Comanagement of Back Pain in Older Adults by Doctors of Chiropractic and Medical Doctors

**Christine Goertz**, **Stacie Salsbury**, **Robert Vining**, **Cynthia Long**, Palmer Center for Chiropractic Research, **Andrew Andresen**, Genesis Family Medical Center, **Maria Hondras**, Palmer Center for Chiropractic Research, **Mark Jones**, Genesis Family Medical Center, **Lisa Killinger**, Palmer Center for Chiropractic Research, and **Kevin Lyons**, Thomas Jefferson University

**Introduction:** Low back pain (LBP) is one of the most common reasons patients seek treatment from either a medical doctor (MD/DO) or a doctor of chiropractic (DC). However, few examples of care coordination between these provider groups for the management of LBP in older adults exist. **Methods:** The purpose of our Institutional Review Board-approved study was to refine an extant model of integrative medicine focusing on four key dimensions: (1) provider attitude, (2) provider knowledge, (3) interdisciplinary referral, and (4) integrative practice.

We developed an interprofessional education (IPE) program for family practice residents and chiropractic graduate fellows and clinicians who are implementing the model within the context of a clinical trial. **Results:** Five IPE sessions covering the dimensions of the collaborative care model and a job shadowing experience provided a foundation for our team-based approach to comanagement of LBP. The IPE program was well received by participants and included collegial debate on evidence-based support for treatment modalities, clinical examination and imaging interpretation, and safety concerns. **Conclusion:** A theory-based model of integrative medicine provided a useful framework for interprofessional education on the benefits and challenges of comanagement of LBP in older adults by DCs and MDs/DOs. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Utilizing YouTube in a Chiropractic Technique Lab

**Christopher Good** and **Saman Pezeshki**, University of Bridgeport College of Chiropractic

**Introduction:** It was hypothesized that creating demonstration videos and putting them on the Internet could enhance skill acquisition. **Methods:** Technique videos were made using an IPhone 4 and uploaded to YouTube, and viewing frequency, user data, and comments were analyzed. A survey obtained information about utilization and perceptions and was approved by the college's Institutional Review Board. **Results:** There were 22 channel subscribers and 2604 viewings. Seventy-six percent of students visited the channel four or more times, 52% viewed over half the videos, and 40% viewed all/nearly all. Eighty-eight percent agreed they were of "moderate help" or better, 56% felt their confidence improved, 74% enjoyed using them, and 93% agreed they should be continued. Students liked that they could review anytime plus the convenience, quality, and change from the usual teaching methods. **Discussion:** Taking IPhone videos took little class time and could be directly uploaded without the file size limits of Blackboard. They were edited easily and viewer frequency, location, and access mode could be tracked. Comments could be monitored and responded to. **Conclusion:** Creating technique videos and uploading to YouTube is a valuable teaching strategy. Future study should determine whether this improves skill acquisition. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Benefits of Active Learning in a Chiropractic Program: Comparison of Student Scores Before and After Utilizing Active Learning Techniques in a Classroom Setting

**Joseph Guagliardo** and **Kathryn Hoiriis**, Life University

**Introduction:** The literature has shown that traditional lectures are less effective for student learning than using collaborative and/or active student roles in the classroom. The purpose of this paper is to report on the effect that active learning had on final examination scores in a chiropractic clinical skills course. **Methods:** A retrospective comparison of student performances ($N$ = 503) over six academic calendar sessions was approved by the Institutional Review Board for human subjects. An independent $t$ test revealed a significant difference between the two groups ($p < .001$, CI 1.29–4.20) A one-way analysis of variance was used to determine whether the subgroups of each cohort were similar as well as Tukey's honestly significant difference evaluation for homogeneity among subgroups. Effectiveness of the intervention was assessed through the use of Cohen's $d$ analysis ($d$ = 0.337). **Results:** Compared with previous versions of the same course taught by the same instructor, the students in the new course design performed better and had a significant increase in student learning related to final examination scores. **Conclusion:** This study suggests that utilizing active learning techniques as well as additional self-guided instruction in lieu of traditional lecture format can help improve student achievement. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Effect of Sampling Rate on Capturing High-Velocity Low-Amplitude Spinal Manipulation Force-Time Characteristics

**Maruti Ram Gudavalli**, **James DeVocht**, **Ting Xia**, and **Ali Tayh**, Palmer Center for Chiropractic Research

**Introduction:** The objective of this study is to determine the minimal sampling rate required to accurately quantify the force-time characteristics (forces, durations, and rates of loading) of manual spinal manipulations delivered by chiropractors. **Methods:** Force-time profiles were recorded during 52 simulated high-velocity low-amplitude thrusts

to a miniature force sensor placed on a force plate. Data sampling frequency of the force plate remained the same at 1000 Hz, while the sampling rate of the force transducer varied at 50 Hz, 100 Hz, 200 Hz, and 500 Hz. The data were reduced and descriptive analyzed using custom written MatLab software. **Results:** From the data we obtained in sampling at different frequencies, it was found that the average differences between 50-Hz and 1000-Hz sampling rates are smaller than 5% in durations and rates of loading. The differences in the magnitudes of the loads are smaller than 3%. **Discussion:** Our data describing forces, durations, and rates of loading suggest that manual spinal manipulations collected at 50-Hz sampling rate are as good as those at 1000 Hz when compared to the individual variations that were observed. **Conclusions:** From the experiments, the small differences we observed suggest that sampling at 50 Hz is essentially as good as sampling at 1000 Hz. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Consensus Process to Develop a "Best Practices" Document on the Role of Chiropractic Care in Health Promotion, Disease Prevention, and Wellness

**Cheryl Hawk**, Logan College of Chiropractic, **Michael Schneider**, School of Health and Rehabilitation Sciences, University of Pittsburgh, **Marion Willard Evans**, Texas Chiropractic College, and **Daniel Redwood**, Cleveland Chiropractic College

**Objective:** The purpose of this project was to develop consensus definitions for the set of "best practices" that chiropractors may use for purposes of promoting health and wellness and preventing disease and to describe the most appropriate components and procedures of such practices. **Methods:** The study was determined to be exempt by the lead institution's Institutional Review Board. The multidisciplinary steering committee developed 49 seed statements, based on their clinical experience and relevant literature. A rigorous Delphi consensus process was conducted in 2011 electronically, following RAND-UCLA (University of California, Los Angeles) methodology. Consensus was reached when at least 80% of the panelists were in agreement. There were 44 panelists from 25 US states, including 36 DCs, four PhDs in health promotion or health education, one doctor of naturopathy, one registered nurse, one biostatistician, and one basic scientist. **Results:** The statements developed through the Delphi process defined the terms and practices constituting a best practice approach to chiropractic care provided to promote health and wellness and prevent disease. **Conclusion:** A multidisciplinary panel reached a high level of consensus on evidence-informed best practices for the role of chiropractic care in health promotion and disease prevention. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Testing Test-Driven Learning and Self-Assessment Learning

**Xiaohua He** and **Anne Canty**, Palmer College of Chiropractic, Florida Campus

**Objective:** We compared and contrasted the efficacy of self-assessment and test-driven learning in two groups of students who studied the same subject. **Methods:** Three hundred twenty first-quarter students at Palmer College of Chiropractic, Florida Campus, participated in the study and were divided into a quiz group and a self-assessment group based on the means they used for their learning. We measured the scores of three formal written exams and difficulty level: exam 1, exam 2, and summative exam between the two groups. The results of a mini-survey were also analyzed. **Results:** The mean scores of exam 1, exam 2, and summative exam were 34 (±6), 32 (±8), and 44 (±6) for the self-assessment group, respectively, with corresponding scores of 33 (±6), 33 (±7), and 43 (±6) for the quiz group. There was no significant difference in the mean scores on all three tests between the two groups ($p > .05$). Sixty-four percent of students in the self-assessment group scored at least 90%, while 47% of students in the quiz group answered at least 90% of the questions correctly ($p < .001$). **Conclusion:** Both self-assessment and quizzes could have significant impact on students' learning, but they offer different strengths and weaknesses. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Manual Palpations Attenuate Immunochemical Reactivities of Pain Mediators in the Nervous System in Response to Adjuvant Knee Arthritis: An Animal Model

**Xiaohua He** and **Veronica Dishman**, Palmer College of Chiropractic, Florida Campus

**Introduction:** The present study was carried out to investigate the neuronal response to complete Freund's adjuvant (CFA) induced knee arthritis in a guinea pig model to determine if manual palpation could alter the neuronal response in the spinal cord and dorsal root ganglion (DRG). **Methods:** Twenty guinea pigs were divided into a control group, arthritic group, and manual palpation group. Manual palpation was done by gentle contact and repeated bending of the knee joint 1 week after CFA injection. The spinal cord and DRG were sectioned and processed for SP, calcitonin gene-related peptide (CGRP), and nitric oxide synthase (NOS) immunochemistry. **Results:** In manual palpation animals, the expressions of SP-, CGRP-, and NOS-LI were similar to arthritic animals before palpation, but they were dramatically reduced after 1 week of manual palpation. Associated changes of the staining intensity in the spinal cord were also observed. **Discussion:** Manual palpations attenuate the expression of neuronal SP-, CGRP-, and NOS-LI in the spinal cord and DRG, indicating possible therapeutic effects of such palpations to the pain and inflammatory process in the nervous system. It is possible that manual palpation may convert the biochemical signal that triggers additional signal molecules, which can inhibit neurons to release nociceptive neurochemicals and, in turn, to inhibit pain. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Effect of Chiropractic High-Velocity Low-Amplitude Manipulation on Vertical Jump Height in Young Female Athletes With Talocrural Joint Dysfunction

**Sofia Hedlund**, **Markus Lenz**, **Hans Nilsson**, Kiropraktiska Föreningen Sverige, **Pernilla Thorman**, Skandinaviska Kiropraktorhögskolan, and **Tobias Sundberg**, Karolinska Institutet

**Introduction:** Despite the emerging evidence of potential clinical benefits of high-velocity low-amplitude (HVLA) manipulation for the talocrural joint, there have been no studies examining the potential clinical change in functional performance with such treatment. The purpose of this study was to explore the effect of chiropractic HVLA manipulation on vertical jump height in young female athletes with talocrural joint dysfunction. **Methods:** Nineteen female handball players were randomized to receive either HVLA manipulation or sham treatment once a week during a 3-week period. The main outcome was change in vertical jump height from baseline to follow-up after 3 weeks. **Results:** After 3 weeks, the HVLA manipulation group had a mean improvement in vertical jump height of 1.07 cm ($p$ = .017). The sham treatment group improved their vertical jump height by 0.59 cm ($p$ = .436). The between groups' change was 0.47 cm ($p$ = .571), in favor of the group receiving HVLA manipulation. **Discussion:** The results might be interesting for athletes as well as regular musculoskeletal patients with talocrural joint dysfunctions as HVLA manipulation may improve musculoskeletal function, sports performance, and activities of daily living. **Conclusion:** HVLA manipulation may increase vertical jump height in young female athletes with talocrural joint dysfunction. The result needs statistical confirmation in a larger clinical trial. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Effect of Audit and Feedback on Record-Keeping Compliance Within a Chiropractic Educational Clinic System

**Nicole Homb**, **Shayan Sheybani**, **Dustin Derby**, and **Kurt Wood**, Palmer College of Chiropractic

**Objective:** To investigate the effect of a clinical documentation quality improvement program utilizing audit-feedback on clinical compliance to indicators of quality chart documentation. **Methods:** This was a secondary analysis of data extracted from an existing database collected from retrospective chart review of a multicampus, time-series, cross-sectional sample. Data were extracted for 11 common indicators of quality documentation and analyzed using SPSS. **Results:** There was a significant increase in the mean percentile compliance in two of five compliance areas and one of 11 compliance objectives. Campus B demonstrated significantly higher levels of compliance relative to campus A and/or campus C in five of five compliance areas and seven of 11 compliance objectives. **Discussion/Conclusion:** Feedback of performance improves compliance to indicators of quality health record documentation, especially when baseline adherence is relatively low. Required educational consultations with clinicians combined with audit-feedback were no more effective at increasing compliance to indicators of quality health record documentation than audit-feedback alone. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Use of the Activator Adjusting Instrument in the Management of Musculoskeletal Disorders: A Descriptive and Systematic Review of the Literature

**Tiffany Huggins**, **Ana Luburic-Boras**, **Brian Gleberzon**, Canadian Memorial Chiropractic College, **Mara Popescu**, and **Lianna Bahry**

**Objective:** The purpose of this study was to conduct a systematic review of the literature investigating clinical outcomes involving the use of the Activator Adjusting Instrument (AAI) or Activator Methods Chiropractic Technique (AMCT). A narrative description of each study is also provided. **Methods:** A literature synthesis was performed on the available research and electronic databases (ICL, EBSCO, CINAHL, Medline) for any studies that investigated the AAI in terms of clinical effectiveness. Studies that met the inclusion requirement were evaluated using an instrument that assessed their methodological quality. **Results:** Eight articles met the inclusion criteria. Overall, the AAI provided comparable clinically meaningful benefits to patients when compared to high-velocity low-amplitude (HVLA) manual manipulation or trigger point therapy for patients with acute and chronic spinal pain, temporomandibular joint dysfunction, and trigger points of the trapezius muscles. **Conclusion:** This systematic review of eight clinical trials involving the use of the AAI found reported benefits to patients with spinal pain and trigger points, although these results were not statistically significantly better when compared to the use of HVLA manual manipulation or trigger point therapy. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Biomechanics of Degenerated Discs With Incomplete and Slack Annular Fibers Under Traction Loads

**Mozammil Hussain**, Logan College of Chiropractic

**Introduction:** Degenerative changes in disc tissue matrix can occur due to incompleteness and laxity in annular fibers. Conventional approaches to spinal pain relief involve application of traction forces to reduce elevated disc pressures. This study objective is to understand the disc stress patterns with degenerative fibers when traction forces are applied on the compressed discs. **Methods:** This study used a finite element model of a healthy C5–C6 segment that was validated under axial forces. Degenerative morphological and material modifications in fibers included reductions in fiber length (incompleteness) and its elasticity (slackness and laxity). A pressure load was applied on the C5: 50 N (compression) followed by 17 N (traction). C6 was constrained in three perpendicular directions. ABAQUS software was used for meshing and analysis. **Results:** Changes in disc stresses increased with incompleteness and laxity in fibers, both under compression and traction forces. When the loading was changed from compression to traction, changes in disc stresses were higher with laxity and slackness than that of the incompleteness in fibers. **Conclusion:** The biomechanical effects of traction forces in reducing the disc compressive stresses are higher when the degenerative factor is laxity than the incompleteness in fibers. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Flow-Mediated Dilatation: An Endothelial Vascular Biomarker

**Martha Kaeser**, **Daniel Haun**, and **Norman Kettner**, Logan College of Chiropractic

**Introduction:** Ultrasonography measures flow-mediated dilatation (FMD) of the brachial artery, a predictor of endothelial function. We established reference values for FMD. **Methods:** FMD was assessed in 47 normotensive healthy subjects (29 men, 18 women) ages 20 to 46 with a mean of 25.6. The university Institutional Review Board approved the project and subject consent was acquired. The brachial artery diameter was measured from intima to intima on longitudinal sonographic images proximal to placement of a blood pressure cuff. Three brachial artery diameter measurements before and after a 5-minute interruption of the brachial artery flow were obtained. FMD was expressed as percent change in the diameter compared with baseline. **Results:** The mean ± standard deviation for FMD was 6.9% ± 4.9 (range, –2.2 to 16.3%). Pre- and postmeasurement values of the brachial artery diameter were significant ($p < .05$). **Discussion:** Atherosclerotic cardiovascular disease is the leading cause of morbidity and mortality in the United States. Endothelial dysfunction, assessed by FMD, is an initial step toward atherogenesis. **Conclusion:** Normative FMD values of the brachial artery following reactive hyperemia are reported. Future studies will assess clinical interventions on FMD. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Correlation Between Predictors of Entering Grade Point Average, Class Scores, and Pretest Scores on National Board of Chiropractic Examiners Exam Part I Scores

**Amilliah Kenya**, Sherman College of Chiropractic

**Introduction:** Competent students are admitted into the Doctor of Chiropractic degree program. With the decline of academic standards and high rates of failure on the National Board of Chiropractic Examiners (NBCE) exam, institutions are left searching for answers. This study investigates whether a students' entry-level grade point average (entry GPA) is a better predictor of academic performance on the NBCE exam or the student's effort irrespective of their entry GPA as depicted by current GPA and the pretests administered before the national examinations. **Methods:** A total of 25 students enrolled in the Doctor of Chiropractic degree program were selected for the study. Average class scores were computed. Subject clusters in the NBCE exam were also computed for a numeric mean score. Pretests were administered in all areas tested in the NBCE exam. Results were compared to the students' scores on the NBCE exam. **Results:** Current GPA ($r$ = 0.700) and the average class performance ($r$ = 0.807) had excellent correlation with the students' NBCE exam scores; pretest scores had good correlation ($r$ = 0.676), while entry GPA had fair correlation ($r$ = 0.475). **Conclusion:** Current GPA, the students' average class performance, and pretest scores are better predictors of good performance on the NBCE exam than entry GPA. All students within acceptable GPA ranges can succeed. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Structural Neuroplasticity in Carpal Tunnel Syndrome: Evidence for Cerebral Cortical Thinning

**Norman Kettner**, Logan College of Chiropractic, **Yumi Maeda**, Martinos Center for Biomedical Imaging and Logan College of Chiropractic, **James Sheehan**, **Jieun Kim**, **Ang Li**, Martinos Center for Biomedical Imaging, **Joe Audette**, Harvard Vanguard Medical Associates, Atrius Health, and **Vitaly Napadow**, Martinos Center for Biomedical Imaging and Logan College of Chiropractic

**Introduction:** The cerebral cortex undergoes remodeling by structural and functional neuroplasticity. Cortical structural neuroplasticity occurs in response to development, aging, and chronic pain. We evaluated structural plasticity (cortical thickness) in carpal tunnel syndrome (CTS). **Methods:** Nineteen CTS patients (47.7 ± 8.8 years old, 17 females, confirmed by nerve conduction testing) and 18 age-matched healthy controls (43 ± 9.9 years old, 10 females) were evaluated at 3.0 T with structural T1-weighted magnetic resonance imaging of the brain. The cortical surface was reconstructed and cortical thickness was evaluated across the cortical mantle using Freesurfer software. **Results:** Significant cortical thinning was found in dorsolateral prefrontal, primary somatosensory, and anterior cingulate cortices for CTS patients. **Discussion:** Cortical thinning and diminished cortical density have been previously noted in other chronic pain syndromes; our original finding of cortical thinning in CTS corroborates these past reports. Our previous results found functional neuroplasticity in CTS, which our current data suggest may be accompanied by structural neuroplasticity as well. **Conclusion:** CTS patients undergo reduced gray matter in cortical areas that process chronic pain. These structural neuroplastic changes may be important in the diagnosis and management of CTS. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Retrospective Analysis of Cultural Competence of Chiropractic Students in a Public Health Course

**Kim Khauv** and **Joel Alcantara**, Life Chiropractic College West

**Introduction:** Serving diverse communities requires chiropractors to be culturally competent. We describe the impact in knowledge and confidence to serve diverse populations following a 6-hour cultural competency training. **Method:** Using a quasi-experimental, one-group design, we utilized a paired $t$ test (IBM SPSS software v19, Chicago, IL) using a 40-item questionnaire (to assess knowledge) and a 15-item questionnaire (to rate their confidence) to serve diverse populations. **Results:** A total of 45 students completed the 40-item questionnaire and 48 students completed the 15-item questionnaire. Analysis revealed significant increase from pretraining to comparative ($\Delta$score = 21.33%; $p < .001$) in their knowledge but not in their confidence ($\Delta$score = 0.24; $p$ = .26) to serve diverse populations. **Discussion:** The lack of change in confidence by our responders may be due to relatively high baseline measures. Further examination of our data revealed that baseline measures on confidence may be relatively high. The relationship between a student's sociodemographic characteristics and their prior life

experience and self-reported cultural competency remains largely unexplored. **Conclusion:** Further study is required to determine the covariates of successful training in cultural competency for chiropractors. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Attitudes, Beliefs, and Teaching of Cultural Diversity by Chiropractic Educators

**Kim Khauv**, Life Chiropractic College West, and **Joel Alcantara**, International Chiropractic Pediatric Association, Life Chiropractic College West

**Background:** With continued diversification of the US population and the globalization of chiropractic, chiropractors are challenged to be culturally competent to effectively serve communities and individuals from different cultural and ethnic backgrounds. Allopathic and allied health providers incorporate cultural competence in their educational systems. In an exploratory study, we examined the attitudes and beliefs and teaching of cultural diversity and competence among chiropractic educators. **Methods:** A 10-item self-directed online survey was provided to the Dean of the College of the 21 Association of Chiropractic College (ACC) members to invite the appropriate faculties to our survey. **Results:** Twenty-nine (17 males, 12 females; majority were white and in the 35–44 year age group) responders comprised our subject population. Half of the responders were trained in public health and 30% indicated that cultural diversity was taught in their college curriculum. Furthermore, less than 40% were of the opinion that cultural diversity was important in the training of chiropractors. **Discussion:** Our study identified deficits and possible barriers in the education of chiropractors on cultural diversity. **Conclusion:** Cultural diversity is not commonly taught in ACC member colleges. We support further research to promote cultural competency in chiropractors. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Developing Activity Modules for Spinal Health Promotion: A Global Collaborative Process

**Ron Kirk**, Life University

**Introduction:** With increasing levels of societal inactivity and technology utilization, the burden of spine and musculoskeletal disorders in the United States and across the global community continues to rise rapidly. Hundreds of millions of individuals are afflicted with musculoskeletal conditions. The Bone and Joint Decade and its partners are working collaboratively to proactively address this rising burden of spine and musculoskeletal disability. **Methods:** A facilitator convened multidisciplinary seed and Delphi panels to create and refine three innovative activity-based spinal health modules. Exercise-based slides with narrative instructions were reviewed through Snap e-surveys. **Results:** All slides of the three draft activity modules were refined and approved through the Delphi process with a mean slide approval rating of 95.8%. Narrative comments were insightful, instructive, and very encouraging. Sixty-one Delphi panelists from around the globe participated. **Discussion:** The Delphi process proved to be an effective tool for developing and refining activity modules through consensus. **Conclusion:** Spine and musculoskeletal disorders continue to increase as society becomes more sedentary and technology driven. Hopefully the new activity modules will encourage individuals to lead more active, spine-healthy lifestyles. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Development and Evaluation of the Health Professional Collaborative Competency Perception Scale (HPCCPS)

**Deborah Kopansky-Giles**, Canadian Memorial Chiropractic College, **Judith Peranson**, St. Michael's Hospital, **Howard Vernon**, Canadian Memorial Chiropractic College, and **David Soave**, Canadian Memorial Chiropractic College

**Introduction:** This study describes the development and evaluation of the Health Professional Collaborative Competency Perception Scale (HPCCPS), a new outcome measure developed to evaluate health professionals' perception of their collaborative competency. **Method:** The design was a prospective, longitudinal study with scale development, evaluation, and application to two groups of mixed professional learners. **Results:** The scale had good face and content validity, was highly responsive to detecting change in interprofessional confidence, and was sensitive to overall group change. The instrument also had strong stability over time. **Discussion:** The HPCCPS appears to be a valid, reliable,

and responsive instrument for evaluating health professional learners' perception of their collaborative competency and may be used as part of an evaluative strategy in the delivery of interprofessional education. **Conclusion:** Further evaluation of this instrument is required to determine its utility when applied in different formats and to assess the range of change resulting in meaningful pre- and postapplication differences. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Teaching an Interprofessional Approach to the Management of Musculoskeletal Problems in Primary Care: A Pilot Study. Part 1: Students

**Deborah Kopansky-Giles**, Canadian Memorial Chiropractic College, **Judith Peranson**, St. Michael's Hospital, and **Scott Reeves**, St. Michael's Hospital

**Introduction:** This exploratory case study utilized a mixed-methods approach to evaluate the outcomes of the pilot program and to explore student satisfaction with the curriculum, including its impact on the acquisition of competencies in interprofessional (IP) collaboration and musculoskeletal (MSK) care. **Results:** Results showed that a 4-day modular IP program can enhance the collaborative abilities of students. Students reported improved knowledge in various areas, including learning about the roles of other health professions, the importance of IP language and of building relationships before entering the workforce, and the different approaches taken in MSK care. Students liked to learn with students who were at their own or similar level of knowledge, understanding, and experience. **Conclusion:** Future research should focus on optimizing the mix of learners involved so as to enable balanced contributions from all participants. Follow-up studies are also required to determine if the learner gains from programs such as this are maintained over the long term. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Spinal Manipulation or Mobilization for Radiculopathy: A Systematic Review

**Brent Leininger**, **Gert Bronfort**, **Roni Evans**, Northwestern Health Sciences University, and **Todd Reiter**, High Point Regional Health System

**Introduction:** This is a comprehensive systematic review of the literature on spinal manipulation and mobilization for the management of cervical- and lumbar-related extremity pain. **Methods:** We used a comprehensive search strategy of multiple databases. Trials meeting the inclusion criteria were assessed for quality by two reviewers using the risk of bias criteria recommended by Cochrane. The overall quality of evidence was assessed by two reviewers using the GRADE system. **Results:** Our search identified 16 randomized trials satisfying the inclusion criteria for the review. We found moderate-quality evidence that spinal manipulation is effective for the treatment of acute lumbar radiculopathy. The quality of the evidence for chronic lumbar spine-related extremity symptoms and cervical spine-related extremity symptoms is low. **Discussion:** Because of the low number of high-quality trials available on this topic, the findings should be viewed with caution. Future research, especially if methodologically sound, could easily change the evidence regarding spinal manipulation therapy and mobilization for radiculopathy. **Conclusion:** Future high-quality studies are needed to evaluate the effectiveness of spinal manipulative therapies for radicular symptoms. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Self-Directed Algorithm Design: A Useful Tool in Learning the Differential Diagnosis Process

**Makani Lew**, Palmer College of Chiropractic, West Campus

**Introduction:** The purpose of this paper is to discuss how a class assignment to develop a clinical algorithm revealed multiple learning styles. Clinical algorithms are a graphic concept map designed to develop a clinical decision. **Methods:** Students read a journal article and electronically submitted a differential diagnosis algorithm using their textbook for the algorithm model. Submissions were graded on level of quality and complexity. **Results:** Twenty-five students in 13 groups of one to four students, including two double entries, yielded 15 total submissions. There were five different submission types: eight algorithms, three outlines, two documents, one table, and one question-answer format. Three platform types of submission were used: nine word processor, three PowerPoint, and three Jpeg photos of notepaper or whiteboard. Students working alone submitted more complex algorithms. **Discussion:**

Students appear to use familiar learning and technology tools and employ a variety of styles of organizing the thought process of differential diagnosis into presentation form. Learning styles, class training, and group interaction were investigated in relation to the variety of submission styles. **Conclusion:** Today's students easily accomplish tasks when allowed some leniency in presentation. If the diverse presentation types can be fairly graded, then it appears this approach can support multiple student types. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## X-Ray Utilization and Demographics in a Chiropractic College Outpatient Clinic

**Makani Lew** and **Gregory Snow**, Palmer College of Chiropractic, West Campus

**Objectives:** To present the radiograph utilization at a chiropractic college clinic, the associated patient demographics, and the utilization rates by body region. **Methods:** Data for outpatient services were extracted from a college clinic billing software program over a 3-year period. Radiographic data were matched with patient demographic information providing the age, gender, and financial class for all patients. **Results:** The overall X-ray utilization rate was 8%, with the highest frequency occurring in the spine in the order of lumbar, cervical, then thoracic regions. The utilization increased as the age of the patients increased. The patient average age was 45.5, of which 48% were female. **Discussion:** Our study found lower overall utilization rates and lower incidence of females X-rayed than previous studies. Limitations are many with findings not applicable to other colleges or private practice. **Conclusion:** The X-ray utilization rate at this teaching clinic was below the published range of previous studies. This study provides new information regarding overall and regional utilization rates and demographics from an American chiropractic college. Further study on this subject across multiple chiropractic college clinics is warranted to give a more accurate and informative picture of their radiographic utilization rates. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Variations in the Implementation and Characteristics of Chiropractic Services in Veterans Affairs: A Pilot Study

**Anthony Lisi**, VA Connecticut Healthcare System, **Brian Mittman**, VA Greater Los Angeles Healthcare System, **Monica Smith**, and **Raheleh Khorsan**, Samueli Institute for Information Biology

**Introduction:** The Department of Veterans Affairs (VA) introduced chiropractic services into its health care system in 2004. Maximizing the quality of these services represents an important goal for VA. This project describes the introduction and implementation of chiropractic programs in six VA facilities. **Methods:** An observational comparative case study approach used data collected via semistructured key stakeholder interviews, along with data collected from policy documents and other sources. Six VA facilities providing on-site chiropractic services were studied. Transcripts and documents were coded and directed content analysis was performed. **Results:** One hundred sixteen stakeholder interviews and 75 source documents were analyzed. Clinical implementation varied in terms of patient access, clinical appointment, and facility integration. Non-DC clinicians expressed mixed opinions on the appropriateness of chiropractic services, yet most were favorable. Stakeholders described professional and interpersonal attributes of the DC clinicians as important facilitators of implementation. Chiropractors themselves varied in professional attributes and self-perception of successful facility integration. **Conclusions:** Significant variations in implementation of chiropractic services at six VA facilities were documented. This study provides a framework for assessing chiropractic services across all VA facilities, as well as assessing the introduction of other new services to VA and other health care systems. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Development of a Strategically Designed Patient Self-Administered Intake Questionnaire to Help Achieve Medicare Compliance

**Albert Luce**, Palmer College of Chiropractic, Florida Campus, **Dale Rossi**, Palmer College of Chiropractic, Florida Campus, and **David Seaman**, National University of Health Sciences, Florida Campus

**Introduction:** Medicare compliance is an issue that is being actively pursued by the chiropractic profession. The *Medicare Benefit Policy Manual*, Chapter 15, Section 240, outlines the required documentation needs for chiropractors. While intake forms can be used to assist in the diagnostic process, to our knowledge, no patient intake questionnaire has been

designed in an evidence-based medicine style specifically to address the needs of Medicare documentation. **Methods:** Over a period of 2 years, a patient self-administered intake questionnaire was designed to collect historical data that satisfies the stated Medicare documentation requirements. The questionnaire has been used in the treatment modules of two faculty clinicians in a chiropractic college outpatient clinic. **Results:** After 2 years of modifications to the questionnaire, comprehensive file audits revealed 100% compliance rates for Medicare's initial visit documentation requirements. **Conclusion:** The strategically designed patient-self administered intake questionnaire can have a positive effect on Medicare compliance. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Attitudes Toward Chiropractic Care Among the Health Care Community in Ghana, Africa

**Dana Madigan** and **Barbara Sullivan**, National University of Health Sciences

**Introduction:** Ghana has undergone health care reform designed to offer universal coverage. With further development, there may be an opportunity to offer complementary and alternative medicine practices. This Institutional Review Board approved study aims to provide a preliminary understanding of local perceptions of chiropractic in Ghana and how to best make chiropractic a valued part of the Ghanaian health care system within the context of the current utilization patterns. **Methods:** Eleven health care providers and administrators were interviewed using a short semistructured interview guide. **Results:** The three respondents with the least medical education responded that they did not know what chiropractic was, while others could provide some explanation of chiropractic, such as it deals with the spine or back (5 of 11) and does not use medications (3 of 11). **Discussion:** While few chiropractors exist in Ghana, the response to including chiropractors as medical providers in Ghana was overwhelmingly positive, although the scope of practice was not discussed. **Conclusion:** This study demonstrates the need for further research to adequately define the possible role that chiropractic might have in developing countries and for development of interventions that render chiropractic treatment as culturally acceptable and easily accessible. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Using Research to Change the Culture of Chiropractic Education

**Michele Maiers**, **Roni Evans**, Northwestern Health Sciences University, and **Louise Delagran**, University of Minnesota

**Introduction:** The CAM Practitioner Research Education Partnership Project (R25), sponsored by the National Center for Complementary and Alternative Medicine (NCCAM), offered an unprecedented opportunity for chiropractic institutions to adopt evidence-informed practice (EIP). **Methods:** Our institution was awarded an R25 grant to focus on the creation of EIP curricula for students and faculty. Evaluation of the project includes assessment of culture change (values, beliefs, and behaviors) through surveys, focus groups, one-on-one interviews, and collection of artifacts from various stakeholders. **Results:** Before project implementation, students and faculty expressed the importance of research-related skills, but identified their own skill levels as low. They believed EIP to be consistent with their values and practice. After project implementation, survey results indicate positive trends in self-reported skills and behaviors and improved satisfaction with research-related coursework. Faculty participation in research and scholarly activities is increasing. There is an emerging emphasis on research and EIP in the institution's mission and guiding principles. Several EIP initiatives are now prominently featured in the university's strategic plan. **Conclusion:** The NCCAM-funded R25 Research Education Partnership Grant is contributing to a positive cultural change among students and faculty, who increasingly identify with evidence-informed practice. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Chiropractic and General Medical Practice: A Survey of Referral Patterns and Communication Between the Professions

**Sarah McSwiney**, **Gabrielle Swait**, **Adrian Hunnisett**, and **Christina Cunliffe**, McTimoney College of Chiropractic

**Introduction:** There is a lack of research into how chiropractic relates to, and positions itself within, health care provision as a whole. The study aims to survey referral patterns and communication between general practitioners (GPs) and chiropractors. **Method:** Following ethical approval, a sample of 200 GPs in the Dublin, Ireland, area was

surveyed using a self-administered questionnaire to assess referral rates and communication between the professions. **Results:** The response rate for the study was 24%. The majority of respondents had not referred to chiropractors (73%). The majority of referrals by GPs to chiropractors are for musculoskeletal conditions, but also referral was based on personal experience or acquired knowledge of chiropractic. The highlighted reasons for nonreferral were "not applicable" and "questionable education and skill of chiropractors." A large proportion of respondents (75%) had no form of communication with, or from, chiropractors. **Discussion:** Lack of knowledge of the scope of chiropractic treatment and benefits was cited as a prime reason for nonreferral. Communication between the professions was poor, also reflecting on referral rates. **Conclusion:** This study shows a knowledge gap about chiropractic. There are issues of trust and evidence between the professions that need to educationally addressed. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Knowledge of Accurate Blood Pressure Measurement Procedures in Chiropractic Students

**Angela Miller** and **James La Rose**, Palmer College of Chiropractic, Florida Campus

**Introduction:** Blood pressure measurement is a basic clinical procedure. However, studies have shown that there are many errors from incorrect procedures. This study assessed knowledge of blood pressure measurement procedures in chiropractic students. **Methods:** This was an observational, descriptive study. A questionnaire based on the 2005 American Heart Association questionnaire on blood pressure measurement was given to 1st-, 2nd-, 3rd-, and 4th-year students. The one-way analysis of variance was used to analyze the data, and Institutional Review Board approval was obtained. **Results:** One hundred eighty-six students participated in the study. Eighty percent of the students were confident that their knowledge of this clinical skill was adequate and above. However, the overall score on the knowledge test of blood pressure-taking skills was 52% with a range of 88% to 24%. **Discussion:** The only significant difference in the mean scores was between the 1st- and 2nd-year students compared to the 3rd- and 4th-year students ($p < .005$). Of the 16 areas tested, there were 10 that were of major concern (test item score < 70%), showing the need for frequent retraining of chiropractic students. **Conclusion:** Chiropractic students need to improve their knowledge in assessing blood pressures. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Faculty Development Workshops: An Evaluation of Effectiveness

**John Mrozek**, **Stephen Foster**, **Alan Adams**, Texas Chiropractic College, and **Rahim Karim**, Centennial College

**Introduction:** Faculty development is integral to achieving defined student learning outcomes. Our college entered into an agreement with a university-based academy of distinguished educators to develop a series of workshops based on our defined need. Workshop topics were evaluating learners, giving feedback, time management, developing learning experiences, presentation skills, and communication. The goal of this study is to determine the effectiveness of these workshops over time. **Methods:** The four-level Kirkpatrick model, including reaction, learning, behavior, and results, was used to evaluate faculty development effectiveness. Each workshop topic included a pre- and postsurvey pertaining to workshop satisfaction, knowledge of topic, and intention to implement learned skills. A follow-up survey on the intention to implement workshop learning was conducted at 4 months postworkshop. **Results:** The 1-month postworkshop surveys reported an increase over preworkshop knowledge of the presented material. Four-month postworkshop surveys indicated that the intention to implement the workshop learning was greatly reduced when compared to the postworkshop response. **Conclusion:** Determining workshop training effectiveness is critical to achieving intended outcomes. Initial positive reaction and workshop learning will require follow-up and ongoing support to achieve desired results. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Comparison of Findings of Active Straight Leg Raise Test in Patients With Lumbar Versus Sacroiliac Pain

**Donald Murphy**, Alpert Medical School of Brown University and New York Chiropractic College, **Eric Hurwitz**, University of Hawaii, and **Brian Hart**

**Introduction:** The active straight leg raise (ASLR) test is designed to assess load transfer through the pelvis. It is associated with posterior pelvic pain. It is unknown whether the findings of this test specifically identify pelvic instability or a generalized lumbopelvic dysfunction. The purpose of this study is to assess the association of the ASLR test in patients with sacroiliac pain versus lumbar pain. **Methods:** The protocol was approved by the Institutional Review Board of New York Chiropractic College. The location of the pain (sacroiliac or lumbar) and the results of three tests of dynamic instability, including the ASLR, were recorded. **Results:** There was substantially greater odds of a positive ASLR in patients with sacroiliac pain versus lumbar pain (OR = 5.03; 95% CI 2.55–9.93; $p < .0001$). Both the hip extension test and segmental instability test had greater associations with lumbar pain versus sacroiliac pain. **Conclusion:** A positive ASLR is substantially more common in patients with sacroiliac pain than in patients with lumbar pain. However, it is unlikely that this suggests that the ASLR identifies pelvic versus lumbar dynamic instability given what is known about motor control mechanisms in the lumbopelvic spine. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Neck and Back Pain Specific Outcome Assessment Questionnaires in the Spanish Language: A Literature Review

**Donald Murphy**, Alpert Medical School of Brown University and New York Chiropractic College, and **Marco Lopez**

**Introduction:** Disease-specific outcome measurement questionnaires are an important component of the management of patients with neck pain (NP) and low back pain (LBP). As the Spanish-speaking population in the United States continues to grow, the availability of outcome assessment instruments in the Spanish language will become more important to spine clinicians. The purpose of this study is to review the literature on NP and LBP specific outcome questionnaires that have been translated into Spanish. **Methods:** A search was conducted of the Medline, Cinahl, Embase, and MANTIS databases for articles in English or Spanish that assessed the reliability, validity, responsiveness, and/or clinical utility of NP or LBP specific outcome questionnaires in Spanish. **Results:** Data on translated versions of the Northwick Park Neck Pain Questionnaire, Neck Disability Index (NDI), Core Outcome Measure, Roland Morris Low Back Pain and Disability Questionnaire (RMQ), North American Spine Society–American Academy of Orthopaedic Surgeons questionnaire, and RMQ culturally adapted for Argentinean patients were found. **Conclusion:** Several disease-specific outcome assessment questionnaires have been validated for use with Spanish-speaking patients with NP or LBP. Based on the data reviewed here, the NDI and RMQ are recommended for use in research and practice. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Optimized Estimation of Contact Force Application During a Side-Lying Lumbar Manipulation

**Casey Myers**, University of Denver, **Brian Enebo**, University of Colorado Hospital, **Andrea Wanamaker**, and **Brad Davidson**, University of Denver

**Introduction:** The two primary methods for estimating contact forces during in vivo spinal manipulation are through direct measurement via pressure mats and indirect measurement via inverse dynamics. We propose an alternative method that apportions individual contributions of direct and indirect measurement through weighted least-squares (WLS) optimization. **Methods:** Five participants underwent side-lying lumbar manipulations at low-force amplitudes while three-dimensional forces were measured at all contact points. Spinal contact forces were estimated from nine equations using common least-squares (CLS) and WLS. **Results:** Comparison between the measured spinal contact forces and the two estimates (CLS and WLS) indicated large error (142.1 ± 99.5 N) and poor agreement using CLS and small error (−3.2 ± 28.6 N) and good agreement using WLS. **Discussion:** Each method was used to estimate spinal contact forces during a clinically meaningful force application. The WLS force estimate maintained qualitative integrity compared to reported values. **Conclusion:** Applying the WLS method of force estimation in research and training settings may increase clinical understanding of how multiple contact

forces contribute to this complex motor task. In addition, accurate estimations of contact force vectors, such as obtained using WLS, are important when investigating mechanisms of spinal manipulative therapy that include clinically meaningful force thresholds. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Planning for Success: Developing a Business Curriculum for Chiropractic Students

**Rita Nafziger**, **Julie Johnson**, **Mary Frost**, and **Alexis VanderHorn**, Palmer College of Chiropractic

**Introduction:** Alumni survey data, student ratings, and educational trends prompted review of a chiropractic business curriculum. **Methods:** Business curriculum task force reviewed course syllabi, materials, and related literature and solicited informal input from practicing chiropractors, chiropractic students, and college administrators. Critical content was identified, redistribution of credit load was explored, measurable learning outcomes were written and sequenced across four courses, and new strategies for course delivery and assessment were identified. **Results:** Formal proposal for curricular change was approved by the curriculum committee. Learning outcomes include critical content, focus on higher levels of learning, and require student-generated artifacts for authentic assessment. Redistributing credit loads and utilizing asynchronous activities eliminated scheduling conflicts between classes and patient care while increasing student responsibility for completion of course requirements. Initial student response to the changes has been supportive and positive. **Conclusion:** A focused curriculum planning process resulted in a closer match between critical business content and course learning outcomes; redistribution of credit load allows more time for postgraduate practice planning. The stronger business curriculum is designed to improve chiropractic student knowledge and confidence in business skills to better support their practice success. Future studies will consider graduate confidence and alumni success. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Chiropractic Education: A Look at Educational Outcomes, Student Satisfaction, and Interest in Postdoctoral Training in a Department of Veterans Affairs Medical Center Chiropractic Clinic

**Jason Napuli**, **Dave Chicoine**, and **Jennifer Smith**, New York Chiropractic College

**Introduction:** Chiropractic services are gradually being added to the services offered within the Department of Veterans Affairs Medical Centers (VAMCs) across the country. As more facilities offer services to the nation's veterans, the opportunity for chiropractic education to become affiliated with VAMCs has presented itself. **Methods:** A survey was conducted to chiropractic students who rotated through a VAMC chiropractic clinic to assess their overall satisfaction and their interest in having postdoctoral training in a VA setting. **Results:** Chiropractic students were found to have overwhelming satisfaction in the VA rotation as well as achievement of the established learning objectives. The survey also showed that there is an interest for postdoctoral training within this setting. **Conclusion:** A VAMC chiropractic clinic provides diversity in clinical education. Academic affiliations should be considered with VAMCs and within programs offering a diverse clinical experience. Thus, it appears to be meeting the challenge to train chiropractic students in an ever-changing health care model. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Pediatric Use of Herbal Supplements in the United States

**Harrison Ndetan**, **Ronald Rupert**, **Patricia Brandon**, and **Maryann Osifo**, Parker University

**Objective:** This study reports the use of herbal supplements (HS) across various sociodemographic factors by children in the United States along with related specific health conditions and problems. **Methods:** Data from National Health Interview Survey 2007 Child Alternative Medicine file were analyzed using SAS 9.2. Weighted frequencies were generated and odds ratios (OR) and 95% confidence intervals (CI) were computed through binary logistic regression to assess HS use as a function of various sociodemographic variables. **Results:** Over 43.3% of the respondents reported HS use within past 12 months. These included Echinacea (36.7%), fish oil/omega 3/DHA fatty acid (30.9%), combination herb pill (20.8%), Flax seed oil/pills (16.3%) and prebiotics/probiotics (13.9%). Over 47% stated use for specific health problems or conditions, mostly head or chest

cold (31.6%) and insomnia (10.5%). Children aged <10 reported less usage than those >10 (OR = 0.67; 95% CI, 0.5–0.88). Hispanics (OR = 0.31; 95% CI, 0.21–0.46) and blacks (OR = 0.24; (95% CI, 0.14–0.39) also reported less usage than whites. Other predictors of usage were child's level of education and parents' presence in the household and education level. **Conclusion:** Many adolescents in the United States report using a wide variety of HS for health reasons, especially head or chest cold. Usage could be predicted by adolescent's age, race or ethnicity, and education level and parents' presence in household and education level. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Pediatric Use of Movement Therapy and Relaxation Technique for Health Problems and Conditions in the United States

**Harrison Ndetan**, Parker University, **Will Evans**, Texas Chiropractic College, **Ronald Rupert**, **Patricia Brandon**, and **Roland Njumentoko**, Parker University

**Objective:** This study reports the use of movement therapies (MT) and relaxation techniques (RT) across various sociodemographic factors by children in the United States along with related specific health conditions. **Methods:** Data from National Health Interview Survey 2007 Child Alternative Medicine file were analyzed using SAS 9.2. Weighted frequencies were generated and odds ratios (OR) and 95% confidence intervals (CI) were computed through binary logistic regression to assess use of MT and RT as functions of various sociodemographic variables. **Results:** MT and RT uses were reported by 2.5% and 2.9% of the respondents, respectively, within the past 12 months. MT (mostly Yoga) were used for anxiety and stress (31.4%), asthma (16.2%), and back and neck pain (15.3%), while RT (mostly deep breathing exercises and meditation) were used for anxiety and stress (41.4%) and attention deficit hyperactivity disorder and attention deficit disorder(16.0%). While there seemed to be no potential predictors for RT usage, age, gender, race or ethnicity, and parents' education level were potential predictors for MT use. For example, respondents aged <10 reported less usage than those >10 (OR = 0.4; 95% CI, 0.3–0.6), as well as males compared to females (OR = 0.5; 95% CI, 0.3–0.7). **Conclusion:** MT and RT are used by several children in the United States each year. More research into how these therapies work related to condition-specific use is needed. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Vitamin and Mineral Supplementation for Pediatric Health Conditions in the United States

**Harrison Ndetan**, **Patricia Brandon**, **Ronald Rupert**, Parker University, **Rabina Acharya**, University of North Texas Health Science Center, and **Kenneth Thomas**, Parker University

**Objective:** This study reports the use of vitamins and minerals across various sociodemographic factors by children in the United States along with related specific health conditions. **Methods:** Data from National Health Interview Survey 2007 Child Alternative Medicine file were analyzed using SAS 9.2. Weighted frequencies were generated and odds ratios (OR) and 95% confidence intervals (CI) were computed through binary logistic regression to assess vitamin and mineral use as a function of various sociodemographic variables. **Results:** Over 43.3% of the respondents reported using vitamins and minerals within the past 12 months. These included multivitamin and mineral combination (94.7%), vitamin C (6.7%), and calcium (3.0%). Only 3.6% stated use for specific health problems or conditions, mostly anemia (26.4%) and head or chest cold (25.6%).Children aged <10 years reported more usage than those >10 (OR = 1.3; 95% CI, 1.2–1.5). High school children reported less usage than 1st through 8th graders (OR = 0.73; 95% CI, 0.63–0.86). Hispanics and blacks also reported less usage compared to whites. Other predictors of usage were child's level of education and parents' presence in the household and level of education. **Conclusion:** Many adolescents in the United States report using a wide variety of vitamins and minerals for health reasons, especially anemia and head or chest cold. Usage could be predicted by adolescent's age, race or ethnicity, level of education, and parents' presence in household and education level. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Demographic Factors and Neck Pain Among the Indigenous African Population in the Greater Durban Area

**Prisca Zandile Ndlova**, **Charmaine Maria Korporaal**, and **Reed B. Phillips**, Durban University of Technology

**Background:** Risk factors associated with neck pain have been documented primarily on white populations in industrialized nations. A paucity of information exists regarding risk factors associated with neck pain in the African (black) population. **Objectives:** Investigate the demographic factors associated with neck pain in the indigenous African population. **Methods:** This was a case-control study. **Results:** Symptomatic participants were less well educated and more self-employed or had lower income, difficulty with work (51%), difficulties with daily activities, or self-rated disability of "none" (48%). They suffered from headaches (78%) with pain classified as mild with 1-month duration and with a frequency of constant (36.5%). **Conclusion:** Self-employment was a good predictor of neck pain. Neck pain was associated with headaches, classified as mild in nature with 1-month duration, and caused difficulty with daily activities. Most patients reported no disability as a result of neck pain. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Physician and Physician Assistant Attitudes and Referral Habits Concerning Chiropractic Care

**Shawn Neff**, Martinsburg Veterans Affairs Medical Center

**Introduction:** What factors most correlate with a positive attitude about chiropractors? This study pilots a new questionnaire and protocol to answer that question. It examines not only factors such as age, gender, and years in practice, but also exposure to chiropractors. **Methods:** Subjects were members of the medical staff of the Martinsburg Veterans Affairs Medical Center. Data were collected using a tool developed for this study. Statistical analysis using SPSS 13.0 consisted of bivariate correlation and factorial analysis of variance. **Results:** Twenty-six providers completed the informed consent and the questionnaire. This represents 22.4% of the provider population. Of the respondents, 42% referred to chiropractors. Over half of the respondents (57.7%) had practiced for 10 or fewer years. The mean knowledge of chiropractic and opinion of chiropractic was 4.8/10, ranging from 1 to 9. The average satisfaction with the treatment was 8 (0–10 scale). The presence of a chiropractor on staff had a positive effect on both opinion and referral habits. **Conclusion:** The tool effectively gathers the data sought. Having a chiropractor on staff positively affects the medical provider's opinions, as well as referral habits to chiropractors. More knowledge about chiropractic correlates with higher opinions. Overall satisfaction with chiropractic referral is 8/10. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Head Trauma in Returning Military Troops: A Review of the Literature

**Shawn Neff**, Martinsburg Veterans Affairs Medical Center

**Introduction:** Traumatic brain injury has become a major cause of morbidity and mortality as a result of the increase in the use of improvised explosive devices (IED) in the Operations Iraqi and Enduring Freedom. This paper is a review of the current available literature concerning traumatic brain injury in troops returning from combat situations and areas. **Methods:** The MD Consult database was searched for articles and abstracts utilizing the key words *military*, *traumatic brain injury*, *head trauma*, *concussion*, and *postconcussion syndrome* separately and in multiple combinations. Similar searches were completed using DC consult and Google. **Discussion:** Mild traumatic brain injury (TBI) was the most commonly seen and was most commonly caused by explosive blast injuries. Mild TBI is an isolated head injury producing a Glasgow Coma Scale (GCS) score of 14–15. The American Congress of Rehabilitation Medicine delineated inclusion criteria for a diagnosis of mild TBI. TBI, especially mild and moderate cases, are often overlooked or misdiagnosed; such injuries can significantly impair memory and other activities of daily living. **Conclusions:** Traumatic brain injury is gaining momentum as a research topic, but more research is needed in the areas of prevention, early screening, diagnostic criteria, treatment, and rehabilitation. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Qualitative Analysis of Comments Made by Chiropractors in Alberta, Canada, About Office-Based Health Product Sales

**Stacey Page**, University of Calgary, **Jaroslaw Grod**, Institute of Evidence-Based Chiropractic, and **D. Gordon McMorland**, National Spine Care

**Introduction:** The sale of nonprescription health products is ubiquitous. The views of health professionals, such as chiropractors, regarding the sale of health products are not well known. Professional opinion is important to inform professional practice. **Methods:** A survey was mailed to chiropractors. Subjects could provide comments about health product sales. These were analyzed using qualitative description. Ethics approval was received from the CHREB at the University of Calgary. **Results:** There were 265 respondents (response rate of 51%) and 107 provided comments. Approximately 30 pages of double-spaced, typed text were gathered. The range of opinions is noteworthy. Respondents did not consistently condone nor condemn health product sales. Practitioners engaged in the practice to greater and lesser extents. While some were opposed to it, some accepted the practice with a degree of ambivalence and others clearly embraced it. Some respondents acknowledged a conflict of interest and described strategies used to mitigate it. Others provided a range of justifications for the practice. Personal integrity and professional standards were referenced. **Discussion and Conclusion:** A wide range of opinions and practices were described leading to much variation in practice. Standards that facilitate consistency in practice may assist professionals and the public alike. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Is There a Chilly Climate? A Mixed Method Study of the Educational Environment

**Per J. Palmgren**, Scandinavian College of Chiropractic, **Madawa Chandratilake**, University of Dundee, and **Klara Bolander-Laksov**, Karolinska Institutet

**Introduction:** The educational environment has a profound impact on students' behavior, sense of well-being, and academic advancement. The objectives of this study were to investigate the existence and degree of a chilly climate among undergraduate chiropractic students with an emphasis on specific demographic groups such as gender, minority belonging, and ethnicity. **Methods:** The perceived educational environment was surveyed using the Perceived Chilly Climate Scale (PCCS) and focus group interviews. **Results:** The survey had a high response rate (83%). The PCCS score was high, 105.0 (range of scores 28–196 and a midpoint of 112). The PCCS score was significantly higher ($p < .05$) among females than males, immigrants than nonimmigrants, and ethnic minority than ethnic majority. Despite high quantitative findings, the focus groups indicated a good sense of equality, oppression-free environment, and no signs of discrimination. **Conclusions:** The institutional educational environment did not demonstrate alarming issues related to gender and ethnic equality. However, subtle but important gender-, ethnic-, and minority-related issues should immediately be addressed to provide an enhanced educational environment to learners. The chilly climate could be fought and the educational climate could be enhanced through feedback and incorporation of more versatile pedagogies. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Mechanism of the Jendrassik Maneuver: Attention or Action?

**Steven Passmore**, New York Chiropractic College and University of Manitoba, and **Paul Bruno**, University of Regina

**Introduction:** The Jendrassik maneuver (JM) is a facilitation contraction shown to affect amplitude and temporal components of a reflex. While neurological models exist, there is debate whether the mechanism is strictly neurological, or whether there are also attentional factors that reinforce the paradigm. The purpose of the present study was to test whether a difference exists between the effects of a facilitation contraction (JM) and a mental distraction (Stroop task) on patellar tendon reflex parameters. **Methods:** In a within-participants design, 18 healthy individuals had their patellar tendon reflex repeatedly elicited under three different conditions (rest, JM, Stroop). The University Research Ethics Board approved the study. **Results:** The traditional Stroop finding of increased reaction time during incongruent trials was replicated. Only the JM significantly decreased total reflex time [$F(2,30) = 14.356$; $p < .001$] and increased reflex amplitude [$F(2,30) = 20.369$; $p < .001$]. **Discussion:** The findings of this study successfully replicated the traditional neurological paradigm for Jendrassik reinforcement. However, the attentional condition had no impact on reflex parameters. **Conclusion:** If an initial faint or absent patellar reflex is elicited clinically, a JM, rather than a shift in cognitive attention, should be used as a reinforcement technique. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Teaching an Interprofessional Approach to the Management of Musculoskeletal Conditions in Primary Care: A Pilot Study. Part 2: Educators

**Judith Peranson**, St. Michael's Hospital, **Deborah Kopansky-Giles**, Canadian Memorial Chiropractic College, and **Scott Reeves**, St. Michael's Hospital

This exploratory case study utilized a qualitative approach to evaluate faculty perceptions about and satisfaction with the development and delivery of the interprofessional education 4-day program and its impact on the acquisition of learner and faculty competencies in interprofessional collaboration and musculoskeletal care. A secondary evaluation outcome of this project was the identification of facilitation strategies used by module educators, and description of their effects, from faculty perspectives. This study showed that a 4-day modular program can enhance the collaborative abilities of teachers and that role modeling, discussion, and interactive activities appear to be important key teaching strategies of such educational programs. The outcome of this project has been the creation of a sustainable and transferable educational program that provides health students and faculty with a forum to come together to learn about and discuss collaborative approaches to musculoskeletal care. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Comparison of Activator Methods Chiropractic Technique Versus Diversified Manipulation in Patients With Acute Low Back Pain

**Mark Pfefer**, **Stephan Cooper**, and **Angela Boyazis**, Cleveland Chiropractic College

**Purpose:** To compare outcomes in terms of pain and function of acute or subacute low back pain patients treated with either manual chiropractic spinal manipulation (Diversified Technique, DT) or instrument-assisted manipulation (Activator Methods Chiropractic Technique, AMCT). **Methods:** A randomized, controlled trial was conducted at a chiropractic college outpatient health center. This project was approved by an Institutional Review Board. The inclusion criteria were 18 years or older, current acute or subacute low back pain, and visual analog scale (VAS) score of 30 mm or more. Patients were randomly assigned to AMCT or DT. Outcome measures included Modified Oswestry Pain and Disability Index (OS) and VAS. Assessments were obtained at the end of weeks 1, 2, 3, and 6. Change in OS and VAS at 3 weeks was the primary outcome. **Results:** Thirty-eight patients provided complete data. No adverse events were reported in either group. Both AMCT and DT demonstrated statistically and clinically significant improvements in the OS and VAS from 2 weeks onward. **Conclusion:** Both AMCT and DT interventions demonstrated clinically significant improvements in the OS and VAS in patients with acute low back pain. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Chiropractic Management of Postconcussive Headache and Neck Pain in a Young Athlete and Implications for Return to Play

**Mark Pfefer** and **Stephan Cooper**, Cleveland Chiropractic College

**Objective:** The purpose of this study is to discuss the management and outcome of a postconcussive headache and neck pain in a young athlete and implications for return to play. **Introduction:** Each year there are an estimated 1.6 to 3.8 million sports-related brain injuries, 136,000 of which occur in young athletes in the course of high school sports. A clinically useful definition of concussion is "a trauma-induced alteration in mental status." Return to play should follow a stepwise progression. **Clinical Features:** A 16-year-old male athlete presented to a chiropractic clinic complaining of neck pain and daily headaches from a concussion while playing football 5 weeks previously. **Intervention and Outcome:** A short course of diversified-type cervical and thoracic manipulation was applied with significant relief after the second treatment and resolution of symptoms after five visits performed over 2 weeks. The athlete was able to participate in a graduated return to play. Three months after the sports-related concussion the athlete was able to return to full game play symptom free. **Conclusion:** Chiropractors who see athletes in their practices should be aware of sports-related concussion and return-to-play guidelines. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Knowledge and Attitudes in Assessment and Management of Chest Pain by Chiropractic Interns: A Pilot Survey

**Mark Pfefer**, **Stephan Cooper**, and **Edward Smith**, Cleveland Chiropractic College

**Introduction:** Chest pain is a common presentation in emergency rooms in the United States. Chiropractors should understand the various causes of chest pain and be able to consider a robust differential diagnosis list, which includes cardiac and noncardiac etiologies. **Methods:** A survey was developed to explore chiropractic interns' knowledge of chest pain assessment. **Results:** Eighteen interns completed and returned the survey. A majority of respondents were able to identify red flag symptoms of cardiac chest pain, symptoms associated with noncardiac chest pain, and important historical factors related to acute coronary syndrome. **Conclusions:** This small convenience sample of chiropractic interns indicated a good knowledge of cardiac risk factors and the ability to differentiate potential cardiac and noncardiac causes of chest pain. Interestingly the vast majority of this group of chiropractic interns would not administer oral aspirin to a patient suspected of having acute coronary syndrome, in spite of knowledge by many about the benefits of this intervention. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Kinematic and Kinetic Response to Galvanic Vestibular Stimulation in Adolescent Idiopathic Scoliosis: Preliminary Results

**Jean-Philippe Pialasse**, **Martin Simoneau**, Université Laval, and **Martin Descarreaux**, Université du Québec à Trois-Rivières

**Introduction:** Adolescent idiopathic scoliosis (AIS) might be caused by various factors and among these an important role has been attributed to vestibular system. The objective of this study is to determine if AIS patients suffer from imbalance problems linked to the vestibular inputs and if this is linked with the severity of the scoliosis. **Methods:** Thirty-two participants were distributed into four groups. They underwent 2-second binaural bipolar galvanic vestibular stimulation while standing with the eyes closed on two force platforms. Kinematics was also collected with an electromagnetic motion tracking system. **Results:** The control group was steadier than the three other groups. After 1 second, control group participants reached a maximum inclination, whereas the AIS patient groups reached their maximum only after the end of the stimulation. Controls had no problem regaining their balance at the end of the stimulation, unlike the AIS patients. **Discussion:** AIS groups and the history group showed a different movement pattern. They were more destabilized than the control group during stimulation and also 4 seconds after the stimulation. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Pediatric Mentored Case Reports

**Katherine A. Pohlman**, Palmer College of Chiropractic, **Sharon A. Vallone**, KIDSPACE Adaptive Play, and **Lia M. Nightingale**, Palmer College of Chiropractic

**Introduction:** A chiropractic pediatric specialist often encounters novel clinical findings not currently in the literature. This project matched experienced, pediatric board-certified chiropractors (DICCPs), with a mentor experienced in scientific writing to coauthor a case report. **Methods:** DICCP and mentors were teamed up and two surveys were conducted. The first was a presurvey to the clinicians. The second survey was conducted upon project completion by both clinicians and mentors. **Results:** Ten reports were submitted. Time spent on this project was an average of 58 hours by clinicians and 36 hours by the mentors. Mentors aided by adding content material, editing manuscript, and educating. Improvements for this project included clearer guidelines and not using the wiki as a communication venue. **Discussion:** There are clear benefits of a mentor. This project was innovative and the first within the chiropractic profession designed to establish a mentor–clinician relationship to write a case report. The overall experience was "good," but with many opportunities for improvement. **Conclusion:** This project ultimately fulfilled the goal of producing case reports using a mentorship model to facilitate scientific writing education and ease the anxiety of assuming such a daunting task as authoring a first publication. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## A Novel Technique for Measuring Changes in Vertebral Artery Blood Flow

**Jairus Quesnele**, **Judith Wells**, Canadian Memorial Chiropractic College, **Greg Wells**, University of Toronto, **John Triano**, Canadian Memorial Chiropractic College, **Michael Noseworthy**, McMaster University, and **Tammy Rayner**, Sick Kids Hospital Toronto

**Introduction:** Spontaneous vertebral artery dissection (sVAD) is a serious cause of stroke and a leading cause of nonatherosclerotic stroke in young adults. The exact pathogenesis of sVAD is unclear; however, several studies suggest certain head movements can alter blood flow through the vertebral arteries (VA), which may lead to sVAD or sVAD symptomatology. Thus, the aim of this study was to measure VA blood flow during several head positions. **Methods:** Measurements were obtained using phase contrast magnetic resonance imaging (MRI) in three different head positions. Data were collected 92 seconds in each head position and were averaged to provide a blood flow profile for one complete cardiac cycle. **Results:** Average velocity (cm/s) during contralateral rotation at 0° was 23.93 and decreased to 22.36 and 19.99 at 34° and 64°, respectively. Average flow (mL/s) at 0° was 1.28, at 34° was 2.00, and at 64° was 1.92 in contralateral head rotation. **Conclusions:** Measurement of VA blood flow and velocity is feasible using phase contrast MRI. In this healthy nonsymptomatic subject, VA velocity appears to decrease and average blood flow increase with contralateral head rotation. However, future investigation is warranted to confirm and expand on these findings. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Consideration of Chronic Pain in Trials to Promote Physical Activity for Diabetes: A Systematic Review of Randomized Controlled Trials

**John J. Riva**, **Jason W. Busse**, McMaster University, **Jessica J. Wong**, Canadian Memorial Chiropractic College, **David J. Brunarski**, Ontario Chiropractic Association, **Alice H.Y. Chan**, **Rebecca A. Lobo**, **Marina Aptekman**, McMaster University, and **Anita Gupta**, Hamilton Health Sciences

**Introduction:** Chronic pain has been estimated to affect 60% of patients with diabetes and is a strong independent predictor of reduced activity tolerance. All randomized controlled trials (RCTs) that explored interventions to improve physical activity among patients with diabetes were systematically reviewed. **Methods:** Electronic literature searches were performed for RCTs that enrolled patients with diabetes and randomly assigned them to an intervention designed to promote physical activity. Trials that used supervised physical activity as part of the intervention were excluded. Each eligible trial was assessed to establish whether comorbid chronic pain was captured at baseline, explored as an effect modifier, and included a component designed to target chronic pain. **Results:** Only one of 80 RCTs captured chronic pain at baseline. No trial included specific interventions to address chronic pain as a competing demand. **Conclusions:** When exploring interventions to promote physical activity among patients with diabetes, trialists should capture baseline chronic pain, explore its impact as an effect modifier, and consider incorporating strategies to address it. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Introduction of a Class on Evidence-Based Clinical Practice in the First Trimester of a Chiropractic Curriculum: Lessons Learned From Student Evaluations

**Robert M. Rowell** and **Lia M. Nightingale**, Palmer College of Chiropractic

**Introduction:** Our institution has an initiative to enhance the use and teaching of evidence-based clinical practive (EBCP) in the curriculum. A new course, Foundations of EBCP, was added in the first trimester. Also, concepts of EBCP were incorporated into several courses including Biochemistry I, which is also in the first trimester. **Methods:** Student evaluation forms were collected at the end of the trimester and student comments were evaluated. **Results:** The majority of comments were positive (19); however, a significant minority of students (15) felt that they had already learned EBCP in the biochemistry class, making the Foundations of EBCP class unnecessary. **Discussion:** To change student perceptions, we added a lecture to the EBCP class describing the minimum skill set that clinicians should possess. We also included a comparison of the skills taught in biochemistry versus the skills taught in EBCP. By making a concerted effort to address students' concerns at the beginning of class, we feel that students will have greater satisfaction with the class. **Conclusion:** Student feedback can range from absurd and insulting to constructive and helpful. A significant minority of our students expressed dissatisfaction with the EBCP course. We have addressed students' concerns about the EBCP class. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Student Rating of the Importance of Advanced Pediatric Education in Chiropractic Institutions

**Drew Rubin** and **Lisa Rubin**, Life University

**Background:** Pediatrics is one of several popular specializations in chiropractic postgraduate education available. The idea of creating a pediatric specialization for a chiropractic student while he or she is still in school was proposed. Chiropractic students were polled to determine if pediatric enthusiasm was as high as predicted. **Methods:** Four classes were polled. A 4-point Likert-type scale from strongly agree to strongly disagree was utilized with 12 questions. **Results:** The survey data strongly support the proposal for the creation of a pediatric tract at the university. According to this questionnaire, 71.54% of students were interested in taking more advanced pediatric classes, and 71.96% had a desire to graduate with a specialization in pediatrics. **Conclusion:** Providing highly motivated students a specialized course of study, one in which they can pursue their passion for pediatrics, can be beneficial for both the student and the university. Creating these specialized tracts may be one answer not only for attracting more students to the university but also for ensuring a higher graduation rate. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Collaborative Learning in a Chiropractic Classroom Setting

**Lisa Rubin**, Life University

**Introduction:** The traditional lecture-based structure of teaching is being challenged in the education system today as possibly outdated and static. More interactive approaches to education may be needed to engage our current adult learners in the chiropractic setting to improve educational outcomes. **Methods:** This study surveyed three quarters of the same course during a 1-year period to assess the helpfulness of collaborative tools integrated into the classroom setting. The survey asked students to rate questions based on a 10-point Likert-type scale (10 being the most helpful and 1 being the least) or a yes/no forced choice option. **Results:** Three quarters of surveys of chiropractic students in a required psychology class display that interactive collaborative learning in this class may have been a useful tool for learning for most students. **Discussion:** Academia, and specifically chiropractic, may benefit from this research by increasing the awareness of collaborative tools utilized in chiropractic education. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Variability of Vertical Ground Reaction Forces in Adults With Chronic Low Back Pain, Before and After Chiropractic Care

**Brent Russell**, Life University, **Mark Geil**, **Jianhua Wu**, Georgia State University, and **Kathryn Hoiriis**, Life University

**Introduction:** There is little evidence that chiropractic "adjustment," or spinal manipulation (SM), has a beneficial effect on gait. This pilot study evaluated the effects of SM on variability of vertical forces of foot contact while walking. **Methods:** Participants [six controls and nine with chronic low back pain (CLBP)] walked on an instrumented treadmill at their preferred walking speed; variability of forces during stance phase was measured using mean standard deviation (MSD) and mean coefficient of variation (MCV). CLBP participants were evaluated before and after a session of SM. Study procedures received Institutional Review Board approval. **Results:** Baseline MSD and MCV were nonsignificantly higher for the CLBP participants, who also had nonsignificant decreases in variability postcare. Pre-post differences indicated a small-to-medium effect size (Cohen's d). **Discussion:** CLBP participants with higher baseline variability generally showed postcare decreases, but others had low baseline levels, with little room for improvement. More research is needed to determine the usefulness of MSD and MCV for vertical forces. **Conclusions:** Although some cases suggested an association of decreased variability with treatment improvements, group differences were not statistically significant. Better participant screening and definition of subgroups would be part of a planned future extension of the project. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)



 

## Female Chiropractors in Ontario: Current Practice Profiles and Graduate Demographics

**Shabnam Sadr**, **David Soave**, **Jean Moss**, and **Silvano Mior**, Canadian Memorial Chiropractic College

**Introduction:** The purpose of this study was to describe the practice profiles and demographics of female chiropractors in Ontario, Canada. **Methods:** In this retrospective descriptive study, practice profiles were assessed from voluntarily submitted administrative data from Ontario chiropractors for the period April 2006 to March 2008. Practice status and graduate demographics were obtained from the regulatory body and Canadian Memorial Chiropractic College (CMCC), respectively. **Results:** Data from 286 chiropractors (33% females) were included. Females were in practice approximately 12 years and worked about 29.7 hours per week. Average gross practice-related income for the year 2006–2007 for males and females was $162,830 and $126,557, respectively. Registration data from 3563 Ontario chiropractors (41% female) revealed that inactive status for females peaked at about 10 years. Female graduates from CMCC increased from 30% in 1990 to 54% in 2011. **Discussion:** There was a significant difference in gross annual income between female and male chiropractors. This appeared related to years in and location of practice. The increasing number of Ontario female graduates may explain the increased proportion of female chiropractors registered. **Conclusion:** Despite the observed increasing trend of females graduating and practicing in Ontario, gender gaps in income and practice profile continue. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Exploratory Analysis of Clinical Predictors of Outcomes of Nonsurgical Treatment in Patients With Lumbar Spinal Stenosis

**Michael Schneider**, University of Pittsburgh, **Jerrilyn Cambron**, National University of Health Sciences, **Lauren Terhorst**, **Rachel Phillips**, University of Pittsburgh, and **Donald Murphy**, Rhode Island Spine Center

**Introduction:** There is little information regarding predictors of clinical outcomes using nonsurgical treatment methods in patients with lumbar spinal stenosis. We performed a secondary analysis of data obtained from a previously conducted randomized trial that compared distraction-manipulation treatment with placebo. This study was approved by the University of Pittsburgh Institutional Review Board. **Methods:** The data set contained a number of baseline variables, including demographics, history, and physical examination findings from a total of 59 subjects with lumbar spinal stenosis. Primary hypothesis was that certain baseline characteristics derived from the physical examination and patient self-reported symptoms might be predictors of clinical outcomes. Thirteen baseline variables were chosen to analyze as potential predictors (independent variables) using linear regression models. Primary outcome measures (dependent variables) were Swiss spinal stenosis (SSS) questionnaire score and visual analogue scale (VAS) at completion of care. **Results:** Five of the baseline variables were found to be significant predictors of outcome: baseline SSS score, baseline VAS score, qualitative description of leg pain, body mass index, and age. **Conclusion:** This preliminary analysis will help to inform the design of larger randomized controlled trials in which these and other baseline predictors of clinical outcomes can be more thoroughly explored. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Learning and Study Strategies Inventory Subtests and Factors as Predictors of National Board of Chiropractic Examiners Part I Exam Performance

**Christine Schutz**, **Leanne Dalton**, and **Rodger Tepe**, Logan College of Chiropractic

**Introduction:** This study was designed to extend research on the relationship between chiropractic students' learning and study strategies and national board exam performance. **Methods:** Sixty-nine first-trimester chiropractic students self-administered the Learning and Study Strategies Inventory (LASSI). Trend tests were utilized to determine if the 10 LASSI subtests and three factors predicted low, medium, and high levels of National Board of Chiropractic Examiners (NBCE) Part I scores. A multiple regression was performed to predict the overall mean NBCE exam scores using the three LASSI factors. **Results:** Four LASSI subtests (Anxiety, Concentration, Selecting Main Ideas, Test Strategies) and one factor (Goal Orientation) were significantly associated with NBCE exam levels. One factor (Goal Orientation) was a significant predictor of overall mean NBCE exam performance. **Discussion:** Learning and study strategies are predictive of NBCE Part I test performance in chiropractic students. Based on current research, Anxiety, Concentration, Selecting Main Ideas, and Test Strategies subtests and the Goal

Orientation factor are the best predictors of NBCE scores. **Conclusions:** It may be useful to include aspects of the LASSI subtests and factors in assisting chiropractic students with NBCE Part I exam preparation as well as in performance-enhancing interventions. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Effects of Curriculum Change and Extracurricular Activities on Students' Choice of Chiropractic Technique

**David Sikorski**, **Anupama Kizhakke Veettil**, and **Gene Tobias**, Southern California University of Health Sciences

**Introduction:** A chiropractic technique survey course at our institution provides an introduction to numerous practice techniques. Curriculum modification moved the course earlier with the expectation that students would make more informed choices regarding chiropractic technique. **Methods:** We conducted an anonymous student opinion survey. **Results:** Students' participation in chiropractic technique clubs increased in each succeeding year. Activator and Diversified were preferred future practice technique choices. Students who took the chiropractic technique survey course earlier were more likely to change their future practice technique preference and technique club participation than students who had taken the survey course later. **Discussion:** The technique survey course changes students' choices of technique club participation and their future practice preferences; significantly more of the students who took the course in 2nd year undertook these changes. These outcomes support our hypothesis that moving the course earlier in the curriculum would enhance the effect of the course on our students' technique choices. **Conclusion:** Teaching a chiropractic technique survey course earlier in the doctor of chiropractic curriculum had a significant effect on students' choices of chiropractic technique club participation and future practice chiropractic technique preference. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Basic Science Physiology Laboratory Research Projects: A Curriculum Designed to Encourage an Active Interest in Research Among Chiropractic Students

**Edward Smith** and **Mark Pfefer**, Cleveland College of Chiropractic Kansas City

**Purpose:** To expose students to an active research experience early in their chiropractic education. **Methods:** Prelaboratory discussions were carried out with an emphasis on experimental design. Students were required to develop and design experimental protocols involving review, critique, and revision. The curriculum involved a student-generated research proposal, experimental design and execution with data analysis, literature review, and presentation in both written and poster format, followed by publication in an in-house periodical. **Rationale:** An essential element of chiropractic education is the identification, development, and practice of critical thinking skills, all elements involved in research. The Association of Chiropractic Colleges member institutions are charged with developing research and educating and developing researchers. In this class, students are required to develop a research question and devise an experimental protocol to investigate that question. Protocols are reviewed, critiqued, and revised. Students collect and analyze data including a review of pertinent literature. The culminating event of the class is the production and presentation of a research article and scientific poster. **Goal:** Through performing research from initiation to publication and presentation, students are exposed to the process of research and hopefully inculcated with an interest in research and incorporating research into their chiropractic practice. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Analysis of Reported Patient Visit Frequencies and Costs From the Patient Management Program Database in Ontario, Canada

**David Soave** and **Silvano Mior**, Canadian Memorial Chiropractic College

**Introduction:** The purpose of the paper is to analyze the recent practice behaviors of Ontario chiropractors in terms of patient visit frequencies and costs and then contrast the findings with historical comparisons. **Methods:** This report summarizes the Patient Management Program (PMP) data file voluntarily submitted by Ontario chiropractors and received by the Ontario Chiropractic Association over a 2-year period beginning in 2006. Differences between the 2 years of data received were compared along with a historical comparison with PMP

data dating back to 1999. **Results:** There was relatively little difference in the patient service-related variables for the chiropractors in the sample between the 2 reporting years. A historical comparison (1999 to 2008) shows the number of patients seen per year on a downward trend, while the average number of services (visits) per patient has remained stable and the average cost per visit has progressively increased. **Discussion and Conclusion:** Chiropractors are managing their annual incomes not by increasing the relative frequency of visits per patient but rather by increasing their per-visit costs. In consideration of the large percentage of patients receiving few visits, price sensitivities and other issues must be explored. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Development of a Student-Mentored Research Program Between a Complementary and Alternative Medicine University and a Traditional, Research-Intensive University

**Barbara M. Sullivan**, National University of Health Sciences, **Sylvia E. Furner**, University of Illinois Chicago School of Public Health, and **Gregory Cramer**, National University of Health Sciences

**Introduction:** The development and outcomes of a mentored research program (MRP) between a complementary and alternative medicine (CAM) and a traditional, research-intensive (TRI) institution, the establishment of mentor and mentee expectations, and the development of clinician-researchers and evidence-based CAM practitioners are reported. **Methods:** CAM students engaged in a full-immersion semester at the TRI, including didactic courses and research with a TRI mentor. Academic strength, student research interests, and career goals were considered with TRI faculty time and research activity. **Results:** Six DC student participants completed graduate courses, did research, and developed and submitted scholarly works for conferences and presentations. Two-thirds were accepted to MPH and PhD programs. All planned to practice chiropractic, maintaining a research component. **Discussion:** Establishing rigorous criteria for mentors and mentees, communicating expectations, and providing support from CAM and TRI coinvestigators were key to the MRP success, benefiting both mentor and mentee. To sustain research opportunities, the institutions developed coordinated DC/MPH and DC/MS degrees. **Conclusion:** A productive, collaborative relationship established between a CAM and TRI institution resulted in mentored research opportunities, provided intensive research experiences for CAM students, and led to the development of coordinated degree programs. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Outcomes From a Faculty Development Program to Enhance Evidence-Based Practice, Research Utilization, and Knowledge Translation

**Barbara M. Sullivan**, **Judith D. Pocius**, **Jerrilyn Cambron**, **Christopher Wolcott**, **Thomas Grieve**, and **Gregory Cramer**, National University of Health Sciences

**Introduction:** Planning and successful implementation of a faculty development program (FDP), leading to a sustainable program with academic and practice outcomes supporting advanced scholarship, the enhancement of research utilization (RU), knowledge translation (KT), and evidence-based practice (EBP) in CAM education and clinical practice are reported. **Methods:** An FDP progressed from a series of outside-speaker-delivered seminars raising the awareness of EBP to a multimodal program featuring 1-day workshops and 1-hour webinars, lectures, and discussion sessions led by university faculty. **Results:** Nearly 100 program hours were developed and delivered to over 68% of the full-time faculty. Various aspects of EBP, RU, and KT were used by faculty in various classroom and clinic environments. Faculty reported using skills and content in courses (83%), in clinic (100%), and in professional activities (33%). **Conclusion:** The FDP initiated to enhance faculty EBP skills, provide exposure to research and opportunities for scholarly activity, and support and sustain an integrated EBP student curriculum through events and content representing a mix of EBP skill- and knowledge-building events, EBP "using" and "doing" experiences, and educator training and enrichment successfully supported the integration of EBP in the curriculum and clinical practice. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Testing Presumptions: A Pilot Study Assessing Palpatory Efficiency Across Levels of Experience

**Stephanie Sullivan**, **Anquonette Stiles**, and **Jessica Quintero-Villa**, Life University

**Introduction:** Palpation is utilized in practice and taught within chiropractic educational curriculums. It is assumed that palpation skills improve with increased experience. This pilot study tested the presence or absence of palpation sensitivity and the methodology for future large-scale randomized controlled trials. **Methods:** The university's Institutional Review Board approved this study. Individuals were recruited from five different groups: 1st-, 2nd-, and 4th-year chiropractic students, nonchiropractors, and chiropractors practicing more than 10 years. After signing an informed consent, participants were asked to palpate and determine the number of hairs detected under varying thicknesses of newspaper. They were allowed 10 seconds in each of 10 stations to relate an answer to the blinded investigators. **Results:** In general, accuracy was greater for practicing chiropractors and higher-level students, although in a few of the stations non-DC or lower-level chiropractic students were represented with greater accuracy. **Conclusion:** As the profession advances its knowledge base, presence in the health care community, and education of new practitioners, review of the benefits of long-standing practices needs to be conducted and, if necessary, improved upon. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## A Single Blind Randomized Controlled Trial of the Effects of Spinal Manipulative Therapy on Fitts' Law Performance in Participants With and Without Neck Pain

**Rodger Tepe**, **Jonathan Emlet**, **Kevin Ward**, and **John Ellis**, Logan College of Chiropractic

**Objective:** The objective of this study was to investigate the effects of spinal manipulative therapy (SMT) on cervical fine motor movement time (MT) while using a head mouse to perform a computerized Fitts' Law task in participants with and without neck pain. **Methods:** This study received Institutional Review Board approval. Twenty consenting adult participants with and without neck pain were randomly assigned to treatment and control groups. All groups completed three Fitts' Law trials before and one Fitts' Law trial after either SMT or a seated rest control condition. **Results:** A hierarchical repeated measures model showed significant reductions ($p < .0001$) in MT in both the neck pain and the no neck pain SMT groups; a significant increase ($p < .0001$) in MT in the neck pain, no SMT group; and no change in MT in the no neck pain, no SMT group. **Conclusion:** In the current study SMT resulted in significant reductions in MT in neck pain and no neck pain participants. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Are Expectations Related to Lumbar Pain Altering Neuromuscular Trunk Responses Associated With Experimental Pain?

**Charles Tétreau**, **Jean-Daniel Dubois**, **Mathieu Piché**, and **Martin Descarreaux**, Université du Québec à Trois-Rivières

**Introduction:** Psychosocial factors play an important role in the chronicity of low back pain but underlying mechanisms remain unknown. This study investigated the role of expectations in the alteration of neuromuscular trunk responses evoked by pain. **Methods:** Twenty-three healthy participants performed flexion–extensions under three conditions: control and moderate lumbar pain combined with expectations of high or low pain. Lumbar pain was evoked by a contact-heat thermode applied over L5. Research received approval from the local ethics committee. **Results:** Pain triggered significant modifications in lumbar muscle activity and lumbopelvic kinematics. Pain expectations, however, did not have a significant effect on these adaptations. **Discussion:** These findings indicate that pain expectations related to painful stimulations do not trigger the use of a voluntary protective strategy at the contact level but could modify neuromuscular strategy at other spinal segments (currently being tested). It is proposed that, since adaptation to experimental pain was already important, it could not be amplified by pain expectation modulations. **Conclusion:** Although the influence of expectations did not modulate neuromuscular adaptations to experimental pain in healthy subjects, pain expectations may result in an altered behavioral response in chronic pain patients for whom fear avoidance is usually typical. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Chiropractic Care by Interns for Athletes at a Colombian Biomedical Center: A Prospective Pilot Study

**Keneth Thomas**, **Harrison Ndetan**, **Ronald Rupert**, **Aleisha Esther Serrano-Alvira**, **Patricia Brandon**, and **Roland Njumentoko**, Parker University

**Objective:** The aim of this study was to describe the demographics, complaints and diagnosis, and course and outcome of chiropractic care for athletes of a Colombia Olympic group provided by interns at a biomedical center. **Methods:** Data were collected by six interns participating in a chiropractic school's clinic abroad program (May 17–August 20, 2011). This involved sex, age, sport played, injury type and mechanism, visual analog scale (VAS) pain score, and duration of complaint during each visit. The main outcome variables were the VAS scores at initial and last visits and were compared using a paired *t* test. **Results:** The sample comprised 86 patients [48 (55.8%) males] involved mostly in swimming and cycling. The mean age was 21.3 years. The chief complaints were muscles and joint pains, affecting mostly the lumbar region and pelvis. Athletes received an average of 2.4 treatments over 10.7 days, mostly manual spinal manipulation (96.5%) and electrotherapies (60.5%). There was a significant difference in the VAS score from onset to last visit ($p < .001$). **Conclusion:** Athletic injuries from this Colombia Olympic group were primarily musculoskeletal. The data demonstrated a statistically significant reduction in reported VAS pain levels. Despite limitations, this study demonstrated the feasibility of future research and the potential for collaboration with Olympic organizations. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Does Neuroanatomy Software Enhance Learning of Spinal Cord Tracts in a Laboratory Setting?

**Steven Torgerud** and **Stephen Duray**, Palmer College of Chiropractic

**Introduction:** Spinal cord tracts are difficult for many students to learn. The effectiveness of using interactive neuroanatomy software in a laboratory setting to help students comprehend spinal cord tract pathways was tested. **Methods:** Following Institutional Review Board exemption of the project, the Axiom Neuro software package was provided to three of five Neuroanatomy I laboratory sections ($N = 49$) during a 50-minute period. This interactive software demonstrated cord pathways. Data on student perceptions were obtained from two Likert scale surveys administered to the experimental group: one immediately after using the software, and the other after taking the exam which covered spinal cord tracts. Exam scores were analyzed for control and experimental groups using the *t* test. **Results:** Survey data revealed that students agreed (95.9%) that the software helped increase comprehension of spinal cord tracts, but were less certain it helped to improve exam scores (57.4%). Students using the software (mean = 69.7%) did not score significantly better on the spinal cord tract portion of the exam than students that did not use the software (mean = 65.4%). **Conclusion:** Students perceive the software as an effective tool to comprehend cord tract pathways. However, exam scores did not improve following a single 50-minute session. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Developing an Introductory Workshop in Evidence-Based Clinical Practice for Chiropractic Field Practitioners

**Michael Tunning**, **Robert Rowell**, **John Stites**, **Barbara Mansholt**, **Ron Boesch**, **Ian McLean**, and **Michelle Barber**, Palmer College of Chiropractic

**Introduction:** Society expects clinical practice to be supported by evidence. Practicing chiropractors need to learn the skills of evidence-based clinical practice (EBCP). The development and assessment of a workshop for field practitioners on EBCP is presented. **Methods:** Seven faculty with EBCP training developed an introductory workshop for practitioners attending a chiropractic college homecoming. The workshop was presented in two 2-hour sessions. Pre and postsurveys with Institutional Review Board approval were developed for each session. **Results:** The first session addressed the interface between EBCP and chiropractic philosophy and addressed potential barriers. The program explored the nature of evidence, the EBCP cycle, and developing answerable clinical questions. The second session explored resources available to acquire evidence, the process of appraising evidence, and interpreting results. Different presenters provided plain language explanations of *p* values, relative risk, risk reduction, sensitivity, specificity, and likelihood ratios. Survey results showed a very positive response to the program. **Discussion:** Providing a program to

a wide spectrum of practitioners is challenging. Practitioners have different skills, knowledge, and clinical experience. Strategies to improve future sessions were discussed. **Conclusions:** A program on EBCP was developed for field practitioners. The program was well received by most participants. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Method for Evaluating the Precision of Patient Positioning in Pre- and Post-Nasium X-Ray Film Pairs

**David Vazquez** and **Dale Johnson**, Life Chiropractic College West

**Introduction:** The potential for distortions occurring due to variability in patient positioning substantiates challenges against radiographic evidence of vertebral realignments following chiropractic corrections. This paper describes a method to quantify patient positioning repeatability in pre- and postradiography. **Methods:** The method generates three variables of skeletal-landmark positional differences occurring between pre- and postfilms: displacement, percent of rotational deviation, and percent of tube tilt deviation. A single analyst performed two separately blinded analysis rounds on 35 pairs of nasium films. **Results:** The mean differences, 95% confidence intervals, and standard deviations calculated for each variable from the two data sets were: for displacement, 0.24 mm ± 0.82 mm (SD 2.49 mm); for percent of rotational deviation, 1.08% ± 2.23% (SD 6.73%); and for percent of tube tilt deviation, 0.49% ± 1.04% (SD 3.13%). **Discussion:** The low intrarater variability indicates that further development of the analytical method should produce a reliable, objective means to evaluate patient positioning repeatability in pre- and post-nasium X-rays. **Conclusion:** Evidence that variability in patient positioning is controlled and minimized will enable precise quantitative determinations of the magnitude of corrections received by patients of upper cervical chiropractic care. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Reviewing the Literature and Creating an Evidence-Based Exam for the Pathoanatomic Diagnosis of Low Back Pain

**Robert Vining**, **Eric Potocki**, **Michael Seidman**, and **A. Paige Morgenthal**, Palmer Center for Chiropractic Research

**Background:** The identification of homogeneous diagnostic groups of patients with low back pain (LBP) has been a long-standing goal for health care professionals in many disciplines. Several independent investigators have suggested improved clinical outcomes when nonspecific LBP populations are separated into subgroups. It is generally accepted that musculoskeletal LBP can arise from multiple tissues, yet it remains difficult to rule in or out specific pain sources. Pathoanatomically focused subgrouping tools for LBP have the potential to improve both research and clinical practice outcomes. **Methods:** With a goal of generating more reliable evidence-based pathoanatomic diagnoses, a narrative review of the literature was performed to (1) find evidence-based pathoanatomic diagnostic classification systems for LBP and (2) find the best rated physical evaluation tools, findings, and condition characteristics that support this classification system. **Results:** A pathoanatomic classification system was identified and articles providing best available evidence for in-office evaluation were reviewed for developing a comprehensive LBP examination. Key elements of the exam are discussed. **Conclusion:** There are significant challenges when assessing performance statistics and creating an efficient, reliable, in-office examination procedure. This is a first step in creating an evidence-based exam for the pathoanatomic diagnosis of LBP. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Report of Harassment of a Female Intern by a Patient Within a Chiropractic Teaching Clinic: A Case Report

**Amy Wright** and **Barry Wiese**, Texas Chiropractic College

**Objective:** The purpose of this case report is to describe and discuss the harassment of a female intern by a patient within a chiropractic college teaching clinic. **Clinical Features:** A female intern was engaged in a text communication with suggestive comments by a patient to whom she had been rendering care in an outpatient teaching clinic. The patient had been in clinic a total of five visits before the incident. Retrospectively, the intern stated there was no previous indication to suggest this behavior would take place. **Intervention and Outcome:** The female intern

reported the issue to the attending clinician. She explained how threatened she felt by the patient's actions. The matter was discussed with clinic administration. Options addressed included dismissing the patient from care or allowing him to continue with treatment and be assigned to a male intern. **Conclusion:** It is reported that behavior that some might describe as harassment was excused by others as inevitable. There has been an increased awareness of harassment as an important social problem. Chiropractic colleges may be able to address potential concerns and favorably provide effective solutions. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Use of Whole Body Vibration as an Adjunct to Treatment of Nonspecific Low Back Pain: A Systematic Review of the Literature

**Shari Wynd**, Texas Chiropractic College, **Jean-Alexandre Boucher**, and **Martin Descarreaux**, Université du Québec à Trois-Rivières

**Introduction:** Recent studies have identified positive training effects of whole body vibration (WBV) to the postural muscles of the spine. These findings are suggestive of the potential that WBV may have in the rehabilitation of a patient with nonspecific low back pain (LBP). Therefore, the purpose of this paper is to systematically collect and synthesize available evidence on the use of WBV as an adjunct to treatment of nonspecific low back pain. **Methods:** Electronic databases (MEDLINE, CINAHL, AltHealthWatch, ICL, and Mantis) were searched to identify published literature between January 2000 and July 2011 using the following key words: whole body vibration (WBV), low back pain (LBP), training, therapy, and rehabilitation. All articles were independently critically appraised (SEW and JAB) and data were extracted and collated. **Results:** A total of 13 articles were reviewed by SEW and JAB that contained one systematic review, one comprehensive review, nine randomized controlled trials, and two cohort studies. Most studies found that exercises involving the use of WBV in conjunction with other exercises showed improvement over most indices measured. **Conclusion:** This systematic review of the literature suggests that there may be some preliminary evidence that indicates WBV may be an effective adjunct to rehabilitative treatment of LBP. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)

## Effects of Test Stress on Chiropractic Student Physical Examination Laboratory Testing: A Pilot Study

**Niu Zhang**, Palmer College of Chiropractic, Florida Campus, and **Kenneth Weber**, Northwestern University

**Introduction:** This study aims to pilot and evaluate students' laboratory physical examination testing stress and possible association between stress and test performance. **Methods:** One hundred sixteen students from Palmer College of Chiropractic Florida participated in the study. Physiological signs of stress (heart rate, palm sweating, and blood pressure) were measured to assess stress level. There was also a survey, which included two parts: a questionnaire about test stress, and physical symptoms before the physical examination test. **Results:** Eighty-eight students had heart rate increase. Seventy students had either systolic or diastolic blood pressure increase. Fifty of them had both systolic and diastolic blood pressure increase. Also, 41 students had both heart rate and blood pressure increase. No significant difference of the lab testing scores were found between students with and without change of individual physiological sign ($p > .05$); however, there was a significant difference of the lab testing scores between 27 students who had an increase in both heart rate and blood pressure and at least one symptom and 89 students who did not meet that criteria ($p < .001$). **Conclusion:** Test stress exists among chiropractic students. The high stress level could affect the performance on the physical examination laboratory test. (This is an abstract from a conference presentation and does not represent a full paper that has been peer reviewed and accepted for publication.)